Biax Experiment *(rev. 1/26/02)*

Exp. Name p093S3mr025 Date 19 FEB 2002

Operator FRYE

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load ~~#1~~ ~~150~~ 92.2 at sample # ~~75~~ ~~92~~ 150

Material (Qtz, Granite, ?) Soda lime glass

Particle Size, Size Distribution 1-800 um rough

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load .006

Horizontal zero load -.002

Displacement Rates

Velocity steps 10 - 20

Sliding velocity 10 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

Normal Stress

Initial voltage

V. at load

TDXR offsets

Vibration amp

Belleville washers?

T (°C) 23° RH (%) 10%

Comments: τ on @ 0.10 mm, displace 2.52mm (2.66) unload

reload to 3.2 disp (3.3) unload

reload, unload @ 3.84 (3.94)

[offset], σ_N to 25 MPa, displace to 1.6mm, do velocity steps

10 - 20 - 10 - 20 - 10 - 20 - 10 - 20 - 10 [offset]

displace to 0.4 mm, do SHS

disp.	time
0.4	3.23 s
0.55	6.61
0.70	9.89
0.90	9.94
1.10	30.06
1.35	30.02

disp	time
1.6	1:39.90
1.9	1:39.88
2.20	5:11.00
2.55	4:59.84
3.0	16:39.97
3.45	16:39.93 — unload

Biax Experiment *(rev. 1/26/02)*

Exp. Name Bellk cal. 31.1.02_2

Date 31-1-02

Operator Marone

16:20

Gouge (or other sample) _____ Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench)_____ Under load_____ at sample #_____

Material (Qtz, Granite, ?)_____

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) _____ Block #_____

Roughness_____

Contact Dimensions_____

Displacement Rates

Velocity steps_____

_____

_____

Normal Stress _____ (MPa)

(DPM readouts) kN

Vertical zero load _____

Horizontal zero load_____

Sliding velocity_____

Data Logger Used_____

Servo Gain Adjust? _____

Vertical DCDT Gain _____

Normal Stress

Initial voltage _____

V. at load _____

TDXR offsets _____

_____

Vibration amp _____

Belleville washers? _____

T (°C)_____ RH (%)_____

Comments:

Same set-up etc. as Bellkcal 31.1.02

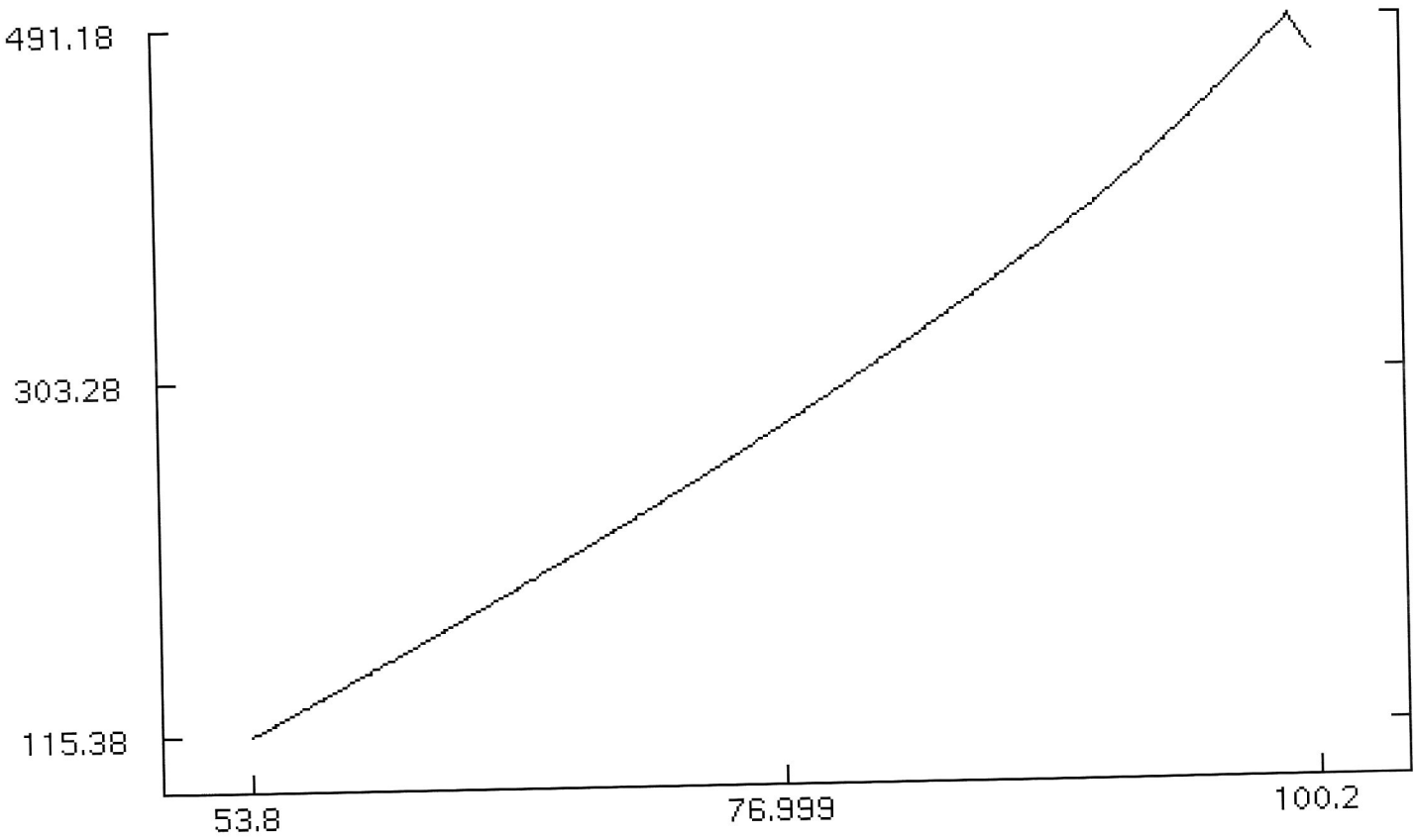
This calibration is a check — to make sure p092 did not permanently squash the washers.

Ramped locking rate.

Go to $\sigma_v \sim 450$ kN, as in p092

1. time vs vert_load

bellkcal31.1.02_2



Biax Experiment *(rev. 1/26/02)*

Exp. Name p092s3mr150 Date 1/31/02

Operator Boettcher

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 92.5mm at sample #1200

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions ~5×5 cm²

Normal Stress 150 (MPa)

(DPM readouts) kN

Vertical zero load 006

Horizontal zero load 000

Displacement Rates

Velocity steps 10 → 20 μm/sec

Sliding velocity 50 μm/sec

Data Logger Used labview

Servo Gain Adjust?

Vertical DCDT Gain high

Normal Stress

Initial voltage −4.709

V. at load 2.939

TDXR offsets

Vibration amp 1.5 MPa

Belleville washers? yes

T (°C) 23.1 RH (%) 26.5

Comments:

2 load cycles: bring on shear load @ 0.09,

unload @ (2.56) 2.65

calibration pulse to 1.5 MPa (3.016) V.

reload, unload @ (3.20) 3.29

slide all the way, [offset] @ 3mm

velocity steps @ every 0.3mm until 2.1mm

[offset] V → 50 μm/sec V50_T0.1-2_u1000.txt

[offset] V50_T0.1-2_u1000

[offset]

velocity steps 50 → 5

Biax Experiment *(rev. 1/26/02)*

Exp. Name p091s3mr100 Date 1/31/02

Operator Boettcher

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 93mm at sample # 960

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions ~5×5 cm²

Displacement Rates

Velocity steps 10 → 20 μm/sec

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 006

Horizontal zero load 006

Sliding velocity 10 μm/sec

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

Normal Stress

Initial voltage -4.707

V. at load .394

TDXR offsets

Vibration amp 1 MPa

Belleville washers? yes

T (°C) 22.9 RH (%) 24.5

Comments:

bring on shear load @ 0, unload @ (2.56) 2.64

calibrate sq. wave pulse to 1MPa (.445 V)

reload, unload @ (3.20) 3.28

velocity steps @ (4.3) 4.38

[offset] V → 10 μm/sec.

V10Disp_T2_3_u250.txt

[offset] V10Disp

[offset] V10Disp

velocity steps 10 → 100 μm/sec

Biax Experiment *(rev. 1/26/02)*

Exp. Name Bell K cal 31.1.02 Date 31-1-02

Operator Mann 10:00

Gouge (or other sample) _____ Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench)_____ Under load_____ at sample #_____

Material (Qtz, Granite, ?)_____

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) _____ Block #_____

Roughness_____

Contact Dimensions_____

Displacement Rates

Velocity steps_____

_____

_____

Normal Stress _____ (MPa)

(DPM readouts) kN

Vertical zero load 06

Horizontal zero load N/A

Sliding velocity_____

Data Logger Used 4 chan.

Servo Gain Adjust? N/A

Vertical DCDT Gain N/A

Normal Stress

Initial voltage _____

V. at load _____

TDXR offsets _____

_____

Vibration amp _____

Belleville washers? _____

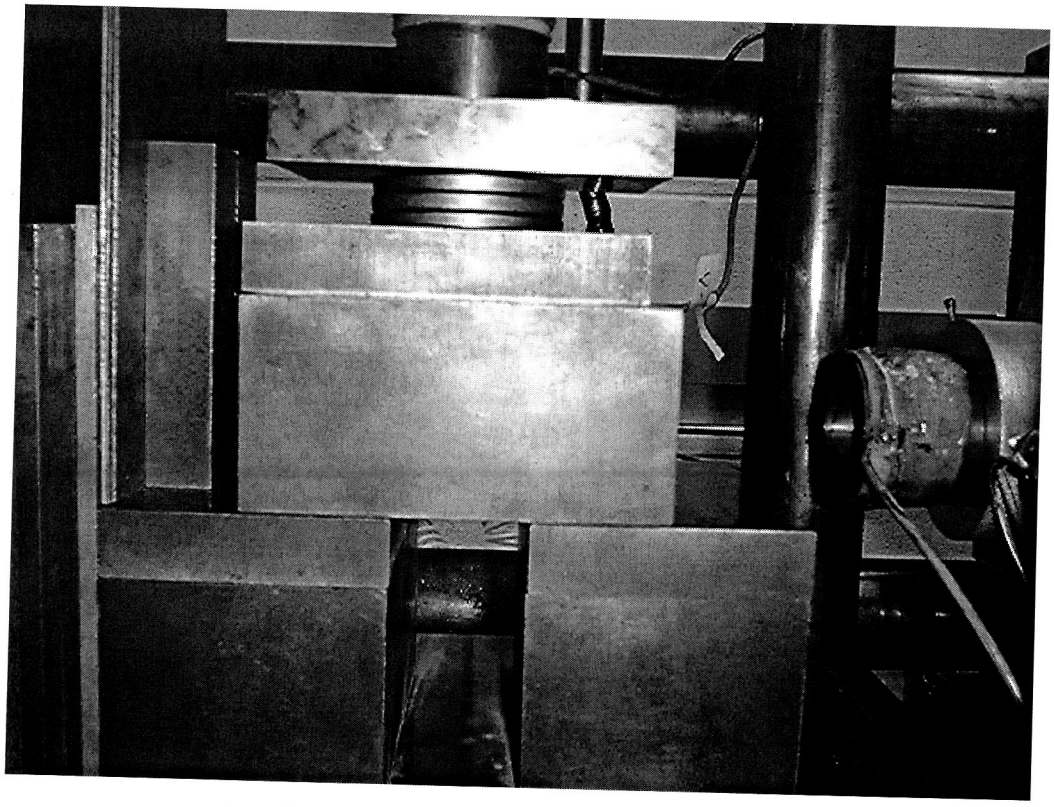
T (°C)_____ RH (%)_____

Comments:

See photo: washerKal.JPG for set-up.
(From Jan 8 '02 → same set-up used)

Running @ 70 μm/s, high gain (σ_v Disp.)

Check stiffness calibration of 3 belleville washers in series.



Biax Experiment *(rev. 1/26/02)*

Exp. Name p090s3mr100 Date 01/30/2002

Operator Boettcher

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 12.5mm at sample # 1170

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions ~ 5x5 cm^2

Displacement Rates

Velocity steps 10 → 20 μm/sec

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 006

Horizontal zero load 000

Sliding velocity 10 μm/sec

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

Normal Stress

Initial voltage -4.698

V. at load 0.403

TDXR offsets

Vibration amp 5MPa

Belleville washers? yes

T (°C) 23.6 RH (%) 32.5

Comments:

bring on shear load @ .20 unload @ (2.56) 2.76

Calibrate Sf wave to 5 MPa .658 V

reload, unload @ (3.20) 3.40 reload

velocity steps @ (4.8) 4.5

[offset] V → 10 μm/sec

~~V100~~ V10R_T0.1-20_u250.txt

[offset]

V10R_T0.1-20_u250.txt

[offset]

V10R_T0.1-20_u250.txt

unload

Biax Experiment *(rev. 1/26/02)*

Exp. Name p089s3mr100 Date 1/~~30~~/02

Operator Boettcher

Gouge (or other sample) gouge

Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm

Under load 92.5 at sample # M10

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions ~5x5cm²

Displacement Rates

Velocity steps 10 → 20 μm/sec

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 006

Horizontal zero load 000

Sliding velocity 100 μm/sec

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain ~~g~~ high

Normal Stress

Initial voltage ~~[illegible]~~ -4.693

V. at load ~~[illegible]~~ 0.408

TDXR offsets

Vibration amp Variable

Belleville washers? yes

T (°C) 23.2 RH (%) 32.8

Comments:

bring on shear load @ .20, unload @ (2.56) ~~[illegible]~~ 2.76

calibrate sq. wave to 1MPa .459 V.

reload, unload @ (3.20) 3.40, reload

velocity steps @(4.~~5~~) 4.5

[offset] V → 100 μm/sec

V100Epsilon_T_25_u1000.txt A = 0.25, 0.5, 1.0, 2.0

[offset] V100Epsilon_T_5_u1000.txt

[offset] V100Epislon_T_75_u1000.txt

velocity steps

Biax Experiment *(rev. 1/26/02)*

Exp. Name p088s3mr100 Date 1/28/02

Operator Boettcher

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 93mm at sample # 1170

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions ~5x5cm²

Displacement Rates

Velocity steps 10 → 20

@ 4.45mm - 3mm each

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load .004

Horizontal zero load -.003

Sliding velocity 1 μm/sec

Data Logger Used LabView

Servo Gain Adjust? yes (see below)

Vertical DCDT Gain high

Normal Stress

Initial voltage -4.726

V. at load 0.376

TDXR offsets

Vibration amp 1 MPa

Belleville washers? yes

T (°C) 23.7 RH (%) 18.7

Comments:

bring on shear load @ .015, unload @ (2.56) 2.71

calibrate sq. wave pulse (to 1MPa) 0.427 V.

reload, unload @ (3.20) ~~2.88~~ 3.35, reload

velocity steps @ 4.45

[offset] V → 1 μm/sec

changed sample rate ½ through T = 0.1 from 1000 Hz → 100 Hz

VIR_T0.1-200_u250.txt @ ~~350~~ 0.5 μm breaks in between are for 80 sec.

↑ velocity range of T ↑ update rate

→

changed the gain up some

[offset] [offset] VIR_T0.1-200_u250.txt

changed the sample rate during T = 0.5 to 10 ~~samples~~/sec

lots of noise from upstairs 462#3124

[offset] V → 50 μm/sec

V50R_T3-10_u1000.txt

Changed the sampling rate at the end of T=3.0s

lots of upstairs noise at 500,000

[offset]

Velocity steps 50 → 5 μm/sec.

Biax Experiment *(rev. 1/26/02)*

Exp. Name p087s3mr100 Date 1/28/02

Operator Boettcher

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 92.5mm at sample # 1050

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5 x 5 cm²

Displacement Rates

Velocity steps 10 → 20

@ 4.43

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005

Horizontal zero load 002

Sliding velocity 10 μm/sec

Data Logger Used Labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

Normal Stress

Initial voltage -4.727

V. at load 0.374

TDXR offsets _____

Vibration amp 1/2 MPa

Belleville washers? yes

T (°C) 23.5 RH (%) 22.4

Comments:

2 load cycles @ 100MPa

bring on shear load @ .13, unload @ 2.69 (2.56)

calibrate sq. wave to ½ MPa (.3995 V.)

reload, unload @ 3.33 (3.20)

velocity steps

[offset] V → 10

V10R_total.01_20.txt ← stopped before the whole set finished...

update rate of 1000 // [offset] update rate to 250 ✓

velocity steps 10→100

[offset] V10R_total.01_20.txt

[offset] V10R_total.01_20.txt 1 velocity step 10 → 100

Biax Experiment *(rev. 1/26/02)*

Exp. Name p086 s3mr100 Date 1/28/02

Operator Boettcher

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3 mm Under load 93mm at sample # 870

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # ______

Roughness grooved

Contact Dimensions ~5 x 5 cm^2

Displacement Rates

Velocity steps 10 → 20

@ 4.39

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005

Horizontal zero load -002

Sliding velocity 10

Data Logger Used Labview

Servo Gain Adjust? ______

Vertical DCDT Gain high

Normal Stress

Initial voltage -4.728

V. at load 0.373

TDXR offsets ______

Vibration amp 2 MPa

Belleville washers? yes

T (°C) 22.4 RH (%) 20.2

Comments:

2 load cycles @ 100MPa

bring on shear load @ 9, Unload @ ~~[illegible]~~ 2.65 (2.56)

calibrate sq. wave to 2 MPa 0.477V.

reload, unload @ ~~3.30~~ 3.29 (3.20)

velocity steps

[offset] V → 10 μm/sec

V10R.~~txt~~_total.~~txt~~ 01___20.txt

velocity steps 10 → 20

[offset] V10R_total. 01___20.txt

[offset] V10R_total. 01 20.txt (2 velocity steps 10 → 100)

Biax Experiment *(rev. 1/26/02)*

Exp. Name p085s3mr100 Date 1/27/02

Operator Boettcher

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 93mm at sample # 1170

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions ~5x5 cm^2

Displacement Rates

Velocity steps 10 → 20

@ 4.3 → really 4.41

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load .005

Horizontal zero load -.002

Sliding velocity 50 μm/sec

Data Logger Used LabView

Servo Gain Adjust?

Vertical DCDT Gain high

Normal Stress

Initial voltage -4.730

V. at load 0.371 at ~~0.373~~ 0.373

TDXR offsets

Vibration amp 1 MPa

Belleville washers? yes

T (°C) 22.7 RH (%) 13.5

Comments:

Bring on Shear load @ 0.11

2 load cycles @ 100MPa unload @ 2.67 (2.56)

adjusted the gain down

calibration pulse to 1MPa (+.05101) 0.424 V.

reload, unload @ 3.31 (3.20)

Velocity steps

[offset] V → 50μm/sec

I started the vibs with 250 samples/sec. update rate, then stopped the sliding

V50R.txt T = 0.1 → 2 s. <- use ~~250~~ 1000! update date

[offset]

V50R_long.txt T = 3, 4, 5, 10

Biax Experiment *(rev. 1/26/02)*

Exp. Name p084s3mrd00 Date 1/26/02

Operator Boettcher / Marone

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 93mm at sample # 990

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F100

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 5x5cm²

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005

Horizontal zero load -002

Displacement Rates

Velocity steps 10 → 20

@ 4.42 (4.3)

Sliding velocity 1000 μm/sec

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain ~~high~~ high to low

Normal Stress

Initial voltage -4.729

V. at load 0.372

TDXR offsets

Vibration amp 1 MPa

Belleville washers? yes

T (°C) 23.75 RH (%) 9.2

Comments:

2 load cycles @100 MPa

Bring on shear load @ .12, unload @ 2.68 (2.56)

Calibration pulse to 1MPa (±.0510 V) .423 V.

reload, unload @ ~~3~~. 3.32 (3.20) ← adjust the blocks

* change the gain to low gain *

[offset] V = 1000 μm/sec 10 μm/sec — adjust the gain...

V1000R — ~~short~~ total .txt T = 0.01, 0.03, 0.1, 0.3, 0.5, 0.75 s

~~[offset]~~

~~V1000R_long.txt T = 0.3, 0.5 s.~~

only a bit of this was captured before it locked

Biax Experiment *(rev. 1/26/02)*

Exp. Name p083s3mr100 Date 1/26/02

Operator Boettcher / Marone

Gouge (or other sample) gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 93mm at sample # 780

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution Fill

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 5×5 cm²

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 004

Horizontal zero load -003

Displacement Rates

Velocity steps 10 → 20

@ 4.44 (4.3)

Sliding velocity 100 μm/sec

Data Logger Used LabView

Servo Gain Adjust?

Vertical DCDT Gain high

Normal Stress

Initial voltage -4.729

V. at load 0.372

TDXR offsets

Vibration amp 1 MPa

Belleville washers? yes

T (°C) 23.0 RH (%) 10.4%

Comments:

2 load cycles @ 100 MPa

Bring on shear load @ 0.14, unload @ 2.70 (2.56)

calibration pulse to 1 MPa (+0.05101) .424 V

reload, unload @ 3.34 (3.20)

[offset] V → 100 μm/s.

V100R_short.txt T = 0.1, 0.25, 0.5, 0.75 s

[offset]

V100R_long2.txt T = 1, 1.5, 2, 4 s

[offset]

V100R_short.txt T = 0.1 → 0.75 s

velocity steps 100 → 10 μm/sec

Biax Experiment *(rev. 1/26/02)*

Exp. Name p100G0&bs020 Date 25 FEB 2002

Operator FRYE

Gouge (or other sample) None Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) \ Under load 0 at sample #

Material (Qtz, Granite, ?)

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) Westerly Block # SBB

Roughness Shot-blasted (fresh)

Contact Dimensions 96.3mm x 97.4mm

Displacement Rates

Velocity steps

Normal Stress 20 (188 kN) (MPa)

(DPM readouts) kN

Vertical zero load 006

Horizontal zero load -003

Sliding velocity 10 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust?

Vertical DCDT Gain High

Normal Stress

Initial voltage

V. at load

TDXR offsets

Vibration amp

Belleville washers?

T (°C) 23°C RH (%) 100 %

Comments:

σ_N to 20 MPa (cold water) displace to 3mm, do SHS. (Tone 0.57mm)

3.0 (3.57)

3.25 (3.82 UNSTABLE

Biax Experiment *(rev. 1/26/02)*

Exp. Name p099s5mr025 Date 2/22/02

Operator Marone, Anthony

Gouge (or other sample) -gouge- Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 5 (100mm Bench) Under load 97mm at sample # 6898

Material (Qtz, Granite, ?) F110, Qtz

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) New Small steel Block # _____

Roughness -rough-

Contact Dimensions 5cm x 5cm

Normal Stress 25 (MPa)

(DPM readouts) kN

Vertical zero load .06 kN

Horizontal zero load -.05 kN

Data Logger Used Labview 4 channel.

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets Yes

Displacement Rates

Velocity steps _____

Sliding velocity ~~[illegible]~~ 20 um/s

Normal Stress

Initial voltage -4.728 V

V. at load -3.8V = 40 MPa

-3.52V = 25 MPa

~~Vibration amp~~

~~Belleville washers?~~

T (°C) 23.59 RH (%) 15%

Comments:

(Following procedure from exp. name p098s3mr025)

σ_N to 40MPa, Jon @ 0.05mm, @ unload @ 2.6mm

reload, unload @ 3.25 mm

reload, unload @ 3.84 mm

[offset] σ_N to 25MPa, (-3.523 initial voltage), displace to 1.6mm, do velocity steps

20 - 10 - 20 - 10 - 20 - 10 - 20 - 10 20 10 20 each one is 600 micron long

Disp -> 1.6mm 2.2 2.8 3.4 4.0 4.4 4.8 5.2 5.6 6

Displace to 0.4mm & (every 0.2mm after that)

D	t
0.4	3
~0.6	3
~0.8	10
~1.0	10
~1.2	30
~1.4	30

D	t	
1.85	1:39.99	(100)
2.1	1:39.97	(100)
2.4	5:00.16	(300) — sample rate left @ 1Hz,
2.8	4:59.09	(300)
3.2	16:39.96	(1000)
—	16:40.56	

Some additional:

D	hold t	time
4.6	(3)	00:03.20
4.85	(~3)	00:04.50
5.1	(10)	00:09.80
5.35	(10)	00:09.96
5.6	(100)	01:40.07
5.85	(30)	00:29.97

Displacement vs. mu

mu	D
10076	0.59147

Time vs. Displacement

122.9 2933.6

Biax Experiment *(rev. 1/26/02)*

Exp. Name p0985 3mr025 Date 22 FEB 02

Operator K. FRYE

Gouge (or other sample) GOUGE Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load _____ at sample # _____

Material (Qtz, Granite, ?) Glass

Particle Size, Size Distribution 1-800 rouge

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10

Displacement Rates

Velocity steps 10, 20 mm/s

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 007

Horizontal zero load -001

Sliding velocity 10 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

Normal Stress

Initial voltage _____

V. at load _____

TDXR offsets _____

Vibration amp _____

Belleville washers? _____

T (°C) 23° RH (%) 20%

Comments: σ_n to 40 MPa; T on @ 0.07 mm, unload @ 2.56 mm (2.63 gross)

reload, unload @ 3.2 mm (3.27)

reload, unload @ 3.84 (3.91)

[offset], σ_n to 25 MPa, displace to 1.6mm, do velocity steps

10-20-10-20-10-20-10-20-10 [offset]

Displace to 0.4mm, do SHS

D	t	D	t
0.4	3:13	1.6	1:40.01
0.55	5:15	1.9	1:39.87
0.70	9:95	2.2	~5:00
0.90	9:95	2.55	5:00.28
1.10	30:02	3.0	17:00
1.35	29.99	3.45	16:39.85

Biax Experiment *(rev. 1/26/02)*

Exp. Name p097 S3mr035 Date 21 FEB 02

Operator FRYE

Gouge (or other sample) Gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 93.0 ave. at sample # 9273

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Displacement Rates

Velocity steps 10, 20 um/s

Normal Stress 40→35 (MPa)

(DPM readouts) kN

Vertical zero load .007

Horizontal zero load -.001

Sliding velocity 10 um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust?

Vertical DCDT Gain High

Normal Stress

Initial voltage

V. at load

TDXR offsets

Vibration amp

Belleville washers?

T (°C) 23° C RH (%) 20%

Comments: σ_N to 40 MPa; ~~t~~ on @ 024mm, unload @ 2.56 (2.80mm gross)

✓ reload, unload @ 3.2 mm (3.44)

reload, unload @ 3.84 mm (4.08)

[offset], σ_N to 35 MPa, displace to 1.6 mm, do velocity steps every .6 mm

10-20-10-20-10-20-10-20-10, unload

[offset] σ_N to remain @35MPa, displace to ~~2.75~~ 3.0 mm, do SHS

disp.	time
3.0	3.09
3.15	3.00
3.3	10.02
3.5	9.99
3.7	29.84
3.95	29.97

disp.	time
4.2	1:39.99
4.5	1:39.96
4.8	5:00.08
5.1	5:00.02
5.4	16:39.89
5.75	16:39.94

unload & save layer

Biax Experiment *(rev. 1/26/02)*

Exp. Name p0945 3mv 049 Date 20 FEB 2002

Operator FRYE

Gouge (or other sample) ~~BT~~ Gouge Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 91.7, 91.4 at sample # 333

Material (Qtz, Granite, ?) glass

Particle Size, Size Distribution 1-800 um rough

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 49.5 (MPa)

(DPM readouts) kN

Vertical zero load .006

Horizontal zero load -.002

Displacement Rates

Velocity steps

Sliding velocity 10um/s, ~~1mm/s~~ 1mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? Yes +4 vert when in low gain

Vertical DCDT Gain High on load up, low on sliding

Normal Stress

Initial voltage

V. at load

TDXR offsets

Vibration amp

Belleville washers?

T (°C) 23° RH (%) 100

Comments: σ_N to 10 MPa, add water, σ_N to 49.5 MPa

load up @ 10um/s

Displace 5.5 mm,

(offset) Go to low gain, gain adjust

Displace @ 1mm/s

Biax Experiment *(rev. 1/26/02)*

Exp. Name p09653mr025 Date 21 FEB 2002

Operator FRYE

Gouge (or other sample) GOUGE Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 91.9, 92.1 at sample # 130

Material (Qtz, Granite, ?) Glass

Particle Size, Size Distribution 1-800 - rough

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm²

Displacement Rates

Velocity steps 10, 20 um/s

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 007

Horizontal zero load -001

Sliding velocity 10 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

Normal Stress

Initial voltage

V. at load

TDXR offsets

Vibration amp

Belleville washers?

T (°C) 23°C RH (%) 70%

Comments:

σ_N to 40MPa, tare 0mm, unload @ 2.56mm

reload, unload @ 3.2mm

reload, unload @ 3.84mm

[offset], σ_N to 35 MPa, displace to 1.6mm, do velocity steps:

10 - 20 - 10 - 20 - 10 - 20 - 10 - 20 - 10 [offset]

displace to 0.4 mm, do SHS

D	t	D	t
0.4	3.01	1.6	1:39.95
0.55	3.08	1.9	1:40.07
0.70	9.99	2.20	5:00.87
0.90	9.99	2.55	5:00.36
1.10	30.00	3.0	16:40.02
1.35	29.99	3.45	16:39.91

Biax Experiment *(rev. 1/26/02)*

Exp. Name p095S3mr005 Date 20FEB02

Operator FRYE

Gouge (or other sample) GOUGE Steel sample thickness w/ no gouge: small 88 mm, large 90 mm

Layer Thickness (total on bench) 3mm Under load 5ton at sample #

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm~

Normal Stress 40→35→5 (MPa)

(DPM readouts) kN

Vertical zero load 007

Horizontal zero load -002

Displacement Rates

Velocity steps 1 um/s - 10

10 - 20

Sliding velocity 10um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain 1/4x

Normal Stress

Initial voltage

V. at load

TDXR offsets

Vibration amp

Belleville washers?

T (°C) 23° RH (%) 100%

Comments: saturate @ 10 MPa, Ton @ 0.17 mm, unload @ 2.56 (2.73 gross

reload, unload @ 3.2 mm (3.37 gross)

reload, unload @ 3.84 mm (4.01 gross)

[offset], σ_N to 35 MPa, displace to 1.6 mm, do vel. steps every 0.6 mm

10 - 20 - 10 - 20 - 10 - 20 - 10 - 20 - 10 ... unload

[offset], σ_N to 5 MPa; wait 3000 s;

displace to 2.75 mm, do vel. steps

10 um/s to 2.75 mm

1 um/s to 3.50 mm

10 um/s to 4.25 mm

1 um/s to 5.0 mm

10 um/s to 5.75 mm

@ 5.75 mm, 1000 s hold (k: 40-14)

unload @ 6.4

Biax Experiment

Exp. Name p082s3mr100 Date 1/25/02

Operator Boettcher / Marone

Gouge (or other sample) gouge

Layer Thickness (total on bench) 3mm Under load 93mm at sample # 990

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm^2

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates (velocity steps) 10 → 20 μm/sec Sliding Velocity 10 μm/sec

Data Logger Used Labview

Normal Stress
Initial voltage -4.721
V. at load 0.38

Servo Gain Adjust? _____

Vibration Amp 0.1 MPa

Vertical DCDT Gain high

Belleville Washers? yes

TDXR offsets _____

T (°C) 22.9 RH (%) 12.1

Comments:

2 load cycles @ 100MPa

1. bring on the shear load @ 007, unload @ 2.63 (2.56)
   calibration pulse to 0.1MPa (0.380 + 0.00501) = 0.385
2. reload, unload @ 3.29 (3.20)
   velocity steps @ 4.37 (4.3)

[offset] adjusted the gain

V = 10 μm/sec

@ 0.25 mm V10R_total.01_2.txt } offset-like problem with the gain

adjust the gain

[offset]

@ 0.25mm V10R_total.01_2.txt

[offset]

@.25mm V10R_total.01_2.txt

455,000 - upstairs noise → stress drop

Biax Experiment

Exp. Name p081s3mr100 Date 1/25/02

Operator Boettcher / Marone

Gouge (or other sample) gouge

Layer Thickness (total on bench) 3mm Under load 93mm at sample # 358

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm²

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 004 (006) mid_experiment _____ (timedisp. = _____)

Horizontal zero load -003 mid_experiment _____ (timedisp. = _____)

Displacement Rates (velocity steps) 10 → 20 Sliding Velocity 10 μm/sec

Data Logger Used LabView

Normal Stress
Initial voltage -4.718 V.
V. at load 0.383 V

Servo Gain Adjust? _____

Vibration Amp 1/4 MPa ± .01275

Vertical DCDT Gain high

Belleville Washers? yes

TDXR offsets #15693 changed the gain

T (°C) 23.2 RH (%) 13.05

Comments:

2 load cycles @ 100 MPa

bring on shear load @ 0.18mm, unload @ 2.74 (2.56)

calibrate Sq. Wave pulse to 0.25 MPa (to 0.397 V.)

reload, unload @ 3.38 (3.20)

velocity steps @ 4.48 (4.3 mm)

[offset] V → 10μm/sec.

@ 0.25mm VIOR_total.txt T = 0.1 → 20 sec.

use update rate of 250 samples per sec.

[offset]

@ 0.25mm VIOR_total.txt

VIOR_total.0.1_20.txt

[offset]

@ 0.25mm VIOR_total.~~txt~~.0.1_20.txt

unload

Biax Experiment

Exp. Name p080606s005 Date 20 JAN 2012

Operator FRYE

Gouge (or other sample) _____

Layer Thickness _____

Material (Qtz, Granite, ?) _____

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) W. Granite Block # SBB

Roughness sandblasted + wear

Contact Dimensions 96.3 x 97.4

Normal Stress 5 (47kN) (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load −001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 100%, T = 24°C, (T on @ 0.40mm)

σ_N to 5 MPa, displace 3mm (3.4 net), do SHS

disp.	time	
3.0	4.99	
3.25	10:02	
3.50	10:05	) stick-slippy
3.80	10:55	
4.1	16:40:20	
4.45		↓ unload.

Biax Experiment

Exp. Name p0796obs010 Date 20 JAN 02

Operator FRYE

Gouge (or other sample) _____

Layer Thickness _____

Material (Qtz, Granite, ?) _____

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) W. GRANITE Block # SBB

Roughness Sandblast + wear

Contact Dimensions 96.3 x 97.4 mm

Normal Stress 10 (94 KN) (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 100%, T = 24°C, τ on @ 0.13 mm

σ_N to 10 MPa, displace 3.0 mm (3.13 net), do SHS

disp	time
3.0	9.55
3.25	10.06
3.50	1:39.91 — Stick slip, unload.
3.8	
4.1	
4.45	

Biax Experiment

Exp. Name p078GObs015 Date 20 JAN 2002

Operator K. FRYE

Gouge (or other sample) _____

Layer Thickness _____

Material (Qtz, Granite, ?) _____

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) W. granite Block # SBB

Roughness Sandblast

Contact Dimensions 96.3 x 97.4 mm

Normal Stress 15 (142 kN (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 100%, T = 24°C

σ_N to 15 MPa, displace 3 mm, do 3 HS (2 cm @ 0.25 mm)

3.0 10.10 s

3.25 9.9 s

3.50 1:40.86 — stick-slip, unload

3.8

4.1

4.45

Biax Experiment

Exp. Name p077G0bs010 Date 19 JAN 2002

Operator K. FRYE.

Gouge (or other sample) _____

Layer Thickness _____

Material (Qtz, Granite, ?) _____

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) W. granite Block # SBB

Roughness Sand-blasted

Contact Dimensions 2 10x10 (97.4x96.3mm)

Normal Stress 10 (94 kN) (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -002 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used labVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 10.5%, T = 23°C

σ_N to 10 MPa, displace to 3.8 mm (2 mm @ 0.1 mm), do SHS

3.0	10.0 s	4.1	16:40.14
3.25	10.06	4.45	16:40.05
3.50	1:40.12		
3.8	1:40.04		

11% RH

Biax Experiment

Exp. Name p076 GOb's005 Date 18 JAN 2002

Operator K. FRYE

Gouge (or other sample) _____

Layer Thickness _____

Material (Qtz, Granite, ?) _____

Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) Westerly granite Block # SBB

Roughness Sand blasted

Contact Dimensions 96.4 x 97.3

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain 1kHz

TDXR offsets _____

Comments: RH = 9-10%, T = 24°C, blocks warmer

σ_N to 5 MPa, τ on @ 0.25 mm disp., do SHS @ 3.0 (3.25 DPM)

disp. (mm)	time (s)	disp (mm)	time (s)
3.0	9.87	4.1	16:39:98
3.25	10.20	4.45	16:39:16
3.5	1 40.02	4.8 — stop	
3.8	1:40.03		

σ_N to 10 MPa (94 kN) (over)

10 MPa (94 kN)

disp.	time
2.5	9.87
2.75	9.95
3.0	1:40.11
3.3	1:40.03
3.6	16:40.07
3.95	16:40.08
4.3	

~~4.7 → stop~~

σ_N to 15 MPa

disp	time
2.0	10.02 → stick slip
2.25	
2.5	unload
2.8	
3.1	
3.45	

σ_N to 5 MPa (stick slip on reload)

2.0	1.5	9.98
2.25	1.75	9.89
2.5	2.0	1:40.13 — servo gain down 1.5 turns
2.8	2.3	1:39.95
3.1	2.6	16:39.95
3.45	2.95	1:39.88

~~3.3 → stop, add water.~~

3.6

~~3.85~~

~~3.~~ 4.15

5 MPa @ 5 MPa

3.2	10.06

3.45 → stop, added water

3.95	10.13
4.2	1:39.95
4.5	16:40

99% RH

~~100% RH~~

Biax Experiment

Exp. Name p075GO bs005 Date 17 JAN 02

Operator FRYE

Gouge (or other sample) Non

Layer Thickness 0

Material (Qtz, Granite, ?) -

Particle Size, Size Distribution -

Forcing Blocks (Steel, Westerly, ?) Westerly Block # SBB

Roughness Sand blasted

Contact Dimensions 97.4mm x 96.3

Normal Stress 5 → 10 → 15 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10um/s

Data Logger Used LaBVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: T = 23.4 °C, RH = 12%, blocks rinsed & dried before test.

σ_N to 5 MPa (47 kN) Ton @ 0.29 mm do SHS

~~disp~~ ~~time~~ 3.6

2.5 mm

2.75 3.45

3.0

3.3 4.3 [offset], σ_N to 10 MPa (cover)

Cover

5 MPa

disp.	time
3.0 (3.29)	9.95
3.25 (3.54)	10.01
3.5 (3.79)	1:39.95
3.8 (4.09)	1:40.08
4.1 (4.39)	16:39.89
4.45 (4.74)	16:40.01

~~10 MPa~~

unload @ 5.29 mm

~~15 MPa~~

Biax Experiment

Exp. Name p07460 bs 005 Date 16 JAN 2002

Operator FAYE

Gouge (or other sample) ~~@~~ NONE

Layer Thickness 0

Material (Qtz, Granite, ?) Granite

Particle Size, Size Distribution N/A

Forcing Blocks (Steel, Westerly, ?) Westerly g. Block # SBB

Roughness Sand - blasted

Contact Dimensions ~10x10 (97.4mm x 96.3mm)

Normal Stress 5 → 10 → 15 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? +1 turn VERT.

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 16%, Then water added, T = 23°C (100% RH)

~~-0.10~~

σ_N to 5MPa, displace to ~~3~~ 4 mm, do SHS 3~~9~~.0 3~~9~~.25 3~~9~~.5 ~~3.8~~ ~~4.1~~ ~~4.45~~ ~~mm~~

10.03 9.90 1:40 1:40 16:40 16:40

σ_N to 10MPa, displace to 3mm, do SHS 3.0 3.25 3.5 3.8 4.1 4.45

4.9 10.1 1:40 1:40 16:40 16:40

15 MPa (141 kN)

disp.	hold time
2.5 mm	10.00
2.75	10:03
3.0	1:39.99
3.3	1:44
3.6	16:39.97
3.95	16:40

12.5 kN (117 kN)

disp	time
2.5	
2.75	
3.0	
3.3	
3.6	
3.95	

5 MPa (47 kN)

0.32 DPM

2.5	10.02
2.75	10.07
3.0	1:40
3.3	1:40.7
3.6	16:40.
3.95	error - rapid unload when static discharge

7.5 MPa (70 kN)

2.5	Unload
2.75	
3.0	
3.3	
3.6	
3.95	

10 MPa (94 kN)

2.5
2.75
3.0
3.3
3.6
3.95

Biax Experiment

Exp. Name p073G0bs ~~010~~ 005 (bs → bare surface) Date 16JAN2002

Operator K. FRYE

Gouge (or other sample) no

Layer Thickness 0

Material (Qtz, Granite, ?) Granite

Particle Size, Size Distribution N/A

Forcing Blocks (Steel, Westerly, ?) westerly Block # SBB

Roughness sandblasted

Contact Dimensions 97.4 mm X 96.3 mm

Normal Stress ~~10~~ 5 (MPa) 47 kN

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load −001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 16%; T = 23°C

σ_N to 5 MPa, displace to 4mm [offset]

do vel. steps, 10-20-10-~~20-10~~, do SHS

1.8 mm	10 s	2.55	100 s	(added water	
2.0	10 s	3.0	1000 s	3.65	100 s
2.2	100 s	3.35	10 s	4.2	unload

Biax Experiment

Exp. Name p072s3mr100 Date 1/10/02

Operator Boettcher / Malone

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions $5 \times 5 cm^2$

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load −001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (10)

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

T = 25.1 °C RH = 17.1%

layer thickness is 92.5mm @ 930

[offset] ★ Washers

2 load cycles @ 100MPa

bring on shear load @ ~0.20, unload@ 2.76 (2.56)

calibrate sq. wave pulse to 1MPa (0.05101 V)
adjust the blocks

reload, unload @ 3.40 (3.20)

velocity steps @ (4.3) 4.5

3 mm each 10μm/sec → 20μm/sec

[offset] V → 10μm/sec

@ 0.2mm V10R_total.txt T = 0.1 → 20 sec

[offset]

V10R_total.txt

[offset]

V10R_total.txt

velocity steps

unload

Biax Experiment

Exp. Name p071s3mr100 Date 1/10/02

Operator Boettcher, Marone

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm^2

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (10) μm/sec

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

T = 24.8 RH = 19.7%

layer thickness is 92.2 mm @ # 270

[offset]

★ Washers $K = 0.0524 \frac{MPa}{\mu m}$

2 load cycles @ 100 MPa

bring on shear load @ 0.25, unload @ (2.56) 2.81

calibrate sq. wave pulse to 1 MPa (0.05101 Volts

reload, unload @ (3.20) 3.45

velocity steps @ (4.3) 4.55

3 mm each 10 μm/sec → 20 μm/sec

[offset] V → 10 μm/sec

V10R.txt T = 0.1, 0.25, 0.5, 0.75, 1, 1.5, 2, 3, 4 s

211719. short hold. 10 - 20 - 10 μm/s v. steps.

[offset]

~~V10R.txt~~ old V10R_total T = 0.1 → 4, —, —, — mystery periods

[offset] → short hold. 10 - 20 - 10 μm/s V. steps.

V10R.txt old version V10R_total T = 0.1 → 4, —, — mystery periods

V (the velocity steps were actually done here)

~~reload~~

[offset]

V10R_total T = 0.1 → 20 sec.

Biax Experiment

Exp. Name p070s3mr100 Date 1/10/02

Operator Boettcher, Marone

Gouge (or other sample) gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) Qtz
Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____
Roughness grooved
Contact Dimensions 5x5 cm^2

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (100) μm/sec

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

Comments:

T = 24.8°C RH = 19.7%

layer thickness is 93mm @#173

stiffness with washers on small sample
⟹ @100MPa ~ 0.0524 MPa/μm

(@~50MPa K = 0.0470 MPa/μm
@~25MPa K = 0.409 MPa/μm

[offset] 2 load cycles @ 100 MPa *(With the Washers)

bring on shear load @ .19, unload @ (2.56) 2.75

calibrate sq wave pulse to 1 MPa (to. 05101)

reload, unload @ (3.20) 3.39

@ (4.3) 4.49

velocity steps (5) 3 mm each 10 μm/sec → 20 μm/sec

[offset] V → 100 μm/sec

V100R_short.txt T = 0.1, 0.25, 0.5, 0.75 s.

[offset] ~~V 0000~~

V100R_long.txt T = 1, 1.5, 2 s

[offset]

V100R_short.txt

unload

Biax Experiment

Exp. Name P069s3mr025 Date 1/9/02

Operator Boettcher / Marone

Gouge (or other sample) gouge
- Layer Thickness 3mm
- Material (Qtz, Granite, ?) Qtz
- Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____
- Roughness grooved
- Contact Dimensions 5 x 5 cm^2

Normal Stress 25 (MPa)

(DPM readouts) kN

Vertical zero load _____ mid_experiment _____ (timedisp. = _____)

Horizontal zero load _____ mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (50)

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

T = 24.3 RH = 13.4 %

layer thickness 94mm @ 139

2 load cycles @ 25 MPa

bring on shear load @ .12, unload @ (2.56) ~~2.68~~ 2.3

calibrate sq. wave pulse to $\frac{1}{4}$ MPa (+0.012751

reload, unload @ (~~3.80~~) ~~3.82~~ 3.24

velocity steps @ (4.3) 4.42

3 mm each 10 → 20 mic/sec

[offset] V → 50 μm/sec

V50R.txt A = .25 MPa

[offset]

Biax Experiment

Exp. Name p068s3mr100 Date 1/9/02

Operator Boettcher/Marone

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution FILO

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions $5 \times 5 cm^2$

Normal Stress 100 MPa (MPa)

(DPM readouts) kN

Vertical zero load .006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (50)

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

T = 24.3 RH = 13.4%

layer thickness 93mm @ 240

lots of lock ups as we were moving the vertical ram down

2 load cycles @ 100 MPa

bring on shear load @ .16, unload@(2.56) 2.72

calibrate sq. wave pulse to 1MPa (+.05101 V)

reload, unload @ (3.20) 3.36

velocity steps (5) 3mm each 10 μm/sec → 20 μm/sec

[offset] V → 50 μm/sec

V50R.txt A=1MPa

[offset]

V50R.txt

[offset]

V50R.txt

velocity steps

Biax Experiment

Exp. Name p067s3mr50 Date 1/9/02

Operator Beeler/Marone

Gouge (or other sample) gouge
Layer Thickness 3 mm
Material (Qtz, Granite, ?) Qtz
Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____
Roughness grooved
Contact Dimensions 5×5 cm

Normal Stress 50 MPa (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (50) μm/sec

start 4.726
goto -2.1745 (50MPa)

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

Comments:

T = 24.3°C RH = 13.4%

layer thickness 93mm @ 392

[offset]

2 load cycles @ 50 MPa

bring on shear load @ .19 , unload @ (2.56) 2.75

calibrate sq. wave pulse to ½ MPa (+0.0255 V)

reload, unload @ (3.20) 3.39

velocity steps (5) 3 mm each 10 μm/sec → 20 μm/sec

[offset] V → 50 μm/sec

V50R.txt A = ½ MPa

← Periods go from short to long
0.1 sec → 2 sec.

[offset]

V50R.txt

[offset]

V50R.txt

unload

* Using Belville Washers

Biax Experiment

Exp. Name p0663mr100 Date 1/8/02

Operator Boettcher, Marone

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm^2

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20, → (50)

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

T = 24 RH = 11

layer thickness 92.5 @ 6270

2 load cycles @ 100 MPa

bring on shear load @ .007, unload @ (2.56) 2.63

calibrate sq. wave pulse to 1 MPa (+ 0.05101 V)

reload, unload @ (3.20) 3.27

keep loading... [offset]

velocity steps @ ~~(4.3)~~ ~~4.37~~

3 mm each 10 μm → 20 μm/sec (5 steps)

[offset] V → 50 μm/sec.

V50.txt A = 1 MPa

[offset]

V50.txt

unload

* Using Belville Washers!

stiffness changes by a factor of ~3

Biax Experiment

Exp. Name p065s3mr100 Date 1/8/02

Operator Boettcher, Marone

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 5x5 cm²

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment (timedisp. =)

Horizontal zero load -001 mid_experiment (timedisp. =)

Displacement Rates 10 → 20 → (50)

start @ -4.725 mV

Data Logger Used labview

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

Comments:

T = 24 RH = 11%

layer thickness is 93 mm at ~ 300 pts

2 load cycles @ 100 MPa

bring on shear load at @ .69, unload @ (2.56) 3.

calibrate sq. wave to 1 MPa (+ 0.05101 V)

* backed up a bit and added more lubricant to the un-lubed block

reload, unload @ (3.20) 3.89

5 velocity steps @ (4.5) (5.12) ~~6.0~~ end

3 mm each 10 μm/sec → 20 μm/sec

[offset] V → 50 μm/sec

V50.txt A = 1 MPa

~~[offset]~~

2 load cycles to 6.43

drop normal stress to 50 MPa & shear stress

~~[offset]~~ calibration pulse A = ½ MPa

→ Very unstable

~~V50.txt~~

Biax Experiment

Exp. Name p064s3mr100 Date 1/8/02

Operator Boettcher, Marone

Gouge (or other sample) gouge
Layer Thickness 3 mm
Material (Qtz, Granite, ?) Qtz
Particle Size, Size Distribution Fill

Forcing Blocks (Steel, Westerly, ?) steel Block #
Roughness grooved
Contact Dimensions 5x5 cm² top = 94.5mm, 94.5, 95, 95

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment (timedisp. =)
Horizontal zero load -001 mid_experiment (timedisp. =)

Displacement Rates 10 → 20 → (50) μm/sec starts @ -4.724 ml

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments:

T = 23.9°C; RH = 11%
Layer thickness is 92.3 @ ~#296

2 load cycles @ 100MPa

bring on shear load @ 0.24, unload @ (2.56) 2.80

locked - servo gain was really high and the amp. was still at 10 MPa

measure layer thickness (did this earlier)

calibrate square wave pulse to 1MPa (+.05101)V

reload, unload @ (3.20) 3.48

5 velocity steps @ 4.5 → 6.0

3 mm each (10 μm/sec → 20 μm/sec)

[offset] V → 50 μm/sec

V50.txt A=1MPA

[offset] V50.txt A=1, V=50 μm/sec

[offset] V.50.txt A=1 MPa, V=10 μm/sec.

Biax Experiment

Exp. Name p063s3mr100 Date 1/7/02

Operator Boettcher & Marone

Gouge (or other sample) gouge

Layer Thickness 3 full sample size = 94.5, 94.5, 94.5, 94

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm^2

- We did a partial load cycle that's not recorded, unintentionally first

Normal Stress 100 (MPa) 5.101 Volts

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → 50 μm/sec

Data Logger Used LabView

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

T = 25.1 RH = 13.7%

2 load cycles @ 100 MPa

bring on shear load @ ~~2.04~~ 2.18, unload @ (2.56) 2.74
layer thickness measured at 92+mm
calibrate square wave pulse to 1 MPa

reload, unload @ (3.20) 3.38

Velocity steps (5) @ 4.5 → 6.0
3 ~~mm~~ each 10 μm/sec → 20 μm/sec

[offset] V → 50 μm/sec

V50.txt (1 MPa) ← ★Actually 10 MPa!

[offset]

change the normal stress servo gain (higher)

V50.txt

[offset]

record # 142400
adjust both gains way up!

V50.txt

Biax Experiment

Exp. Name p062 SB 3mr 100 Date 1/7/02

Operator Boettcher/Marone

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

4 corner heights: top 94.5mm 94.5mm; bottom 94.5mm 95mm

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm^2

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (50) μm/sec

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

_____

_____

Comments:

RH = 14% T = 24.6°C

2 load cycles @ 100MPa

bring on shear load @ 25μm, unload @ (2.56) 2.81 → slightly changed the normal stress

~~test~~ calibrate vibe Amp. to 1MPa = ~~50.6 mV~~ 51.01mV

reload, unload @ (3.20) 3.45

use calibration_pulse
with update rate of 1/sec.

velocity steps @ (4.5) ✓ stop ~~at~~ (6.0)

(5 times) every 0.3mm (10μm/sec → 20μm/sec)

[offset] V → 50μm/sec

1 MPa amp.
V50.TXT T = 2, 1.5, 1.0, 0.75, 0.5, 0.25, 0.1

[offset]

V50.TXT ✱ Actually 10 MPa!

unload

Biax Experiment

Exp. Name p0615 3mr 005 Date 7 NOV 2001

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass / soda-lime

Particle Size, Size Distribution Rough, 1-800

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 25 - 5 (MPa)

(DPM readouts) kN

Vertical zero load 0.06 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 1.8% T = 23°C

σ_N to 40 MPa, τ on @ 0.066mm unload @ 2.5 (2.62 net)

reload, unload @ 3.2 (3.26 net)

reload, unload @ 3.84 (3.90 net)

[offset], σ_N to 25 MPa, displace to 1.6mm, do velocity steps

every 600um: 10-20-10-20-10-20-10-20-10 ... unload [offset]

SHS

disp	time
2.0	2.95
2.15	3.08
2.30	10.00
2.50	10.01
2.7	30.01
2.95	29.95
3.2	1:40.22
3.5	
3.8	— 16:39.93
4.15	
4.5	16:39.95
4.85	

} Bed res. on σ_N

Biax Experiment

Exp. Name p060S3mr025 Date 6 Nov 2001

Operator FRYE

Gouge (or other sample) GOUGE
Layer Thickness 3mm
Material (Qtz, Granite, ?) ~~Gouge~~ Westerly
Particle Size, Size Distribution ~~Fill~~ < 150 um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10x10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)
Horizontal zero load 000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: T = 23.5°C, RH = 17%

σ_N to 40 MPa, layer thickness offset, T on @ 0.08mm, unload @ 2.56mm (2.64)
reload, unload @ 3.2mm (3.28)
reload, unload @ 3.84mm (3.92)

[offset], σ_N to 25 MPa, displace to 1.6mm, do vel. steps
10-20-10-20-10-20-10-20-10 [offset]

displace to 0.4mm do SHS (over)

disp (mm)	hold time (s)
0.4	2.94
0.55	3.03
0.70	10.05
0.90	9.99
1.10	9.87 - whoops
1.35	31.04
1.60	1:41.46
1.90	1:39.85
2.20	5:00.06
2.55	4:59.99
2.90	16:39.70
3.25	16'39.95

Biax Experiment

Exp. Name p059s3mr025 Date 5 Nov 2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Westerly

Particle Size, Size Distribution < 150 mm

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 006 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 channel

Servo Gain Adjust? Vert down 1 turn

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH = 17%, T = 23°C

σ_N to 40 MPa, T on @ 0.52 mm, unload after 2.52 mm (3.08 net)

reload, unload @ 3.2 (3.72)

reload, unload @ 3.84 (4.36)

[offset] σ_N to 25 MPa, displace to 1.6 mm, do vel. steps

10, 20, 10, 20, 10, 20, 10, 20, 10 [offset]

do CHS loven

disp. (mm)	Time (s)
0.4	3.06
0.55	2.87
0.7	9.95
0.9	9.95
1.10	29.98
1.35	30.01
1.60	1:39.73
1.90	1:40.04
2.20	5:00.07
2.55	5:00.16
2.90	16:39.95
3.25	16:40.00

Biax Experiment

Exp. Name p058s3mr020 Date 5 Nov 2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 35 → 20 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20, 1 mm/s

Data Logger Used LV 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: Saturate @ 10 MPa, T = 23.5°C

σ_N to 40 MPa, Y on @ 0.11 mm, unload after 2.56mm (2.67 net)

reload, unload @ 3.2 (3.31 net)

reload, unload @ 3.84 (3.95 net)

[offset]. σ_N to 35 MPa, displace to 1.6 mm, do vel. steps 10-20-10-20

unload [offset] σ_N to 20 MPa. (slow)

10mm/s to 2.75

1mm/s to 3.5

10mm/s to 4.25

1mm/s to 5.0

10mm/s to 5.75

1000s hold @ 5.75

1000s hold @ 6.2

Biax Experiment

Exp. Name P0575 3m035 Date 3 Nov 2001

Operator Frye

Gouge (or other sample) Gouge
Layer Thickness 3mm 94.8, 95.0 @ 10MPa
Material (Qtz, Granite, ?) QTZ
Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10 x 10 cm²

Normal Stress 40 -> 35 -> 35 (MPa)

(DPM readouts) kN

Vertical zero load 000 mid_experiment _____ (timedisp. = _____)
Horizontal zero load 001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20, 1 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: Saturated @ 10 MPa, T = 24°C

σ_N to 40 MPa, T in @ 0.5 , unload @ 2.56 mm (3.06 net)
reload , unload @ 3.2 (3.70 net)
reload , unload @ 3.84 (4.34 net)

[offset] σ_N to 35 MPa, displace to 1.6 mm, do v. steps 10-20-10-20-10...

unload, [offset] σ_N still @ 35 MPa, displace to 2.75 mm, do vel. steps

(over)

10 um/s to 2.75 mm

1 um/s to 3.50 mm

10 um/s to 4.25 mm

1 um/s to 5.00 mm

10 um/s to 5.75 mm

5.75 mm → 1000s Hold (16:39.96)

Biax Experiment

Exp. Name p0563mr025 Date 3 Nov 2001

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm 94.5, 94.7 @ 10MPa

Material (Qtz, Granite, ?) QTz

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 35 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 002 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20, 1 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: Saturated @ 10 MPa, T = 24°C

σ_N to 40 MPa, T on @ 1.10mm unload @ 2.52mm (3.66)

reload, unload @ 3.2 (4.30)

reload, unload @ 3.84 (4.94)

[offset] σ_N to 35 MPa, displace 1.6mm, do v. steps 10-20, -10-20.... unload

[offst] σ_N to 25 MPa, displace to 2.75 mm, do vel. steps (over)

vel. steps

10 mm/s	to	2.75 mm
1 mm/s	to	3.5
10	-	4.25
1	to	5.0
10	to	5.75

SHS

5.75 - 16.70

Biax Experiment

Exp. Name p055 53mr 015 Date 3 NOV 2001

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm 94.24, 94.4 @ 40 MPa

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 15 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 002 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20, 1 mm/s

Data Logger Used LV 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: Saturate @ 10 MPa, T = 24°C

σ_N to 40 MPa, τ on @ 0.68 mm, unload @ 2.52 mm (3.2 net)

reload, unload @ 3.2 mm (3.84 net)

reload, unload @ 3.84 mm (4.48 net)

[offset] σ_N to 35 MPa, displace to 1.6 mm, do vel. steps 10-20-10-20 ....

unload, [offset] σ_N to 15 MPa, do vel steps (over)

vel steps

10mm/s to 2.75 mm

1 mm/s to 3.5

10mm/s to 4.25

1mm/s to 5.0

10mm/s to 5.75

5.75 16:39.58 1 to 1cl.

Biax Experiment

Exp. Name p0545 3 c. 005 Date 1 NOV 01

Operator Koren

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) So. Calaveras fault sand (BAG1 + BAG2)

Particle Size, Size Distribution ?

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm

Normal Stress 5, 10, 15, 20, 25 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 2-20-200 mic/s

Lt init = 93.5 mm
= 93.8 mm @ 5MPa. before τ on

Data Logger Used labview

Lt fin = 91.0 mm
= 91. @ 25 MPa τ off.

Servo Gain Adjust? _____

Vertical DCDT Gain hi

TDXR offsets horiz in low Gain

Comments:

τ on @ 0.68mm on DPM

5MPa (50kN) Run in @ 20mic/s for 6mm (4.68 on DPM)

[offset]

@ 5MPa Run in @ 20mic/s for 1.6mm

→ 2 → 20 → 200 → 20 → 2 → 20 (increased @ 200 mic/s step).

[offset]

@ 10MPa Run in @ 20mic/s for 1.6mm.

→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset]

@ 15MPa Run in @ 20mic/s for 1.6mm

→ 2 → 20 → 200 → 20 → 2 → 20

[offset]

@ 20MPa Run in @ 20mic/s for 1.6mm

→ 2 → 20 → 200 → 20 → 2 → 20 → (Dot moved 0.5V

[offset]

@ 25MPa Run @ 20mic/s for 1.6mm

→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[unload]

DPM	mic/s
1.6	2
2.2	20
2.8	200
3.4	20
4.0	2
4.6	20
5.2	200
5.8	20

Biax Experiment

Exp. Name f053s3sr005 Date 1 Nov 01

Operator Koren

Gouge (or other sample) Gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) Sikeston Ridge Missouri (fault sand)
Particle Size, Size Distribution ?

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness Grooved
Contact Dimensions 10 x 10 cm

Normal Stress 5, 10, 15, 20, 25 (MPa)
(DPM readouts) kN

Vertical	zero load 006	mid_experiment _____	(timedisp. = _____)
Horizontal	zero load -000	mid_experiment _____	(timedisp. = _____)

Displacement Rates 2-20-200 mic/s

Data Logger Used labview 4

Servo Gain Adjust? _____

Vertical DCDT Gain hi

TDXR offsets Change boxing to low Gain
Increase Horiz gain 8½ turns.

Lt init = 93.8 mm @ 5MPa
= 94.1 mm Just prior to T.

Lt final = 91.6 mm @ 25 MPa
91.4 mm after T off

RH₀ = 26 %
T₀ = 24 °C

Comments: DPM reads 10 → 10 kN → 1 MPa on 10x10cm sample.

Horiz load up tried to switch to load control too early → offset horiz DPM reading. Switched @ 50kN finie.

↑ on @ 0.3 DPM mm.

5MPa (50kN) run in @ 20mic/s for 4mm (6.3 on DPM)
[offset]

δ_n @ 5MPa Run in @ 20mic/s for 1.6mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset] Go to 10MPa.

δ_n @ 10MPa Run in @ 20mic/s for 1.6mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset] Go to 15MPa

δ_n @ 15MPa Run in @ 20mic/s for 1.6mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 → -92.0mm

[offset] to to 20MPa

δ_n @ 20MPa Run in @ 20mic/s for 1.6mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 (physical dat offset)

91.6mm

[offset] Go to 25MPa.

δ_n @ 25MPa Run @ 20mic/s for 1.6mm
→ 2 → 20 →

DPM	mic/s
1.6	2
2.2	20
2.8	200
3.4	20
4.0	2
4.6	20
5.2	200
5.8	20

Biax Experiment

Exp. Name p052s3sr001 Date 1 Nov 01

Operator Karen

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Sikeston Ridge Missouri (fault sand)

Particle Size, Size Distribution ?

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 10 x 10

Normal Stress 1, 2.5, 5, 7.5 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 2-20-200 mic/s

Data Logger Used labview 4

Servo Gain Adjust? _____

Vertical DCDT Gain hi

TDXR offsets Horiz in hi Gain

Comments: Shear load on @ -0.59 mm on DPM.

initial lt @ 1MPa = 96.73 mm
96.2 mm

final lt @ 7.5MPa = 92.3 mm
after ↕ off 92.4 mm

RH = 25.6%
T = 26°C

Run in @ 20mic/s for 4mm SD (4.59 on DPM)
[offset]

@ 1 MPa — Run in @ 20mic/s for 1.6 mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset] load up to 2.5 MPa.

@ 2.5 MPa — run in @ 20mic/s for 1.6mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset] load up to 5 MPa

@ 5.0 MPa — run in @ 20mic/s for 1.6mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset] load to 2.5 MPa

@ 2.5 MPa — run in @ 20 mic/s for 1.6mm
→ 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[shear load off.]

DPM	mic/s
1.6	2
2.2	20
2.8	200
3.4	20
4.0	2
4.6	20
5.2	200
5.8	20

Biax Experiment

Exp. Name 010153cr001 Date 1/NOV/01

Operator Koren

Gouge (or other sample) Gauge
Layer Thickness 3mm
Material (Qtz, Granite, ?) So. Calaveras fault sand (BAG 1)
Particle Size, Size Distribution ?

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10 x 10 cm

Normal Stress 1, 2.5, 5, 2.5 (MPa)
(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 2-20-200

Initial σ_n = 1 MPa
↓
when shear load 1st on.

93.9mm = lt front
93.9mm = lt back

Data Logger Used labview 4 ch

Servo Gain Adjust? No

final σ_n = 2.5 MPa
after T off

lt front = 92.0 mm
lt back = 92.2 mm

Vertical DCDT Gain hi

TDXR offsets leave in hi gain

RH = 25.6 %
T = 24 °C

Comments:

So Calaveras fault (Bag 1) → Contained consolidated sand chunks (friable size) → sieved on 20 mesh to remove these. Then built sample as usual.

NB: Forgot logger until 1 MPa = σ_n LVDS on
locked up + started logging. switch to load feedback.

4mm SD run in @ 20mic/s

1MPa 7.5MPa 5MPa.

(Shear load on @ -0.39 mm)

→ [offset]

@ 1 MPa (99kN)
Run @ 20mic/s (for 1.6mm) → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20
[offset] load to 2.5 MPa

@ 2.5MPa (249kN)
Run @ 20mic/s (for 1.6 mm) → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20
[offset] load to 5MPa

@ 5MPa (299kN)
Run @ 20mic/s (for 1.6 mm) → 2 (lt = 92.4 mm) → 20 → 200 → 20 → 2 → 20 → 200 → 20
[offset] load to 7.5 MPa.

@ 7.5MPa (269kN)
Run @ 20mic/s (for 1.6 mm) → 2 (lt = 92.3 mm) → 20 → 200 → 20 → 2 → 20 → 200 → 20

DPM	mic/s
1.6	2
2.2	20
2.8	200
3.4	20
4.0	2
4.6	20
5.2	200
5.8	20

Biax Experiment

Exp. Name p050 53hr005 | Date 31Oct01

Operator Karen

Gouge (or other sample) Gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) humboldt Mckinleyville sand
Particle Size, Size Distribution ~100µm ?

Forcing Blocks (Steel, Westerly, ?) Steel | Block # ____
Roughness grooved
Contact Dimensions 10x10

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment ____ (timedisp. = ____)
Horizontal zero load -007 mid_experiment ____ (timedisp. = ____)

Displacement Rates 2-20-200-2000-20000 mic/s

Data Logger Used labview 4 / mon_out

Servo Gain Adjust? ____

Vertical DCDT Gain ____

TDXR offsets noisy in hi gain

Start σ_n = 5 MPa lt_{front} = 93.13 lt_{back} = 93.2 @ 1st offset

RH = 24%

To = 24 C

σ_n = 5 MPa lt = 91.7 mm @ end.

Comments:

dM = 0-23mm shear load on
Regular loading 2-20-200 mic/s
then 2 stages of fast Δ2A. 200-2000-200 mic/s

Run in @ 20mic/s to (4.23) 4mm
offset (do layer thickness measurement here).

Run @ 20 mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 →

→ Auto 200 - 2000 → 20000 → 2000 → 20000 → 2000 → 200

92.3mm ↙

Run @ 20mic/s → 2 → 200 → 200 → 20 → 2 → 20 → 200 → 20
offset

→ Auto 200 - 2000 - 20000 → 2000 → 20000 → 2000 → 200
offset (zero)

Run @ 20mic/s → 2 → 20 → 200 → 20 → 2 → 20 →

DPM	V mic/s
0.4	2
1.0	20
1.6	200
2.2	20
2.8	2
3.4	20
4.0	200
4.6	20
5.2	offset.

Auto (Dorian script)

0	200
1	2000
2	20000
3	2000
4	20000
5	2000
6	200

Biax Experiment

Exp. Name P0495 3hr 005 Date 30 Oct 01

Operator Koven

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) humbolt Mckinleyville sand

Particle Size, Size Distribution ~ 100 μm ?

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load .005 ~~mid~~ end experiment .005 (timedisp. = _____)

Horizontal zero load -.004 ~~mid~~ end experiment -.005 (timedisp. = _____)

Displacement Rates _____

Data Logger Used labview 4

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets having ram in hi gain

Stat σ_n = 5 MPa Utfront = 93.9 mm
Utback = 93.9 mm

Grad σ_n = 5 MPa Utfront = 91.75 mm
Utback = 91.6 mm
after vert loaded

RH = 17%
T_o = 26°C

Comments:

σ_n = 496 lcN on DPM Determine displacement effect on V dependence
0.48 mm vert load on. @ 5 Mpa = σ_n.

Run in @ 20 mic/s for 4mm DPM (4.48)

sample rate didn't click down ⟷

[offset]

Run in @ 20 mic/s ~~[illegible]~~ → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset]

τ → 75

n →

* Run in @ 20 mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset]

Run in @ 20 mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

[offset]

* Run @ 20 mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 →

[offset]

↙ ~~vert~~ horiz gain to turn down.

Run @ 20 mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

unload.

smooth
decimant

DPM	V (mic/s)
0.4	2
1.0	20
1.6	200
2.2	20
2.8	2
3.4	20
4.0	200
4.6	20
5.2	[offset]

smooth / decimant

pick V-steps (a-b) @ row #

stats for row #

Biax Experiment

Exp. Name p048S3hr001 Date 30 Oct 01

Operator MAR

Gouge (or other sample) Lange

Layer Thickness 3mm

Material (Qtz, Granite, ?) NUMBER MCKINLEYVILLE SAND

Particle Size, Size Distribution ? ~ 100 μm.

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10

Normal Stress 1 (MPa)

(DPM readouts) kN

Vertical zero load 0.06 mid_experiment (timedisp. =)

Horizontal zero load -0.04 mid_experiment (timedisp. =)

(σ_n = 0 MPa → 96.8 mm)

Displacement Rates 2-70-200 stab σ_n = 1 MPa l_{front} = 96.5 mm

l_{back} = 96.7 mm

Data Logger Used Labview 4 Gd σ_n = 1 MPa 92.59 mm

92.79 mm

Servo Gain Adjust?

RH = 24%

T_0 = 26 °C

Vertical DCDT Gain hi

TDXR offsets

Comments:

Horiz in hi gain

Determine displacement effects on V dependence

@ 1 MPa = σ_n

Vert Gd on @ 0.18 mm

DPM

Run in @ 20mic/s for 4 mm (6.18) [offset]

Run @ 20mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 → [offset]

$\tau \rightarrow 13$
$\mu \rightarrow 0.6$

Run @ 20mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 [offset]

↙ slight gouge loss stents.

$\tau \Rightarrow 13$
$\mu \rightarrow 0.6$.

Run @ 20mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 offset

Run @ 20mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 → offset

Run @ 20mic/s → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20 → unload.

DPM	V(mic/s)
0.4	2
1.0	20
1.6	200
2.2	20
2.8	2
3.4	20
4.0	200
4.6	20
5.2	(offset)

Biax Experiment

Exp. Name P04753hr005 Date 29 Oct 01

Operator MAR / GOYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) HUMBOLT COUNTY MCCANCLEY VILLE SAND

Particle Size, Size Distribution ? ~ 100μm ?

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10

Normal Stress 1, 7.5, 5, 7.5 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment (timedisp. =)

Horizontal zero load −006 mid_experiment (timedisp. =)

Displacement Rates

Data Logger Used labview 4 chan

Servo Gain Adjust? Yes - Horiz - 8½ turns

Vertical DCDT Gain

TDXR offsets

Lt initial $\delta_n = 0$ → 95.40mm

σ_n = 1MPa Lt = 94.50mm front

σ_n = 1MPa Lt = 94.50 mm back (Start)

σ_n = 7.5MPa Lt = 92.08 front

92.12 back (End)

Ch 172.

Comments:

horiz ram in hi gain (turn gain down 4½ +4)

logger on @ 1MPa (96kN)

DPM reads 100 → 10kN → 1MPa (for 10x10 sample)

0.37mm

0.63mm 1st vert load on

5mm run in 0.75mm after V steps.

Run in @ 20mic/s to 4.43 mm (4mm) 20→2→20

2 4.43

20 5.03 → offset @ 5.63mm

~~200 5.63 → offset~~

~~20 6.23~~

~~20 2 20 200 20 200 20~~ offset 20→2

0.6 1.2 1.8 2.4 3.0 3.6 4.2 4.8 5.

Run @ 20 → 2 → 20 → 2 → 20 → 200 → 20 → 200 → 20 offset

244kN → 2.5MPa

Run @ 20 mic/s → 2 → 20 → 2 → 20 → 200 → 20

for 1.6mm

offset

---

494 kN → 5MPa → 2 → 20 → 200 → 20 → 2 → 20 → 200 → 20

Run in @ 20 mic/s offset.

for 1.6mm

(... forgot to unlock vent.)

244 kN → 2.5 MPa

Run in @ 20mic/s for 1.6mic → 2 → 20 → 200 → 20 → ~~2~~ → 20 → 200 → 20

Biax Experiment

Exp. Name P0463Shr005 Date 29 Oct 01

Operator MAR / MARONE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) HUMBOLT SAND (MCKINLEYVILLE F.2)

Particle Size, Size Distribution ? ~ 100 μm Mean

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 10x10

Normal Stress 5, 10, 15, 20, 25 (MPa)

(DPM readouts) kN

Vertical zero load .004 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.002 mid_experiment _____ (timedisp. = _____)

Displacement Rates 2-20-200 mic/s

Lt initial = 95.35 mm before loading

Data Logger Used labview 4chan

Servo Gain Adjust? No

RH_o = 17%

T_o = 24°C

Vertical DCDT Gain hi

TDXR offsets _____

_____

_____

Comments:

48kN, 50MPa load @ 20mic/s

Lt front @ 5MPa = 93.89 mm

Lt back @ 5MPa 93.82 mm

Start

Vert load on @ -0.6mm DPM.

Lt front @ 25MPa = 91.23 mm

Lt back @ 25MPa = 91.32 mm

End

Load up @ 20 μm/s ⊠ 49 kN

DCDT offset @ 5 mm

0.4 mm 20 → 2 mic/s

0.7 mm 2 → 20
20 → 200
200 → 20

1.4 mm → 2
20
200
20 I 200!
2

XDT 3.36 mm

δ = 10 MPa H_{DISP} = 0.71

20	
2	0.4 ← go further
20	0.7
200	1.0
20	1.3
2	1.6
20	1.9
200	2.2
20	2.5
2	2.8
20	3.1
2	3.4

Block set up

<25 mm

<69 mm

δn 15 MPa

20	~~0.6~~
2	~~0.8~~ 0.6
20	1.9
200	2.2
20	2.5
2	2.8
20	~~3.4~~
200	~~3.7~~
20	~~4.0~~
2	4.0

δn = 20 MPa

20	
2	1.6
20	1.9
200	2.2
20	2.5
2	2.8
20	3.1
20	3.4
20	3.7
2	4.0

δn = 25 MPa offset -

20	~~1.6~~
2	1.6
20	1.9
200	2.2
20	2.5
2	2.8
20	3.1
200	3.4
20	3.7
2	4.0

Biax Experiment

Exp. Name p04553mr010 Date 28 OCT 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm 93.42 93.55 @10 MPa

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40→35→10 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20, 1 mm/s

Data Logger Used LabVIEW 4

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: Saturated (100% RH) @ 10 MPa, T = 24°C

σ_N to 40 MPa, T on @ 0.20 mm, unload @ 2.56 (2.76 net)

reload, unload @ 3.2 (3.4 net)

reload, unload @ 3.84 (4.04)

[offset), σ_N to 35 MPa, do velocity steps 10-20-10-20... unload [offset]

σ_N to 10 MPa displace to 2.75mm, do vel. steps (over)

0 – 2.75 mm → 10 mm/s

2.75 – 3.5 1 mm/s

3.5 – 4.25 10

4.25 – 5 1

5 – 5.75 10

5.75 1000s Hold

Biax Experiment

Exp. Name p0445 3mr 045 Date 28 OCT 2001

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm 94.47, 94.60 @ 10MPa

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #_____

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 35 → 45 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment_____ (timedisp. = _____)

Horizontal zero load 006 mid_experiment_____ (timedisp. = _____)

Displacement Rates 10, 20, 1 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: Saturated (100% RH) @ 10MPa σ_N, T=

σ_N to 40MPa, T on @ 0.04mm disp, unload @ 2.56 (2.60net)

reload, unload @ 3.2mm (3.24)

reload, unload @ 3.84 (3.88)

[offset], σ_N to 35MPa, do velocity steps 10-20-10-20... unload [offset]

σ_N to 45MPa, displace to 2.75 mm, do vel. steps (over)

2.75 → 3.50 1 mm/s

3.5 → 4.25 10

4.25 → 5.0 1 mm/s

5.0 → 5.75 10

5.75 1000s Hold

Biax Experiment

Exp. Name p043s3mr005 Date 28 OCT 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm 94.5, 94.6 @10MPa

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 40 → 35 → 5 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 1, 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain Hyz

TDXR offsets _____

Comments: σ_N to 10 MPa, saturate (100%RH), T = 24°C,
σ_N to 40 MPa, T on @ 0.09mm, unload @ 2.56 (2.65 net)
reload, unload @ 3.2 (3.29)
reload, unload @ 3.84 (3.93)
[offset], σ_N to 35 MPa, displace to 1.6mm, do velocity steps
every 0.6mm - 10-20-10-20-10... ~~Eoff~~ unload, [offset]
σ_N to 5 MPa; displace to 2.75 mm do vel. steps (over)

vel. steps

10 mm/s to 2.75 mm

1 mm/s to 3.5 mm

10/100 mm/s to 4.25

1 mm/s to 5.0

10 mm/s to 5.75

5.75 16:39.89 hold.

Biax Experiment

Exp. Name p042 S3 mr 005 Date 27 OCT 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm - 92.30, 92.13 @ 10 MPa

Material (Qtz, Granite, ?) Soda-lime glass

Particle Size, Size Distribution ROUGH, 1-800

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 25 → 5 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

T = 24°C

Comments: Sahrated @ 10 MPa, σ_N to 40 MPa, τ_m @ 0.34

unload @ 2.50mm (2.90)

reload, unload @ 3.2 mm (3.54)

reload, unload @ 3.86 (4.18)

[offset] σ_N to 25 MPa, displace to 1.6 mm, do velocity steps every 0.6 mm

10 - 20 - 10 - 20 - 10 ... unload [offset]

σ_N to 5 MPa, displace 2.0 mm, do SHS

SIS

Disp	Hold Time
2.0	3.01
2.15	2.95
2.30	9.89
2.50	9.90
2.7	29.94
2.95	30.37
3.2	1:39.99
3.5	1:40.12
3.8	5:00.03
4.15	5:00.15
4.5	16:43.69
4.85	

Biax Experiment

Exp. Name p0453mr025 Date 27 OCT 2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm 91.23.91.98 @ 10 MPa

Material (Qtz, Granite, ?) Soda lime glass

Particle Size, Size Distribution 1-500 um ROUGH

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 10x10

Normal Stress 40→25 (MPa)

(DPM readouts) kN

Vertical zero load 005 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 001 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20, ~~Ramps~~

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: Saturated, T=23°C

Sat. @ 10MPa, σ_N to 40MPa τ on @ 0.34 mm, unload @ 2.56mm (2.90)

reload, unload @ 3.2 mm (3.54)

reload, unload @ 3.84mm (4.18)

[offset] σ_N to 25 MPa displace to 1.6 mm, do velocity steps every 0.6mm

10-20-10-20 ... etc. [offset]

Displace to 0.4mm, do SHS (over)

SIIS

disp	Thold time
0.4	3.16
0.55	2.86
0.70	9.86
0.80	9.96
1.10	30.04
1.35	30.03
1.60	1:40.02
1.90	1:39.89
2.20	4:59.95
2.55	4.59.99
~~3.00~~	1:40.03
3.~~75~~ 45	1:40.06

Biax Experiment

Exp. Name p070s7mr060 Date 10-19-01

Operator Suffer

Gouge (or other sample) gouge

Layer Thickness 7 mm (pre-assembly) ; 5 mm (post-assembly)

Material (Qtz, Granite, ?) Smectite

Particle Size, Size Distribution <500 mm

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 5×5.25 cm

Normal Stress 60 → 80 → 130 (MPa)

(DPM readouts) kN

Vertical zero load 0.05 kN mid experiment (timedisp. =)

Horizontal zero load 0.04 kN mid experiment (timedisp. =)

Displacement Rates 2, 20, 200 um/s

Data Logger Used Biax 4 ch. (Labview)

* 91.8 mm thick under 60 MPa load

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	_____	Mass Qtz + cup (before):	_____
Mass Qtz + cup (after):	_____	Mass Qtz + cup (after):	_____
Mass cup:	_____	Mass cup:	_____

Comments: load init @ -0.10 mm

20 mm/s to 5.0 mm disp [offset] both hor. + vert

@ 80 MPa : 20 mm/s to 2.0 mm → 20 - 2 - 20 - 200 - 20 - 2 - 20 - 200 - 20
[offset,
$\sigma_n \rightarrow$ M

@ 130 MPa: 20 mm/s to 2.0 mm → 20 - 2 - 20 - 200 - 20 - 2 - 20 - 200 - 20
~~[unload]~~ [offset
$\sigma_n \rightarrow 145$

@ 145 MPa: 20 mm/s to 3.5 mm → unload

88.8 mm thick after experiment
(400 um layer thickness)

Biax Experiment

Exp. Name P039s05mr060 Date 19 Oct 2001

~ 9:30 start

Operator MARONE / SAFFER

T = 23.7°C

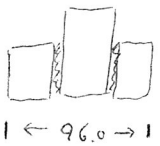
RH = 22.6%

Gouge (or other sample) 50% smectite / 50% QTZ F110

Layer Thickness 5mm Pre-assembly, 4mm post-assembly, 96.0 mm total

Material (Qtz, Granite, ?) QTZ, Commercial grade smectite

Particle Size, Size Distribution F110



Forcing Blocks (Steel, Westerly, ?) steel, small blocks Block # small block 88 mm wide w/ no gouge

Roughness grooved

Contact Dimensions 5.02 x 5.27

$60 \times 10^6 \frac{N}{m^2} = \frac{F}{A} \Rightarrow F = 158.7\ kN$

$A = 2.646 \times 10^{-3}\ m^2$

Normal Stress 60MPa → (MPa)

(DPM readouts) kN

Vertical zero load 006 mid experiment (timedisp. =)

Horizontal zero load 001 mid experiment (timedisp. =)

−0.5 Vert load on. $\sigma_H \Rightarrow F = 0$ −4.937 50.61mV 1 kN = 0.378

Displacement Rates

19.29 mV/kN · kN/0.378 MPa

Data Logger Used

60MPa Total thickness = 91.5 @ H136

Horz. DCDT offset →

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	_____	Mass Qtz + cup (before):	_____
Mass Qtz + cup (after):	_____	Mass Qtz + cup (after):	_____
Mass cup:	_____	Mass cup:	_____

Comments: 20 um/s to 5.0 mm disp [offset]

then 20 um/s to 2.0 mm → 20 um/s → 2 - 20 - 200 - 20 - 2 - 20 - 200 - 20 - 2 - 20 [offset 0.78]

20 um/s to 2.0 mm → [Hit 0.71]

@ 120 MPa: 20 mm/s to 2.0 mm → 20-2-20-200-20-2-20-200-20 [offset, V. DCDT offset, $\sigma_n \rightarrow 145$ MPa]

@ 145 MPa: 20 mm/s to 2.0 mm → 20-2-20-200-20 [end expt.]

88.7 mm thickness @ end exp.

Biax Experiment

Exp. Name p038s7nr020 Date 10-18-01

16:05 start

Operator SAFFER/MARONE T = 23.8°C

RH = 19.5%

Gouge (or other sample) gouge

Layer Thickness 7 mm (pre-assembly) → 5 mm (post assembly)

Material (Qtz, Granite, ?) ~~No~~ Leg 190 1174-74

Particle Size, Size Distribution < 500 mm

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5 x 5.25

Normal Stress 20 (MPa) (52 kN)

(DPM readouts) kN

Vertical zero load 5 kN mid_experiment _____ (timedisp. = _____)

Horizontal zero load 1 kN mid_experiment _____ (timedisp. = _____)

Displacement Rates 2, 20, 200 mm/s

σ_H in low gain.

Servo # 90 → 93.0 Total thickness (2.5 mm layers)

Data Logger Used LabView Biax 4 ch. #230. Horz DCDT offset.

Servo Gain Adjust? Both vert & Horz adj @ ~21900 - during 20 mm/s section < 2 mm/s section @ 22800.

Vertical DCDT Gain _____

TDXR offsets _____

_____

_____

Comments:

load initiated at panel reading -0.45 mm

20 mm/s to 5.0 mm disp [offset]

20 mm/s to 2.0 mm → then 20-2-20-200-20-2-20-200-20 (offset

0.5 mm steps [20 mm/s to 2.5 mm → then 20-2-20-200-20 [offset]

20 mm/s to 2.0 mm → then 20-2-20-200-20-2-20 [offset] →

20 mm/s to 0.5 mm → 20 - 2 - 20 (unload)

90.3 mm thickness at end of experiment

(1.15 mm layer thickness)

Biax Experiment

Exp. Name p037s7nr010 Date 10-18-01

Operator Safter

Gouge (or other sample) gouge
Layer Thickness 7 mm bench (pre-assembly), 5 mm (post-assembly)
Material (Qtz, Granite, ?) ODP Leg 190; 1174-7A
Particle Size, Size Distribution <500 mm

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 5 x 5.25 cm

Normal Stress 10 (MPa)

(DPM readouts) kN

Vertical zero load 006 mid_experiment _____ (timedisp. = _____)
Horizontal zero load =220 zero 0.1 mid_experiment _____ (timedisp. = _____)
└ 262 on DPM.

#242 @ 26 kN in low gain
σ_H output
switched to High gain.
Restarted in σ_H high gain.

Displacement Rates 2, 20, 200 mm/s

Data Logger Used Labview 4 ch.

Servo Gain Adjust? High Gain

Vertical DCDT Gain ~~[illegible]~~

* thickness: 92.5 mm at sample # 4680
= 2.25 mm layers

TDXR offsets _____

Comments:

load initiated at -1.2 mm

20 mm/s to 5.0 mm (-6.2 mm reading) [offset] Vert + Horiz

Sample #15060 gain? Stop + lock, re-start

20 mm/s to 2.0 mm → then 20-2-20-200-20-2-20-200-20 [offset]

20 mm/s to 2.0 mm → then 20-2-20-200-20-2-20 [offset]

20 mm/s to 2.0 mm → H[illegible] [offset]

at #34590 DCDT offset

resume @ 20mm/s [Vert. offset]

end experiment

load off @ #61590

Biax Experiment

Exp. Name p0365 7mr050 Date 10-17-2001

Operator SAFFER / MARONE

Gouge (or other sample) gouge

Layer Thickness 7 mm (pre-assembly); 4.9 mm (post-assembly)

Material (Qtz, Granite, ?) montmorillonite

Particle Size, Size Distribution < 500 mm

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 5 × 5.25 cm

Normal Stress 50 - 100 - 150 (MPa) (132 kN, 264 kN, 395 kN)

(DPM readouts) kN

Vertical zero load ~~005~~ 4 mid_experiment _____ (timedisp. = _____)

Horizontal zero load +1 mid_experiment _____ (timedisp. = _____)

Displacement Rates 2 - 20 - 200 mm/s

Data Logger Used Labview 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

_____

_____

σ_H Load in Disp. Mode, change to load mode, stop to offset dcdt#, continue to final load.

92.4 ~ #185 ← @ 132 kN.

= 2.2 mm thickness (layer)

Final thickness (w/ 150 MPa σ_n; # 261

89.3 mm

= 650 um thickness (layer)

Comments: sample 510 Horiz. DCDT offset

load initiated at -0.50 mm (sample # 570)

20 um/s to 5.0 mm displacement (-5.50 mm readings) [offset]

20 um/s to 2.0 mm → then 20 - 2 - 20 - 200 - 20 - 2 - 20 - 200 - 20 [offset, $\sigma_n \rightarrow 100$,

16,386

20 um/s to 2.0 mm → then 20 - 2 - 20 - 200 - 20 - 2 - 20 - 200 - 20 [offset, $\sigma_n \rightarrow 150$ MPa

20 um/s to 2.0 mm → then 20 - 2 - 20 - 200 - 20 - 2 - 20 - 200 - 20 [unload]

Biax Experiment

Exp. Name p035s7mr080 Date 10-17-01

Operator Saffer / Marone

Gouge (or other sample) Montmorillonite gouge
Layer Thickness 7 mm benchtop (pre-assembly) ; 4.8 mm (post-assembly)
Material (Qtz, Granite, ?) mont.
Particle Size, Size Distribution < 500 um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 5 x 5.25 cm

Normal Stress 40, 120 (MPa) (211, 316 kN)

(DPM readouts) kN

Vertical zero load ~~-016~~ -015 mid end experiment 001 (timedisp. = _____)
Horizontal zero load -020 ~~mid~~ experiment -004 (timedisp. = _____) - (191 kN)

Displacement Rates 2, 20, 200

Data Logger Used Labview 4 ch

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

steel sample and layers | (Hor. DCDT offset @ ~ 70 MPa.)
Total thickness @ 80 MPa = 92.0 mm
end of run ~# 26900
total thickness = 89.1

Comments: load initiated @ -0.21 mm ; Hor. DCDT offset at -1.66 mm reading ; sample #660
20 um/s to 5.0 mm displacement [offset]

400 um steps
- 20 um/s to 2.0 mm → then 20 - 2 - 20 - 200 - 20 - 2 - 20 - 200 - 20 (offset)
- 20 um/s to 2.0 mm → then 20 - 2 - 20 - 200 - 20 - 2 - 20 (offset; σ_1 → 120 MPa)
- 20 um/s to 2.0 mm → then 20 - 2 - 20 - 200 - 20 - 2 - [illegible] (offset) →

20 um/s to [illegible] mm → then Vert DCDT out of range (sample 24663)
1.92

new offset

20 um/s to 2.0 mm → then unload

Biax Experiment

10:47 A.M.

Exp. Name p0345ir080 Date 10-17-01

Operator SAFFER

Gouge (or other sample) illite shale / gouge
Layer Thickness 7 mm benchtop (pre-assembly); 4.5 mm post-assembly
Material (Qtz, Granite, ?) illite shale
Particle Size, Size Distribution < 500 mm

Forcing Blocks (Steel, Westerly, ?) steel Block # _____
Roughness grooved
Contact Dimensions 5 × 5.25 cm

Normal Stress 80 → 120 (MPa)

(DPM readouts) kN

Vertical zero load -016 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -020 mid_experiment _____ (timedisp. = _____)

Displacement Rates 2-20-200 um/s

Horz. DCDT OFFSET ~ # 220.
Thickness @ 211 kN (80 MPa) = 91 mm
23.8°C, 25% RH

Data Logger Used Labview 4 channel

Servo Gain Adjust? _____

Vert. servo gain adj. @ ~17300 right after σ_n increase during 20 mm/s section.

Vertical DCDT Gain _____

TDXR offsets _____

Final Block/layer thickness @ $\sigma_V = 0$, $\sigma_H = 316$ kN
89.26 pop.
89.8 bk.
~28550

Comments:

load initiated at -0.25 mm disp.
vert. offset at -5.25 mm (5.0 mm disp.)

200 um steps	2.0 mm	then	20-2-20-200-20-2-20-200-20-2-20-200-20-2-20 offset
400 um steps	2.0 mm	then	20-2-20-200-20 (offset) σ_n to 120 MPa (297 KN)
400 um steps	2.0 mm	then	20-2-20-200-20-2-20-2-20-200-20

unload

$$.4\,\frac{KN}{\mu m} \cdot \frac{10^4\,\mu m}{cm} \cdot \frac{1\,MN}{1000\,KN}$$

App stiff is.

$$K = 4\,\frac{MN}{cm} \cdot \frac{1}{(.05\,m)^2} = 1800\,\frac{mPa}{cm}$$

Biax Experiment

Exp. Name p033S3mr002 Date OCT-2-2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40→35-2.5 (MPa)

(DPM readouts) kN

Vertical zero load -016 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -019 low gain +002 high gain mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? Yes = -7 turns horiz./turned back after expt.

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: Saturated @10MPa, RH=100%, T=23°C

σ_N to 40 MPa T on @0.23mm unload @2.52 (2.79 gross)

reload, unload @3.2mm (3.43 gross)

reload, unload @3.84 (4.07 gross)

[offset], σ_N to 35 MPa, displace 1.6mm, do vel. steps every 600mm

10-20-10-20... unload [offset]

σ_N to high gain; σ_N to 2.5 MPa, displace 3.0mm, ~~do~~ do SHS (over)

	Hold Time (s)
3.0	2.95
3.15	3.13
3.3	10.01
3.5	9.92
3.7	30.27
3.95	30.00
4.2	1:40.02
4.5	1:40.02
4.8	~5:00
5.1	4:59.95
5.4	16:40.06
5.75	16:39.99

Biax Experiment

Exp. Name p0323s3mrD07 Date 2 OCT 2001

Operator K. FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 35 → 7.5 (MPa)

(DPM readouts) kN

Vertical zero load -016 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -019 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? vert. down 1/2 turn

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: Saturated @ 10 MPa, RH = 100%, T = 23°C

σ_N to 40 MPa, T on @ 0.44mm, unload @ 2.56mm (3.00)

reload, unload @ 3.2 mm (3.64 gross)

reload, unload @ 3.84 (4.08 gross)

[offset] σ_N to 35 MPa, displace 1.6 mm, do vel. steps every .6mm

10-20-10-20-10-20-10-20-10 unload [offset]

σ_N to 7.5 MPa, displace 3.0 mm, do SHS (over

Disp. (mm)	Hold Time (s)
3.0	3.06
3.15	2.98
3.3	10.02
3.5	10-ish
3.7	30.05
3.95	30
4.2	1:40
4.5	1:40.37
4.8	4:59.95
5.1	4:59.98
5.4	16:39.95
5.75	16:40.36

Biax Experiment

Exp. Name p03153mr045 Date 1 OCT 2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40→35→45 (MPa)

(DPM readouts) kN

Vertical zero load -.016 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.020 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH= 100% (saturated @ 10 MPa) T=23°C

σ_N to 40 MPa, τ on @ 0.12 mm, unload @ 2.56 mm (2.68 gross)

reload, unload @ 3.2 mm (3.32 gross)

reload, unload @ 3.84 (3.96 gross)

[offset], σ_N to 35 MPa, displace 1.6 mm, do Vel. steps every 0.6 mm.

10 - 20 - 10 - 20 - 10 - 20 - 10 - 20 - 10 [offset]

σ_N to 45 MPa, displace 3.0 mm, do SHS (oven)

Disp	Time
3.0	2.90
3.15	3.07
3.3	10.00
3.5	9.95
3.7	30.01
3.95	29.88
4.2	1:39.84
4.5	1:40.12
4.8	4:59.99
5.15	500.05
~~5.15~~ 5.5	16:40.06
~~5.8~~ 5.9	16:39.97

Biax Experiment

Exp. Name p030531rO12 Date 1 OCT 2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 35 → 12.5 (MPa)

(DPM readouts) kN

Vertical zero load -.015 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.019 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 100% (saturated @ 10MPa) T = 23°C

σ_N to 40MPa, Ton @ 0.12 mm, unload @ 2.56 (2.68 gross)

reload, unload @ 3.2 (3.32 gross)

reload, unload @ 3.84 (3.96 gross)

[offset] σ_N to 35 MPa, displace 1.6 mm, do velocity steps every 0.6mm

10-20-10-20-10-20-10-20-10-unload, [offset]

σ_N to 12.5 MPa, displace 3.0 mm, do SHS

disp (mm)	Hold Time (s)
3.0	2.95
3.15	3.05
3.3	9.95
3.5	9.95
3.7	30.09
3.95	29.95
4.2	1:39.88
4.5	1:39.99
4.8	5:00
5.1	4:59.99
5.4	16:40.24
5.75	16:39.93

Biax Experiment

Exp. Name p02953mr025 Date 1 OCT 2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 → 35 → 25 (MPa)

(DPM readouts) kN

Vertical zero load −.016 mid_experiment _____ (timedisp. = _____)

Horizontal zero load −.020 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 100% (saturated @ 10 MPa), T = 22.5°C

σ_N to 40 MPa, τ on @ 0.62 mm unload @ 2.56 mm (3.18 gross)
reload, unload @ 3.2 (3.82 gross)
reload, unload @ 3.84 (4.46 gross)

[offset], σ_N to 35 MPa, do vel. steps every 0.6 mm, 10-20-10-20.... unload [offset]

σ_N to 25 MPa, displace 3.0 mm, do SHS (cover)

Disp (mm)	Hold Time (s)
3.0	2.94
3.15	2.95
3.3	10.06
3.5	9.97
3.7	30.00
3.95	30.02
4.2	1:39.94
4.5	1:40.00
4.8	5:00.02
5.1	5:00.11
5.4	16:40.18
5.75	16:40.08

Biax Experiment

Exp. Name p028S3m-015 Date 30 Sept 2001

Operator K. Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 15 (MPa)

(DPM readouts) kN

Vertical zero load −015 mid_experiment (timedisp. =)

Horizontal zero load −019 mid_experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 100%, Sat. @ 10 MPa, T = 23°C

σ_n to 40 MPa, τ on @ 0.08 mm, unload @ 2.56 mm (2.64 gross)

reload, unload @ 3.2 (3.28)

reload, unload @ 3.84 (3.92)

[offset] σ_n to 35 MPa, displace 1.6 mm, do velocity steps

10-20-10-20... unload [offset]

σ_n to 15 MPa, displace 3.0 mm, do SHS (over)

Disp.	Hold Time (s)
3.0	3.06
3.15	3.07
3.3	10.12
3.5	11.0
3.7	29.94
3.95	30.00
4.2	1:39.96
4.5	1:40.73
4.8	5:00.07
5.1	5:00.16
5.4	16:39.99
5.75	16:40.13

Biax Experiment

Exp. Name p0275 3mm 010 Date 30 sept 2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 → 35 → 10 (MPa)

(DPM readouts) kN

Vertical zero load -.015 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.019 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LV 4 channel

Servo Gain Adjust? Horiz up 2 turns.

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 100% → saturated @ 10 MPa, T = 23°C

σ_N to 40 MPa, τ on @ 0.44 mm, unload @ 2.56 (3.10 gross)

reload, unload @ 3.2 (3.64 gross)

reload, unload @ 3.84 (4.28 gross)

[offset], σ_N to 35 MPa, displace 1.6 mm, do vel. steps every 600um

10 - 20 - 10 - 20 - 10 ... unload [offset]

σ_N to 10 MPa, disp. 3.0 mm, do SHS (over)

Disp (mm)	Hold Time (s)
3.0	3.05
3.15	2.99
3.3	9.93
3.5	10.06
3.7	30.16
3.95	29.84
4.2	1:40.05
4.5	1:39.95
4.8	5:00.32
5.1	5:02
5.4	16:39.95
5.75	16:40.02

Biax Experiment

Exp. Name p02653mr005 Date 30 Sept 2001

Operator K. Frye

Gouge (or other sample) gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) QTZ
Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10x10

Normal Stress 40 → 35 → 5 (MPa)
(DPM readouts) kN

Vertical zero load -015 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -019 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain 1Hz

TDXR offsets _____

Comments: Rit = 100%, T = 23°C
σ_N to 40 MPa, saturate @ 10 MPa, Ton @ 0.44, unload @ 2.56 (3.00 gross)
reload, unload @ 3.2 mm (3.64 gross)
reload, unload @ 3.84 mm (4.28 gross)
[offset] σ_N to 35 MPa, displace 1.6 mm, do vel. steps every 0.6 mm
10-20-10-20... unload [offset]
σ_N to 5 MPa, displace 3 mm, do SHS (over)

disp.	Hold Time (s)
3.0	3.02
3.15	3.06
3.3	9.98
3.5	9.83
3.7	29.97
3.95	30.03
4.2	1:39.90
4.5	1:39.93
4.8	5:00.06
5.1	5:00.94
5.4	16:41.79
5.75	16:40.09

Biax Experiment

Exp. Name p025s3mr-005 Date 29 SEPT 2003

Operator K. FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 5 (MPa)

(DPM readouts) kN

Vertical zero load -.015 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.018 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LV 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH = 33%, T = 23°C

σ_N to 40 MPa, τ on @ 0.32, unload @ 2.56 mm (2.88 g ross)

reload, unload @ 3.2 (3.52 g ross)

reload, unload @ 3.84 (4.16 gross)

[offset], σ_N to 35 MPa, displace to 1.6 mm, do vel. steps every 600 um, 10-20-10-20, unload [offset]

σ_N to 5 MPa, displace to 3.0 mm, do SHS (oven)

disp.	Hold Time (s)
3.0	3.09
3.15	3.09
3.3	10.02
3.5	9.88
3.7	29.99
3.95	29.97
4.2	1:43.51
4.5	1:40.00
4.8	5:00.02
5.1	4:59.95
5.4	16:40.06
5.75	16:40.04

Biax Experiment

Exp. Name p024 S3 mr 007 Date 28 SEPT 2001

Operator K. FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 35 → 7.5 (MPa)

(DPM readouts) kN

Vertical zero load ~~- 017~~ 015 mid_experiment _____ (timedisp. = _____)

Horizontal zero load - 000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used Lab VIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: T=23°C, RH=37%

σ_N to 40 MPa, τ on @ 0.14mm, unload @ 2.56mm (2.70 gross)
reload, unload @ 3.2 (3.34 gross)
reload, unload @ 3.84 (3.98 gross)
[offset], σ_N to 35 MPa, disp. to 1.6mm, do vel. steps every 0.6mm
10-20-10-20-10 etc., unload, [offset]

σ_N to 7.5 MPa, displace 3.0mm, do SHS (over)

disp. (mm)	Hold Time (s)
3.0	3.09
3.15	2.96
3.3	9.88
3.5	9.96
3.7	29.94
3.95	29.95
4.2	1:39.93
4.5	1:39.94
4.8	5:00.11
5.1	5:00.09
5.4	16:40.07
5.75	16:40.01

Biax Experiment

Exp. Name p02353mr 010 Date 28 SEPT 2001

Operator K. Frye

Gouge (or other sample) Gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) QTZ
Particle Size, Size Distribution F: 110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10x10

Normal Stress 40 → 35 → 10 (MPa)
(DPM readouts) kN

Vertical zero load -014 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -020 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: T = 23.5°, RH = ~~32%~~ 33%

σ_N @ 40 MPa, τ on @ 0.34 mm disp, unload @ 2.56 (2.90 gross)
reload, unload @ 3.2 mm (3.54 gross)
reload unload @ 3.84 (4.18 gross)

[offset] σ_N @ 35 MPa, do vel. steps after 1.6 mm disp.
10-20-10-20-10... unload [offset]

σ_N @ 10 MPa, displace 3.0 mm, do SHS (over)

Disp. (mm)	Hold Time (s)
3.0	2.94
3.15	3.13
3.30	10.09
3.5	9.90
3.7	30.02
3.95	30.02
4.2	1:40.14
4.5	1:40.05
4.8	4:59.98
5.1	4:59.93
5.4	16:39.98
5.75	16:39.97

Biax Experiment

Exp. Name p022 s3mr012 Date 28 SEPT 2001

Operator K. ARYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 35 → 12.5 (MPa)

(DPM readouts) kN

Vertical zero load -014 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -020 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: T = 23°C, RH = 35%

σ_N to 40 MPa, T on @ 0.24 mm disp., unload @ 2.56mm (2.80)
reload, unload @ 3.2 (3.44)
reload, unload @ 3.84 (4.08)

[offset], σ_N to 35 MPa, displace to 1.6mm do vel steps every 600 mm,
10 - 20 - 10 - 20 - 10 ... [offset]

σ_N to 12.5 MPa, do SHS after 3 mm disp. (cover)

SITS

disp	Hold Time (s)
3.0	3.16 s
3.15	3
3.30	9.88
3.50	9.82
3.70	29.98
3.95	29.94
4.20	1:39.92
4.5	1:39.73
4.8	4:59.54
5.1	5:00.00
5.4	16:40.04
5.75	16:40.05

Biax Experiment

Exp. Name p0215 3mr015 Date 28 SEPT 2001

Operator Kevin Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → ~~15~~ 35 → 15 (MPa)

(DPM readouts) kN

Vertical zero load -.015 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.020 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain 1+3

TDXR offsets _____

Comments: T=23°C, RH=36%

σ_N to 40 MPa, τ on @ 0.24 mm disp. unload @ 2.570mm (2.80 gross)

reload, unload @ 3.2mm (3.44 gross)

reload, unload @ 3.84 (4.08 gross)

[offset]; σ_N to 35 MPa, displace to 1.6 mm, do vel. steps every 600 mm.

10 - 20 - 10 - 20 - 10 ... [offset]

σ_N to 15 MPa, do SHS after 3.0 mm disp. (over)

Disp (mm)	Hold Time (s)
3.0	2.92
3.15	2.93
3.30	9.97
3.50	9.98
3.70	29.96
3.95	29.89
4.2	1:39.94
4.5	1:39.53
4.8	5:00.04
5.1	5:00.13
5.4	16:40.05
5.75	16:40.06

Biax Experiment

Exp. Name p020S3mr025 Date 27 Sept 2001

Operator K. Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Soda lime glass

Particle Size, Size Distribution 1-800 um rough

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load -014 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -019 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain 1Hz

TDXR offsets _____

_____

_____

Comments: RH = 37%, T = 23° C

σ_N to 40 MPa, [offset] layer thickness, τ on @0.55, unload @ 2.56 (3.11) net

reload, unload @ 3.2mm (3.75)

reload, unload @ 3.84 (4.39)

[offset], σ_N to 25 MPa, displace 1.6 mm, do vel. steps every 600 um

10-20-10-20-10... [offset]

displace 0.4 mm, do SitS (over)

disp (mm)	Hold Time (s)
0.4	3.06
0.55	3.10
0.70	9.99
0.90	9.96
1.10	29.93
1.35	30.09
1.60	1:40.08
1.90	1:39.95
2.20	5:00.06
2.55	5:00.02
2.90	16:39.97
3.25	16:40.04

Biax Experiment

Exp. Name p019 S3mr025 Date 27 Sept 2001

Operator K. FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Westerly

Particle Size, Size Distribution <500um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40→25 (MPa)

(DPM readouts) kN

Vertical zero load -014 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -019 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 chan.

Servo Gain Adjust? down 3 turns (vert)

Vertical DCDT Gain High

TDXR offsets _____

Comments: T = 23.5°C, RH = 36%

σ_N to 40 MPa, τ on @ 0.73, unload @ 2.56 mm (3.29 net)

reload, unload @ 3.2 (3.93 net)

reload, unload @ 3.84 (4.57 net disp)

[offset], σ_N ≈ 25 MPa, displace to 1.6 mm, do vel. steps every 600 um.

10-20-10-20... [offset]

displace to 0.4 mm, do SHS

(over)

disp (mm)	time (s)
0.4	3.06
0.55	3.03
0.7	10.16
0.9	9.95
1.10	29.98
1.35	31.00
1.60	1:40.98
1.90	1:39.88
2.20	4:59.95
2.55	4:59.96
2.90	16:40.38
3.25	16:39.99

Biax Experiment

Exp. Name D018 S3mr 002 Date 31 Aug 2001

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 70x70

Normal Stress 40 → 35 → 2 (MPa)

(DPM readouts) kN

Vertical zero load -.012 mid_experiment _____ (timedisp. = _____)

Horizontal zero load .008 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 chan

Servo Gain Adjust? change gain to high, down turn 4 turns

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH=58% T=24°C

σ_n to 40 MPa; T on @ 0.08 mm, unload @ 2.56 mm (2.64 gross)

reload unload @ 3.2 (3.28 gross)

reload, unload @ 3.84 (3.92 gross)

[offset] σ_n to 35 MPa, displace to 1.6mm, do vel. steps every 600 um

10-20-10-20 unload [offset] σ_n to 2 MPa, do SHS →

disp.	Hold Time
3.0	3.02
3.15	3.05
3.30	10.02
3.50	10.00
3.70	30.07
3.95	29.98
4.2	1:39.99
4.5	1:40.03
4.8	4:59.97
5.1	4:59.13

large weakening trend - displace further

~~5.4~~ goto 6.4, [offset]

~~5.8~~ go to 3.0 mm, do SHS

disp	Hold Time
3.0	2.97
3.15	3.09
3.30	9.94
3.5	10.00
3.7	30.03
3.95	29.99
4.2	1:39.90
4.5	1:40.07
4.8	5:01.87

5.1 locked up, horizontal ran off, apparently 2. MPa was the offset in high gain

5.4

5.8

Biax Experiment

Exp. Name p01753mr045 Date 31 AUG 2001

Operator Fryk

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 35 → 45 (MPa)

(DPM readouts) kN

Vertical zero load -012 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 009 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV4

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 60% T = 24°C

σ_N = 40 MPa, τ on @ 0.36 mm; unload @ 2.56 mm (2.92 gross)

reload, unload @ 3.2 (3.56 gross)

reload, unload @ 3.84 (4.2 gross)

[offset] σ_N to 35 MPa, displace 1.6 mm, do vel. steps every 0.6 mm

10 - 20 - 10 - 20 - 10 ^ [offset] unload

σ_N to 45 MPa displace 3.0 mm, do SHS (over)

drop (mm)	Hold Time (s)
3.0	3.06
3.15	3.16
3.30	9.94
3.50	9.84
3.70	30.01
3.95	29.93
4.20	1:40.00
4.5	1:40.03
4.8	5:00.01
5.15	5:00.01
5.5	16:40.06
5.9	16:40.55

Biax Experiment

Exp. Name p01653mr035 Date 26 AUG-2001

Operator FRYE

Gouge (or other sample) GOUGE
Layer Thickness 3mm
Material (Qtz, Granite, ?) QTZ
Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10 x 10

Normal Stress 40 → 35 → 35 (MPa)
(DPM readouts) kN
Vertical zero load -028 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -010 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust? N.

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 100% (sat) T = 24°C
σ_N to 40 MPa (sat. @ 10) τ on @ 0.4mm, unload @ 2.56mm (2.96 gross)
reload unload @ 3.2 (3.6 gross)
reload, unload @ 3.84 (4.24 gross)
[offset] σ_N to 35 MPa, displace to 1.6mm, do vel. steps every 600 mm
10 - 20 - 10 - 20 ... unload [offset]
σ_N still @ 35, reload, displace to 3.0 mm, do SHS (over)

disp. (mm)	Hold Time
3.0	3.02
3.15	3.00
3.30	9.93
3.50	9.95
3.70	29.93
3.95	30.03
4.20	1:39.99
4.50	1:40.02
4.80	4:59.92
5.10	4:59.99
5.40	16:39.97
5.80	16:39.95

Biax Experiment

Exp. Name p015s3mr015 Date 26 AUG 2001

Operator Frye

Gouge (or other sample) Gouge
Layer Thickness 3 mm
Material (Qtz, Granite, ?) QTz
Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10x10

Normal Stress 40 → 35 → 15 (MPa)

(DPM readouts) kN

Vertical zero load -027 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -008 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH=100%, T=24°C (sat.)

σ_N to 40 MPa (saturate @ ~15 MPa) T on @ 0.05 mm disp., unload @ 2.56 (2.61)
reload, unload @ 3.2 mm (3.25 gross)
reload, unload @ 3.84 mm (3.89 gross)

[offset], σ_N to 35 MPa, displace 1.6 mm, do velocity steps every 0.6 mm - 10-20-10-20-10... unload, [offset]

σ_N to 15 MPa, displace 3.0 mm, do SHS (over)

drop (mm)	Hold Time
3.0	3.16 s
3.15	3.15
3.30	9.88
3.50	9.88
3.70	30.07
3.95	30.03
4.2	1:40.04
4.5	1:41.08
4.8	5:00.00
5.1	4:59.96
5.4	16:40.10
5.8	16:40.11

Biax Experiment

Exp. Name p014s3mr035 Date 26 AUGUST 2001

Operator FRYE

Gouge (or other sample) GOUGE
Layer Thickness 3mm
Material (Qtz, Granite, ?) QTZ
Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 10x10

Normal Stress 40 → 35 → 35 (MPa)
(DPM readouts) kN
Vertical zero load -027 mid_experiment _____ (timedisp. = _____)
Horizontal zero load -008 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 90%, T = 23.7°C

σ_n to 40 MPa, T on @ -.12 mm disp, unload @ 2.56mm (2.68 gross)
unload, reload @ 3.2 (3.32 gross)
unload, reload @ 3.84 (3.96 gross)
[offset], σ_n to 35 MPa, displace to 1.6 mm, do velocity steps
10-20-10-20-10-... unload, [offset]

displace to 3.0 mm, do SHS (over)

disp	Hold Time
3.0	2.97
3.15	2.97
3.30	9.89
3.5	9.88
3.7	29.92
3.95	29.93
4.20	1:39.90
4.5	1:40.02
4.8	5:00.06
5.1	4:59.86
5.4	16:40.06
5.8	16:40.09

Biax Experiment

Exp. Name p01353mr010 Date 25AUG2001

Operator FREYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40→35→10 (MPa)

(DPM readouts) kN

Vertical zero load -026 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -009 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LV4

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH=100%, water poured on, T=23.8°C

σ_n to 10, saturate, σ_n to 40 MPa, T on @ 0.05mm, unload @ 2.52 (2.61 gross)

reload, unload @ 3.2 mm (3.25 gross

reload, unload @ 3.84 (3.89 gros

[offset], σ_n to 35 MPa, displace to 1.6 mm, do velocity steps

10-20-10-20... unload [offset]

σ_n to 10 MPa, do SHS (over) after going 3mm

Disp.	Hold Time
3.0	2.97 s
3.15	2.98 s
3.30	9.91
3.52	9.88
3.7	30.02
3.95	29.99
4.2	1:40.4
4.5	1:39.91
4.8	5:00.01
5.1	4:59.99
5.4	16:40.09
5.8	16:39.94

Biax Experiment

Exp. Name D0125 3mm 015 Date 25 AUG 01

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution FINE

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 15 (MPa)

(DPM readouts) kN

Vertical zero load -027 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -008 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LV4

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH=90%, T=24°C

σ_n to 40 MPa, I brought in @ ~~0.008~~ 0.08mm, ~~offset~~ unload @ 2.56 (2.64 gross)

reload, unload @ 3.2 (3.28 gross)

reload, unload @ 3.84 (3.92 gross)

[offset] σ_n to 35 MPa, displace to 1.6 mm, do velocity steps every 0.6 mm

10-20-10-20-10 ... ok. ~~Eq~~ unload, [offset]

σ_n to 15 MPa, displace to ~~8~~ 3.0 mm, do SHS (over)

Disp	Hold Time (s)
3.0	2.96
3.15	2.95
3.3	10.01
3.5	9.98
3.7	29.90
3.95	29.83
4.20	1:39.88
4.5	1:39.91
4.8	4:59.92
5.1	4:59.88
5.4	16:39.96
5.8	16:39.96

89% RH

Biax Experiment

Exp. Name p011S3mr005 Date 24 AUG 2001

Operator krye

Gouge (or other sample) gouge
Layer Thickness 3 mm
Material (Qtz, Granite, ?) QTZ
Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #
Roughness grooved
Contact Dimensions 10 x10

Normal Stress 40 → 35 → 5 (MPa)

(DPM readouts) kN

Vertical zero load -.028 mid experiment (timedisp. =)
Horizontal zero load -.009 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LV 4

Servo Gain Adjust?

Vertical DCDT Gain 1/4 gr

TDXR offsets

Comments: Sat. → 100% RH; T = 24.3°C

σ_N to 40 MPa. τ on @ 0.21 mm, unload @ 2.56 (2.77 gross)
reload, unload @ 3.2 (3.41 gross)
reload, unload @ 3.84 (~~3.87~~ 4.05 gross)

[offset] σ_N to 35 MPa, displace to 1.6 mm, do velocity steps every 0.6 mm
10-20-10-20... unload, [offset]

σ_N to 5 MPa, displace 3mm, do SHS (over.)

Disp.	Hold Time
3.0	3.02
3.15	3.02
3.30	9.95
3.50	9.91
3.70	29.92
3.95	29.90
4.20	1:39.94
4.5	1:39.86
4.8	4:59.85
5.1	4:59.94
5.4	16:39.95
5.8	16:39.96

Biax Experiment

Exp. Name p0105 3mr 010 Date 24 AUG 2001

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 10 (MPa)

(DPM readouts) kN

Vertical zero load -028 mid experiment (timedisp. =)

Horizontal zero load @ -008 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4 chan.

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 88%. T =

σ_N to 40 MPa, run @ 0.28mm, unload @ 2.56 (2.84 gross)

reload, unload @ 3.2 (3.48 gross)

reload, unload @ 3.84 (4.12 gross)

[offset], σ_N to 35 MPa, displace to 1.6 mm, do vel. steps every 600 μm

10-20-10-20-10 unload [offset]

σ_N to 10 MPa, displace to 3mm, do SHS (over)

SHS

disp.	Hold Time
3.0	2.99 s
3.15	3.02
3.30	9.70
3.50	9.94
3.70	29.81
3.95	30.01
4.20	1:40.14
4.5	1:39.95
4.8	4:59.90
5.1	4:59.87
5.4	16:39.90
5.8	16:40.08

Biax Experiment

Exp. Name p00953mr015 Date 23 Aug 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 35 - 15 (MPa)

(DPM readouts) kN

Vertical zero load -025 mid experiment (timedisp. =)

Horizontal zero load -006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LV 4

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 57%, T = 24° C

σ_N = 40 MPa, τ on @ 0.22 mm unload @ 2.56 mm (2.78 gross)

reload, unload @ 3.2 (3.42 gross)

reload, unload 3.84 (4.06 gross)

[offset] σ_N to 35 MPa, displace to 1.6 mm, do vel steps every 0.6 mm

10-20-10-20... unload, [offset]

σ_N to 15 MPa, displace for 3mm, do SHS (over)

SHS

disp	Hold time
3.0	3.04
3.15	3.15
3.30	9.91
3.50	10.11
3.70	29.92
3.95	29.86
4.20	1:39.98
4.5	1:40.09
4.8	4:59.91
5.1	5:00.06
5.4	16:40.16
5.8	16:40.10

Biax Experiment

Exp. Name p0085Smr005 Date 23 AUG 2001

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 5 (MPa)

(DPM readouts) kN

Vertical zero load -026 mid experiment (timedisp. =)

Horizontal zero load -007 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH=90% T=24°C AVE RH=88%

σ_N = 40 MPa, τ on @ 0.12 mm, unload @ 2.56 mm (2.68 gross)

reload, unload @ 3.2 (3.32 mm gross)

reload, unload @ 3.84 (3.96 gross)

[offset] σ_N to 35 MPa, displace to 1.6 mm, do velocity steps every 600 um

[offset] σ_N to 5 MPa, displace for 3 mm, do SHS (over)

SHS

disp. (mm)	Hold Time (s)
3.0	3.03
3.15	3.33
3.30	10.08
3.50	9.91
3.70	29.84
3.95	29.96
4.20	1:40.02
4.5	1:40.00
4.8	4:59.98
5.10	4:59.96
5.4	16:39.91
5.8	16:40.09

RH 86%

Biax Experiment

Exp. Name p00753mr010 Date 22 AUG 2001

Operator FRYE

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 10 (MPa)

(DPM readouts) kN

Vertical zero load −026 mid experiment (timedisp. =)

Horizontal zero load −008 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 52% T = 24°C

σ_N to 40 MPa, τ brought on @ 0.23 mm disp.; unload @ 3.52 (2.79 gross)

reload, unload @ 3.2 (3.43 gross)

reload unload @ 3.84 4.07 gross

[offset] σ_N to 35 MPa, do vel. steps every 600 mm after 1.6 mm disp.

[offset] σ_N to 10 MPa, displace for 3 mm, do SHS cover

disp.	hold time
3.0	2.92 S
3.15	3:01
3.30	10.00
3.50	9.96
3.70	29.95
3.98	29.89
4.20	1:39.89
4.50	1:40.04
4.80	5:00.03
5.10	5:00.02
5.40	16:42.10
5.80	16:40.00

Biax Experiment

Exp. Name p00653mr025 Date 21 AUG 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Granite (west.)

Particle Size, Size Distribution <150 μm

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10 cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load -030 mid experiment (timedisp. =)

Horizontal zero load -013 mid experiment (timedisp. =)

Displacement Rates 10, 20 μm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: Sat. (100% RH) T = 24°C

σ_N to 40 MPa, τ brought on @ 0.24 mm disp; unload @ 2.52 mm disp (2.80 gross)

reload, unload @ 3.2 mm disp (3.44 gross)

reload unload @ 3.84 mm disp (4.08 g

[offset] σ_N to 25 MPa → displace to 1.6 mm, do vel. steps every 600 μm

10-20-10-20-10... [offset]

do SHS (over)

disp. (mm)	Hold Time (s)
0.4	3.01
0.55	2.98
0.70	9.94
0.90	10.13
1.10	29.82
1.35	29.91
1.60	1:39.90
1.90	1:40.02
2.20	4:59.90
2.50	4:59.91
2.80	16:39.96
3.20	16:40.01

Biax Experiment

Exp. Name p005s3mr025 Date 21 AUG 2001

Operator FRyE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Granite, west.

Particle Size, Size Distribution <150mm

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm²

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load -029 mid experiment (timedisp. =)

Horizontal zero load -010 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 53%, T = 23.9°C

σ_N to 40 MPa, τ brought in @ 0.18 mm, unload @ 2.56 (2.74 gross)

Note: DAQ board down until 1.50 mm disp. (gross)

reload, unload @ 3.2 (@ 3.38 gross)

reload, unload @ 3.84 (4.02 gross)

[offset] σ_N to 25 MPa, displace to 1.6 mm. Then do velocity steps:

10 - 20 - 10 - 20 - 10 [offset] do SHS (cover)

disp.	Hold Time
0.4	2.94 s
0.55	3.02
0.70	10.12
0.90	10.01
1.10	29.90
1.35	1:39.82
1.60	2:01.63 ←
1.90	4:59.88
2.20	4:59.96
2.50	16:39.95
2.80	16:40.01
3.20	

Biax Experiment

Exp. Name p004s3mr025 Date 20 Aug 2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Granite (west.)

Particle Size, Size Distribution < 150 μm

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10cm²

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load -026 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -005 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? _____

Vertical DCDT Gain Hi

TDXR offsets _____

Comments: RH = 77%, T = 24°C

σ_n @ 40 MPa T brought on @ 0.45 mm disp, unload @ 2.56 (3.01 gross)

reload, unload @ 3.2 mm (3.65 gross)

reload, unload @ 3.84 (4.29 gross)

[offset] displace to 1.6 mm, do vel. steps every 0.6 mm

10-20-10-20-10... etc. [offset] do SHS (over)

disp.	Hold Time
0.4	2.99
0.55	3.07
0.70	10.05
0.90	9.79
1.10	29.86
1.35	30.02
1.60	1:40.09
1.90	1:40.02
2.20	5:00.06
2.50	5:00.01
2.80	16:40.03
3.20	16:40.06

Biax Experiment

Exp. Name p000353 mr 025 Date 19 AUG 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3 mm

Material (Qtz, Granite, ?) West. Granite

Particle Size, Size Distribution < 150 um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10 cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load -023 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -003 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 95% T = 24° C

σ_N to 40 MPa; τ brought on @ 0.33 mm disp.; unload @ 2.56 mm (2.89 gross)

reload, unload @ 3.2 mm (3.53 gross)

reload, unload @ 3.84 mm (4.17 gross)

[offset], σ_N to 25 MPa, displace to 1.6 mm, then vel. steps every 600 mm

10 - 20 - 10 - 20 [offset] → do SHS

(over)

drip	Hold time
0.4	2.88
0.55	2.97
0.70	9.95
0.90	10.01
1.10	30.06
1.35	29.94
1.60	1:40.01
1.90	1:39.97
2.20	4:59.88
2.50	5:00.12
2.80	16:39.91
3.15	16:39.93

Biax Experiment

Exp. Name p002S3mr025 Date 18 AUGUST 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Granite (Westerly)

Particle Size, Size Distribution <150 μm

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load −023 mid_experiment (timedisp. =)

Horizontal zero load −003 mid_experiment (timedisp. =)

Displacement Rates 10, 20 μm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 52%, T = 24.5°C

σ_N ≈ 40 MPa, τ brought in @ 0.40 mm, unload @ 2.56 mm (2.96 gross)

reload, unload @ 3.2 (3.6 gross)

reload, unload @ 3.84 (~~4.24~~ 4.24 gross)

[offset] σ_N ≈ 25 MPa, displace to 1.6 mm, Then vel. steps every 600 μm,

10 - 20 - 10 - 20 . . .

disp.	thid (s)
0.4	3.03
0.55	3.08
0.70	10.11
0.90	10.05
1.10	29.97
1.35	29.89
1.60	1:40.16
1.90	1:39.88
2.20	4:59.98
2.50	4:59.92
2.80	16:39.86
~~3.00~~ 3.15 ~~3.40~~	16:39.97

Biax Experimen

P00153mr025

Exp. Name (M53353mr025)

P001

Operator K. FRYE

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Westerly Granite

Particle Size, Size Distribution <150 μ

PSU #1

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load -023 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -002 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? _____

Vertical DCDT Gain High

TDXR offsets _____

Comments:

RH = 54%, sample open to lab, T = 24.5°C → unloaded τ → 25 MPa

σ_N to 40 MPa, τ brought on @ 0.164 mm, ~~unload @ 2.56 (3.2 mm gross)~~

~~reload, unload~~ @ 3.2 (3.84 gross)

reload, unload @ 3.84 (4.48 gross)

[offset], σ_N to ~~25 MPa~~, ~~displace to~~ 1.6 mm, do vel. steps every 600 um

10-20-10-20... unload, [offset]

Biax Experiment

Exp. Name m5325 3mr010 Date 17 MAY 2001

Operator FRYE

Gouge (or other sample) GOUGE
- Layer Thickness 3mm
- Material (Qtz, Granite, ?) QTZ
- Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
- Roughness grooved
- Contact Dimensions 10x10 cm²

Normal Stress 40 → 35 → 10 (MPa)

(DPM readouts) kN

Vertical zero load 011 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 0087 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets _____

Comments: RH = 29%, T = 24.7°C

σ_N to 40MPa, τ brought on @ 0.38 mm, unload @ 2.56 (DPM 2.94)

reload, unload @ 3.2 (3.58)

reload, unload @ 3.84 (4.22 DPM)

[offset] σ_N to 35 mPa, displace to 1.6mm, do vel. steps every 100mm

10-20-10-20..., unload, [offset], σ_N to 10MPa, do SHS → (over)

SHS

disp	time
3.0	2.99
3.15	3.04
3.30	10.18
3.50	9.99
3.70	29.89
3.95	29.97
4.2	1:40.03
4.45	1:39.95
4.70	5:00.02
5.00	4:59.96
5.30	16:40.03
5.65	noise from trax (lock up)

RH = 29%

unload.

Biax Experiment

Exp. Name m5315 3m-035 Date 16 MAY 2001

Operator FRYE

Gouge (or other sample) G

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 40 → 35 → 35 (MPa)

(DPM readouts) kN

Vertical zero load 0.11 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 0.07 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH = 29%, T = 24.5°C

σ_N to 40 MPa, T brought on @ 0.05mm, unload @ 2.54 mm (DPM 2.59)

reload, unload @ 3.2 mm (DPM 3.25)

reload, unload @ 3.84 (DPM 3.89)

[offset] → σ_N to 35 MPa, disp to 1.6 mm, 4 vel steps every 600 um,

16-20-10-20 unload [offset]

S11S

DISP	TIME
3.0	2.91
3.15	3:13
3.30	10.48
3.50	9.92
3.70	30.01
3.95	30.86
4.2	1:39.95
4.45	1:40.17
4.70	4:59.93
5.00	5:00.01
5.30	16:40.06
5.65	16:40.06

RH=28%

unload

Biax Experiment

Exp. Name m530S3mr005 Date 16 MAY 2001

Operator KFRYE

Gouge (or other sample) Gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ.

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block # ______

Roughness grooved

Contact Dimensions 10 x 10 cm

Normal Stress 40 → 35 → 5 (MPa)

(DPM readouts) kN

Vertical	zero load 011	mid_experiment ______	(timedisp. = ______)
Horizontal	zero load 007	mid_experiment ______	(timedisp. = ______)

Displacement Rates 10, 20, µm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? ______

Vertical DCDT Gain High

TDXR offsets ______

Comments: %RH = 29 , T = 24.6°C

τ brought on @ 0.08 mm disp. , unload @ 2.56 mm (2.64 DPM)

reload, unload @ 3.2 (3.28 DPM

reload, unload @ 3.84 (3.92 DPM) [offset]

σ_n to 35 MPa, displace to 1.6 mm, Then do vel. steps every 600 µm (10, 20, 10, 20...) unload [offset]

σ_n to 5 MPa → do SHS (...)

SIFS

disp	time
3.15	2.95
3.30	3.13
3.45	10.11
3.60	10.06
3.75	29.96
3.95	29.81
4.20	1:39.95
4.45	1:40.52
4.70	4:59.95
5.00	5:00.07
5.35	16:59
5.70	16:40.13

RH=29%

Unload

Biax Experiment

Exp. Name m529 53mr015 Date 15 MAY 2001

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 10 (MPa)

(DPM readouts) kN

Vertical zero load 011 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: T = , RH = <42%

σ_N to 40 MPa, τ brought on @ 0.50 mm disp., unload @ 2.56 mm (3.06 DPM)

reload, unload @ 3.2 mm (3.7 DPM)

reload, unload @ 3.84 mm (4.34 DPM)

[offset]

σ_N to 35 MPa, go to 1.6 mm disp., do vel. steps every 600 mm – 10-20-10-20... to unload [offset]

SHS

DISP.	TIME
3.0	3.19
3.15	3.03
3.30	9.91
3.50	10.13
3.70	29.98
3.95	29.95
4.20	1:39.91
4.45	1:39.95
4.75	5:00.00
5.05	5:00.16
5.40	16:40.13
5.75	16:40.10

unload.

Biax Experiment

Exp. Name M528 WIF Date 7 May 2001

Operator Marone / Zhenya / Frye

Gouge (or other sample)
- Layer Thickness
- Material (Qtz, Granite, ?)
- Particle Size, Size Distribution

1" diameter
10 cm length
Ground cylinder
Westerly.
Water saturated.

Forcing Blocks (Steel, Westerly, ?) Block #
- Roughness
- Contact Dimensions

Big audible stress drop.

Normal Stress (MPa)

(DPM readouts) kN

Vertical zero load 11 mid experiment (timedisp. =)

Horizontal zero load 6. mid experiment (timedisp. =)

Displacement Rates

Data Logger Used

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

Comments:

Berea ~~Barre~~
1" dia cylinder
fracture exp

Biax Experiment

T = 24.1° C
RH = 15.6%

Exp. Name M52761f   Date 7 May 2001

Operator Marone / Zhenya

1" diameter Berea sandstone sample 10cm long
Fracture experiment
Uniaxial loading.
Water saturated.

Gouge (or other sample)

Layer Thickness

Material (Qtz, Granite, ?)

Particle Size, Size Distribution

Electrical & Magnetic signals, along w/ vert load and pzt will be recorded by transient event system from GAGE.

Forcing Blocks (Steel, Westerly, ?)   Block #

Roughness

Contact Dimensions

Normal Stress (MPa)

(DPM readouts) kN

Vertical	zero load 10	mid experiment	(timedisp. =)
Horizontal	zero load 6	mid experiment	(timedisp. =)

Displacement Rates

Data Logger Used   4ch. biax LabView

Servo Gain Adjust?   Digital Photos

~ 0.019 V/kN.

Vertical DCDT Gain   ? Load Drop Not Audible.

Load cycle # ~ 26579

TDXR offsets

Comments:

Biax Experiment

Exp. Name m526 s3mr100 Date 4/27/01

Operator Boettcher/Marone

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm^2

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 11 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 7 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20

Data Logger Used labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

RH = 25% T = 22.86

2 load cycles @ 100 MPa

bring on shear load @ .09, unload @ (2.56) 2.65

reload, unload @ (3.20) 3.29

velocity steps @(4.5) ~~4.59~~ every 0.3 (5 times)

[offset] V → 10 μm/sec

V10.T1, V10.T2, V10.T1, V10.T2, ~~velocity steps~~

→ 36321 Servo Gain Adjust for both Rams

[offset]

velocity steps @ 0.6 (3 of them)

V10.T1 @ 1.8 mm
V10.T2
V10.T1

sample is loosing a lot of gauge

[offset]

V10.T1
V10.T2
V10.T1

Biax Experiment

Exp. Name m525s6mr001 Date 26 APR 01

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 6mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution ROD, 1mm, 11 to 5hm

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 5.02 x 5.27cm

Normal Stress 1.4 (MPa)

(DPM readouts) kN

Vertical zero load 011 mid_experiment (timedisp. =)

Horizontal zero load 006 mid_experiment (timedisp. =)

Displacement Rates 50, 10 mm/s

Data Logger Used LabVIEW 4

Servo Gain Adjust? Yes, horiz -5, vertical +5 } turned back after expt.

Vertical DCDT Gain Low

TDXR offsets

Comments:

velocity step @ 2mm disp 50 → 10 mm/s

@ 11 mm, 100s SHS.

Biax Experiment

Exp. Name m524s6mr001 Date 25 APR 2001

Operator Frye

Gouge (or other sample) gouge
Layer Thickness 6mm
Material (Qtz, Granite, ?) QTz ROD
Particle Size, Size Distribution RODS - 1mm, parallel

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness grooved
Contact Dimensions 5.02 x 5.3 cm

Normal Stress 1 (MPa)
(DPM readouts) kN

Vertical zero load 010 mid_experiment _____ (timedisp. = _____)
Horizontal zero load 007 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? Yes, Horiz -5 (turned back after run

Vertical DCDT Gain ~~LOW~~ HIGH

TDXR offsets _____
_____
_____

Comments:
Stress drops occur as rods slip out sides.

Biax Experiment

Exp. Name m523s3mr100 Date 4/24/01

Operator Boettcher / Frye

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5cm²

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 11 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 8 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → (50)

Data Logger Used Labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

RH = 41 T = 24

2 load cycles @ 100 MPa

bring on shear load @ .03, unload @ (2.56) 2.59

uload, unload (3.20 3.23

velocity steps @ (4.5) 4.53 (stop at 6.03)

every 0.3 mm (5 times)

[offset] V → 50 μm/sec

V100.T1, V100.T2

V = 50 μm/sec

[offset]

[extra offset]

V100.T1, V100.T2

[offset]

V100.T1, V100.T2

Biax Experiment

Exp. Name m522s3mr100 Date 4/24/01

Operator Boettcher / Frye

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm²

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 011 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 008 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10→20→100

Data Logger Used Labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

RH = 41.3 T = 24.3

2 load cycles @ 100 MPa

bring on shear load @ 12, unload (2.56) 2.68

reload, unload (3.20) 3.32

velocity steps @ (4.5) 4.62

every 0.3 x 5

displacement offset

[offset]

V100.T2.

[offset]

V100.T2

[offset]

V100.T2

Biax Experiment

Exp. Name m521s3mr100 Date 4/24/01

Operator Boettcher / Faye

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 5x5 cm²

Normal Stress 100 (MPa)

(DPM readouts) kN

Vertical zero load 11 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 06 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 → 20 → 100

Data Logger Used Labview

Servo Gain Adjust? _____

Vertical DCDT Gain high

TDXR offsets _____

_____

_____

Comments:

RH = 41% T = 24°C

T_n to 100 MPa (270 kN) layer thickness (offset)

2 load cycles @ 100 MPa

bring on shear load @ 9 , unload (2.56) 2.65

reload, unload (3.20) 3.29

velocity steps @ 5.0
5.3
5.6
5.9
6.2

10 → 20
20 → 10

[offset] V → 100 μm/sec — layer thickness offset. locked up.

V100.T2.txt T = 0.75, 0.5, 0.25, 0.1

A = 1 MPa

[offset]

V100.T2.txt

[offset]

V100.T2.txt

Biax Experiment

Exp. Name m520s3mr100 Date 4/23/01

Operator Boettcher / Malone

Gouge (or other sample) gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) Qtz
Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #
Roughness grooved
Contact Dimensions 5×5 cm²

Normal Stress 100 MPa (MPa)

(DPM readouts) kN

Vertical zero load 011 mid_experiment (timedisp. =)
Horizontal zero load 006 mid_experiment (timedisp. =)

Displacement Rates 10 → 20 → 100

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments:

horizontal load output @ zero load = ___ V

for 100 MPa ⇒ 50.6 mV/MPa + ___ = ___ (~270ki

*Not Wet

2 load cycles @ 100 MPa

bring on shear load @ .42, unload (2.56) 2.98 pict

uload, unload (3.20) 3.62

RH = 30% T = 24.2 °C

velocity steps @ 5.0 10 → 20
5.3 20 → 10
5.6 10 → 20
5.9 20 → 10
6.2 10 → 20

σ_N servo gain adj @ ~ # 4662. No change in σ_N.

[offset] V → 100 μm/sec

T = ~~1~~, 3

V100.T2.txt (T = 0.75, 0.5, 0.25, 0.1)

A = 1 MPa

[offset]

V100.T1.txt (T = 2, 1.5, 1)

[offset]

Biax Experiment

Exp. Name m519S6mr001 Date 19APR2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 6 mm

Material (Qtz, Granite, ?) QTZ RODS

Particle Size, Size Distribution 1 mm Rods, || to shear

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 1 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid_experiment (timedisp. =)

Horizontal zero load -005 mid_experiment (timedisp. =)

Displacement Rates 10mm/s

Data Logger Used LabVIEW 4

Servo Gain Adjust? No

Vertical DCDT Gain Low

TDXR offsets

Comments:

Biax Experiment

Exp. Name m518 56mr 001 Date 19 APR 2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 6 mm

Material (Qtz, Granite, ?) Quartz-glass Rods

Particle Size, Size Distribution 1 mm diameter, 1 to shear

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooves

Contact Dimensions 10x10 cm²

Normal Stress 1 (MPa)

(DPM readouts) kN

Vertical zero load 011 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 010 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? -8 5 turns Loriz

Vertical DCDT Gain Low ~~High~~ Low, Horiz High

TDXR offsets _____

_____

_____

Comments:

$\gamma_{ik14} = 13$, $T = 25°C$

σ_N to 1MPa, unload & reload

begin shearing @ 10 mm/s

@ 8.5 mm disp. 100s SHS. @ 9 mm disp, SHS

Biax Experiment

Exp. Name m517sg010 Date 4-13-01

Operator MARONE/SAFFER

Gouge (or other sample) gouge

Layer Thickness 10.4 mm apparatus on bench → after σ_N = 10 MPa applied 9.97 mm

Material (Qtz, Granite, ?) San Gregorio fault sample "D"

Particle Size, Size Distribution <500 μm

Forcing Blocks (Steel, Westerly, ?) steel Block # ____

Roughness grooved

Contact Dimensions 5x5 cm

Normal Stress 10, 20, 50, 100, 150 (MPa)
(high gain 273, 523, low gain 133, 253, 383)

(DPM readouts) kN

Vertical zero load 10 mid_experiment ____ (timedisp. = ____)

Horizontal zero load 7 mid_experiment ____ (timedisp. = ____)

Displacement Rates 2, 20, 200 μm/sec

Data Logger Used ____

Servo Gain Adjust? ____

Vertical DCDT Gain ____

TDXR offsets ____

Comments: initial vert offset @ 0.1 mm displacement

20 μm/sec up to ~~4~~ 3.5 mm displacement, then 20-2-20-200-20-2 up to 6.4 [offset & σ_N = 10 MPa]

Need reason so no load-up

(bumped to) 20 μm/s up to 3 mm displacement; then 20-2-20-200-20 up to 5 mm [offset & σ_N = 50 MPa]

Steps = 500 μm

20 μm/sec up to 3 mm disp; then 20-2-20-200-20 up to 5 mm [offset & σ_N = 100 MPa]

#5577 Hor. load servo adj; 20 μm/sec up to 4 mm; (offset) 20-2 (~500 μm)-20 (1 mm) ~~-200-20~~ up to ~~6~~ 7 mm [offset & σ_N = 150 MPa]

#5840 → LVDT adjusted

#7202 Hor. DCDT offset

20 μm/sec up to 4 mm; then 20-2-20 up to ~~6~~ 4.4 mm EOT

Biax Experiment

Exp. Name m516s7sg010 Date 4-13-01

Operator MAZZONI / SAFFER

Gouge (or other sample) gouge

Layer Thickness 10.3mm total apparatus on beach → after σ_N = 10MPa applied; top = 98.22mm, bottom = 98.33mm

Material (Qtz, Granite, ?) San Gregorio fault Sample "C"

Particle Size, Size Distribution <500 μm

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness roughly grooved

Contact Dimensions 5x5 cm

highgain on panel: ~~45~~ ~~273~~ ~~523~~ 133 ~~253~~ ~~383~~

Normal Stress 10, 20, 50, 100, 150 (MPa)

(DPM readouts) kN

Vertical zero load 11 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 8 mid_experiment _____ (timedisp. = _____)

Displacement Rates 2, 20, 200 mm/s

Data Logger Used _____

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

Comments: @Sample #490 σ_N was dropped back to zero (from 10MPa) and apparatus switched to highgain

Hor. Servo Gain Adj. → 8 to 20 Hor. Ram offset. vert load initiated ~0.3mm

20 μm/s up to 5mm displacement [offset]

20 μm/s to 2mm displacement; then 20-2-20-200-20-2-20 (0.5mm steps) up to 5mm [offset & σ_N → 20MPa]

20 μm/s to 2mm displacement; then 20-2-20-200-20-2-20 (0.5mm steps) up to 5mm [offset & σ_N → 50MPa]

Switch to low gain → 20 μm/s to 2mm displacement, then 20-2-20-200-20-200-20 [offset & σ_N → 100 MPa]

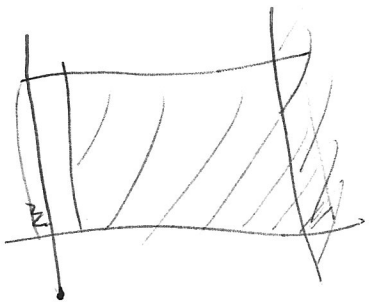
20 μm/s to 2mm 20-2-20 up to 4mm [offset & σ_N = 150MPa]

over

Running out of room on sample

@ Sample #B026 → horiz offset.

20 μm/sec up to 2mm end of run b/c no more space.



Biax Experiment

Exp. Name m5155 7ir 040 Date 4-12-01

Operator Saffer / Marone

Gouge (or other sample) ~~Dixet~~ gouge

Layer Thickness 100.5 mm total apparatus on bench → after σ_n

Material (Qtz, Granite, ?) "wet" illite shale

Particle Size, Size Distribution <500 μm

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10 cm

Normal Stress 40 (MPa)

(DPM readouts) kN

Vertical zero load 10 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 8 mid_experiment _____ (timedisp. = _____)

Displacement Rates _____ ~13:40 → at ~ # 790 rec. #

98.7 mm top
99.0 bot
} Sample thickness under v. low σ_n

Wetting sample from top.
bubbles coming up

Data Logger Used _____

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

Comments: "wet sample": loaded to < 1 kN dry, then wetted from top & soaked water allowed to soak in over 30 minutes (until seen @ base of sample). All done in H-displacement [not load feedback] mode. Minimal stress relaxation indicates negligible compaction of layers upon wetting. Left side layer required 2-3 x as long to soak in.

* Layers extruding @ top upon σ_n application. Experiment run @ 5 MPa

load in at -0.44 displacement
20 mm/s to 5.0 mm (offset) →

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-20-2 (offset)

2 mm/s to 2.0 mm; then 2-0.2-2-20 ~~1111~~ → end expt.

H. offset during 0.2 step

Biax Experiment

Exp. Name m514s7ir050 Date 4-12-01

Operator Saffer

Gouge (or other sample) Gouge

Layer Thickness 101 mm total apparatus on bench → layer thickness after σ_n = 50 MPa applied = 93.4 mm top, 93.5 bottom

Material (Qtz, Granite, ?) Illite shale (Oxland's)

Particle Size, Size Distribution < 500 um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions .5 × 5 cm

Normal Stress 50 – 75 – 100 ~~+~~ (MPa)

(DPM readouts) kN

Vertical zero load 11 kN mid_experiment _____ (timedisp. = _____)

Horizontal zero load 7 kN mid_experiment _____ (timedisp. = _____)

Displacement Rates _____

23.5% RH

25.7° C

Data Logger Used _____

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

Comments: vert. load initiated @ 548 mm displacement

20 μm/s up to 5.0 mm displacement [offset]

20 mm/s to 2.0 mm ; then 20-2-20-200-20-2-20 (offset; σ_n → 80)

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-20 (offset; σ_n → 100 MPa)

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-20 (offset; σ_n → 150 MPa)

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-20 end experiment

Biax Experiment

Exp. Name m51357fr 010 Date 4-11-01

Operator Saffer/Marone/Maggioni

Gouge (or other sample) Gouge
Layer Thickness 100 mm benchtop (total assembly)
Material (Qtz, Granite, ?) Ward's Illite Shale
Particle Size, Size Distribution < 500 um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness Grooved
Contact Dimensions 10 x 10 cm

Normal Stress 10 (MPa)
(DPM readouts) kN

Vertical zero load 011 mid_experiment _____ (timedisp. = _____)
Horizontal zero load 008 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s (0.1; 1; 10; 100)

Data Logger Used Labview 4 ch. Biax

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

Comments: initiation of vertical load @ 0.2 mm displacement
20 mm/sec up to 5 mm displacement (offset)
10 mm/sec up to 4 mm displacement (offset) then 10-100-10-100-10 up to 6.4 (offset)
10 mm/sec up to 6 mm displ. then 10-100-10-100-10-1-10-100 up to 6.4 mm (offset)
switch to computer control

10 mm/s to 1.6 mm; then 10-1

Thickness
95.1 mm @ Sample #330
95.1 mm after several insignificant offsets.

Biax Experiment

Exp. Name in512s7sg050 Date 4-11-01

Operator Saffer / Marone

Gouge (or other sample) Gouge

Layer Thickness 103.5 entire apparatus on bench — top 95.1 mm @ 50 MPa σ_n, bot. 95.3 mm

Material (Qtz, Granite, ?) San Gregorio Outer Core ("B")

Particle Size, Size Distribution ~500 um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions ~5 x 5 cm

Normal Stress 50, 80, 100, 150 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 007 mid_experiment _____ (timedisp. = _____)

Displacement Rates 20 mm/s, (2-200)

Data Logger Used Biax 4 ch. Labview

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

_____

_____

Comments:

20 mm/s load in contact at reading of ~0.05 mm

20 mm/s to 5.0 mm (offset)

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-20 (offset) $\sigma_n \rightarrow$ 80 MPa

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-20 (offset) $\sigma_n \rightarrow$ 100 MPa

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-20 (offset) $\sigma_n \rightarrow$ 150 MPa

20mm/s to 20mm; then 20-2-20-700-20-2-20 → end experiment

Biax Experiment

Exp. Name m5157sg005 Date 4-11-01

Operator Mazzoni / Saffer

Gouge (or other sample) Gouge

Layer Thickness 7mm on bench, assembly total thickness 104 mm (corners to ± 0.5mm)

Material (Qtz, Granite, ?) San Gregorio outer core ("B")

Particle Size, Size Distribution < 500 um

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10cm x 10cm

Normal Stress 5, _____ (MPa)

(DPM readouts) kN

Vertical zero load 011 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 007 mid_experiment _____ (timedisp. = _____)

Displacement Rates 20 um/s (2, 200)

layer thickness after σ_n = 5 MPa applied
top = 98.8 mm
bottom = 99.3 mm

Data Logger Used Labview Biax 4 ch.

Servo Gain Adjust? _____

σ_n Load up stuck at #360.

Vertical DCDT Gain _____

TDXR offsets _____

_____

_____

Comments:

17.7% RH; 24.9° C

displacement = 0.9 mm → initiation of wet loading

20 um/s to 5.0 mm disp. (offset)

20 um/s to 4.0 mm disp; then 20-2-20-200-20 (offset; σ_n → 10 MPa)

20 um/s to 2.8 mm disp; then 20-2-20-200-20-2-20 (offset; σ_n → 20 MPa)

20 um/s to 2.3 mm disp; then 20-2 [offset Hor. LVDT]-20-200-20-2-20 (offset σ_n - 35

20 um/s to 2.8 mm ; then 20-2-20-200-20-2-20 (offset σ_n → 50 MPa)

offset vertical load voltage

20 mm/s to 2.8 mm; 20-2-20-200-20-2-20 (offset)

20 mm/s to 2.8 mm; 20-2-20-200-20 – end experiment

Biax Experiment

Exp. Name m510s7sg050 Date 4-10-01

Operator Mazzoni

Gouge (or other sample) Gouge

Layer Thickness 7mm bench-top (103.5 mm total assembly on bench)

Material (Qtz, Granite, ?) San Gregorio Core ("A")

Particle Size, Size Distribution < 500 mm

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 5 x 5 cm

Normal Stress 50 - 80 - 100 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 007 mid_experiment _____ (timedisp. = _____)

Displacement Rates _____

Data Logger Used _____

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

_____

_____

layer thickness after σ_n = 50 MPa applied

bottom = 95.32 mm

top = 95.34 mm

Comments:

20 mm/s · load in dt reading of -0.1 mm

20 mm/s to 5.0 mm (offset)

20 mm/s to 2.0 mm; then 20-2-20-200-20 (offset) σ_n to 80 MPa

20 mm/s to 2.5 mm; then 20-2-20-200-20-2-20 (offset) σ_n → 100 MPa

20 mm/s to 2.0 mm; then 20-2-20-200-20-2-2[illegible] ([illegible]) σ_n → 150 MPa

20 mm/s to 2.0 mm ; then 20-2-20-200-20-2-20 — end experiment

~14:30 start

Biax Experiment

Exp. Name m50957gr005 Date 4/10/01

T = 25.1°C
RH = 19.7%

Operator Saffer / Marone

Gouge (or other sample) _____
Layer Thickness Bench total thickness: 103 mm, corners good to ± 0.5mm (Big Steel Sample is 89.7mm total thickness)
Material (Qtz, Granite, ?) San Gregorio "A"
Particle Size, Size Distribution _____

Forcing Blocks (Steel, Westerly, ?) ~~Steel~~ Block # ~~—~~
Roughness Steel, Grooved
Contact Dimensions 10 x 10 cm

Normal Stress 5, _____ (MPa)

(DPM readouts) kN

Vertical zero load 10 kN mid_experiment _____ (timedisp. = _____)
Horizontal zero load 7 kN mid_experiment _____ (timedisp. = _____)

Displacement Rates 2, 20, 200

Layer thickness after σ_n = 5 MPa applied
98.9 mm - top
98.8 mm - bottom

Data Logger Used Biax R; 4 channel

Servo Gain Adjust? N.

Vertical DCDT Gain yes.

TDXR offsets _____

Comments:

displacement = 0.2 mm → initiation of vertical loading
20 mm/s to 5.0 mm displacement (offset)
20 mm/s to 4.0 mm disp. (offset)
20 mm/s to 1.6 mm; then 20-2-20-200-20-2-20 (offset + σ_n →
20 mm/s to 1.6 mm; then 20-2-20-200-20-2-20 (offset) σ_n →
20 mm/s to 2.8 mm; 20-2-20-200-20-2-20 (offset σ_n → 35

20 mm/s to 2.8 mm; then 20-2-20-200-20-2-20 (offset)

20 mm/s to 2.8 mm; then 20-2-20-200-20-2-20 (offset) σ_n to 50 MPa

20 mm/s to 2.8 mm; then 20-2-20-200-20

with V. LVDT offset
@ ~1.2 mm

Vertical Load offset. DPM = 608 @ # ~ 22873 ← Ram may have been locked

" " " on unload.

↳ Load was zero at end of run/data.

Final DPM vertical = 010.

Biax Experiment

Exp. Name m50857sg010 Date 4-10-01

Operator Mazzoni / Saffer

Gouge (or other sample) Gouge
Layer Thickness 7mm on bench
Material (Qtz, Granite, ?) SAN GREGORIO GOUGE (CORE)
Particle Size, Size Distribution <500 um

post-load thickness
98.4 mm top
98.4 mm bottom

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
Roughness Grooved
Contact Dimensions 10cm x 10cm

Normal Stress 10 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid_experiment _____ (timedisp. = _____)
Horizontal zero load 008 mid_experiment _____ (timedisp. = _____)

Displacement Rates 20 mm/s (2 - 200 mm/s)

Data Logger Used labview 4ch

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

Comments:

vertical load contact at -1.1 mm reading
20 mm/s to 5.0 mm disp ; (offset)
20 mm/s to 8.0 mm disp ; (offset) - H & V offset
20 mm/s to 1.6 mm disp ; then 20-2-20-200-20-2-20-200-20 (offset)
20 mm/s to 1.6 mm disp ; then 20-2-20-200-20-2-20-200-20 (offset)

20 mm/s to 1.6 mm; then 20-220-200-20 (offset)

20 mm/s to 1.6 mm; then 20-200-20-2-20

Biax Experiment

Exp. Name m5075Tir050 Date 4-10-01

Operator Saffe / Mazzoni

Gouge (or other sample) Gouge

Layer Thickness 7 mm on bench

Material (Qtz, Granite, ?) Illite shale (Ward's)

Particle Size, Size Distribution <500 mm

under 25 MPa σ_n:
94.83 mm top
94.87 mm bottom

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness Grooved

Contact Dimensions 10cm × 10cm

Normal Stress 25 → 50 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 007 mid_experiment _____ (timedisp. = _____)

Displacement Rates 20 μm/s (2, 200 μm/s)

Data Logger Used Labview 4 ch.

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

Comments:

24.7° C ; 22.7% RH

vert. load contact @ -0.25 mm reading

20 μm/s to 5.0 mm disp (offset)

20 μm/s to 4.0 mm disp; then 20 -~~200~~ 20 -2-20 (offset)

20 μm/s to 1.6 mm disp; then 20 -200 -20 -2 -20 -200 -20 -2 -20 (offset; σ_n → 50 MP

~~20 μm/s to 1.6 mm, then~~ to 0.73 mm → offset vert. load

20 mm/s to 2.0 mm disp; then 20-200-20-2-20-200-20 (offset)

20 mm/s to 1.0 mm; then 20-2-20 experiment end at 2.2 mm

Biax Experiment

Exp. Name m506S7ir10 Date 4-9-01

Operator Saffer / Mazzoni 9:10 pm

RH = 20.9%
T = 25.7°C

Gouge (or other sample) Gouge
- Layer Thickness 7mm on bench
- Material (Qtz, Granite, ?) Illite shale (Wards)
- Particle Size, Size Distribution < 500 um

Thickness @ 100 kN.
95.25 Top
95.1 Bot
#966

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____
- Roughness Grooved
- Contact Dimensions 10cm × 10cm

Normal Stress 10 → 20 → 30 (MPa) increase σ_n at each offset

(DPM readouts) kN

Vertical zero load 010 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 007 mid_experiment _____ (timedisp. = _____)

Displacement Rates 20 mm/s (2 → 200 mm/s)

Data Logger Used _____

Servo Gain Adjust? _____

Vertical DCDT Gain _____

TDXR offsets _____

_____

_____

* Horizontal LVDT out of range until ~sample # 15717

Comments:

vertical load contact @ -0.41 mm reading

20 mm/s to 5.0 mm disp; (offset V ~~dd~~)

20 mm/s to 4.0 mm ; (offset)

20 mm/s to 1.6 mm; then 20 → 200 - 20 - 2 - 20 - 200 - 20 - 2 - 20 (σ_n → 20 MPa offset +)

20 mm/s to 1.6 mm, then 20 → 200 - 20 - 2 - 20 - 200 - 20 - 2 - 20 (σ_n → 30 MPa offset, then)

20 mm/s to 1.6 mm, then 20 - 200 - 20 - 2 - 20 - 200 - 20 - 2 - 20 and exp. @ 6.2 mm disp

Biax Experiment

Exp. Name m5055Tir020 Date 4-9-01

Operator Saffer / Mazzoni

Gouge (or other sample) Gouge

Layer Thickness 7 mm on bench (after load 95.2 top, 95.2)

Material (Qtz, Granite, ?) Illite shale (Wards)

Particle Size, Size Distribution ~500 um

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10cm x 10cm

Normal Stress 20 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid experiment (timedisp. =)

Horizontal zero load 007 mid experiment (timedisp. =)

Displacement Rates 20 um/s (→ 2 um/s - 200 um/s)

Data Logger Used Labview 4 ch.

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

Comments: 25.6°C 26.1% RH

Vert load in contact at -0.41 mm disp. reading

20 um/s to 5.0 mm disp (offset)

20 um/s to 4.0 mm ; then 20 - 2 - 20 - 2 - 20 (offset)

20 um/s to 1.6 mm ; 20 200 -20 -2 -20 200 20 -2 (offset)

2 um/s to 0.1 mm ; 2 -20 -2 -20 200 -20 -2 -20 end experiment @ 6.4 mm

Biax Experiment

Exp. Name m5045 7Ir005 Date 4-9-01

Operator Saffer / Mazzoni

Gouge (or other sample) Gouge 96.5 96.5
Layer Thickness 7mm on bench (96 top, 96.5 bottom) after initial load
Material (Qtz, Granite, ?) Illite Shale (Woodside)
Particle Size, Size Distribution < 500 μm

Forcing Blocks (Steel, Westerly, ?) Steel Block #
Roughness Grooved
Contact Dimensions 10cm x 10cm

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 0.10 mid experiment (timedisp. =)
Horizontal zero load 0.07 mid experiment (timedisp. =)

Displacement Rates 20-200-2

Data Logger Used Labview 4 ch.

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

Comments: load point (vertical load) @ -1.22 mm reading
20 mm/s to 5.0 mm (offset)
20 mm/s to 4.0 mm, then 20-2-20-200-20
20 mm/s for 1.6 mm, then 20-200-20-2-20-200-20-2
20 mm/s for 0.1 mm, then 2-20-2-20-200-20-2-20 end experiment @ 1.4 mm

Biax Experiment

Exp. Name m503S7Fr040 Date 4-9-01

Operator Marone / Saffer / Mazzoni

Gouge (or other sample) Gouge

Layer Thickness 7 mm in bench ⇒ Loaded assembly thickness top = 95.6 mm, bottom = 95.7 mm @ $\bar{\sigma}_H$ = 40.0 MPa

Material (Qtz, Granite, ?) Illite Shale (Wang's) Sample # ~5100

Particle Size, Size Distribution < 500 um

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 cm x 10 cm

26 % RH

Normal Stress 40 (MPa) 24.8 °C

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 005 mid experiment (timedisp. =)

Displacement Rates 10 um/s ; 1 mm/s -> 100 um/s

Data Logger Used Labview 4 ch.

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

Comments:

vert. load @ -0.50 mm disp.

offset at 5.0 mm

mistake, only ~50 mm disp at 100 um/s

10 um/s to 4 mm, then 10 - 100 - 10 - 1 - 20 - 2 - 20 (every 600 um), offset

1.6 mm, then 20 - 200 - 20 - 2 - 20 - 200 - 20 - 2 (every 600 um), offset

0.10 mm, then 2 - 20 - 2 - 20 - 200 - 20 - 2 exp. stopped

Biax Experiment

Exp. Name m5025 3mr 050 Date 4-8-01

Operator Frye / Morzoni / Sattler

Gouge (or other sample) Ward's Illite Shale Gouge

Layer Thickness 3mm (gouge + blocks 92 mm top; 92 mm bottom)

Material (Qtz, Granite, ?) Illite Shale

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm

Normal Stress 50 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? down 1.5

Vertical DCDT Gain High

TDXR offsets

Comments: 33°C, ~22% RH

σ_N to 50 MPa, Layer Thickness [offset]. τ brought on @ 0.12 mm.

Biax Experiment

Exp. Name m501s3mr010 Date 3 APR 2001

Operator K. Frye

Gouge (or other sample) Gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 35 → 10 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: T=23°C, RH=12%

σ_N to 40 MPa, load on @ 0.3 mm, unload @ 2.56 mm (2.56 DPM)
reload, unload @ 3.2 mm (3.5 DPM)
reload, unload @ 3.84 mm (4.14 DPM) [offset]

σ_N to 35 MPa, → go to 1.6 mm, do vel. steps every 0.6 mm, 10, 20, 10, 20...

σ_N to 10 MPa → go to 3 mm, do SHS → slower) [offset]

SHS

clasp (rel)	time
3.0	3.01
3.15	3.03
3.30	10.13
3.50	10.10
3.70	29.95
3.95	32.13
4.20	1:40.55
4.45	1:39.81
4.75	5:00.17
5.05	5:02.78
5.40	16:39.88
5.75	16:40.20

Biax Experiment

Exp. Name m500 S3mr 005 Date 22 MAR 01

Operator K. Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions $10 \times 10\ cm^2$

Normal Stress 40 → 35 → 5 (MPa)

(DPM readouts) kN

Vertical zero load ~~00~~ 010 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 chan

Servo Gain Adjust? ~~[illegible]~~ gain up to yesterday's values, down 1 turn for unload.

Vertical DCDT Gain High

TDXR offsets

Comments: %RH ≤ 40%, T = 24°C NOISY DATA

σ_N to 40MPa, τ brought on @ 0.98 mm, unload after 2.56 mm disp (3.54 DPM)

reload, unload @ 3.2 (4.18 DPM)

reload, unload @ 3.84 (4.82 DPM)

[offset]

σ_N to 35 MPa, @ 1.6 mm disp do velocity steps every 600um, unload, [offset]

σ_N to 5 MPa, displacement to 1.5 mm, do SHS →

SHS

disp.	Time
1.5	2.91 s
1.65	2.97
1.8	9.98
2.0	9.99
2.2	30.30
2.45	29.94
2.70	1:39.84
2.95	1:39.84
3.2	4:59.88
3.5	4:59.92
3.8	16:40.21
4.15	16:39.95

V. step. 4.5 - 5.1

5.1 to 5.7 - unchanged

Biax Experiment

Exp. Name m4995 3m-005 Date 3/20/2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 35 → 5 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 μm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? YES + 3 turns after σ_N turned down to 5MPa

Vertical DCDT Gain High

TDXR offsets

Comments: RH ~ 0% (offscale) T = 24° C

σ_N to 40 MPa, τ brought on @ 0.36mm disp, unload @ 2.56 (2.92) DPM

reload, unload @ 3.2mm (3.56mm DPM)

reload, unload @ 3.84mm (4.2mm dPM) [offset]

σ_N to 35 MPa, vel. steps every 0.6mm after 1.6mm disp. (10-20-10) [offset]
↓ unload

σ_N to 5MPa, go to 3mm disp; do SHS →

Slit S-disp	TIME
3.0	3.0
3.15	2.97
3.3	9.99
3.5	10.06
3.7	30.05
3.95	30.08
4.2	1:40.02
4.45	1:39.98
4.7	5:00.19
5.0	4:59.95
5.3	16:39.93
5.65	16:39.95

Biax Experiment

Exp. Name m49853mr025 Date 10 MAR 2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10x10

Normal Stress 40 → 35-25-5-25 (MPa)

(DPM readouts) kN

Vertical zero load 0.10 mid experiment (timedisp. =)

Horizontal zero load 0.06 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s, creep

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? -10 turns vert. - change pot (added 10 after test) returned to default.

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 19% T = 23.4°C

σ_N to 40 MPa, τ breakin @ 0.11 mm disp, unload @ 2.52 (2.67)

reload, unload @ 3.2 (3.31) 0.11

reload, unload @ 3.84 (3.95) [offset]

σ_N to 35 MPa, velocity steps every 0.6 mm after 1.6 mm disp (10-20-10) (offset)

σ_N to 25 ramp to ~~25~~ 250 kN shear load → go to load control

Biax Experiment

Exp. Name m4975 3mr-005 Date 7 MAR 2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40→35→5 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain 1/3

TDXR offsets

Comments: RH = 64% T = 22.3°C

σ_N to 40 MPa τ brought on @ 0.13 mm disp unload @ 2.56 mm (2.69 DPM)

reload, unload @ 3.2 mm (3.33 DPM)

reload, unload @ 3.84 mm (3.97 DPM) [offset]

σ_N to 35 MPa, velocity steps after 1.6mm every 0.6mm (10-20-10-20-10...)

unload @ end of range [offset]

σ_N to 5 MPa, go to 3.0 mm disp., do SHS →

SHS

DISP.	TIME
3.0	2.99
3.15	3.09
3.30	10.02
3.5	10.16
3.7	29.91
3.95	29.93
4.2	1:40.09
4.45	1:39.99
4.70	4:59.94
5.00	5:00.09
5.30	16:40.03
5.65	16:40.05

3210
DISP
5195

Biax Experiment

Exp. Name m496S3mr035 Date 6 MAR 2001

Operator K. Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40→35 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? ~~+1~~ +1 turn, vert.

Vertical DCDT Gain High

TDXR offsets

Comments: ~~RH=60%~~, T=23°C RH=66%

σ_N to 40 MPa, τ brought on @ 0.20 mm disp., unload @ 2.576mm (2.76 DPM)

reload, unload @ ~~3.84~~ 3.2 mm (3.4 DPM)

reload, unload @ 3.84 (4.04 DPM) [offset]

σ_N to 35 MPa velocity steps after 1.6 mm (every 0.6) 10-20-10...

unload at end of range, [offset]

σ_N constant @ 35; go to 3.0 mm disp, do SHS →

disp.	hmm
3.0	3.02
3.15	3.02.
3.3	9.95
3.5	10.01
3.7	30.00
3.95	30.04
4.2	1:40.12
4.45	1:40.12
4.70	5:00.09
5.00	5:00.11
5.30	16:40.06
5.65	16:43.32

unload @ 6.2

61% RH

Exp. Name m495s3mr100 Date 3/2/01

Boettcher / Marone

gouge
3mm
Qtz
F110

Steel
- grooved
- 5×5cm²

σ_n = 100 MPa

Vert. 10 zero load
Horiz. 6 zero load

Disp. Rates 10 → 20 → 100

Labview

Vert. Gain → High

---

horizontal load output @ zero load = −4.73 V
for 100MPa ⇒ 5.06 mV + −4.73 = ~.326 (270kn)

2 load cycles @ 100 MPa 10.5% (~~DRY~~ Room Hum. Sample) I = 23

bring on shear load ~.15, unload @ (2.56) 2.70

reload, unload @ (3.20) 3.35

Velocity steps @ 5.0 10 → 20

5.3 20 → 10

5.6 10 → 20

5.9 20 → 10

6.2 10 → 20

± ½ MPa

[offset] V → 100 μm/sec

V100.T2.txt [.75, .5, .25, .1]

[offset]

V100.T1.txt [2, 1.5, 1]

[offset]

velocity steps

10 → 1 μm/sec

Biax Experiment

Exp. Name m494s3mr100 Date 2/28/01

Operator Boettcher / Marone

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 5x5 cm^2

Normal Stress 100 MPa (MPa)

(DPM readouts) kN

Vertical 12 zero load mid experiment (timedisp. =)

Horizontal 6 zero load mid experiment (timedisp. =)

Displacement Rates 10 → 20 → 100

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments:

horizontal load output @ zero load = -4.732 V

for 100 MPa ⇒ 50.61 mV/MPa + -4.732 V = .326 V ← (270 kN)

2 load cycles @ 100 MPa

bring on shear load @ 0.30, unload (2.56) 2.86

reload, unload (3.20) 3.50

→ wet the sample

velocity steps @ 5.0 10→20

5.3 20→10

5.6 10→20

5.9 20→10

6.2 10→20

[offset] V → 100 μm/sec

V100.T2.txt (T = 0.75, 0.5, 0.25, 0.1)

[offset]

V100.T1.txt (T = 2, 1.5, 1 sec)

[offset]

velocity steps

10 → 1 μm/sec

Biax Experiment

Exp. Name m493S3mrC005 Date 2/27/2001

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution FINE

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10x10

Normal Stress 40→35→5 (MPa)

(DPM readouts) kN

Vertical zero load 009/10 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH= ~~[illegible]~~ 11-12% T=24°C

σ_N to 40 MPa, T brought on @ 0.59mm, unload @ 2.56mm (3.15mm)

reload, unload @ 3.2 mm (3.79)

reload, unload @ 3.84mm (4.43 mm DPM) [offset]

σ_N to 35MPa velocity steps after 1.6mm every 0.6mm - 10-20-10-...

unload at end of range, (offset)

T to 5MPa → go to 3.0 mm disp, do SHS →

disp.	TIME
3.0	2.95
3.15	2.97
3.3	9.95
3.5	10.09
3.7	29.81
3.95	29.99
4.2	39.85
4.45	39.93
4.70	4:59.82
5.00	4:59.91
5.30	16:39.92
5.65	16:39.85

unload @ 6rchange.

Biax Experiment

Exp. Name m49253mr035 Date 2/23/2001

Operator KEVIN FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm^2

Normal Stress 40→35 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? Yup. -2 turns

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 10.5 %, No Bag. T = 24°C

σ_n to 40 MPa, τ brought on @ 0.85 mm, unload @ 2.56mm (3.41 mm)
reload, unload @ 3.2 mm (4.05)
reload, unload @ 3.84mm (4.69) [offset]

σ_n to 35 MPa, velocity steps after 1.6mm, every 0.6mm -10-20-10-20...
unload @ end of range, [offset]

σ_n remains @ 25 MPa (will adjust in future experiments). go to 3.0mm disp., do SHS →

drop	Time
3.0	2.98s
3.15	3.13
3.3	10.04
3.5	9.95
3.7	30.21
3.95	29.94
4.2	1:39.98
4.45	1:40.23
4.70	5:00.00
5.00	5:00.06
5.30	16:40.06
5.65	16:40.2

Biax Experiment

Exp. Name m491s3mr100 Date 2/16/01

Operator Boettcher / Marone

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 5×5 cm^2

Normal Stress 100 MPa (MPa)

(DPM readouts) kN

Vertical #10 zero load mid experiment (timedisp. =)

Horizontal #6 zero load mid experiment (timedisp. =)

Displacement Rates 10 → 20 → 100

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments:

horizontal load output @ zero load = -4.723

for 100 MPa ⟹ 5.06 + -4.723 = .337 V

2 load cycles @ 100 MPa

bring on shear load @ 11, unload (2.56) 2.67

+wet the sample*

reload, unload (3.20) 3.31

velocity steps @ 5.0 10 → 20

5.3 20 → 10

5.6 10 → 20

5.9 20 → 10

6.2 10 → 20

[offset] v → 100 μm/sec

V100.T1.txt

(T = 2, 1.5, 1 sec)

[offset]

V100.T2.txt

(T = 0.75, 0.5, 0.25, 0.1 sec)

[offset]

velocity steps

Biax Experiment

Exp. Name m490 53mr040 Date 2/14/01

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 5x5

Normal Stress 40 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates 10 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? +2 turns one early one @ 7mm

Vertical DCDT Gain ~~Hi~~ Low

TDXR offsets

Comments: for figure in beads paper.

Biax Experiment

Exp. Name m4895 3mr 100 Date 2/9/01

Operator Boettcher / Malone

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 5 x

Normal Stress 100 MPa (MPa)

(DPM readouts) kN

Vertical 10 zero load mid experiment (timedisp. =)

Horizontal 7 zero load mid experiment (timedisp. =)

Displacement Rates 10 → 20, 100 μm/sec

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments:

In the same way that increases in Coulomb stress promote fault failure, stress decreases should inhibit failure, and one factor that Kilb and co-workers do not address is such stress shadowing[3]. Proponents of the static stress transfer hypotheses for fault interaction point out that neither dynamic stress transfer nor a fault weakening mechanism based on dynamic shaking can explain stress shadows. This could seem a criticism. But to my mind it is unlikely that dynamic stressing would produce stress shadows in any case, since dynamic shaking is likely to strengthen faults only under unusual conditions. One way to prove the role of dynamic weakening would be to document a shaking-induced increase in seismicity within a static stress shadow –sort of like *spilling the beans* because you bump the pot while removing a bean; but this would be difficult given present data limitations.

The possibility of distinguishing between the roles of stress transfer and fault weakening in earthquake triggering is intriguing and may help in building a more general understanding of fault interaction. **In the future, initiatives such as EarthScope[8] should allow detailed study of surface deformation and earthquake-induced strain changes in Earth's crust.** That data, and further work of the sort reported by Kilb *et al.*, will shed further light on earthquake triggering and the associated changes in seismic hazard.

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3 load cycles 100 MPa (250 kN) , unload @ (1.92)

reload, unload @ (2.56)

(Saturate the sample) stop for a while here — reload, unload @ (3.20)

velocity steps @ 5.0 10 → 20

@ 5.3 20 → 10

@ 5.6 10 → 20

@ 5.9 20 → 10

@ 6.2 10 → 20

[offset] & velocity to 100 µm/sec

Total Disp	disp	T	A	time	disp	vel	
7.4	1.0 mm	10 sec	5 MPa	30 sec	300 µm	100 µm/sec	* [illegible]
[offset] @ [illegible] 4.5 (total = 11.9)							
[illegible] 12.4	0.5	5	5	25	2500	100	
[illegible] 15.4	3.5	2	5	10	1000	100	
[illegible] 16.9	5.0	1.5	5	9	900	100	* 6 cycles
[offset] @ [illegible] 18.3 ← total							
18.8	0.5	1	5	5	500	100	
19.3	1.5	.5	5	3	300	100	× 6 cycles
20.1	2.3	.1	5	1	100	100	× 10 cycles

velocity steps

~3.0

Biax Experiment

Exp. Name m4853mr035 Date 7 FEB 2001

Operator FRYE

Gouge (or other sample) G

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10×10

Normal Stress 40 → 35 → 15 → 35 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain HIGH !

TDXR offsets

Comments: RH ~ 1% T = 23°C

σ_N to 40 MPa, τ brought on @ 0.18 mm, unload @ 2.56 mm disp (2.74)

reload, unload @ 3.2 mm (3.38)

reload, unload @ 3.84 mm (4.02)

SHS

disp.	time
0.4	3.18 s
0.55	2.94
0.70	30.00
0.95	29.91
1.20	5:00.03
1.50	5:00.00
1.80 →	unload, σ_N to 15 MPa [offset]
0 →	reload
1.35	3.01
1.60	3.11
1.75	29.81
2.00	29.95
2.25	4:59.99
2.55	4:59.85
2.85 →	stop. [offset], σ_N to 35 MPa
0 →	reload.
~~1.30~~	
1.50	3.03
1.65	3.84
1.80	29.92
2.05	30.78
2.30	4:59.95
2.6	4:59.95
2.9	unload

Biax Experiment

Exp. Name m487 S3 mr035 Date 6 FEB 2001

Operator FRYE

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions $10 \times 10 cm^2$

Normal Stress 40 → 35 MPa (MPa)

(DPM readouts) kN

Vertical zero load 009-010 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: Rit ~1% T = 23°C

σ_N to 40 MPa, τ brought on @ 10 um/s, contact @ 0.53
unload after 2.52 mm disp (3.09)
reload, unload after 3.2 mm disp (3.73)
reload unload after 3.84 mm disp (34.37) [offset]

σ_N to 35 MPa, vel. steps after 1.6 mm disp. (every 0.6 mm)

10-20-10-20 ... over →

[offset] - unload on offset → fix lock?

SHS

disp.	time
1.2	3.02
1.35	2.98
1.5	10.02
1.7	9.91
1.9	29.95
2.15	30.01
2.40	1:39.95
2.65	1:42.36
2.90	4:59.99
3.25	4:59.97
3.55	16:40.02
3.90	16:40.

Biax Experiment

Exp. Name m4853mroxs Date 5 FEB 2001

Operator Frye

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 15 (MPa)

(DPM readouts) kN

Vertical zero load 010 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: <4% RH, T ~ 23° C

σ_N to 40 MPa, T brought on @ 10 um/s, contact @ 0.65 mm

unload after 2.56 mm disp (3.21)

reload, unload after 3.2 mm disp (3.85)

reload, unload after 3.84 mm disp (4.49) [offset]

σ_N to 15 MPa, velocity steps after 1.6 mm disp (every .6mm)

10-20-10-20... → max →

SHS

Disp	Time	
0.4	3.09	
0.55	3.09	
0.70	10.06	
0.90	10.02	
1.10	29.99	
1.35	30.08	
1.60	1:39.91	
1.90	1:39.99	RU ~2%
2.20	5:13.49	
2.55	5:00.25	
2.90	16:39.97	
3.25	16:40.24	

vol slip

unload

Biax Experiment

Exp. Name m485S3mr150 Date Feb 2, 2001

Operator Leeftaker / Marone / Frye

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 5x5 cm²

Normal Stress 40→25 → (MPa)

(DPM readouts) kN

Vertical 008 zero load mid experiment (timedisp. =)

Horizontal 006 zero load mid experiment (timedisp. =)

Displacement Rates 10→20 μm/sec

Data Logger Used labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments:

Jn to 40 MPa (106 KN) bring on shear @ .28 , unload @ (1.92) 2.20

reload , unload @ (2.56)

[offset] Jn to 25 (68.5 KN)

reload , unload @ (3.20)

velocity steps 1000 μm @ 1mm 10→20 @ 1.6mm 20→10 @ 2.2 10→20

@ 2.8 20→10

		A	T	time
@ 3.5 mm	vib	1 MPa	10	50 sec
@ 4.5 mm		1 MPa	2	50 sec
@ 5.5 mm		1 MPa	1	50 sec

[offset]

σ_n to 200 MPa (506 Kn)

vertical LVDT offset

	A	T	time
@ 3.75 vibs	2MPa	10	50
@ 4.75 vibs	2MPa	5	50
@ 5.75	2MPa	2	50
[offset] @ .5	2MPa	1.5	50 ← 0 MPa to reset the σ_n
@ 2.0	2MPa	1	50
@ 3.03	2MPa	.5	50
@ 4.0	2MPa	.1	50
@ 5.02	2MPa	2	50

[offset]

2 MPa	5	50	
2MPa	10	50	

total disp. = 24

Biax Experiment

Exp. Name m484 S3mr100 Date 1/31/01

Operator Boettcher & Frye

Gouge (or other sample) Gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) Qtz
Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #
Roughness grooved
Contact Dimensions 5x5 cm²

Normal Stress 40 → 25 → 100 (MPa)
(DPM readouts) kN
Vertical 009 zero load mid experiment (timedisp. =)
Horizontal 007 zero load mid experiment (timedisp. =)

Displacement Rates 10 → 20 μm/sec

Data Logger Used labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments:
σn to 40MPa bring on shear @ 0.31, unload @ (256) 2.87
(106 kN)
reload, unload @ (320) 3.51
reload, unload @ (384) 4.15

[offset] σn to 25

1600 μm

[offset]

slide 0.5

@ 0.5	2 MPa	30 sec	0.3 Hz
@ 1.3	2 MPa	30 sec	0.6 Hz
@ 2.1	2 MPa	30 sec	1 Hz
@ 2.9	2 MPa	30 sec	3 Hz

sliding 0.4

[offset]

On to 100

@ 2.00	5 MPa	30 sec	0.1 Hz
@ 2.80	5 MPa	30 sec	0.3 Hz
@ 3.60	5 MPa	30 sec	0.6 Hz
@ 4.4	"	"	1 Hz
@ 5.0			3 Hz
@ 5.8			10 Hz

Biax Experiment

Exp. Name m483 S3mr005 Date 31 JAN 2001

Operator Frye

Gouge (or other sample) G

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block # ______

Roughness grooved 10x10 cm

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 5 (MPa)

(DPM readouts) kN

Vertical	zero load	009	mid experiment	(timedisp. =)
Horizontal	zero load	006	mid experiment	(timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? ______

Vertical DCDT Gain High

TDXR offsets ______

Comments: RH = 1.37%, T = 24°C

σ_n to 40 MPa, τ brought on @ 0.6 mm, unload @ 2.56 (3.16 mm)

reload, unload @ 3.2 (3.8 mm)

reload, unload @ 3.84 (4.44 mm) [offset]

~~~~ σ_n to 5 MPa, 10 um/s to 1.6 mm. Then vel. steps

every .6
~~~~

SILS

DISP	TIME
0.4	3.03
0.55	2.96
0.70	10.04
0.90	9.94
1.10	29.82
1.35	30.03
1.60	1:40.27
1.90	1:40.13
2.20	4:59.91
2.50	4:59.58
2.80	16:39.90
3.15	16:39.91

1.3% RH

unload.

Biax Experiment

Exp. Name m4823mr025 Date 30 JAN 2001

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Quartz - ottawa

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions $10 \times 10\ cm^2$

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: RH off scale (low) T = 23°C

σ_N to 40 MPa, τ brought on @ 10 mm/s @ 0.25 mm, unload @ 2.56 (2.81)

reload, unload @ 3.2 mm (3.45)

reload, unload @ 3.84 mm (4.09) [offset]

[offset layer thick] σ_N to 25 MPa, 10 mm/s to 1.6 mm, Then velocity steps over 600 mm

↳ after σ_N reduced 10 - 20 - 10 - 20 ... [offset]

→ over →

S115

DISP	TIME	
0.4	3.07	
0.55	3.08	
0.70	10.10	
0.90	9.99	
1.10	29.91	
1.35	29.99	
1.60	1:40.08	
1.90	1:40.03	
2.20	5:00.08	
2.50	5:00.34	
2.80	16:40.08	
3.15	16:42.51	(6:42:51)
3.50	unload	

Biax Experiment

Exp. Name M481 S3mr025 Date Jan 26, 2001

Operator Boettcher, Marone, Frye

Gouge (or other sample) gouge

Layer Thickness 3mm ± .5mm

Material (Qtz, Granite, ?) qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 (MPa)

(DPM readouts) kN

Vertical 09 zero load mid experiment (timedisp. =)

Horizontal 06 zero load mid experiment (timedisp. =)

Displacement Rates 10 → 20 μm/sec

Thin Sections: 94.05 - top
93.38 - bottom

Data Logger Used LabVIEW

Servo Gain Adjust?

for both 35 & 25 → 91.87 - top
92.58 - bottom

Vertical DCDT Gain high

TDXR offsets

Comments: σ_n to 40 MPa bring on the shear load 0.82 unload @ (2.55) 3.37
reload, unload @ (3.30) 4.02 (an extra .1)!
reload, unload @ (3.86) 4.68

[offset] σ_n to 25 MPa

1600μm disp then velocity steps every 400μm [10 → 20 μm/sec]

[offset]

slide 1mm

vib @ ~~1mm~~ 2.4mm 2MPa 0.1 Hz 100 sec.

slide 1mm

vib @ ~~4~~ 4mm ~~3~~ 2 MPa 0.3 Hz 100 sec

[offset]

slide, vib @ ~~4~~ 0.5mm ~~3~~ 2 MPa 1 Hz 50 sec

slide, vib @ 2.00 2MPa 10 Hz ~~5~~ 30 sec

hold @ 3.3 2 MPa 1 Hz 30 sec (a little too long...)

hold @ 4.~~3~~ 2 MPa 1 Hz 30 sec

hold @ 4.8 2 MPa 0.3 Hz 30 sec

hold @ 5.~~5~~ 3 MPa ~~1 Hz~~ .~~3~~ 30 sec

hold @ 6.1 3 MPa 1 Hz 30 sec

[offset] ←

[offset] σn to 35 in steps

vib @ 1mm 2 MPa 0.1 Hz 100 sec

vib @ ~~3~~ 2.75 mm 2 MPa 0.3 Hz 100 sec

vib @ 4.~~2~~5mm 2MPa 1 Hz 50 sec

[offset]

vib @ 5.75 2MPa 10 Hz 30 sec

Biax Experiment

Exp. Name m480s3mr025 Date Jan. 18, 2001

Operator Boettcher, Frye

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm²

Normal Stress 40 → 25 → 35 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 005 mid experiment (timedisp. =)

Displacement Rates 10 → 20 μm/sec

Data Logger Used Labview

Servo Gain Adjust? — up 2 turns vertical - after 1st offset + 2.5 mm — turned down after test

Vertical DCDT Gain high

TDXR offsets

Comments:

σn to 40 MPa bring on shear 0.94, unload @ 3.49

reload, unload @ 4.14

reload, unload @ 4.78

[offset] σn to 25 MPa

1600μm disp then velocity steps every 600μm [10 → 20μm/s] servogain adjust ~1529 seconds at

[offset]

slide 1mm
vib .3mm 2MPa 0.1 Hz
slide 1mm
Vib .3mm 2MPa 0.3 Hz
slide 1mm
vib .3mm 2MPa 1 Hz
slide 1mm
vib .3mm 2MPa 10 Hz
slide .5mm

[offset]

slide .5
vib. .3 3MPa 0.1 Hz
slide 1mm
vib @1.8 3MPa 0.3 Hz
slide 1mm
vib @ 3.1 3 MPa 1 Hz
slide 1mm
vib @ 4.4 3MPa 10 Hz
slide .5mm

[offset] up to 35 MPa
unload during offset

[offset]
normal load didn't really lock?
unload

[offset]

slide 1mm
vib@1.0 2MPa 0.1 Hz
Slide 1mm
vib @ 2.3 2MPa 0.3Hz
slide 1mm
vib @ 3.6 2MPa 1Hz
slide 1mm
vib @ 4.9 2MPa 10 Hz
Slide 0.5mm

[offset]

Slide .5mm
vib @.5mm 3MPa 0.1 Hz
slide 1mm
vib @ @ 1.8 3MPa 0.3Hz
slide 1mm
3.18 vib@ ~~3.1~~ 3MPa 1 Hz
slide 1mm
vib@ 4.4 3MPa 10 Hz
Slide ~1mm
unload

Biax Experiment

Exp. Name calibration, calibration 2 Date jan. 17, 2001
jan. 18, 2001

Operator Boettcher, Marone, Faye

Gouge (or other sample) block

Layer Thickness

Material (Qtz, Granite, ?)

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness

Contact Dimensions

Normal Stress 25MPa (MPa)

(DPM readouts) kN

Vertical 008 zero load mid experiment (timedisp. =)

Horizontal 006 zero load mid experiment (timedisp. =)

Displacement Rates ——

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain

TDXR offsets

Comments: Problem: There were effects occuring in steady state σ_n after the first set of normal stress vibrations at a given amplitude, plus the signal was not symetric.

Fixed: The innitial point of the signal from labview was originally set at zero, rather than the first point of a sine curve, so at the end of a cycle the normal stress was still one point below the zero level.

Biax Experiment

Exp. Name m479S3mr025 Date 1/8/01

Operator Boettcher/Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions $10 \times 10\ cm^2$

Normal Stress 40 MPa, 25 MPa (MPa)

(DPM readouts) kN

Vertical zero load .009 mid experiment (timedisp. =)

Horizontal zero load .006 mid experiment (timedisp. =)

Displacement Rates 10, 20 μm/sec

Data Logger Used labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets offset layer thickness during 1st unload. T = 24°C RH = 15%

Comments:

σ_n to 40 MPa bring on shear, 0.52 unload @ 3.07

reload , unload @ 3.72

reload , unload @ 4.38

[offset] σ_n to 25 MPa

1600 μm disp. then velocity steps every 600 μm (10 μm/s → 20 → 10) [offset]

slide 1 mm

vibrations during sliding ½ mm 10 μm/sec 0.1 Hz 1 MPa

slide 1 mm
vibs ½ mm 1 Hz 1 MPa
slide 1 mm
vibs ½ mm 10 Hz 1 MPa
slide ½ mm

[offset]

slide ½ mm (~.53 μm)
vibs ½ mm 0.1 Hz 2 MPa
slide 1 mm (~2.03 μm)
vibs ½ mm 1 Hz 2 MPa
slide 1 mm ~~10 Hz~~
vibs ½ mm 10 Hz 2 MPa

slide ½ mm

[offset]

slide ½ mm
vibs ½ mm 0.1 Hz 3 MPa
slide 1 mm (~0.9 μm)
vibs ½ mm 1 Hz 3 MPa
slide 1 mm
vibs ½ mm 10 Hz 3 MPa
slide ½ mm

Biax Experiment

Exp. Name M478 S6 mr001 Date 29 DEC 2000

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 6 mm

Material (Qtz, Granite, ?) spaghetti

Particle Size, Size Distribution Angel Hair #12, ⊥ to shear

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved w/ shims on center block

Contact Dimensions 10 x 10

Normal Stress 1 (MPa)

(DPM readouts) kN

Vertical zero load 0.08 mid experiment (timedisp. =)

Horizontal zero load −0.03 mid experiment (timedisp. =)

Displacement Rates 10 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? Horizontal ↓ 3 turns

Vertical DCDT Gain High, Horiz. High

TDXR offsets

Comments: T = 23°C RH ~ 11%

Horizontal disp. offset.

Biax Experiment

Exp. Name m477S3mr025 Date 28DEC2000

Operator K. Frye

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? YES, HORIZONTAL UP 3

Vertical DCDT Gain High Horiz Low

TDXR offsets

Comments: RH ~ 5% T = 22°C, This test is to check low humidity @ 25 MPa, compare w/ low RH @ 5 MPa.

σ_n to 40 MPa, τ brought on @ 10 um/s @ 0.67mm, unload @ 2.55mm (3.22)

reload, unload @ 3.2mm (3.87 readout)

reload, unload @ 3.86mm (4.53) [offset]

70 um/s to 1.6 mm, then vel. steps every 600 um

10 – 20 – 10 – 20 – 10 . . .

[offset] →

SHS

Disp	Time
0.4	2.66
0.55	3.12
0.70	9.93
0.90	14.71 (whoops)
1.10	29.99
1.35	29.77
1.60	1:39.93
1.90	1:40.18
2.20	4:59.96
2.55	5:00.02
2.90	16:39.97
3.25	16:40.12

all exhibit healing. Does sand need to be heated?

Biax Experiment

Exp. Name m476 S3 mr 005 Date 26 DEC 2000

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10×10

Normal Stress 40 → 5 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High / Horizontal ~~High~~ Low

TDXR offsets

Comments: RH ~ 5% T = 23°C

σ_N to 40 MPa, τ brought on @ 10 um/s (0.35mm), unload @ 2.55mm (2.9)

reload, unload @ 3.2 mm disp (3.55)

reload, unload @ 3.86 mm disp (4.21)

σ_N to 5 MPa, [offset disp]; 10 um/s to 1.6 mm, Then vel. steps

*every 600 um (10→20→10→20) [offset] →

SHS

disp.	time
0.4	2.99
0.55	3.00
0.70	10.06
0.90	9.94
1.10	30.03
1.35	30.09
1.60	1:39.96
1.90	1:40.06
2.20	4:59.97
2.55	5:00.18
2.90	16:39.99
3.25	16:40.88

3.60 - vel. step to 20, 4.2 → 10, 4.8, stop, σ_n to 25

SHS

~~10 mm/s to 5.2 100s~~

~~5.5~~

6.00 mm	1:40.24
6.2 mm	1:40.05

unload

Biax Experiment

Exp. Name M47553mr005 Date 22 DEC 2000

Operator frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 5 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid_experiment _____ (timedisp. = _____)

Horizontal zero load 006 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? yes, horizontal ↑ 4 turns

Vertical DCDT Gain High

TDXR offsets _____

Comments:

T=23°C, RH= 35%

σ_N to 40 MPa, τ brought on @ 10 mm/s @ 0.8 mm

unload @ 2.55 mm (3.35), reload

unload @ 3.20 mm (4.00), reload

unload @ 3.86 mm (4.66), reload

σ_N to 5 MPa [offset] → 10 mm/s to 1.60 mm, Then vel. steps every 600 um [offset]

10-20-10-20...

→

SHS

DISP.	HOLD TIME
0.4	3.06
0.55	3.16
0.70	10.69
0.90	9.96
1.10	29.88
1.35	30.06
1.60	1:40.12
1.90	1:40.06
2.20	5:01.95
2.55	5:00.23
2.90	16:40.06
3.30	16:40.15

4.0 vel. steps 10-20-10-20-10 unload

Biax Experiment

Exp. Name 47456mr001 Date 20 DEC 2000

Operator Frye

Gouge (or other sample) gouge

Layer Thickness 6 mm

Material (Qtz, Granite, ?) spaghetti

Particle Size, Size Distribution #12 / Angel hair – ⊥ to shear

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 1 (MPa)

(DPM readouts) kN

Vertical zero load .008 mid_experiment _____ (timedisp. = _____)

Horizontal zero load .004 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 mm/s

Data Logger Used LabVIEW 4 chan.

Servo Gain Adjust? _____

Vertical DCDT Gain High – Horiz. = High

TDXR offsets _____

_____

_____

Comments: T = 23.5°C, RH = 15%, Rods are ⊥ to shear.

σ_N brought to 1 MPa. τ brought on @ 10 mm/s

Biax Experiment

Exp. Name m473S6m.001 Date 1 DEC 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 6 mm

Material (Qtz, Granite, ?) pasta

Particle Size, Size Distribution Angel hair

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10 x 10 cm

Normal Stress 1 (MPa)

(DPM readouts) kN

Vertical zero load .008 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -.007 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10,

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain 1 to 5

TDXR offsets _____

_____

_____

Comments:

Biax Experiment

Exp. Name m4725Gmr002 Date 30 NOV 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 6 mm

Material (Qtz, Granite, ?) Macaroni / Seminole

Particle Size, Size Distribution Angel Hair / 12

Forcing Blocks (Steel, Westerly, ?) Steel Block # _____

Roughness grooved

Contact Dimensions 10x10cm

Normal Stress 2 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -003 mid_experiment _____ (timedisp. = _____)

Displacement Rates _____

Data Logger Used LabVIEW 4

Servo Gain Adjust? Horiz down 4 turns

Vertical DCDT Gain High

TDXR offsets _____

Comments: Horizontal Gain High

σ_N brought to 2 MPa

τ brought on @ 10um/s

[offset] [offset]

velocity steps 10-1-10-20-10

T = 23.4°C

RH = 25%

Biax Experiment

Exp. Name m471 S6mr002 Date 28 Nov 2000

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness ~6mm

Material (Qtz, Granite, ?) Macaroni / pasta

Particle Size, Size Distribution Angel Hair ~ 900 um diameter

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 10x10

Normal Stress 2 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid_experiment _____ (timedisp. = _____)

Horizontal zero load -000 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10 um/s -20

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? YES HORIZONTAL - ~~down 13.5 Turns for high gain~~

Vertical DCDT Gain High Horizontal - High

TDXR offsets _____

_____

_____

Comments:

σ_N to ~~15~~ 15 MPa, supports for center block knocked out.

τ brought on @ 10 um/s → 6.4mm [offset]

do some vel. steps after lock up.

(offset) σ_N to 2 MPa

Biax Experiment

Exp. Name m47053nr025 Date 26 Nov 2000

Operator Frye

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block # _____

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid_experiment _____ (timedisp. = _____)

Horizontal zero load −601 mid_experiment _____ (timedisp. = _____)

Displacement Rates 10um/s, 20.um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? YES +1 turn, vert

Vertical DCDT Gain High

TDXR offsets _____

_____

_____

Comments: RH = 75% T = 22.6°C

σ_N to 40 MPa, τ brought on @ 0.7 mm, unload @ 2.55 (3.25 mm)

reload, unload @ 3.20 (3.90 mm)

reload, unload @ 3.86 (4.56mm) [offset]

σ_N → 25 MPa, 10 um/s to 1.6 mm, then velocity steps every 0.6 mm [offset]

SHS tests - (over)

disp.	time
0.4	3.08 s
0.55	2.97
0.70	10.56
0.90	10.24
1.10	29.99
1.35	29.87
1.60	1:40.16
1.90	1:40.11
2.20	4:59.95
2.50	5:00.06
2.85	16:40.13
3.30	16:39.90
3.80	- velocity steps 10-20-60-20-10

~RH - 72%

Average 74%?

unload

Biax Experiment

Exp. Name m469S3mr025 Date 17 NOV 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Alumina

Particle Size, Size Distribution 150 grit

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 001 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? vert, down 1 turn

Vertical DCDT Gain High

TDXR offsets

Comments: Saturated, distilled water, 90°C

Bring on Normal Stress (to 10 MPa), saturate, heat.

Norm. displacement offset. - take out vert. load cell, dry, reseal

σ_N to 40 MPa, begin vert. loading @ 10um/s, unload when F_v = 350 kN (5.27), reload; reload to 5.91, unload @; reload to 6.4, unload [offset], σ_N to 25 MPa. load up @ 10um/s to 1.6 mm.

velocity steps every .6mm 10-20-10-20-10-20-10-20-10 [offset], Then SHS →

4	3.13
0.55	4.03
0.70	9.95
0.90	9.95
1.10	30.52
1.35	29.91
1.60	1:39.87
1.90	1:41.29
2.20	4:59.89
2.55	5:00.09
2.90	16:39.88
3.3	16:39.95
4.0	
~~3.8~~,	unload.

SHS

Biax Experiment

Exp. Name m468S3mr 005 Date 27 OCT 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 5mm to start

Material (Qtz, Granite, ?) Kaolinite

Particle Size, Size Distribution small

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 003 mid experiment (timedisp. =)

Displacement Rates 1-10-100

Data Logger Used LabVIEW 4 chan

Servo Gain Adjust? Yes, one turn

Vertical DCDT Gain High

TDXR offsets

Comments: T = 22.7°C RH = 41%

Tc - 43mm, load cycle @ 4.43, (4 net), offset @ 5

10 um/s to 4.0, then velocity steps every 600 um

10-1-10-1-10 [offset]

1.6 mm, then 10-~~100~~-10 (1) -10-100-10-100-10 [offset] Servo gain adjust

1 mm, then ~~10-1-10-1-10-100-10-100-10~~ 10-100-10

(unload)

Biax Experiment

Exp. Name demo Date 19SEPT2000

Operator Frye

Gouge (or other sample) Gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) Glass beads
Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block #
Roughness grooved
Contact Dimensions 10 x 10 cm

Normal Stress 15 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)
Horizontal zero load 004 mid experiment (timedisp. =)

Displacement Rates 10, 100 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: demonstration for freshman seminar.

Biax Experiment

Exp. Name m46753mr025 Date 21 AUG 2000

Operator Fryer

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions $10 \times 10\ cm^2$

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? down 2 nums vert.

Vertical DCDT Gain High

TDXR offsets

Comments:

σ_3 to 10 MPa, add 1M NaCl water (1 gal)

bring T → 86°C, adjust ~~DCDT~~ LVDTs while locked [offset]

σ_N to 40 MPa, τ brought on @ 10.mm/s

unload when $F_v \approx 350$ kN (4.98mm); reload

unload @ 5.98 mm, ~~[offset]~~, reload

unload @ 6.22, [offset], σ_N to 25 MPa

(over) →

10mm/s to 1.6 mm, vel. steps every 0.6mm 10-20-10-20...

[offset]

SHS

disp -	TIME
0.4	3.08 s
0.55	3.12
0.70	9.92
0.90	9.94
~~0~~.10	30.49
1.35	30.13
1.60	1:40.15
1.90	1:40.09
2.20	4:59.91
2.505	4:59.98
~~2.805~~ 2.9mm	16:40.04
~~3.05~~3	16:46
3.60	velocity steps?

Biax Experiment

Exp. Name m4665 3mr 025 Date 14 AUGUST 2000

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3 mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 005 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

τ ↑ @ 0.29, apparently elastic loading of ~~gasket~~ mat. jacket.

Comments: Saturated w/ Distilled Water; T = 85°C

τ brought on @ 2.4 (slope change), unload @ 2.55 (4.95)

reload , unload @ 3.20 (5.6)

reload , unload @ 3.86 → (6.24 Offset)

σ_N to 25 MPa, 10 mm/s to 1.6mm, Then vel. steps every 0.6

Heater turned off last 3 steps.

loss rate = 1° C / minute

SHS

disp	Time
0.4	3.11
0.55	3.00
0.70	9.95
0.90	10.02
1.10	29.97
1.35	30.01
1.60	1:40.07
1.90	1:40.02
2.20	5:00.00
2.50	5:00.23
2.80	16:41.56
3.25	16:39.95
3.60	

~ heater turned off before hold; turned on 5 min → 14 min
turned off 14 → 16:40 + 0.2 mm disp

~ heater on for entire SHS

↳ velocity steps, 20-10-20-10 unload @ 6.0 mm

@ 100 samples/s

turn off heater.

OTHER NOTES 0.050" latex used for jacket

`Biax Experiment

Exp. Name ~~m453~~ m465S3mr015 Date 12 AUG 2000

Operator Frye

Gouge (or other sample) gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) QTZ
Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Alumina Block #
Roughness grooved
Contact Dimensions 10x10 cm²

Normal Stress 15 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)
Horizontal zero load 004 mid experiment (timedisp. =)

Displacement Rates 10um/s, 20um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 25.4°C, saturated sample (D.I. water)
T on @ 0.55mm disp → load cycle @ 4.55, 5.55 [offset]
run to 6.4mm (offset)
run to 1 mm, → 20um/s → ~~10um/s → 20um/s → 10~~
pull off → blocks failed.

`Biax Experiment

Exp. Name m464S3nr025 Date July 7, 2000

Operator Margaret

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical 009 zero load mid experiment (timedisp. =)

Horizontal 001 zero load mid experiment (timedisp. =)

Displacement Rates 10, 20 μm/s

Data Logger Used Lab View

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments: T = 25.3°C RH = 35%

σ_n = 40 MPa, τ brought on at .27

unload at 2.55 [2.82]

reload, unload at 3.20 [3.47]

reload, unload at 3.86 [4.13] [offset]

σ_N to 25 MPa, reload at 10 μm/s to 1.6 mm

Then velocity steps every 0.6 mm (10-20-10...) [offset]

~~kbi~~ displacement hold time

0.4	35
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	~~1000~~ problems

[offset]

0.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

Extra Long Hold
(Labview Problems
↑
memory)

[offset]

0.4	5
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

`Biax Experiment

Exp. Name M46353mr025 Date 28 JUNE 2006

Operator Frye

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10x10

Normal Stress 40→25 (MPa)

(DPM readouts) kN

Vertical zero load 008-9 mid experiment (timedisp. =)

Horizontal zero load 001 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4chan

Servo Gain Adjust? ~~No~~ Yes down ~~1~~ 2 turns

Vertical DCDT Gain High

TDXR offsets

Comments: Rubber Jacket ~~23"x16"~~ 80cm x 55cm

σ_N to 10 MPa, saturate, raise T to 70°C

σ_N to 40, ~~disp~~ τ brought in @ .75 mm, unload @ 2.55 (3.3)

reload, unload @ 3.2 (3.95)

reload unload @ 3.86 (4.61)

① Sprung a leak, ② noise due to heater done

`Biax Experiment

Exp. Name M462S3mr025 Date June 27, 2000

Operator Margaret

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10×10 cm²

Normal Stress 40 → 25 (MPa) 0.1 Hz, 2 MPa

(DPM readouts) kN

Vertical 009 zero load mid experiment (timedisp. =)

Horizontal 003 zero load mid experiment (timedisp. =)

Displacement Rates 10, 20 μm/s

Data Logger Used LabView

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: T = 26°C RH = 57%

σ_n = 40 MPa, τ brought on at .35

unload at 2.55 [2.90]

reload, unload at 3.20 [3.55]

reload, unload at 3.86 [4.21] [offset]

σ_N to 25 MPa reload at 10 μm/s to 1.6 mm

Then velocity step [illegible] 1 mm (10-20-10) [offset]

Displacement	Hold Time
0.4	10s
1.4	10s
2.4	30s
3.4	100s
4.4	300s
5.4	1000s

[offset]

0.4	10
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	10
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	10
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

`Biax Experiment

Exp. Name M461133mr025 Date June 26, 2000

Operator Margaret

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions $10 \times 10 cm^2$

Normal Stress 40 → 25 (MPa) 0.1 Hz Vibs

(DPM readouts) kN

Vertical 009 zero load mid experiment (timedisp. =)

Horizontal 003 zero load mid experiment (timedisp. =)

Displacement Rates 10 μm/s → 20 μm/s

Data Logger Used LabView

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: T = 26.5°C RH = 52%

σ_N to 40 MPa, τ brought on at 10 μm/s at .23

unload at 2.55 [2.78]

reload, unload at 3.20 [3.43]

reload, unload at 3.86 [4.09] [offset]

σ_N to 25 MPa reload at 10 μm/s to 1.6 mm

Then velocity steps every 2 mm (to 20 μm/s) [offset]

Displacement	Hold Time
0.4	10s
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	10s
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	10
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	10
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

`Biax Experiment

Exp. Name M460S3mr025 Date June 21, 2000

Operator M. Boettcher

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions $10 \times 10 cm^2$

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical 008 zero load mid experiment (timedisp. =)

Horizontal 002 zero load mid experiment (timedisp. =)

Displacement Rates 10 μm/s → 20 μm/s

Data Logger Used Lab View

Servo Gain Adjust? 0.1 Hz

Vertical DCDT Gain high

TDXR offsets

Comments: T = 25.4 RH = 40%

σ_n to 40 MPa, τ brought on at 10 μm/s at .71 mm

unload at 2.55 (3.26)

reload unload at 3.2 (3.91)

reload unload at 3.86 (4.57) [offset]

σ_n to 25 MPa,

reload @ 10 μm/s to 1.6 mm. Then velocity steps every 0.6 mm (10-20-10-20...) [offset]

4 10 sec
.4 10 sec
.4 30 sec
.4 100
.4 300
.4 1000

[offset]

0.4 10 sec
1.4 10 sec
2.4 30 sec
.4 100 sec
1.4 300 sec
5.4 1000 sec

[offset]

0.4 10 sec
.4 10 sec
.4 30 sec
3.4 100 sec
.4 300 sec
.4 1000 sec

[offset]

0.4 10 sec
.4 10 sec
2.4 30 sec
3.4 100 sec
.4 300 sec
5.4 1000 sec

`Biax Experiment

Exp. Name M4595Bmr025 Date 9 JUNE 2000

Operator Margaret B.

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 001 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 22.4°C, 51% RH

σ_N to 40MPa, τ brought on @ 10mm/s at 0.40 mm, unload @ 2.55mm (2.95 mm)

reload unload @ 3.2 (3.60 mm)

reload, unload @ 3.86 (4.26mm)

σ_N to 25 MPa, [offset] displacement

reload @ 10 mm/s to 1.6mm, Then velocity steps every 0.6 mm (10-20-10-20...) [offset]

dup	SHS time
0.43	3.54
1.4	10.32
2.4	30.35
3.4	100.40
4.4	300.34
5.4	1000.37

[offset]

0.4	3.40
1.4	10.28
2.4	33.80
3.4	100.32
4.4	300.45
5.4	1000.34

[offset]

0.4	3.38
1.4	10.21
2.45	30.31 ½ mm late
3.4	100.03
4.4	300.31
5.4	1000.38

[offset]

0.4	3.36
1.4	10.14
2.4	30.37
3.4	100.42
4.4	300.37
5.4	1000.40

`Biax Experiment

Exp. Name m4585 3mr 025 Date 9 JUNE 2000

Operator Kevin

Gouge (or other sample) Gouge

Layer Thickness 3mm 952, 953

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10×10cm²

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 001 mid experiment (timedisp. =)

Displacement Rates 10, 1 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: %RH = 5.3, T = 24°C

σ_N to 40 MPa, T brought on @ .12mm disp @ 10um/s, unload @ 2.55 (2.67mm)

reload unload @ 3.20 (3.32mm)

reload unload @ 3.86 (3.98mm)

σ_N to 25 MPa, [offset]; 10 um/s to 4.3mm [offset]

10um/s to 0.4mm, then velocity steps every 1mm 10-1-10-1-10-1-10

`Biax Experiment

Exp. Name m45753mr025 Date 6 JUNE 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Soda-lime glass

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates 10 um/s

Data Logger Used LabVIEW 4/channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T=21°C, 46% RH

σ_N to 40 MPa, τ brought on @ 0.14 mm, unload @ 2.55 (2.69)

reload, unload @ 3.20 (3.34)

reload, unload @ 3.86 (4.00)

reload, unload @ 4.50 (4.64)

reload, unload @ 5.14 (5.28)

reduce σ_N to 25 MPa (offset) let sample run-in for 6.4mm @ 10 (offset)

run @ 10 mm/s unload @ 6mm

`Biax Experiment

Exp. Name m456S3mr025 Date 27 MAY 2000

Operator Kevin

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass-beads

Particle Size, Size Distribution log normal

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load -002 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: 27% RH, 26.4°C

σ_N to 40 MPa, τ brought on @ 10um/s (@ 0.16um); unload @ 2.55 (2.71mm)

reload, unload @ 3.20 (3.36mm)

reload unload @3.86 (4.02mm)

reduce σ_N to 25 MPa, [offset]

let sample run-in for 6.4mm @ 10um/s [offset]

Perform sHS → over →

10mm/s to 2mm

disp.	Hold time
2.0	2.97 s
2.15	3.07
2.30	9.95
2.50	10.04
2.70	30.01
3.00	29.88
3.30	1:40.03
3.60	1:41.26
3.90	5:00.30
4.25	4:59.78
4.60	16:40.04
4.95	16:40.34
5.30	Vel. steps 10-20-10

unload

`Biax Experiment

Exp. Name m455S3mrB25 Date 26 MAY 2000

Operator Kevin

Gouge (or other sample) gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) glass beads
Particle Size, Size Distribution log Normal

Forcing Blocks (Steel, Westerly, ?) steel Block #
Roughness grooved
Contact Dimensions 10x10cm^2

Normal Stress 40→25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)
Horizontal zero load −002 mid experiment (timedisp. =)

Displacement Rates 10um/s, 20

Data Logger Used LabVIEW 4chan.

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 24.4°C, 32% RH, last sample made from bead batch 2

σ_N to 40 MPa, τ brought on @ 10um/s (@ 0.32 mm); unload @ 2.55 (2.87mm)
reload, unload @ 3.20 (3.52 mm)
reload unload @ 3.86 (4.18mm)

reduce σ_N to 25 MPa, [offset]
Let sample run in @ 10um/s for 6.4mm [offset]
perform SHS → over →

10um/s to 2mm

disp.	Hold time
2.0	3.02
2.15	3.09
2.30	9.93
2.50	9.96
2.70	29.96
3.00	30.12
3.30	1:40.19
3.60	1:39.81
3.90	4:59.98
4.25	5:00.02
4.60	16:40.11
4.95	16:40.01
5.30	velocity step → 20 - 10

Biax Experiment

Exp. Name M454S3mr025 Date May 25, 2000

Operator Boettcher / Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm²

Normal Stress 40 → 25 (MPa) 10Hz, 2MPa

(DPM readouts) kN

Vertical 009 zero load mid experiment (timedisp. =)

Horizontal -001 zero load mid experiment (timedisp. =)

Displacement Rates 10 μm/s → 20 μm/s

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments: T = 24.2°C RH = 42% [0.9mm]

σ_n to 40 MPa, unload @ 2.55 (3.45)

reload, unload @ 3.20 (4.10)

reload, unload @ 3.86 (4.76)

[offset] σ_n to 25; 10 μm/s to 1.6mm, Then vel. steps every 0.6 mm [offset]

0.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

a little slow to restart...

[offset]

0.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

2.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

* 300-300-300-100... 5sec between the 300's and possibly vibrated before the hold started

Biax Experiment

Exp. Name m453S3mr025 Date 24 MAY 2000

Operator FRYE

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) QTZ

Particle Size, Size Distribution F-110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load -201 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: Saturated w/ 0.1 M NaCl solution, 24°C

σ_N to 10 MPa, saturate, wait 10 min; σ_N to 40 MPa

τ brought on @ 10 um/s (at 0.38mm); unload @ ~~2.55~~ 2.55mm (2.93)

reload, unload @ 3.20 (3.58)

reload, unload @ 3.86 (4.24)

[offset]; σ_N → 25, 10 um/s to 1.6mm, Then vel. steps every 0.6mm (10-20-10-20...)

[offset]

disp.	Hold
0.4	3.17s
0.55	3.11
0.70	9.99
0.90	10.02
1.10	29.91
1.35	30.29
1.60	1:40.09
1.90	1:40.00
2.20	5:00.03
2.50	5:00.23
2.80	16:40.14
3.25	16:40.01
3.60	~~unload~~ ✓. steps 10-20-10-20-10 unload

Biax Experiment

Exp. Name m452S3mr025 Date May 23, 2000

Operator Boettcher / Faye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 → 25 (MPa) 2MPa vibs

(DPM readouts) kN

Vertical 009 zero load mid experiment (timedisp. =)

Horizontal -001 zero load mid experiment (timedisp. =)

Displacement Rates 10 & 20 μm/s

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments: RH = 33% T = 24.1 °C

On to 40 MPa, τ brought on @ 10 μm/s [0.52 mm];
unload @ 2.55 (3.07 mm)
reload; unload @ 3.20 (3.72 mm)
reload; unload @ 3.86 (4.38 mm)

On to 25 MPa, [offset] vert. displacement

[offse

1.6 mm Then rel. steps every 0.6 mm

0.4 mm	35
1.4 mm	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	~~3~~	none
1.24	10	started sliding again too early...
2.4	30	
3.4	100	
4.4	300	
5.4	1000	

[offset]

0.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

[offset]

0.4	3
1.4	10
2.4	30
3.4	100
4.4	300
5.4	1000

Biax Experiment

Exp. Name m451S3mr025 Date 5/22/00

Operator Boettcher / Frye

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 → 25 (MPa) 3MPa vibs

(DPM readouts) kN

Vertical 008 zero load mid experiment (timedisp. =)

Horizontal -002 zero load mid experiment (timedisp. =)

Displacement Rates 10 & 20 μm/s

Data Logger Used Labview 4 channel

Servo Gain Adjust? no

Vertical DCDT Gain high

TDXR offsets

Comments: RH 37% T = 22.4°C

σ_N to 40 MPa, T broughton @ 10 μm/s [0.42mm) ; unload @ 2.55 (2.97 mm)

reload ; unload @ 3.20 (3.62 mm)

reload ; unload @ 3.86 (4.28 mm)

σ_N to 25 MPa, [offset] vert. disp.

1.6 mm, Then vel. steps every 0.6 mm (10-20-10-20....) [offset]

wisp

0.4 ~3 s

1.4 10 s

2.4 30s

3.4 100 s

4.4 300 s

5.4 1000 s

(offset)

0.4 3s
1.4 10s
2.4 30s
3.4 100s
4.4 300s
5.4 1000s

[offset]

0.4 3s
1.4 10
2.4 30
3.4 100
4.4 300
5.4 1000

[offset]

0.4 3
1.4 10
2.4 30
3.4 100
4.4 300
5.4 1000

Biax Experiment

Exp. Name m450S3mr025 Date 21 MAY 2000

Operator Kevin

Gouge (or other sample) gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) alumina
Particle Size, Size Distribution 150 grit

Forcing Blocks (Steel, Westerly, ?) Steel Block #
Roughness grooved
Contact Dimensions 10 x 10cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)
Horizontal zero load −001 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: Saturated w/ D.I., 22.5°C.

σ_N to 10 MPa, saturate, wait 10 min, σ_N to 40 MPa,
(brought on @ 10um/s (0.80) unload @ 2550 (3350)
reload unload @ 3200 (4000mm)
reload unload @ 3860 (4660 mm)
σ_N to 25 MPa, [offset]
10um/s to 1.6 mm, The velocity steps every 600 um 10-20-10 ... [offset]

disp.	time	
0.4	3.09	STS
0.55	3.07	
0.70	9.96	
0.90	9.92	
1.10		
1.35	29.81	
1.60	30.02	
1.90	1:40.11	
2.20	1:39.92	
2.50	5:00.16	
2.80	5:00.03	
3.~~1~~	16:40.48	
3.4	16:39.85	

Biax Experiment

Exp. Name m4495 3mr025 Date 19MAY2000

Operator Kevin

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Soda lime glass beads

Particle Size, Size Distribution log Normal

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load −001 mid experiment (timedisp. =)

Displacement Rates 10 um/s, 20

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 23.6°C, 30% RH

σ_N to 40 MPa, τ brought on @ 10 um/s (0.39 mm), unload @ 2550 um (2940 um)

reload unload @ 3200 (3590 um)

reload, unload @ 3860 (4250 um)

reduce σ_N to 25 MPa, [offset]

1600 um, then vel steps every 600 um 10-20-10, etc. [offset]

10 mm/s to 1.6 mm velocity step 10-20-10
out to 3.2 mm

SHS

3.09
2.99
10.05
9.95
29.97
30.04
1:40.04
1:40.32
[offset]
4:59.16
4:59.73

unload

Biax Experiment

Exp. Name m4485 3mr015 Date 19MAY2000

Operator Kevin

Gouge (or other sample) gouge

Layer Thickness 93.68, 93.64 after σ_n applied

Material (Qtz, Granite, ?) smectite

Particle Size, Size Distribution —

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10cm²

Normal Stress 15 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load -000 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? n/a

Vertical DCDT Gain High

TDXR offsets

Comments: 22.8°C 33% RH

σ_N to 15MPa τ brought on @ 10mm/s (@ 0.5mm) unload after 4mm disp, reload, [offset] @ 5mm

10mm/s to 4mm, then vel. steps every 600um 10-1-10-1-10 [offset]

1.6mm, then, 10-100-10-1-10-100-10-100-10 [offset]

1.0 mm, then 10-1-10-1-10-100-10-100-10 unload

Biax Experiment

Exp. Name M447 S3mv 015 Date 17MAY2006

Operator Kevin

Gouge (or other sample) gouge

Layer Thickness 93.53, 93.52 after σ_N

Material (Qtz, Granite, ?) Smectite

Particle Size, Size Distribution —

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 15 (MPa)

(DPM readouts) kN

Vertical zero load .008 mid experiment (timedisp. =)

Horizontal zero load -.002 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 22.83°C, 26% RH 0.31

93.52, 93.53 width after σ_N applied

σ_N to 15MPa, T applied @ 0.31 mm

load cycle @ 4mm disp, ~~offset after 5~~ 10000s hold during unload.

~~after~~ reload, [offset] @ 5mm

10 mm/s to 4 mm, then vel. steps every 600um 10-1-10-1-10 [offset]

10 mm, then 10-100-10-1-10-100-10-100-10 [offset]

1 mm, then 10-1-10-1-10-100-10-100-10 unload

Biax Experiment

Exp. Name m446S3mr005 Date 11 MAY2000

Operator Kevin

Gouge (or other sample) Gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Soda-lime glass beads

Particle Size, Size Distribution "log normal"

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions $10 \times 10\ cm^2$

Normal Stress 005 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load -001 mid experiment (timedisp. =)

Displacement Rates 10um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? Yes: Vert + 4 turns

Vertical DCDT Gain Low

TDXR offsets

Comments: T = 24.8°C 33%RH

σ_N @ 5 MPa, τ brought on (@ 10um/s) at 0.18 mm in low gain disp. mode.

Biax Experiment

Exp. Name m4553mr005 Date 10 MAY 2000

Operator Kevin

Gouge (or other sample) gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) beads
Particle Size, Size Distribution log normal

Forcing Blocks (Steel, Westerly, ?) steel Block #
Roughness grooved
Contact Dimensions 10 x 10 cm²

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)
Horizontal zero load -001 mid experiment (timedisp. =)

Displacement Rates 10 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 23.2°C, 32% RH

σ_3 @ 5MPa, τ brought on (@ 0.09mm) @ 10um/s
1 stress drop [offset]
[offset]
[offset] vel. steps 10-20-10 unload.

Biax Experiment

Exp. Name M44453mr005 Date 10MAY2000

Operator Kevin

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Beads

Particle Size, Size Distribution Gaussian about 10^2

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm²

Normal Stress (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load -002 mid experiment (timedisp. =)

Displacement Rates 10mm/s, ...

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: 23°C 33% RH

σ_N @5MPa, τ brought to 10mm/s (@ 0.12 mm)

velocity steps 10 → 20 (stress drop) → 10 → 20 (stress Drop) → 10 [offset]

10 → 1 → 10 ($\frac{2}{3}$D) – ½ – 10 (SD) [offset]

10 – 1 – 10 (SD) – 100 (SD) – 10 unload.

Biax Experiment

Exp. Name M443S3mr025 Date 9 MAY 2000

Operator Kevin

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass beads

Particle Size, Size Distribution gaussian about 10^2

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm

Normal Stress 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load -000 mid experiment (timedisp. =)

Displacement Rates 10um/s,

Data Logger Used LabVIEW 4channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: T = 25.4 °C, 34%RH

σ_N to 25 MPa, shear brought on (0.42) @ 10um/s

(2)[offsets], Then velocity steps, 10 → 100 → 10 - 1 - 10 - 1 - 10 (offset)

vel. steps: 10 - 100 - 10 - 100 - 10

SHC: 2 30 300 unload.

Biax Experiment

Exp. Name M6253m005 Date 9th May 2000

Operator Koren

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads -200/+270 mesh,

Particle Size, Size Distribution 53-74 μm drain

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 005 (MPa) 060 kN.

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 010 mid experiment (timedisp. =)

Displacement Rates 10 μm/s load up

Data Logger Used labview 6 channel

Servo Gain Adjust? No

Vertical DCDT Gain Hi (Main in Cav)

TDXR offsets 10, 1,

T = 25.3°C

HUM = 68%.

Comments: false start - take main block spacer in so unloaded + restarted test

No fracture noises on load up.

Biax Experiment

Exp. Name M461S3 mr005 Date 8th May 2000

Operator Kerem

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads (Mo Sc. Class IV)

Particle Size, Size Distribution Mesh -50/+70, 210-297 μm

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 010 mid experiment (timedisp. =)

Displacement Rates load up @ 10 μm/s

Data Logger Used lab View 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain Vi, horiz in 60

TDXR offsets

Comments:

T = 23.9°C

num = 402.

10 μm/s

1 μm/s (HH II)

0.1 μm/s (HHT)

1 μm/s III

10, 20, 100, 200, 10, 1, 0.1

Biax Experiment

Exp. Name M6405Smr025 Date 8th May 2000

Operator Loren

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads (Mo-Sci Class IV)

Particle Size, Size Distribution Mesh -50/+70, ~~#80~~ 210 - 297 μm.

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 25 (MPa) → 250kN

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 010 mid experiment (timedisp. =)

Displacement Rates 10 μm/s load up then 1, ~~0.1~~, 1, 10, ~~20~~, 30, 100, ~~200~~

Data Logger Used Lab View 4 channel

Servo Gain Adjust?

Vertical DCDT Gain Hi, Navg in Lv.

TDXR offsets

Comments: 6g stem drops @ 1000 Hz if possible.

T = 25.6°C

Hum = 45%.

after stable sliding do U steps
- they only have a direct effect!

- stem drops start early in load up.
- stem drops stop → constant. → cracking → audible → much grain fracture

NB. @ 6 - 9 mm Usteps show only a direct effect + no evolution

10 - 1

1 - 10

10 - 1

1 - 10

10 - 100

100 - 10

10 - 1

1 - 10

Biax Experiment

Exp. Name m943953mr025 Date 4 MAY 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Soda-lime glass beads

Particle Size, Size Distribution Gaussian about 10^2 microns ($\pm .5$ [log])

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm

Normal Stress 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 008 mid experiment (timedisp. =)

Displacement Rates

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: T = 25.5°C RH = 26%

0.3

(93.78, 93.80 mm thickness after σ_N brought on)

σ_N → 25 MPa, V_{slr} = 10 um/s step to 1 um/s [offset]

stable (?) @ 1um/s → step to 10 → stress drop → step back to 1 → 2 → 1

step to 0.1 um/s → 1 → 10 → 1 → 10 → [offset]

(1 um not clean)

10 → 100 → 10 →

SHS

3.07

3.01

30.62

29.89

5:09.94

[offset]

velocity steps

10 - 20 - 10 - 100 - 200 - 100 - 10 - 100 - 10 - 100 - 10

unload

Biax Experiment

Exp. Name m4385 3mr025 Date 21 APR 2000

Operator FRYE

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Al_2O_3

Particle Size, Size Distribution 150 grit

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 008 mid experiment (timedisp. =)

Displacement Rates 10um/s, 20um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: ~~35~~ 5 % RH, 24.5°C

σ_N to 40 MPa [offset layer thickness]; τ_{on} @ 0.80, unload after 2550 (3350)

reload, unload @ 3200 (4000)

reload, unload @ 3860 (4660)

[offset] disp.; $\sigma_N \rightarrow 25$ MPa

10um/s to 1.6mm, Then velocity steps every 600um (10-20-10 etc.)

[offset]

SHS

DISP.	TIME	
0.4	3.06	
0.55	3.01	
0.70	9.81	
0.85	10.09	
1.00	29.94	
1.20	29.89	
1.4	1:39.99	
1.65	1:40.18	
2.00 ~~1.90~~	5:00.06	
2.35 ~~[illegible]~~	5:00.06	
~~[illegible]~~ 2.7	16:40.38	5.2% RH
3.20	16:40.20	
4.0	velocity steps	

5.29 4.80
1327 2597

Biax Experiment

Exp. Name M437S3 mr025 Date 19th April 2000

Operator Karen

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads

Particle Size, Size Distribution 100 μm diam

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 25 (MPa) 259kN

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 008 mid experiment (timedisp. =)

Displacement Rates 10μm/s load up then 1, 0.1, 1, ~~12~~ 3, 10, 30, 100

Data Logger Used Biax LabView Lch

Servo Gain Adjust? No No

Vertical DCDT Gain Hi Noisy in Gm.

TDXR offsets

Comments: T = 23.6°C, Hum = 30%

1 mic/s HHT HHT I 20 mic/s

0.1 mic/s IIII

1 mic/s HHT

10 mic/s

Biax Experiment

Exp. Name m4365 3mv025 Date 19 APR 2000

Operator KEVIN

Gouge (or other sample) GOUGE

Layer Thickness 3MM

Material (Qtz, Granite, ?) @ Al_2O_3

Particle Size, Size Distribution 150 grit

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10cm

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 008 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: 67% RH 23 °C

σ_N to 40 MPa, τ brought on @ 0.60mm, unload after ≠ 2550um (3150)

reload, unload @ 3200 (3800)

reload, unload @ 3860 (4460)

[offset]; σ_N to 25 MPa; [layer thickness offset]

10 um/s to 1.6mm, then velocity steps every 0.6mm (10-20-10-20...)

[offset]

SHS

disp.	time	
0.4	3.00	
0.55	4.15	
0.70	9.74	
0.85	9.92	
1.00	30.07	66% RH
1.20	29.99	
1.40	1:39.99	
1.65	1:40.02	
1.90	4:59.99	
2.20	4:59.64	
2.50	17:02	sample rate?
~~2-9~~ 3.1	16:39.93	
3.67	16.44.50	66% RH

velocity steps

Biax Experiment

Exp. Name M43553mr-025 Date 18 JAN 2000

Operator K. FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Al_2O_3

Particle Size, Size Distribution 150 grit

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness GROUND

Contact Dimensions 10 x 60

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 007 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: 23°C, RH = 87%

σ_N to 40 MPa, shear brought on @ 0.15mm, unload after 2530 (2700)

reload , unload @ 3200 (3350)

reload , unload @ 3860 (4010)

σ_N to 25 MPa, [offset]

10um/s to 1.6 mm, then velocity steps every 600 um (10-20-10-20, etc) [offset]

0.15

disp	itold
0.4	3.00
0.55	3.02
0.70	9.96
0.85	10.16
1.00	29.92
1.2	30.02
1.4	1:40.06
1.65	1:40.06
1.90	5:00.22
2.2	4:59.95
2.5	16:40.66
3.00 ~~2.85~~	16:40.84

SHS

Biax Experiment

Exp. Name m43453mr025 Date 17 APRIL 2000

Operator Frye

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Al_2O_3

Particle Size, Size Distribution 150 grit

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 008 mid experiment (timedisp. =)

Displacement Rates 10, 20 mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: RH = 50-55% T = 23.6°C

0.13

σ_N to 40MPa, τ brought on @ 0.13, unload @ 2530 (2680)

reload, unload @ 3200 (3330)

reload unload @ 3860 (3990)

σ_N to 25 MPa, [offset]

10 um/s to 1.6 mm, Then velocity steps every 600 um

SHS

DISP	TIME
0.4	2.99
0.55	3.11
0.70	10.02
0.85	10.03
1.00	29.74
1.20	30.22
1.40	1:39.67
1.65	1:40.06
1.90	5:00.08
2.2	5:00.10
2.5	16:40.03
2.8	16.39.85

Biax Experiment

Exp. Name M6353mr005 Date 13th April 2000

Operator Koren

Gouge (or other sample) Gauge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads

Particle Size, Size Distribution 100 μm drain

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 005 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10 μm/s load up; 1 μm/s 0.1 μm/s

Data Logger Used Biax LV 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High (Noisy in Gw)

TDXR offsets

Comments: 10% RH, 25°C.

Biax Experiment

Exp. Name m4325 3mv 025 Date 13 APRIL 2000

Operator KEVIN

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Al_2O_3

Particle Size, Size Distribution 150 grit

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 20 μm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? down 3 turns vert (low gain to high)

Vertical DCDT Gain High

TDXR offsets

Comments: T = 24°C, 48% RH

σ_N → 40 MPa, τ on @ 0.41 mm, unload @ 2550 μm (2960) 0.41

reload, unload @ 3200 (3610)

reload, unload @ 3860 (4270) [offset]

10 μm/s to 1.6 mm, Then velocity steps every 600 μm (10-20-10-20-)

46% RH [offset]

SIT)

add .6

0.4	3.11
0.55	3.28
0.70	9.97
0.85	9.91
1.00	32.90
1.20	30.02
2 ~~1.40~~	1:39.99
2.25 ~~1.65~~	1:40.24
2.5 ~~1.90~~	4:59.88
2.8 ~~2.2~~	5:00.29
3.1 ~~2.5~~	16:40
3.45 ~~2.85~~	16:40.09
3.6 ~~3.2~~	

vol. steps

10-20-10

unload

Biax Experiment

Exp. Name M4315Smr025 Date 12th April 2000

Operator Karen

Gouge (or other sample) Gauge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads

Particle Size, Size Distribution 100 μm diam

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm

Normal Stress 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 007 mid experiment (timedisp. =)

Displacement Rates 10, 100, 1000 μm/s

Data Logger Used Biax LV 4channel

Servo Gain Adjust? P Gain by 4 whole turns

Vertical DCDT Gain low Gain

TDXR offsets

Comments:

Temp 24°C

16.2 mm

Biax Experiment

Exp. Name m430S3mr025 Date 12 APR 2000

Operator KEVIN

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Al_2O_3

Particle Size, Size Distribution 150 Grit

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions $10 \times 10\ cm^2$

Normal Stress 4/0 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 007 mid experiment (timedisp. =)

Displacement Rates 10, 20 um/s

Data Logger Used ~~HP~~ LabVIEW 4 channel

Servo Gain Adjust? vert. gain ↓ by 4 turns (last exp. in low vert. gain); gain up 2 turn, gain down 1 turn, down 1 turn TOTAL (↓ 4 turns)

Vertical DCDT Gain High

TDXR offsets

Comments: 4/~~6~~0% RH, T = 24.4°C

$\sigma_N \rightarrow$ 40 MPa, τ brought on @ 1.37mm [layer thickness offset] reload, reload, $\sigma_N \rightarrow$ 25 MPa, [offset] disp.

unload @ 2550 (3920)
unload @ 3200 (4570)
unload @ 3860 (5230)

10 um/s to 1.6 mm. Then vel. steps every 600 um

SHS

disp	Time
0.4	3.05
0.55	3.02
0.70	10.08
0.85	10.08
1.00	30.01
1.2	30.09
1.4	1:40.10
1.65	1:40.06
1.90	5:00.06
2.2	5:00.12
2.5	16:40.05
2.85	16:40.07

RH = 40%

velocity steps

10 - 20 - 10 - 20 - 10

SHS

6.00	1:39.99

1.5

[offset]

gain adjust

Biax Experiment

Exp. Name m429 53mr025 Date 11th April 2000

Operator Loren

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads

Particle Size, Size Distribution 100 μm diam

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm

Normal Stress 25 (MPa) (25.9kN)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 007 mid experiment (timedisp. =)

Displacement Rates 10, 100, 1000, μm/s

Data Logger Used Biax LabView 4 channel

Servo Gain Adjust? keep gain as for m428

Vertical DCDT Gain ~~high~~ Vert in low gain (Horiz in low gain)

TDXR offsets

Comments:

Biax Experiment

Exp. Name u428S3mr005 Date 11th April 2000

Operator Karen

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass beads

Particle Size, Size Distribution 100 μm diam

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10x10 cm

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 10, 100, 1000 mic/s

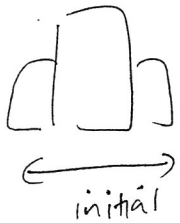
Data Logger Used Biax LV 4channel

Servo Gain Adjust? ↑ (vdcdt) gain by 6x whole turns

Vertical DCDT Gain Switch to low gain Vert (was in low gain)

TDXR offsets

Comments:



Biax Experiment

Exp. Name m427 S3mr025 Date 11 APR 2000

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Alumina

Particle Size, Size Distribution 150 grit (~F-110)

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load -001 mid experiment (timedisp. =)

Displacement Rates 10 um/s, 20

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? ~~No~~ YES

Vertical DCDT Gain High

TDXR offsets

Comments: 75% RH, 24°C

σ_N → 40MPa, [layer Thickness offset],

τ applied (@ .15mm); unload @ 2550 (2700um)

reload, unload @ 3200 (3350)

reload, unload @ 3860 (4010)

[offset], σ_N → 25MPa

10um/s to 1.6 mm disp., Then rel. steps every 600um (10-20-10-20) [offset]

.15

disp.	Hold	
0.4	3.02	
0.55	2.97	
0.70	10.03	
0.85	9.98	
1.05	30.04	
1.25	30.06	
1.45	1:39.95	
1.70	1:40.08	
1.95	5:00.18	
2.25	4:59.97	
2.55	16:40.31	
2.9	16:40.06	70% RH

vel. steps

Biax Experiment

Exp. Name m4265Smr040 Date 10th April '00

Operator Warren

Gouge (or other sample) Gouge
Layer Thickness 3mm
Material (Qtz, Granite, ?) Beads
Particle Size, Size Distribution 1000 μm diam

Forcing Blocks (Steel, Westerly, ?) Steel Block #
Roughness Grooved
Contact Dimensions 10x10 cm

Normal Stress 40 (MPa)
(DPM readouts) kN
Vertical zero load 009 mid experiment (timedisp. =)
Horizontal zero load -000 mid experiment (timedisp. =)

Displacement Rates load up @ 10μm/s then 100μm/s and 1000μm/s

Data Logger Used labview 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain low gain, having in the low gain

TDXR offsets

Comments: 25°C, 13% RH

Biax Experiment

Exp. Name M425S3mr005 Date 10th April '00

Operator Karen

Gouge (or other sample) Gauge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Glass Beads

Particle Size, Size Distribution 100 μm diam

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 x 10 cm

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load 009 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates load up @ 10 μm/s then 100 μm/s and 1000 μm/s

Data Logger Used labview 6 channel

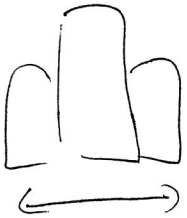
Servo Gain Adjust? Yes increase by 4 x turns (whole turns)

Vertical DCDT Gain low gain, horiz in low gain

TDXR offsets

Comments: sampled @ 1 Hz for initial
10 Hz for 10 μm/s loadup
100 Hz for 100 μm/s stage
1000 Hz for 1000 μm/s stage
NB: try faster logging in next run.

Biax LV2 look ___ - t
fetch as raw data



95.5 mm (initial)

test stopped @ 12 mm displacement
following significant gouge loss.

Biax Experiment

Exp. Name m424S3mr025 Date 9APR2000

Operator frye

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Alumina

Particle Size, Size Distribution ~F110 (150 GRIT)

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 002 mid experiment (timedisp. =)

Displacement Rates 10 mm/s, 20

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: Saturated w/ tap water, 24°C

σ_N to 10 MPa, water added; after 10 min, σ_N → 40 MPa, [layer thickness offset]

Shear broughton, load cycle @ 2550 um (3350)

reload, unload @ 3200 (4200)

reload, unload @ 3860 (4860)

σ_N → 25 MPa, [offset,] 10 um/s to 1.6 mm, Then velocity steps every 0.6 mm

0.80?
-1.00

16-20-10, etc. Offset)

SHS

disp.	hold time
0.5	3.1
0.65	3.09
0.80	9.87
0.95	9.88
1.10	29.96
1.30	30.09
1.50	1:40.00
1.75	1:40.01
2.00	5:00.13
2.36	4:59.95
2.66	16:40.06
2.96	16:40.02

velocity steps

10 - 20 - 10 - 20 - 10

unload

Biax Experiment

Exp. Name m423 S3mm 025 Date 4/7/00

Operator Boettcher / Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm (94.0, 93.9 @ σ_n = 40 MPa)

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10×10 cm^2

Normal Stress 40 MPa → 25 MPa (3 MPa vibrations) (MPa)

(DPM readouts) kN

Vertical 008 zero load mid experiment (timedisp. =)

Horizontal 001 zero load mid experiment (timedisp. =)

Displacement Rates 10 μm/s, 20 μm/s

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets .28mm

Comments: T=25° 19° RH

σ_n @ 40 MPa bring on shear load @ 2550 (2830)
@ 3200 (3480)
@ 3860 (4140)

[off set] σ_n to 25 MPa

1.6 mm displacement then velocity steps every 0.6 mm

SHS 1 Hz

0.4 3sec

0.7 → 0.1 μm/s
0.8 → 10 μm/s

prep. time = 1090 sec.

1.4 10 sec

1.7 10 μm/s → 0.1 μm/s
1.8 0.1 μm/s → 10 μm/s

2.4 30 sec.

2.7 10 μm/sec → 0.1 μm/sec
2.8 0.1 μm/sec → 10 μm/sec.

3.4 100 sec

3.7 10 → 0.1
3.8 0.1 → 10

4.4 300 sec

4.7 10 → 0.1
4.8 0.1 → 10

5.4 1000 sec

[offset]

up-not-downs (6 MPa up)

0.4 3 sec
1.4 10 sec
2.4 30 sec
3.4 100 sec
4.4 300 sec.

[offset]

1 Hz 3 MPa (single amplitude)

0.4 3 sec
1.4 10 sec.
2.4 30 sec.
3.4 100 sec.
4.4 300 sec.
5.4 1000 sec.

[offset]

10 Hz 3 MPa (single Amp.)

0.4 3 sec
1.4 10 sec
2.4 30 sec
3.4 100 sec
4.4 300 sec
~~5.4 1000 sec.~~

Biax Experiment

Exp. Name m4225 3mr 050 Date 2APR 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness nom 3mm (92.7, 92.6) after σ_N

Material (Qtz, Granite, ?) Smectite (mont)

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 49.5 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 006 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T=24.7°C, 23% RH; No copper shims

σ_N to 49.5 MPa [layer thick. offset] shear Loading begins @ 0.37 mm, load cycle @ 4mm (4.37), [offset] @ 5mm (5.37) 0.37

10 um/s to 4mm disp., Then velocity steps every 600 um → 10-1-10-1-10 [offset]

1.6 mm disp, Then 10-100-10-1-10-100-10-100-10 [offset]

1.0 mm disp; Then 10-1-10-1-10-100-10-100-10

unload

Biax Experiment

Exp. Name m421 S3mr045 Date 2APR2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness nom. 3mm (92.7, 92.68) under σ_N

Material (Qtz, Granite, ?) Smectite (mmt)

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10cm^2

Normal Stress 45 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 005 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 24.3°C, 21% RH, no copper shims. 0.22

σ_N to 45 MPa; load cycle @ 4mm, [offset] @ 5mm

[Layer Thickness offset]

10 um/s to 4mm, Then 10 - 1 - 10 - 1 - 10 (velocity steps every 600um) [offset].

1.6mm disp, Then 10 - 100 - 10 - 1 - 10 - 100 - 10 - 100 - 10 [offset]

1.0 mm disp, Then 10 - 1 - 10 - 1 - ~~e~~ vert. LVDT touching block, exp. stopped.

Biax Experiment

Exp. Name m42053mr040 Date 1 APR 2000

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness nom. 3mm (92.7 92.8) after σ_N applied

Material (Qtz, Granite, ?) smectite (montmor. ll.)

Particle Size, Size Distribution small

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 004 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

vert. load touchs @ 0.43 mm

Comments: T = 24°C , 14% RH , no copper shims

σ_N to 40 MPa [layer thick offset] load cycle @ 4mm disp.; [offset] @ 5mm.

10 um/s to 4 mm, Then velocity steps every 600 um → 10-1-10-1-10 [offset]

1.6 mm disp, Then 10-100-10-1-10-100-10-100-10 [offset]

1 mm disp, Then 10-1-10-1-10-100-10-100-10 unload

Biax Experiment

Exp. Name m419S3mr035 Date 1 APR 2000

Operator Frye

Gouge (or other sample) gouge
Layer Thickness nom. 3mm (93, 92.85)
Material (Qtz, Granite, ?) smectite-mont.
Particle Size, Size Distribution — small

Forcing Blocks (Steel, Westerly, ?) Steel Block #
Roughness grooved
Contact Dimensions 10x10 cm²

Normal Stress 35 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)
Horizontal zero load 004 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 25° C, 16% RH

0.58

σ_N @ 35 MPa, [layer thickness offset], load cycle @ 4mm, [offset] @ 5
10 um/s to 4mm, Then velocity steps every 600 um; 10-1-10-1-10 [offset]
1.6 mm disp. Then 10-100-10-1-10-100-10-100-10 [offset]
1 mm disp.; Then 10-1-10-1-10

Biax Experiment

Exp. Name m418S3mr030 Date 1 APR 2000

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness Nom 3mm (93.0, 93.2) on loading or

Material (Qtz, Granite, ?) Smectite/mont.

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 30 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 004 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T=24°C 16% RH

0.20

σ_N @ 30 MPa, [layer Thickness offset], load cycle @ 4mm, disp [offset] @ 5mm

10 um/s to 4mm, Then velocity steps every 600um; 10-1-10-1-10 [offset]

1.6mm disp, Then 10-100-10-1-10-100-10-100-10 [offset]

1 mm disp, Then 10-1-10-1-10-100-10-100-10

Biax Experiment

Exp. Name N 417 S3mr025 Date 31 MAR 00

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness nom. 3mm (93.3, 93.3 after σ_N)

Material (Qtz, Granite, ?) Smectite

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions $10 \times 10 cm^2$

Normal Stress 25 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 004 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 25°C 15% RH

σ_N @ 25 MPa, load cycle @ 4 mm disp, [offset] @ 5 mm 0.26

layer thickness offset

10 um/s to 4mm, Then vel. steps every 600 um 10-1-10-1-10 [offset]

1.6 mm, Then 10-100-10-1-10-100-10-100-10 [offset]

1 mm Then 10-1-10-1-10-100-10-100-10 unload

Biax Experiment

Exp. Name M416 83mr025 Date 3/31/00

Operator Boettcher / Frye

Gouge (or other sample) gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40-25 (3 rb) (MPa)

(DPM readouts) kN

Vertical 008 zero load mid experiment (timedisp. =)

Horizontal 005 zero load mid experiment (timedisp. =)

Displacement Rates 10 μm/s 20 μm/s

Data Logger Used Labview

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments: 16% RH, T = 25°C

load on @ 0.15 mm

σ_n @ 40 MPa, bring on shear, unload @ 2550 (2700)

" " 3200 (~~3250~~ (3350)

" " 3860 (4110)

[offset], σ_n to 25 MPa

1.6 mm disp then velocity steps every .6 mm [offset]

SHS, 10 Hz.

0.4	3.49
1.4	10 s
2.4	30s
3.4	1:41
4.4	5:00
5.4	17:00

2
6
18

LabVIEW TIME TO GENERATE signal.

[offset]

0.4	3 s
1.4	10 s
2.4	30s * vibrations early
3.4	1:40s
4.4	5:05
5.4	16:48

[offset]

0.48	3s
1.4	10s
2.4	30s
3.4	100s * small partial unload
4.4	5:02
5.4	16:52

[offset]

0.4	3 s * early vibes?
1.4	10s
2.4	30
3.4	1:41
4.4	5:02.91
5.4	16:48

Block slipping early in hold

Biax Experiment

Exp. Name M4153mr015 Date 31 MAR 00

Operator FRYE

Gouge (or other sample) gouge

Layer Thickness 93.7, 93.7 after σ_N

Material (Qtz, Granite, ?) smectite

Particle Size, Size Distribution —

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10 cm²

Normal Stress 15 (MPa)

(DPM readouts) kN

Vertical zero load 008 mid experiment (timedisp. =)

Horizontal zero load 005 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 mm/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 25°C 16% RH

σ_N to 15 MPa, ([offset] layer thickness) load cycle @ 4mm disp, offset @ 5mm disp 79

10 mm/s to 4mm, Then vel. steps every 600 um 10-1-10-1-10 [offset]

1.6 mm, Then 10, 100-10-1-10-100-10-100-10 [offset]

1 mm, Then 10-1-10-1-10-100-10-100-10

Biax Experiment

Exp. Name M41453mr 010 Date 31 MAR 00

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness nom. 3mm, (97.3, 98.3, 98, 98.3) (93.92, 94) — after initial loading

Material (Qtz, Granite, ?) Clay - smectite

Particle Size, Size Distribution - ~~PSD~~

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10 cm²

Normal Stress 10 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 005 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100 um/s

Data Logger Used LabVIEW 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

Comments: T = 25°C 16%RH

σ_N @ 10MPa, load cycle @ 4mm, [offset] @ 5mm

LAYER THICK. [OFFSET]

10 um/s to 4 mm, then velocity steps every 600 um 10 → 1 → 10 → 1 → 10 [offset]

6mm, then 10 - 100 - 10 - 1 - 10 - 100 - 10 - ~~100 - 10~~ [offset]

1mm, then 10 - 1 - 10 - 1 - 10 - 100 - 10 - 100 - 10

Biax Experiment

Exp. Name M41353mv 005 Date 30MAR00, 1 DAY A.K.

Operator Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm (97.38, 97.44, 98.8, 98.8) Initial 94.6 after loading

Material (Qtz, Granite, ?) Smectite

Particle Size, Size Distribution

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 5 (MPa)

(DPM readouts) kN

Vertical zero load ~~000~~ 007 mid experiment (timedisp. =)

Horizontal zero load ~~0034~~ 005 mid experiment (timedisp. =)

Displacement Rates 10um/s, 1um/s, 100mm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust? NO

Vertical DCDT Gain ~~High~~

TDXR offsets

Comments: T = 25°C, 18%RH

layer thickness offset

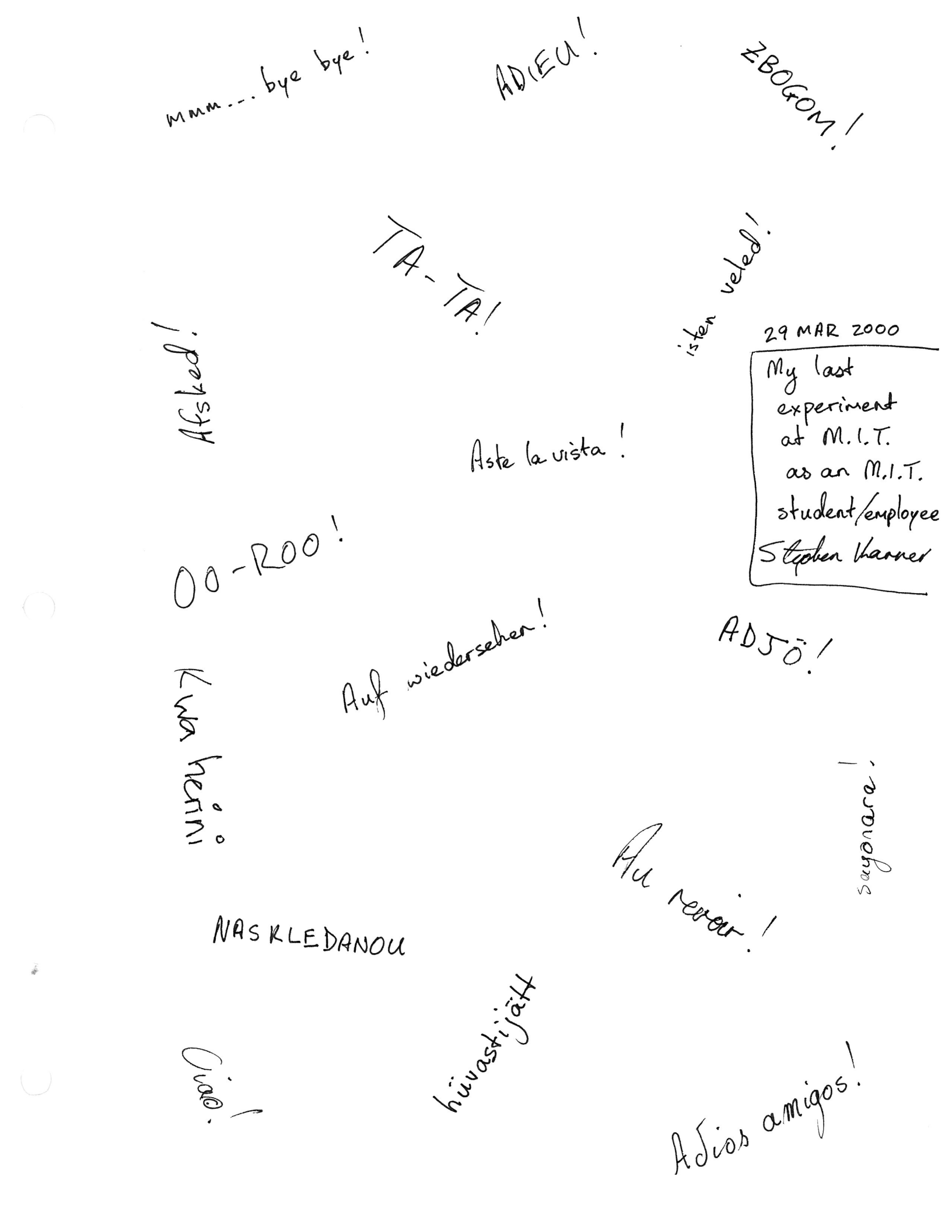
σ_N to 5MPa, load cycle @ 4 mm, offset @ 5 → look @ shear stress, I locked before I stopped the computer. 0 3

10um/s to ~~3~~ 4.0, Then velocity steps every 600mm

10 - 1 - 10 - 1 - 10 [offset]

1.6mm, Then 10-100-10-1-10-100-10-100-10 offset)

~~0~~ 1mm, Then 10-1-10-1-10-100-10-100-10 [offset @ 5.8], 1mm, Then 10-100-10-1-10-100-11


mmm... bye bye!
ADIEU!
ZBOGOM!
TA-TA!
isten veled!
Adjö!
29 MAR 2000
My last experiment at M.I.T. as an M.I.T. student/employee
Stephen Hanney
Aste la vista!
OO-ROO!
Auf wiedersehen!
ADJÖ!
Kwa heri!
Au revoir!
sayonara!
NASKLEDANOU
hüvastijätt
Ciao!
Adios amigos!

Biax Experiment

Exp. Name M4253mw005 Date 29 MAR 2000

Operator KARNER

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) SS Block #

Roughness grooved

Contact Dimensions 10×10cm²

Normal Stress 5 MPa (~~50~~ 49.7 kN) (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 000 (logain) mid experiment (timedisp. =)
-003 (hi gain)

Displacement Rates ~~30-300~~ 10 μm/s run in) Else 10 μm/s

Data Logger Used LV 8chan

Servo Gain Adjust? Usual, Hor decr. 4 turns for sio/ to hi gain

Vertical DCDT Gain Hi

TDXR offsets Usual

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	114.9345	Mass Qtz + cup (before):	112.6109
Mass Qtz + cup (after):	_____	Mass Qtz + cup (after):	_____
Mass cup:	_____	Mass cup:	_____

L 52.6746
R 63.6873

Comments: Init LT 94.70mm
Humidity 26% down to 22% @ end of day.

Load up to 50 kN @ Hor Load low gain (had to load up twice)
Switch 2 hi gain -u-

σ_n load up @ 50 kN - - . ~10 M 00.25s
After ramp #1 ... load cycle 7M 41.09s
2nd ramp as per M411

← lock & o/s

1st hold: 100s	1M 40.02s	→ reload to 10000 ct	(71)	from 71 kN
2nd hold: 100s	1M 40.09s	→ -"- 20000	(72)	
3rd hold: 1s	?	→ -"- 30000	(72)	
4th hold: 1s	?	→ -"- 40000	(72)	
5th hold: 3s	3.18s	→ -"- 50000	(73)	
6th hold: 3s	3.22s	→ -"- 60000	(74)	

← lock & o/s

7th hold: 10s	11.19s	→ -"- 10000	(75)	from 74
8th hold: 10s	10.05s	→ -"- 20000	(75)	
9th hold: 30s	30.52s	→ -"- 30000	(76)	
10th hold: 30s	30.07s	→ -"- 40000	(76)	
11th hold: 100s	1M 40.03s	→ -"- 50000	(77)	
12th hold: 100s	1M 40.06s	→ -"- 60000	(77)	from 75

← lock & o/s

13th hold: 300s	5M 00.06s	→ -"- 10000	(77)	
14th hold: 300s	5M 00.16s	→ -"- 20000	(77)	
15th hold: 1000s	16M 40.06s	→ -"- 30000	(78)	
16th hold: 1000s	16M 40.08s	→ -"- 40000	(78)	
17th hold: 3000s	50M 00.05s	→ -"- 50000	(78)	
18th hold: 3000s	50M 00.14s	→ -"- 60000	(78)	

← lock & o/s

19th hold: 100s	1M 40.70s	→ -"- 10000	(77)	
20th hold: 100s	1M 40.04s	→ -"- 20000	(77)	
21st hold: 10 000s	2H 46M 40.09s	→ -"- 30000	(78)	
22nd hold: 10 000s	2H 46M 40.09s	→ -"- 40000	(79)	← went into servo overload ~1H 20M into hold
23rd hold: 100s	1M 40.01s	→ -"- 50000	(77)	
24th hold: 100s	1M 40.05s	→ -"- 60000	(?)	

END EXPT

At end expt hor load went to -0.3 kN (hi gain) Apr 15

366091

Biax Experiment

Exp. Name ~~KARNER~~ m4153mr015 Date 28 MAR 2000

Operator KARNER

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) SS Block #

Roughness grooved

Contact Dimensions 10x10cm²

Normal Stress 15 MPa (150 kN) (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates (30-300-10 μm/s ramp) Else 10 μm/s

Data Logger Used LV 8chan

Servo Gain Adjust? Usual

Vertical DCDT Gain Hi

TDXR offsets Usual

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	100.0312g	Mass Qtz + cup (before):	113.4255g
Mass Qtz + cup (after):	_____	Mass Qtz + cup (after):	_____
Mass cup:	_____	Mass cup:	_____

Comments: Init LT 94.41 mm

Humidity 36% down to 27% by end expt

On load up @ 50kN ... 7M 47.89s.
After ramp #1 ... load cycle 7M 32.24s
z-locon lock scotch not used

2nd ramp: 300 μm/s (3×10^{-2}) to 25000
30 μm/s (3×10^{-3}) to 32000
300 μm/s (3×10^{-2}) to 39000
30 μm/s (3×10^{-3}) to 46000
10 μm/s (1×10^{-3}) to 53000
→ lock & offset ... 100s hold

1st hold: 100s 1M 40.06s → reload to 10000 ct (208) from 205
2nd hold: 100s ~1M 40s → reload to 20000 ct (?) ?
3rd hold: 1s ~1s → —"— 30000 ct (208)
4th hold: 1s ~1s → —"— 40000 ct (208)
5th hold: 3s 3.26s → —"— 50000 ct (209)
6th hold: 3s 3.16s → —"— 60000 ct (209)

→ lock & offset

7th hold: 10s 11.49s → —"— 10000 ct (210)
8th hold: 10s 10.07s → —"— 20000 ct (210)
9th hold: 30s 29.98s → —"— 30000 ct (211)
10th hold: 30s 30.03s → —"— 40000 ct (211)
11th hold: 100s 1M 40.00s → —"— 50000 ct (?)
12th hold: 100s 1M 40.09s → —"— 60000 ct (211)

Note Ramp failsafe kicked in twice
→ lock & offset

13th hold: 300s ~~5M 08.76s~~ → —"— 10000 ct (?)
14th hold: 300s 5M 00.21s → —"— 20000 ct (212)
15th hold: 1000s 16M 40.06s → —"— 30000 ct (212)
16th hold: 1000s 16M 40.18s → —"— 40000 ct (213)
17th hold: 3000s 50M 00.06s → —"— 50000 ct (214)
18th hold: 3000s 50M 00.06s → —"— 60000 ct (211)
19th hold: 100s 1M 40.00s → —"— 10000 (211)
20th hold: 100s 1M 40.01s → —"— 20000 (215)
21st hold: 10000s 2H 46M 40.09s → —"— 30000

22nd hold: 10000s 2H 46M 40.07s (217) reload to 40000 ct
3rd hold: 100s 1M 40.10s (211) —"— 50000 ct
4th hold: 100s 1M 40.02s (211) —"— 60000 ct

Biax Experiment

Exp. Name m4105 3M-035 Date 27 MAR 2000

Operator KARNER

Gouge (or other sample) G

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F1r0

Forcing Blocks (Steel, Westerly, ?) SS Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 35 MPa (350 kN) (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load -000 mid experiment (timedisp. =)

Displacement Rates (30-300-10 μm/s run in) Else 10 μm/s

Data Logger Used LV Schenn

Servo Gain Adjust? Usual

Vertical DCDT Gain Hi 1st ramp, else Lo

TDXR offsets Usual

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	147.0606g	Mass Qtz + cup (before):	163.7743g
Mass Qtz + cup (after):	100.0312g	Mass Qtz + cup (after):	113.4255g
Mass cup:	-------	Mass cup:	------

Comments: Init LT 94.65 mm

Humidity 21%

σ_a load up @ 50 kN. -- 7M 40.13s
After ramp #1... load cycle 7M 30.23s
Z-down lock switch not used ... reg SHS screwed up 2nd ramp

1st hold: 100s	1M 40.09s	- reload to 12600 ct (463)
2nd hold: 100s	1M 40.06s	- reload to 14600 ct (463/4)
3rd hold: 1s	?	- reload to 16600 ct (?)
4th hold: 1s	?	- reload to 18600 ct (?)
5th hold: 3s	3.22s	- reload to 20600 ct (?)
6th hold: 3s	3.28s	- reload to 22600 ct (465)
7th hold: 10s	10.02s	- reload to 24600 ct (466)
8th hold: 10s	10.02s	- reload to 26600 ct (465)
9th hold: ~~30~~ s	30.04s	- reload to 28600 ct (464)
10th hold: 30s	30.06s	- reload to 30600 ct (463)
11th hold: 100s	1M 40.01s	- reload to 32600 ct (462)
12th hold: 100s	1M 39.96s	- reload to 34600 ct (460)
13th hold: 300s	4M 59.93s	- reload to 3~~8~~100 ct (~~453~~)
14th hold: 300s	5M 00.05s	- reload to ~~40~~100 ct (453)
15th hold: 1000s	16M 40.01s	- reload to 42100 ct ( )
16th hold: 1000s	16M	- reload to 44100 ct ( )

Shall stop here as vert control sucks!
Also, my cock up on 2nd ramp, and that I think middle + right blocks are in contact

Biax Experiment

Exp. Name M40953mm025 Date 26 MAR 200[illegible]

Operator KARNER

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) SS Block # New blocks w/ PZT wells

Roughness ~~710 × 10 cm²~~ grooved

Contact Dimensions

Normal Stress 25MPa (250 kN (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates (30-300-10 μm/s run a) Load 10 μm/s, unl. 300 μm/s

Data Logger Used LV8dan

Servo Gain Adjust? Usual

Vertical DCDT Gain Hi 1st ramp, ~~lo~~ hi rest

TDXR offsets Usual

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	90.5197g	Mass Qtz + cup (before):	103.3529g
Mass Qtz + cup (after):	43.8063g	Mass Qtz + cup (after):	56.8844g
Mass cup:	_____	Mass cup:	_____

Comments: Init LT 118.75mm
Humidity 23%

147.0606g 163.7743

At 50 kN TM 30.06
1st load up @ hi gain (as prev), rest test @ hi gain
Aft ramp #1 ... load cycle TM 30.17s
Zero load SHS tests (100s holds x 6)

			pre	mid.	peak
1st hold (100s)	TM 41.52s (get time from data)	- reload to 50000 ct	333 kN	0,	360 kN
2nd hold (100s)	TM 42.24s	- ——— " ———	331	0,	355
3rd hold (100s)	TM 43.63s	- ——— " ———	~326	0,	348
4th hold (100s)	TM 40.14s	- ——— " ———	320	0,	341
5th hold (100s)	TM 40.??s (get from data)	shown noise ——— " ———	! (315) / 316	0,	333
6th hold (100s)	TM 40.10s	- ——— " ———	309	0,	324

At end expt ... unload τ totally
... unload σ_n to 1 MPa (one MPa = 10 kN)
... lock & shut down hydraulic supply
... build "dam" @ top of each gouge layer
... pour in low viscosity epoxy ——— " ———
... let sit overnight (from 2pm)

2nd ramp

300 μm/s to 25000 cts
30 μm/s to 32000 ct
300 μm/s to 39000 ct
30 μm/s to 46000 ct
10 μm/s to 53000 ct

Biax Experiment

Exp. Name m40853mr025 Date 24 Mar 2000

Operator KARNER

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) SS Block #

Roughness gr.

Contact Dimensions 10×10 cm²

Normal Stress 25 MPa (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates (30-300-10 μm min) load 10μm/s, unload 100μm/s

Data Logger Used LVDT chan

Servo Gain Adjust? Usual

Vertical DCDT Gain Hi 1st, Lo rest

TDXR offsets Usual

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	137.8261g	Mass Qtz + cup (before):	153.6997g
Mass Qtz + cup (after):	90.5197g	Mass Qtz + cup (after):	103.3529g
Mass cup:	_____	Mass cup:	_____

Comments: Init LT 94.62mm

Humidity 22%

At 50 kN 2M 59.42s
1st load up @ hi gain (as prev.)
Aft. ramp #1 ... load cycle 4M 00.17s
Z-down lock sw dialed to 7.80

1st hold (bounce): ?
2nd hold (bounce): ?
3rd hold (10s): 15.27s (adj sample LVDT)
4th hold (10s): 10.15s
5th hold (bounce): ?
6th hold (bounce): ?
7th hold (10s): 9.86

	pre	ul.	peak
- reload to 17600	333	?	340
- 24600	330	~~255~~ ?	338
- 31600	328/9	?	337/8
- 38600	326	169	333
- 45600	32~~2~~	169	329
- ~~52600~~ 51000	318	169	324
- 550000	314~~/5~~	169	321

shim noise

Strange test, μ_{ss} is low.

Biax Experiment

Exp. Name m4075 3mr025 Date 23 MAR 2000

Operator KARNER

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) SS Block #

Roughness grooved

Contact Dimensions 10 x 10 cm²

Normal Stress 25 MPa (250 kN) (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates

Data Logger Used LV8 chan

Servo Gain Adjust? Usual

Vertical DCDT Gain Hi 1st ramp, else lo

TDXR offsets Usual

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	186.3451g	Mass Qtz + cup (before):	203.8495
Mass Qtz + cup (after):	137.8261g	Mass Qtz + cup (after):	153.6997g
Mass cup:	_____	Mass cup:	_____

Comments: Init LT 94.34mm.
Humidity 23%

At 50 kN → 7M 30.99s
1st load up @ hi gain - as previously
After ramp #1 ... load cycle 7M 30.17s
Z-down lock scr. dialed to 7.80

1st hold (1000s): 16M 40.07s - reload to 18600 ct, pre 341, cal 169, pk 352
2nd hold (1000s): 16M 40.07s - reload to 26600 ct, 339, 168, 350
3rd hold (10ks): 2H 46M 40.12s - reload to 34600 ct, 333/4, 168, 344
4th hold (10ks): 2H 46M 40.12s - reload to 42600 ct, 332/3, 169, 346
5th hold (1000s): 16M 40.10s ← o/s main ram - reload to 8600 ct, 332/3, 169, 350
6th hold (1000s): 16M 40.07s - reload to 16000 ct, 332, 169, 349

Biax Experiment

Exp. Name m4065 3rot 025 Date 22 MAR 2000

Operator KARNER

Gouge (or other sample) G

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) SS Block #

Roughness grooved

Contact Dimensions 10×10cm²

Normal Stress 25 MPa (250 kN) (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates (300-30-10 μm/s ran in) Load 10 μm/s, unload 10 μm/s

Data Logger Used LV 8 chan

Servo Gain Adjust? The usual

Vertical DCDT Gain Hi 1st ramp, Else low

TDXR offsets Usual

LEFT "L"		RIGHT "R"	
Mass Qtz + cup (before):	113.2684g	Mass Qtz + cup (before):	106.0352g
Mass Qtz + cup (after):	68.4746g	Mass Qtz + cup (after):	57.5304g
Mass cup:	-------	Mass cup:	

Comments: Init LT 94.41mm

Humidity 24%.

1st load up @ low gain - as previously.
At 50 kN σ_n → 15M 30.09s

After ramp #1 ... load cycle 7M 30.08s
z-down lock sw. dialed to 7.80

1st hold (100s) : 1M 40.25s - reload to 14600 ct pre 342 kN, unl 166 kN, peak 352 kN
2nd hold (100s) : 1M 40.06s - reload to 18600 ct 341/2, 167, 353 kN
3rd hold (1000s) : 16M 40.20s - reload to 23600 ct 339/40, 167, 353 kN
4th hold (1000s) : 16M 40.07s - reload to 28600 ct 338, 166, 351 kN
5th hold (100s) : 1M 40.08s - reload to 33600 ct 336, 167, 350 kN
6th hold (100s) : 1M 40.10s - reload to 38600 ct 335, 167, ??

Whoops ... I've done reloads incorrectly. Should have been 8000 cts.
Forgot that 1 ct = 0.5 μm @ low gain Silly me!

7th hold (10s): 9.99s - reload to 43600 ct 333/334, 167, 345
8th hold (10s): 10.25s - reload to 48600 ct 331/332, 167, 343
9th hold (100s): 1M 40.06s - reload to 53600 ct 330, 167, 341

DONE

Biax Experiment

Exp. Name m405s3mr010 Date 22MAR2000

Operator Frye

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Clay - smectite

Particle Size, Size Distribution very small

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10

Normal Stress 10 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load 000 mid experiment (timedisp. =)

Displacement Rates 1, 10, 100

Data Logger Used LabVIEW

Servo Gain Adjust? no

Vertical DCDT Gain High

TDXR offsets

Comments: 24°C, 28% RH @ start = 38%

.13

.33

5, @ 10 MPa, load up, load cycle @ 4 mm, [offset] @ 5

Velocity steps 10 - 100 - 10 - 1 - 10 - 100 - 10 - 1 - 10 [offset]

10 - 100 - 10 → SHS: 3.10 s
9.85 s
29.98
1:39.94

4259.93
16:40.04

56% RH

10 - 100 - 10 (offset) →

10-100-10-1-10 → unload

Biax Experiment

Exp. Name m4053mr025 Date 21 MAR 00

Operator FRYE

Gouge (or other sample) GOUGE

Layer Thickness 3mm

Material (Qtz, Granite, ?) Al_2O_3

Particle Size, Size Distribution 150 GRIT, ~120 μm

Forcing Blocks (Steel, Westerly, ?) steel Block #

Roughness grooved

Contact Dimensions 10x10 cm^2

Normal Stress 40 → 25 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load -000 mid experiment (timedisp. =)

Displacement Rates 10 μm/s; 20 μm/s

Data Logger Used LabVIEW 4channel

Servo Gain Adjust?

Vertical DCDT Gain High

TDXR offsets

Comments: T = 23.7°C RH = 22%

σ_N → 40 MPa, shear load brought on (650 μm), unload @ 2550? (3200)

reload, unload @ 3200 (3850)

reload, unload @ 3860 (4510)

[offset] → σ_N to 25 MPa, 1.6 mm disp, then velocity steps every 600 μm

[offset]

SHS

0.4 mm disp.

then 3.02

3.02

9.95

9.91

30.02

30.06

1:40.25

1:39.88

4:59.99

5:00.13

16:40.06

16:40.02

@ 4.4mm disp, velocity steps 20-10-20-10

[offset]

10-20-10 →

SHS

@ 1.6mm 2.99 s

1.9mm 30.06 s

2.2mm 4:59.95

unload.

Biax Experiment

Exp. Name m4038 3mr-025 Date 3/21/00

Operator Boutchen / Frye

Gouge (or other sample) Gouge

Layer Thickness 3mm

Material (Qtz, Granite, ?) Qtz

Particle Size, Size Distribution F110

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness grooved

Contact Dimensions 10 x 10 cm^2

Normal Stress 40 – 25 MPa (MPa) ± 3 MPa (single amplitude vibrations)

(DPM readouts) kN

Vertical 007 zero load mid experiment (timedisp. =)

Horizontal 000 zero load mid experiment (timedisp. =)

Displacement Rates 10 μm/s 20 μm/s

Data Logger Used Lab view

Servo Gain Adjust?

Vertical DCDT Gain high

TDXR offsets

Comments: 21% RH, 24°C

σ_n @ 40 MPa, bring on shear, unload @ 2550 (3050)

" " 3200 (3700)

" " 3860 (4360)

[offset], σ_n to 25 MPa, offset horiz. displacement

1600 mm disp. Then velocity steps every 600 mm. [offset]

fault on @ .5 mm

[offset] → SHS

disp.	Hold
.4	— NO DATA
1.4	30 s
2.4	1:44
3.4	5:07
4.4	17:43
5.4	10 s

10Hz

[offset]

.4	10.27 s
1.4	31.3
2.4	1:40.88
3.4	5:01.43
4.4	16:40.61
5.4	10.82

1 Hz

Biax Experiment

Exp. Name m401S3mr010 Date 3-18-00

Operator Saffer / Frye

Gouge (or other sample) gouge

Layer Thickness 3 mm

Material (Qtz, Granite, ?) Montmorillonite

Particle Size, Size Distribution small

Forcing Blocks (Steel, Westerly, ?) Steel Block #

Roughness Grooved

Contact Dimensions 10 cm x 10 cm

Normal Stress 10 (MPa)

(DPM readouts) kN

Vertical zero load 007 mid experiment (timedisp. =)

Horizontal zero load -000 mid experiment (timedisp. =)

Displacement Rates 10 mm/s (1, 100)

Data Logger Used Labview 4 channel

Servo Gain Adjust? No

Vertical DCDT Gain High

TDXR offsets

T=22.8°C RH=20%

Comments: 0.48 mm load on

4 mm load cycle

OFFSET

10-100-10-1-10-100-10-1-10

OFFSET

10-100-10

SHS

3.08 s

3.02 s

9.87 s

9.91 s

30.09

29.91

1:39.93

1:40.02

4:59.84

4:59.85

16:40.88

16:40.01

top: 92.08 mm base 92.22 mm At START OF 1ST 300s HOLD

VELOCITY STEPS

10 - 100 - 10 - 100 - 10 - 1 - 0.2 - 2 - 20 - 200 - 20

OFFSET

20 - 200 - 20 - 2

UNLOAD