Today’s lecture

• Introduce the course
• Introduce the Instructor and Teaching Assistants
• Let’s see some Geologic Structures!

\[
\sigma = \frac{1}{3}(\sigma_1 + \sigma_3) + \frac{1}{3}(\sigma_1 - \sigma_3) \cos 2\theta, \\
\tau = \frac{1}{3}(\sigma_1 - \sigma_3) \sin 2\theta.
\]
Why do we care?

Understand and anticipate natural hazards (1995 Kobe Earthquake)

Mineral resources

Magmatic segregation: pegmatites
Crystallization in fluid-rich environment:

Hydrothermal solutions: important ore deposits
Hot, metal-rich fluid migration as vein deposits or disseminated deposits

Quartz veins

Types of oil traps (Keller, 2002)
(a) Anticlinal trap
(b) Fault trap
(c) Unconformity trap
Structural Geology

• Introduces the physical side of Geological Sciences and emphasizes
  – Geometry (shape, orientation, position, size, etc.)
  – Motion (beginning and ending positions and paths of particles and bodies—deformation or change in geometry)
  – Mechanics (explanations of why the geometry and motion are how they are)
Structural Geology

- Includes lots of observations from the field (but also some from the laboratory and the computer)
- Teaches you not only facts, but also skills and techniques that are necessary in advanced classes and central to geologic practice.

Course Webification

- We will try to put as much on the web as possible:

  [http://arrowsmith310.asu.edu/](http://arrowsmith310.asu.edu/) and Blackboard
Course Logistics, Texts, and Schedule

Required text

**Handouts from this text**

Suggested Lab and Field Equipment

These are important tools that you should preferably own for this class (should be able to get them at the bookstore)

- 3-ring binder—some handouts in this class!
- 6 inch semi-circular protractor
- Straight edge (8 inch 30-60 degree triangle is fine)
- Engineer scale (English/Metric)
- Assorted pencils (hard, several colors)
- Calculator
Suggested Lab and Field Equipment

• Mechanical Pencil
• Mechanical eraser
• Supply of good quality paper (pad of engineering graph paper)
• Small rolls of masking and magic tape (can share this)

Your Professor

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San Andreas Fault Research

San Andreas Fault

Andean backarc

India-Eurasian collision

Baja California Rift

East African Rift

http://www.ig.utexas.edu/research/projects/plates/images/topo.ph.htm
San Francisco Volcanic field, Flagstaff, and active faults

Your TA: Dominique Garello

Ledi-Geraru Research Project
Southern Afar Depression, Ethiopia

- Paleo-landscape Reconstruction
- Stratigraphy
- Structural Geology
- Geochronology/tephrachronology
Your TA:
Dominique Garello
Undergraduate: UC Davis 2010/2011
Geology & Human Evolution
Graduate:
Pre-candidate Geosciences Ph.D.
Advisor: Ramón Arrowsmith (SESE)
Co-advisor: Chris Campisano (IHO & SHESC)

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HSPDP
http://hspdp.asu.edu/
https://www.facebook.com/HSPDP

Your other TA:
Joel Leonard
Undergraduate:
Arizona State 2012
B.S. ESE: Geological Sciences
Graduate:
• Research Assistant – Arjun Heimsath
• Teaching Assistant – Field 2

Interests
Tectonic Geomorphology