**Topic:** Advanced Structural analysis of field data

**Data Sources and Publications:**

*GoldenGatefielddata.xlsx -all of the Golden Gate Station Data*

*Shaw,C.A., Karlstrom, K.E., McCoy, A., Williams, M.L., Jercinovic, M.J., and Dueker, K., 2002,*

*Proterozoic shear zones in the Colorado Rocky Mountains: From continental assembly to intracontinental reactivation, In* Science at the Highest Level*, ed. Lageson, D., GSA Field guide, v. 3, doi:10.1130/0-8137-0003-5.102*

**Additional resources:**

*Houghton, J., 2012, Introduction to Structural Geology: Workbook 2 Stereonets, University of Leeds*

*School of Earth and Environment*

*Duebendorfer, E.M., 2003, The interpretation of stretching lineations in multiply deformed terranes: an*

*example from the Hualapi Mountains, Arizona, USA*

**Goals:**

1) To gain a better understanding of the 3-dimensional structure of the mapping area.

2) To understand how to create stereonet depictions of a variety of field structural data

3) To understand some basic techniques for stereonet analysis of field data, including how to plot poles to planar fabrics, determine average orientations of planar and linear features, and statistical fold axis determination.

4) To better understand the value of shear sense determination in shear zone rocks.

**Figures to create:**

1. Stereonets and additional Cross Sections. Plot stereonets with the following individual datasets. A) Bedding/early foliation S0/S1, B) Foliation S2, C) Mylonite Sm, D) Mineral/stretching Lineations with their associated foliation surfaces, E) Fold Hinges, F) Other fabrics? Some of these can be plotted on one stereonet with unique symbology or you can split into multiple stereonets. Label domains of planar and linear fabrics (are some unique?)
2. Draw simple sketches of the kinds of deformation that the field area has experienced.
3. Consider constructing a down-plunge profile view cross-section, and/or a cross-section that is perpendicular to your first one

**Questions to Answer:**

1. Based on the data, do you see one or multiple fabric domains? (use stereonets)
2. If there are multiple fabric domains, then are there multiple deformation events?
3. What is your interpretation of the relative timing of multiple geologic events in this map area?
4. What is the range of shear sense determinations at field sites across the shear zone, and what might this tell you about its history?
5. How would this additional data and your interpretations of them affect your original map and cross-section interpretation?
6. How do these data and interpretations relate to other field and analytical datasets that other students groups are working with?
7. Identify some of the main sources of uncertainty in these data and interpretations and discuss some ways that they are addressed.