The University of Sydney School of Geosciences Geos3008 and Macquarie University Department of Earth and Planetary Sciences GEOS307

MIGMATITES, FOLDS, FACING AND TILLITES

OBJECTIVES: This day of exercises is designed to improve your outcrop analysis skills, including cross cutting relationships, structural analysis and rock identification.

PART 1. Migmatite: Literally a "mixed" rock with both lighter coloured (leucosome) and darker coloured (mesosome) portions. Commonly ascribed to local partial melting of metasedimentary rocks but can occur through sub-solidus segregation processes.

What minerals can you identify in the:

(1) Leucosome: _____

_____

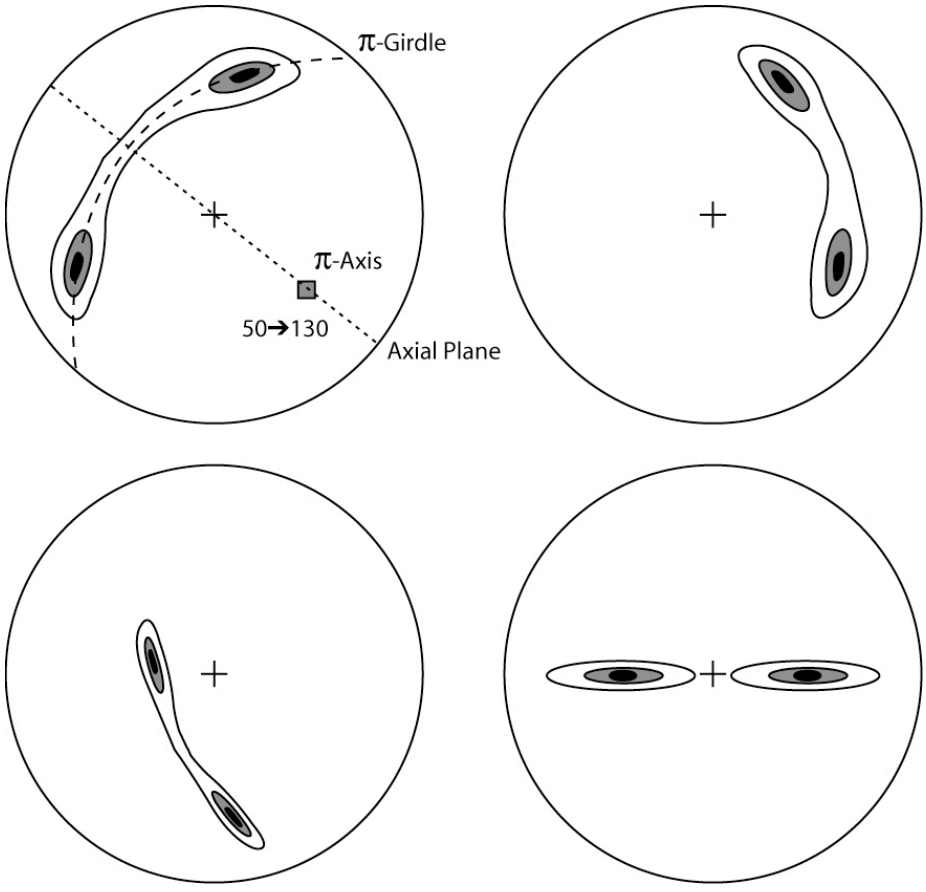
(2) Mesosome: _____

_____

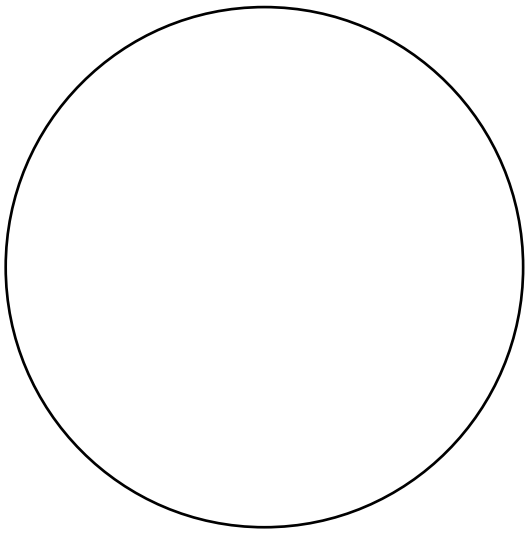
In your notebooks make sketches of cross cutting relationships between deformation and magmatic processes in the outcrop. Be prepared to describe one cross cutting relationship to the class.

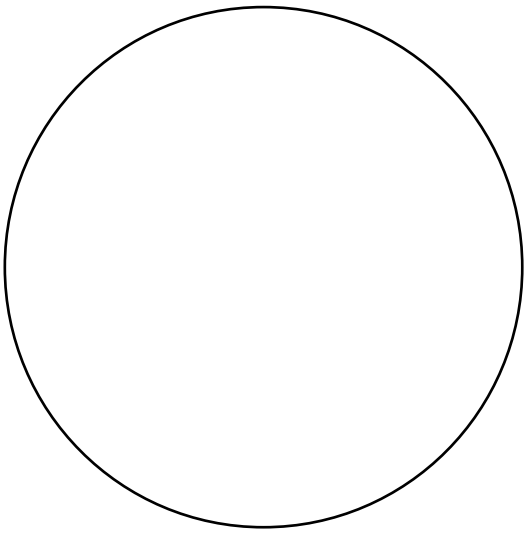
PART 2. Structural measurements at the waterfall.

(a) Preparation: There are four stereonet patterns of contoured distributions of poles to bedding. On each, sketch the best-fit π-girdle, axial plane, π-axis, and estimate the orientation of the π-axis. The first one has been done for you. Round your answers to the nearest 5 degrees.



(b) Draw cartoon sketches of girdles typical for the distribution of poles to bedding for (1) an open north-trending fold with plunge of 25°, and (2) an isoclinal north-trending fold with a horizontal axial plane.





(c) Draw a sketch of the whole outcrop and label S0, S1, S2, F1 and F2.
(d) Make a sketch of a small outcrop that shows the S0-S2 intersection lineation.
(e) As a group, make a sufficient number of measurements of the following structural elements at the waterfall to sensibly plot and constrain:

1) the distribution of bedding around the reclined F_1 folds (30) - plot bedding as poles
2) F1 fold axes (5)
3) S0-S2 intersection lineations (10)
4) S1 - plot as poles, but also put one or two as planes on the bedding plot (10)
5) S2 (10)

Plot the data directly onto a stereonet and relate the features to what is seen in outcrop. How does the pattern fit with the model ones that you drew above? In the afternoon/evening we will use a computer to plot these.
(f) Walk up to the top of the waterfall (it is safest via the hill to the side of the waterfall). In your notebook, sketch two different younging structures located in the outcrop.

PART 3. Tillite: a synonym for boulder clay. The tillite located in the Adelaidian sequence is a glacial tillite.

(a) How does a glacial tillite form?

_____

_____

_____

_____

(b) List the range of rock types that form boulders in the tillite:

_____

_____

_____

(c) Place an asterixis (*) beside any rocks in the above list that you think are derived from the Willyama Supergroup.