Name_____

Folding and Mesoscopic Fabrics

Introduction

The bedrock geology of this *real* region in the United Kingdom is made up mainly of three deformed metasedimentary units: a quartzite, a slate, and a meta-conglomerate. These are called units rather than formations to stress that they may be metamorphic, rather than sedimentary layers, reflecting transposition and a psuedostratigraphy rather than real stratigrapic layering. Some dikes, of two different compositions (dolerite=diabase, and lamprophyre), were also mapped. (See the map explanation.)

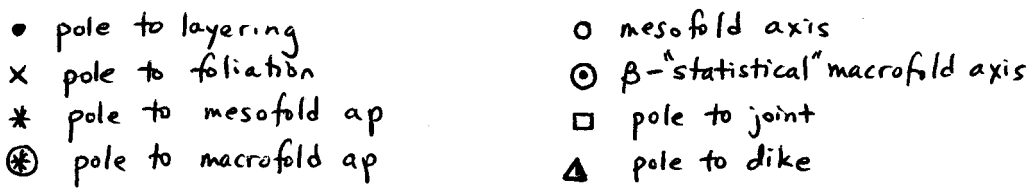
This map represents a good example of the best kind of geologic map that a geologist can make, an ***outcrop geologic map***. The irregularly shaped "blobs" on the map represent actual *outcrops*. They show how these *rock exposures* are distributed across the map area. Whenever possible it's preferable to make (and use) this sort of map rather than a standard geologic map, especially for doing structural geology. This is because outcrop maps more clearly distinguish facts and observations from the inferences made from these facts and observations. They precisely show how much of the area's bedrock is exposed vs. covered, contacts only where they were observed directly, precisely where orientation data were collected, etc.

Exercise

1. Using colored pencils, color in the three different units on the map and on the map's legend. As you do so make special note of the contacts observed between these units at individual outcrops.

2. Interpolate the position of the contacts between the three units and show these on your map as thin, but solid, dark lines.

3. Using the segment of the geologic map that contains the key, make two stereo net plots: (1) one plot of poles to compositional layering planes and (2) a second plot of all of the other fabric subelements (i.e., mesofold axes, poles to foliation planes, poles to joint surfaces, poles to dikes). In the interest of time, randomly select 12 data points for each element. It may be most efficient to first make a data list and then plot the data. Please use the following "standard" symbols on your stereoplots:



a) Using the data on your pole to compositional layering stereoplot, determine and show (as dashed lines on your stereoplots) π-girdles (these are great circles that contain all the poles). You can only do this if the folding in your domain is cylindrical (or subcylindrical). Is it?

b) Using the π-girdles you drew above, construct and show on your stereoplots of poles to compositional layering, the fold axes (β) of the folded compositional layering surfaces. A β-axis is found by plotting attitudes of foliations (such as bedding or cleavage) on an equal-area net. The β-axis is the intersection point of the planes. How do their orientations compare to those of the mesofold axes in your domain? Does this corroborate the claim that this region has a simple fabric? How?

c) Assuming a flat topographic surface, draw a cross-section through the map area oriented perpendicular to the major fold axes. Color layers in your cross section in using the same colors you used on the map.