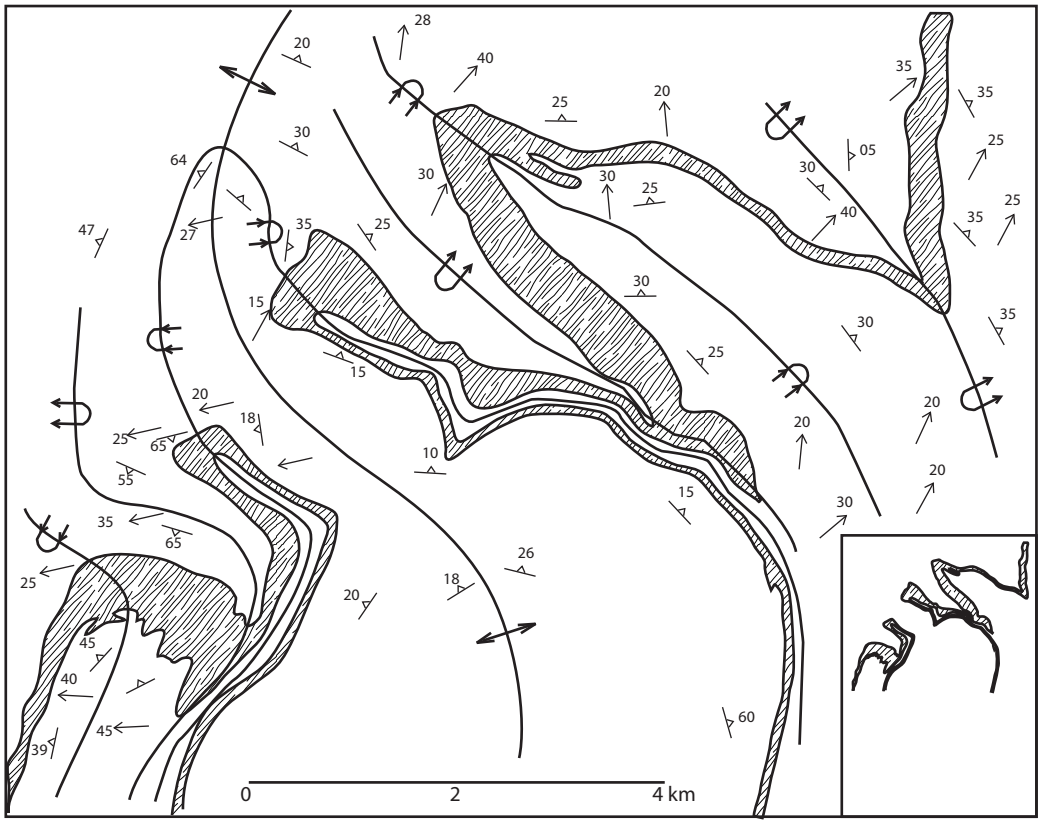
Lab 9: High grade terranes

Fall 2005

1 Superposed folds

Fold interference patterns are seen at all scales, from thin section to regional scale maps. Below is a map of a portion of the Connecticut Valley synclinorium (map digitized from Marshak and Mitra). Assume the stippled area is compositional (i.e. its either bedding or a transposition foliation). How many generations of folds are shown? Label every generation of the axial surface. Some axial surfaces have already been marked, add additional ones if necessary, and name them as F2, F3, etc. Based on the structural information shown on the map, which way does the lastest fold plunge. Draw a series of schematic cartoons that illustrate the history of superposed folding.



2 Foliations in thin section

Photos to follow are all drawn from Passchier and Trouw 2005 Microtectonics

2.1

Describe and explain the fabric. Why is the quartz in the folded vein much more coarse grained than in the matrix?

Image removed due to copyright considerations.
Please see:
Passchier, Cees W., and Rudolph A. J. Trouw. *Microtectonics.* Berlin: Springer, 1996. ISBN: 3540587136.

Describe and explain the fabric(s). Begin by tracing out the fabrics, this will make it easier to discriminate between primary sedimentary layering and between different generations of tectonic fabrics. How many fabric generations can you identify in this photo?

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Please see:
Passchier, Cees W., and Rudolph A. J. Trouw. *Microtectonics*. Berlin: Springer, 1996. ISBN: 3540587136.

3 Shear sense indicators

Determine the shear sense (assume that each photomicrograph is a view perpendicular to the foliation and parallel to the lineation) for the following two micrographs. Identify as many shear sense indicators as you can. For each kind of shear sense indicators, briefly explain what they are, how they form (with particular reference to the progressive evolution of the finite strain ellipse), and why they indicate shear sense. Discuss possible pitfalls and ambiguities in the interpretation. For this, you will want to read relevant chapters of Passchier and Trouw, as well as the review paper by Carol Simpson posted on the website.

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4 Rocks

4.1 Rock One

... is a deformed conglomerate. Sketch this rock (include a scale, consider making detailed sketches of certain parts of the rock to highlight important observations). Describe the rock (matrix composition, clast composition, size of the clasts, deformation of matrix, deformation of clasts, planar fabrics, lineations, etc.). Determine shear sense for this rock. Finally, describe the strain: is it homogeneous or heterogeneous? How does the deformation of the clasts differ from the deformation of the matrix? Describe and compare the deformation of different clast compositions. Explain why these differences arise.

4.2 Rock Two

.... is a porphyroclastic sheared granitoid. Sketch this rock, as above. Describe the rock (matrix composition and grain size, porphyroclast compostion and grain size). Describe the strain in the rock, with particular reference to the deformation of matrix and porphyroclasts. Determine the shear sense of this rock, make sure you clearly identify the shear sense criteria and justify your appeal to these.