Mylonites

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What are Mylonites?

- ► Foliated, usually lineated fault zone rock.
- Presence of strong ductile deformation.
- No "set" mineral composition; composition can vary depends on parent material.
- Mylonite is a structural term that refers only to the fabric of the rock and does not give information on the mineral composition.
- Present day use for mylonite refers to rocks dominantly deformed by ductile flow.

Characteristics

- porphyroclast is a clast or mineral fragment in a metamorphic rock, surrounded by a groundmass of finer grained crystals.
- Clear visible foliation
- Sometimes folding.

Types of folding





Chevron Folds

Where do they form?

- Mylonites form in ductile shear zones where there is significant strain.
- Shear zone deformation in planar zones that accommodate movment of relatively rigid wall- rock blocks.
- Mylonite Zone: high strain/ ductile shear zones. Can occur in any rock type and have been described from sub- millimetric scale to sones several Kilometers wide. (Bak et al. 1975; Hanmer1988)

classification

- Classification for mylonites depends on metamorphic grade at which deformation took place, or according to the lithotype or mineralogy where they develop.
- Another way of classifying mylonites is based on the percentage of matrix as compared to porphyroclasts.
 - ▶ 10 50% matrix = protomylonites
 - 50 90% matrix = mylonites (or mesomylonites.)
 - >90% matrix = unltramylonites

Pictures

► All photos are 2.5x, with a field of view of 7 mm

P-5 in thin section

Mylonite in XP



Mylonite in PPL



P-18 in hand sample.





XP





Sample locations

► These samples where collected in Patagonia, Argentina

Other pictures



More highly deformed quartzo-feldspathic mylonite from the Redbank shear zone. Some layers are dominated by quartz ribbons and other layers contain fragments of broken feldspar surrounded by a fine-grained matrix of recrystallized quartz and cataclastic feldspar. (http://www.tectonique.net)



Quartzo-feldspathic mylonite developed at greenschist conditions; feldspar deformed by regime 1 dislocation creep, quartz by regime 2 dislocation creep. (http://www.tectonique.net)



Mylonite developed in quartzofeldspathic aplite, deformed at greenschist grade in the Redbank shear zone. Quartz grains form thin ribbons wrapped around K-feldspar porphyroclasts. The feldspar porphyroclasts show some fracturing, the development of deformation. (http://www.tectonique.net)

references

- Passchier, C.W. and Trouw, R.A.J., 1996, Microtectonics: New York, Springer-Verlag Berlin Heidelberg, 289 p.98,102,
- Bell, T. H. (1978). Progressive deformation and reorientation of fold axes in a ductile mylonite zone: the Woodroffe thrust. Tectonophysics, vol. 44, p. 285-320.
- White, S. (1979). Grain and sub-grain size variations across a mylonite zone. Contributions to Mineralogy and Petrology, vol 70, p.193-202.
- http://www.tectonique.net/MeansCD/contribs/tullis/SlideSet/ 06_natdqr/natdqr_mylo_RB.html