Partial melting and melt loss: Migmatites from Val Strona di Omegna (Ivrea Zone, NW Italy)

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The mid to lower crustal field gradient through amphibolite to granulite facies rocks in the Ivrea Zone [1] offers the potential to study classical high-grade metamorphic processes such as partial melting and melt loss. Metapelitic rocks in Val Strona di Omegna show a progressive development in structures, starting with typical amphibolite facies mica-schists at lowest grades that change to metatexites with rare isolated leucosome veins at medium grades and diatexites in high-grade granulite facies rocks.

The first field evidence for partial melting is given by narrow discontinuous leucosomes that coincide with the fluid-absent breakdown of muscovite and the prograde appearance of K-feldspar. Towards high grades the consumption of biotite lead to more extensive melting and the formation of garnet-bearing leucosomes. Zones of diatexite in the highest-grade rocks indicate that melt loss was inefficient and/or accumulation of melt occurred. These zones are common at boundaries between diatexitic metapelitic rocks and metatexitic metagreywacke and may indicate that the metagreywacke formed a low-permeability barrier that restricted melt flow.

Field and petrographic evidence for melting can also be seen by crossing the position of the modelled wet solidus, which is consistent with the small amounts of melt predicted to occur by H_2O-saturated melting. In addition, calculated *P–T* pseudosections show that the metapelitic rocks have produced up to 30-40 mol.% melt at peak metamorphic conditions of around 11 kbar and 900°C. Modelling of granulite facies samples suggest a significant melt loss prior to cooling by showing elevated solidi. This is consistent with a depletion in SiO_2, Na_2O and K_2O and an enrichment in FeO, MgO and TiO_2 relative to amphibolite facies samples.

[1] Redler *et al*. (2012) *J.metamorphic Geol*. **30**, 234–254.

Peloid mud maturation, a mineralogical and health hazard point of view.

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One of the main topic in medical spa is understanding the health hazard correlated to the presence of heavy metal cations in the thermal mud that can be absorbed by the skin associated with the more desirable cations who have beneficial property for some chronic diseases. I develop a standard protocol for analysis of the thermal mud during the maturation for better understanding the characteristic and eventually change in mineralogical and metal available parameter.

I used a maturation protocol developed at Salsomaggiore Terme [1] Italy, mixing a common clay, obtain in Tor Caldara Regional park, Anzio with 11 thermal water collected in the Lazio region in Italy plus distillated water. These mud has been put at 40°C in sealed container for all the maturation perid.

After one month and three month of maturation I sample the mud for XRD analysis and heavy metal sequential extraction plus “sweat” extraction [2] to understand the change in these parameter with the progress of the maturation process. These parameter were compered each other, to see the modification of the mineralogy and heavy metal availability during the different stage of mud maturation.

The first data are under integration with new data obtain in these days. But avaiable data demonstrate the formation of gypsum inside the clay, and the partial reduction of some more complex mineral, like plagioclase. The data of the metal and “sweat” extraction are under processing phase and will be ready for the end of June.

[1] Veniale, *et al*. (2004). Formulation of muds for pelotherapy: effects of “maturation” by different mineral waters. Appl. Clay Sci. 25, 135–148.
[2] Tateo F, *et al*. (2009). The in-vitro percutaneous migration of chemical elements from a thermal mud for healing use. Applied Clay Science, vol. 44, p. 83-94

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