

Importance of relative water fugacity estimates in metagranites and white schists from SIMS measurements of water content in phengite

CINDY LUISIER¹, L.P. BAUMGARTNER¹, A.-S. BOUVIER¹, G. SIRON¹, J. VAUGHAN-HAMMON¹, S.M. SCHMALHOLZ¹

¹ Institute of Earth Sciences, University of Lausanne, Switzerland. (cindy.luisier@unil.ch)

The Monte Rosa nappe is a basement nappe of the Western Alps. This crustal segment of the southern-most European margin consists of hercynian and older paragneisses, which were intruded by a Permian granitic body. The record of deformation and alpine metamorphism is very heterogeneous within the nappe as documented by the transition of undeformed, monometamorphic jadeite-free metagranite, which locally grades into orthogneiss and chloritoid-kyanite-talc-phengite bearing white schists. The latter occur as 10-50 meters ellipsoidal bodies within the metagranite and originate from the metasomatic alteration of the granite during the Permian [1].

The high pressure is marked by symplectitic zoisite + albite intergrowths pseudomorphing plagioclase and phengite + titanite ± garnet coronas surrounding biotite in the undeformed metagranite. No jadeite has been found despite efforts made in the granite or the surrounding metapelites.

We performed a detailed textural analysis and started to re-evaluate the phase petrology calculations in the light of new SIMS analysis of the water content in white mica. Pressure estimates for white schists as well as the estimated pressures from phengite barometry in the metagranites depend on the water fugacity during metamorphism. SIMS analysis of OH⁻, F⁻ and Cl⁻ of white micas were undertaken in order to estimate water activity of different generations of white micas.

Preliminary data suggest that (i) the OH⁻ content of phengites increases with the deformation intensity of the metagranites; (ii) phengites from undeformed metagranites record a highly variable OH⁻ content, whereas it is constant in the phengites from whiteschist. Despite these differences in water fugacity inferred from the SIMS measurements, it is unlikely that independent pressure estimates from white schists and from metagranites can be obtained which agree.