Geophysical Research Abstracts, Vol. 8, 04780, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04780


# Fluid inclusions and metamorphic evolution of Himalayan granulitised eclogites, Ama Drime Range, southern Tibet

**S. Ferrando** (1), F. Rolfo (1, 2), C. Groppo (1), B. Lombardo (2)

(1) Department of Mineralogical and Petrological Sciences, University of Torino, Italy, (2) C.N.R., Institute of Geosciences and Georesources, Torino, Italy

(simona.ferrando@unito.it)

Most of fluid inclusion data along the Himalayan Main Central Trust (MCT) have been collected from syntectonic/synmetamorphic segregations and veins. Nevertheless, the application of fluid inclusion studies also to the host rocks would allow to correlate the nature of different fluids with the metamorphic evolution of both host rocks and veins.

Here we report the results of a fluid inclusion study on Himalayan eclogites, partly overprinted to granulite-facies conditions. The eclogites crop out as sub-concordant sheets within orthogneiss, just below the Main Central Thrust Zone in the Ama Drime Range of southern Tibet. Locally, mm-thick metamorphic veins crosscut the main foliation of the eclogites.

The eclogites from the Ama Drime Range are medium grained and mainly consist of Grt and pseudomorphs after Omp and Phe. Grt is relatively homogeneous but shows large intersample variations ($Alm_{41-61}$ $Prp_{10-16}$ $Sps_{0-3}$ $Grs+Adr_{25-35}$). Omp is always replaced by a Pl + Di ($Jd_{5-6}$) $\pm$ Opx symplectite. Grt is typically surrounded by an inner corona of Pl ($An_{40-50}$) and an outer corona of Opx ($En_{37-47}$). The pseudomorphs after Phe consist of Pl $\pm$ Bt. The most retrogressed samples show a foliation defined by preferred orientation of brown Hbl. Discordant veins consist of coarse grained Qtz, Pl, Ap and minor brown Bt.

The P-T path of the Ama Drime eclogites was reconstructed combining conventional thermobarometry and pseudosection analysis. An early eclogitic event (T = 650˚C?;

P $>$ 1.5 GPa) was followed by two granulitic stages: the first at T = 750˚-770˚C and P = 0.9-1.1 GPa, and the second at approximately the same temperature, but at pressure lower than 0.8 GPa. During the following cooling and decompression, brown hornblende pervasively grew in the Ama Drime eclogites.

Three types of fluid inclusions are recognised in the granulitised eclogites and veins. The first type is represented by multisolid $CO_2$-rich inclusions within Grt in the eclogite. They occur as intragranular trails and range in size from 2 to 15 $\mu$m. Usually, these inclusions have irregular or star-shaped outlines, suggesting post-trapping changes such as partial decrepitation. Type I inclusions contain several high-birefringence crystals and the fluid phase is represented by $CO_2$, usually homogenised at room temperature. The second type of fluid inclusions are mixed $CO_2$-$H_2O$ inclusions and occur in the studied vein as isolated inclusions within Ap and Qtz, as well as intragranular trails within Qtz. They show rounded or negative crystal shape and their size ranges from 5 to 20 $\mu$m. The $CO_2$ content in the inclusions is from 40 to 90 % of the inclusion total volume. Most of inclusions show biphase (L+V) $CO_2$ bubble at room temperature. The last type of fluid inclusions consists of biphase (L+V) aqueous inclusions. They occur in the vein as intragranular trails within Qtz. Their size range from 2 to 15 $\mu$m and the shape is usually irregular.

In conclusion, study of the Ama Drime eclogites suggests the presence of an early $CO_2$-dominated fluid that is probably responsible for their granulitisation. The data collected within the late vein record the influx of a mixed $CO_2$-$H_2O$ fluid followed by the influx of an aqueous fluid, in agreement with previous fluid inclusion studies along the MCT.