GEOCHEMISTRY AND GEOCHRONOLOGY OF E HIMALAYA ECLOGITES

ROLFO, F [1], LOMBARDO, B. [2] & McCLELLAND, W [3]

[1]Dipartimento di Scienze Mineralogiche e Petrologiche, Via Valperga Caluso 35, I-10125, Torino, Italy
[2]CNR, Istituto di Geoscienze e Georisorse, Via Valperga Caluso 35, I-10125, Torino, Italy
[3]Department of Geological Sciences, University of Idaho, Mines 322, Moscow, ID 83844-3022, USA
e-mail: franco.rolfo@unito.it

Compared to other collisional belts, the Himalaya is relatively poor in high pressure (HP) metamorphic rocks. Rare eclogite bodies of Eocene age have been described from two areas in the NW part of the belt (see MASSONNE & O'BRIEN, 2003, for a review), while granulitized eclogites have been reported in the E Himalaya (LOMBARDO & ROLFO, 2000).

The E Himalaya eclogites occur at the top of the Main Central Thrust zone in the Kharta region of S Tibet and record two superposed metamorphic events: A first eclogitic (T = 600 - 650 °C ?; P = 1.2 - 1.4 GPa ?) and a second granulitic (T = 750 - 770 °C; P = 0.55 - 0.65 GPa).

Geochemically, the E Himalaya eclogites have a basaltic (olivine tholeiite) composition showing a limited variation in SiO_2 contents (from 47.3 to 48.9 wt%), and low to medium K_2O (0.25 - 0.56 wt%) and MgO (5.57 - 7.50 wt%) contents. Ti content is moderate to high (1.47 - 2.83 wt% TiO_2) as well as the Fe content (FeO_{tot} = 11.48 - 15.39 wt%), pointing to Fe-rich dolerites. $^{87}Sr/^{86}Sr$ ratios and ε_{Nd} values are in the ranges of 0.70445 to 0.71515 and of +2.36 to +3.94, respectively

The timing of the HP event in the E Himalaya is difficult to constrain because of the widespread HT overprint and the poor preservation of HP assemblages. However, zircons could be separated and analysed by the U-Pb SHRIMP method. The zircons display complex systematics. A few analyses from low-U domains with low Th/U ratios (0.02 - 0.03) yield young $^{206}Pb/^{238}U$ ages from 12 to 15 Ma. Ages ranging from 88 to 110 Ma are interpreted to represent a Cretaceous protolith age of the mafic rock, while Proterozoic ages (1.8 Ga) are attributed to inherited components.

The basaltic protolith of the E Himalaya eclogites is possibly related to the Cretaceous Rajmahal Trap volcanism, widespread in NE India and here reported for the first time in the Higher Himalaya Crystallines. Because no evidence was ever found in the Nepal Himalaya for a metamorphic event between the Tertiary Himalayan orogeny and the Early Paleozoic metamorphism and plutonism (LE FORT et al., 1986), the Kharta eclogites must be Precambrian if they are not Himalayan in age. Even if the age of eclogitization was not recorded by the zircons, a Cretaceous protolith age for the Kharta eclogites definitely rules out the possibility that the age of eclogitization is Early Paleozoic or Precambrian, and corroborates the hypothesis put forward by LOMBARDO & ROLFO (2000) that the Kharta eclogites are of Tertiary age. The metamorphic ages of 13 - 14 Ma could record the end of the HT-LP fluid circulation and thus be linked to extrusion along the Main Central Thrust.

References

LE FORT, P., DEBON, F., PECHER, A., SONET, J. & VIDAL, P. (1986): Mem. Sci. Terre, 47, 191-209.
LOMBARDO, B. & ROLFO, F (2000): Journal of Geodynamics, 30, 37-60.
MASSONNE, H.-J. & O'BRIEN, P.J. (2003): EMU Notes in Miner., 5, Eötvös Univ. Press, Budapest, 145-187.