Intrusion of basalt melts to onset of hydrothermal evolution in the Ligurian Tethys lithosphere

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This talk deals mainly with the interplay between igneous/tectonic processes, crustal structure and hydrothermalism recorded by the gabbroic sequence from the Internal Liguride ophiolites. In particular, the following events will be examined: (i) formation of gabbroic bodies within the mantle; (ii) development of high temperature ductile shear zones within the gabbro-peridotite complex; (iii) high temperature hydrothermalism associated with brittle deformation. These events predate the exposure of the gabbro-peridotite complex at the seafloor, and the subsequent outpouring of basalt lavas and deposition of pelagic sediments. As a whole, the igneous to high temperature metamorphic evolution recorded by the gabbroic sequence from the Internal Liguride ophiolites bears striking structural, petrological and geochemical similarities to that recognised in the gabbroic sequences from modern magma-poor slow to ultra-slow spreading centres (e.g. Mid-Atlantic Ridge and South West Indian Ridge).

The crustal rocks from the External Liguride ophiolites will be also considered. The External and Internal Liguride gabbros retain a similar igneous evolution. In particular, one of the External Liguride gabbroic bodies lacks any evidence for interaction with seawater-derived fluids and is slightly older than the oldest pelagic sediments of the Ligurian Tethys. This gabbroic body thus testifies to mantle melting prior to continental break-up, similar to what is inferred for the “syn-rift” gabbros from the modern ocean-continent transition of the Western Iberian margin. The basalt flows from both External and Internal Liguride ophiolites have a N-MORB geochemical signature, in agreement with the notion that geochemically enriched basalts are uncommon in the Ligurian Tethys lithosphere.