Complexities in the high pressure metamorphic history of the central Sesia Zone near Cima di Bonze (NW Italy)

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The central Sesia-Lanzo Zone includes a narrow, continuously surfacing unit, which was termed Monometamorphic Cover Complex (MCC) by Venturini (1995). The MCC comprises: (a) the *Bonze Unit*, composed of basic rocks (metagabbros and glaucophane-eclogites), found in tectonic contact with (b) metasediments (calcschists, metamarls, impure quartzites) of the *Scalaro Unit*. The contacts between this body and the two large basement blocks of the Sesia Zone are clearly tectonic and mostly predate the eclogitic metamorphism.

Rubatto et al. (1999) showed that gabbros of the Bonze Unit had intruded the crystalline basement in the early Carboniferous. Blasto-mylonitic metagabbros contain local relics of brown hornblende; these may reflect pre-Alpine metamorphism (amphibolite facies?). However, no relics of a pre-Alpine stage have been found in the metasediments of the Scalaro Unit. This unit is thus a good target for structurally controlled petrochronology of the Alpine evolution in the central Sesia Zone.

We report results of detailed structural, petrographic, chemical and geochronological work carried out in the Cima Bonze region, with a focus on impure quartzites of the poly-deformed Scalaro Unit. A pervasive HP planar structure (S2 foliation) dominates in the area studied and in the samples analysed. Several generations of metamorphic allanite and LREE-rich epidote occur, providing a robust (Th-Pb, U-Pb) chronometer that can be intimately linked to the petrological and micro-structural evolution. Three growth zones with variable REE and U-Th contents were recognized in these allanites, and retrogressive tiny rims of clinozoisite/epidote were often observed. Phase relations between allanite and other REE-rich phases were carefully studied and yield a very clear and interesting sequence. Epidote often includes relics of monazite, thorite, apatite and xenotime. The phase relations indicate the reaction: monazite + fluid → allanite + thorite + apatite. Large crystals of xenotime forming coronas on zircon are associated with small crystals of thorite and REE-poor allanite.

SHRIMP U-Th-Pb *in situ* dating of the three growth zones consistently yield three different Alpine ages (from 80 Ma to 60 Ma) Preliminary LA-ICP-MS data on the same samples confirm the ion probe results. Further electron microprobe dating is underway on monazite and thorite to understand their relations to allanite and to unravel whether the early monazite is a prograde or a detrital phase.

These results have important implications on the Alpine HP-evolution of the Sesia Zone as a whole. A detailed PTDt-path is presently being be worked out, but the preliminary data in any case indicate a a complex, protracted reaction sequence producing allanite over at least 10 m.y. This is in line with a zircon study by Boston *et al*. (this meeting) and may serve to explain at least some of the complex Ar-Ar age patterns found by Venturini (1995).

References:

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