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HIGH P METAMORPHISM AND TECTONICS IN THE NORTHEASTERN PART OF THE SESIA-LANZO ZONE (WESTERN ALPS)

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The Sesia-Lanzo Zone (SLZ) overlies the Liguro-Piemontese ophiolites and is separated from the Ivrea-Verbano Zone (IVZ) to the east by the Canavese Line (CL), part of the Insubric fault system. Several workers have proposed a Late Cretaceous metamorphic field gradient across the SLZ comprising subduction-related eclogitic and blueschist facies assemblages south and southwest of the Val Sesia transitional to lower pressure greenschist facies assemblages northeast of Val Sesia (e.g. COMPAGNONI et.al. 1977). The Mesozoic Canavese metasediments along the CL were thought to contain only Late Cretaceous and Tertiary greenschist facies assemblages (ZINGG & HUNZIKER 1990). So far, no convincing mechanism has been proposed for exhuming the HP rocks of the SLZ; the 45 Ma Gressoney Shear Zone (WHEELER & BUTLER 1993, REDDY et al. 1999) formed in the footwall of the SZ and therefore only exhumed structurally deeper units like the Middle Penninic basement units (e.g., Monte Rosa nappe) and the Liguro-Piemontese ophiolites.

Detailed mapping in the Canavese mylonites and the easternmost SLZ in the lower Val Sermenza revealed four Alpine deformational phases: The oldest visible structures are relicts of an older foliation within the regional composite main foliation. Microprobe analysis of blue amphibole clasts within these relicts reveal glaucophanes (gln) without any internal zonation. The gln coexisted stably with paragonitic white mica (wm) and albite (ab), an assemblage diagnostic of blueschist facies. Low-Fe gln also occurs in Canavese-derived calc-silicate mylonites along the CL at Scopello. As there is no evidence for eclogitic assemblages within these relicts, these early structures may be correlated regionally with the retrograde blueschist facies D2 deformation in the central SLZ (e.g. GOSSO et al., 1979).

D3 deformation involved isoclinal folding and the development of a composite S2/S3 foliation parallel to moderately SE- to E-dipping F3 axial planes. Shear bands indicate that this main foliation accommodated WNW- to NW-directed extensional exhumation of the footwall parallel to a gently ESE- to SE-plunging stretching lineation (Ls). Kinematic indicators are best preserved near the CL. Away from the CL within the SLZ, the D3 microstructures are partly annealed. D3 was associated with a marked decompression, as evidenced by the partial replacement of D2-gln by tremolite (tr) or actinolite (act), and by the synkinematic growth of act+ab+wm+-bt in the pressure shadows of gln microboudins. White micas that are dynamically recrystallized or newly formed have a muscovitic chemistry, and both qtz and fsp underwent syn-D3 dynamic recrystallization. Taken together, these observations indicate lower amphibolite to upper greenschist facies conditions for D3.

D4 deformation within the bulk of the SLZ involved subhorizontal, NE-SW extension along conjugate sinistral, NE-SW-trending and dextral, ENE-WSW-trending oblique-slip shear zones. These shear zones are several hundred meters wide and were active under retrograde amphibolite- to greenschist facies conditions. The dextral shear zone probably merges with the Canavese mylonites near Fobello, whereas the sinistral zone forms the steep northern margin of the SLZ from the Val Macugnaga to the Val Sesia. In the Val Sesia, it truncates the dextral shear zone and continues to the SW as an internal dislocation of the SLZ. Along the CL in the lower Val Sermenza, D4 is characterized by steep F4 folds and a steeply WNW-dipping mylonitic foliation that overprints the SLZ-IVZ contact. The Ls plunges variably within this foliation, although most shear bands indicate ESE-backthrusting of the SLZ onto the IVZ. These movements occurred under retrograde conditions, as evidenced by the brittle behaviour of fsp and the syn-D4 growth of chl, tr, ep and ab. The celadonite component of syn-D4 white micas is similar to that of D3 muscovites. D5 involved the development of open to tight folds (100 m scale) with moderately dipping axial planes. These folds refolded steeply dipping S4 in the D4 shear zones under greenschist facies metamorphism.

We propose the following tectonic history for the NE part of the SLZ: **D1** involved stacking of the SLZ and parts of the IVZ (the seconda zona dioritica-kinzigitica, IIZDK) as nappes during Late Cretaceous subduction (e.g. RUBATTO et al. 1998) and HP metamorphism. The kinematics of **D2** blueschist facies deformation are unknown, but similar conditions are found in other parts of the SLZ (see KONRAD et al., this volume) and are clearly retrograde with respect to the thermal and baric peak during D1. **D3** top-to-SE extensional mylonitic shear in the internal part of the SLZ (near the CL) appears to be responsible for early (pre-Insubric) juxtaposition of the SLZ with the Alpine-unmetamorphosed IVZ. However, we suspect that most exhumation of HP metamorphic rocks was accommodated elsewhere, perhaps by thrusts at the base of the SLZ and/or at within the Penninic nappe pile. Unfortunately, these units are overprinted by the Gressoney Shear Zone. We are currently dating white micas to constrain the age of D3 (Early Tertiary or Late Cretaceous?) and its possible temporal relationship to thrusting in deeper units of the nappe pile. **D4** accommodated Mid-Tertiary transpressional tectonics in front of the Apulian indenter. This intense greenschist facies D4 overprint obliterated most HP assemblages. D4 strain was strongly partitioned, such that Sesia-internal steep belts accommodated NE-SW subhorizontal extension while mylonites of the CL accommodated backthrusting of the SLZ onto the IVZ. Dating of D2-D4 fabrics is in progress. **D5** accomodated minor shortening of the locally D4-steepened main foliation.

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