

ALPINE EVOLUTION OF THE LANGUARD-CAMPO AND SERIE DEL TONALE: STRAIN PARTITIONING VS. REACTION RATE (AUSTRALPINE DOMAIN - ITALIAN CENTRAL ALPS)

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The Central Austroalpine domain, right north of the Insubric tectonic line (Monte Padrio-Passo del Mortirolo-Monte Serottini, Upper Val Camonica), has been classically divided, on the base of lithological affinities and dominant metamorphic imprints, into three units: the „Serie del Tonale“, the „Cima Rovaia Schists“ and the „Punta di Pietra Rossa“. The association of these three units should correspond to a complete section of a pre-Alpine continental crust (BONSIGNORE & RAGNI, 1966; 1968; SCHMID et al., 1996; VENZO et al., 1971) and an Alpine metamorphic imprint under greenschist facies conditions is interpreted to affect only kilometre scale shear zones (e.g. Mortirolo Line; FROITZHEIM et al., 1994; MANCKTELOW et al., 1999).

The study of the relationships between the evolution of meso- and microfabrics and metamorphic transformation during pre-Alpine and Alpine times suggests a relative timing of the superposed structural events, which results as follows:

i) D1 and D2 deformation phases developing a S1+2 composite foliation marked by biotite + sillimanite + feldspar + garnet in micaschists and gneisses; ii) emplacement of Permian age granitoids, diorites and minor gabbros (BORIANI et al., 1985; DEL MORO et al., 1981; TRIBUZIO et al., 1999) during development of the S2 foliation; iii) syn-D3 metamorphic transformations and S3 fabrics occurring within Permian age metaintrusives and their country rocks. HP/low to intermediate -T metamorphic parageneses (GAZZOLA et al., 2000; SPALLA et al., 1995; TOMASCHEK &

BLÜMEL, 1998) mark the S3 foliation in all lithologies. Large-scale D3 fold structures mainly occur in the central part of the area (Cima Cadi – Passo del Mortirolo); they deform the S1+2 surface and are associated to the development of an S3 axial plane foliation. Within smaller volumes, D3 deformation occurs as meter scale shear zones deforming coronitic metaintrusives (metaintrusive preserving igneous textures) and country rocks (Alpe Troena – Cima Verda – Monte Serottini – Pian di Locher) as shown by GAZZOLA et al. (2000) at Monte Pagano. Moreover syn-D4 metamorphic transformation occurred under greenschist facies conditions affect all lithologies in the whole area but the corresponding fabrics (S4 tectonitic and/or mylonitic foliations) better developed in the central part, across the Passo del Mortirolo (kilometre-scale shear zone) and in the northern part along the Cima Tre Comuni – Monte Tremoncelli divide (metre-scale shear zones). Detailed mapping of all these structures was accomplished within the “Progetto Carte Prototipali” of the Italian CNR, a project devoted to improvement of mapping techniques. Mapping of foliations was conducted together with definition of their mineralogical support and therefore associated with corresponding metamorphic conditions, in an area of ~40 km²; it allowed to contour the volumes which record equivalent Alpine tectono-metamorphic evolutions. Overlapping of such contours with those of the previously proposed three-unit subdivision (“Serie del Tonale”, “Cima Rovaia Schists” and “Punta di Pietra Rossa”) shows that they corre-

spond to a single tectono-metamorphic unit during Alpine evolution and that kilometre scale interaction between strain gradients and reaction rate generated the prominent lithological differences and, ultimately, the distribution of the dominant metamorphic imprint. In conclusion, under the light of this new analytical perspective, the geological distinctions “Serie del Tonale”, “Cima Rovaia Schists” and “Punta di Pietra Rossa” are kilometer-size volumes showing different dominant metamorphic imprints and relative timing of structures.

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