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A Permian extensional detachment fault at the floor of the Collio Basin (Southern Alps, Italy)

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The Early Permian Collio Formation *Auct.* in the area of the Orobic Anticline (Southern Alps) comprises volcanic rocks and clastic sedimentary rocks of up to 1250 m thickness (the stratigraphic rank and naming of the Collio Fm. are presently under revision). The shallow-dipping contact between the Collio Formation and the underlying basement, including the Morbegno Gneiss and the latest Carboniferous to Early Permian (Thöni et al., 1992) Val Biandino granodiorite, is tectonic. The Morbegno Gneiss in the footwall is mylonitized, the mylonitic foliation being subparallel to the contact and the stretching lineation oriented NW-SE. Microscopic shear-sense criteria in the mylonite consistently indicate top-to-the-southeast shearing. The Val Biandino granodiorite, also in the footwall, is not mylonitized and has xenoliths of mylonitized Morbegno Gneiss. The granodiorite comes close to the contact but nowhere intrudes the hanging wall. The Collio Formation (hanging wall) shows brittle deformation and has a layer of pre-Alpine, tourmaline-bearing cataclasite at the bottom. These relationships suggest that the granodiorite intruded after mylonitization but before brittle faulting along the basement/Collio contact. This contact represents an extensional detachment fault (Grassi detachment fault) which was only moderately overprinted by later Alpine deformation.

Textures of recrystallized quartz layers in the mylonite were measured using the neutron texture goniometre SV7-b at Forschungszentrum Jülich. Textures in mylonite close to the granodiorite show single maxima of quartz c-axes close to the Y axis of the finite strain, indicating deformation by dominant prism <a> slip as is typical

for deformation under temperatures above 500˚C. The texture of a sample farther away from the granodiorite suggests lower-T deformation. The high-T textures close to the pluton are interpreted in terms of a heat input by the rising melt. Hence, mylonitization closely predated the final emplacement of the pluton.

The field relations are interpreted in terms of extensional shearing and detachment faulting during the opening of the Collio basin. The mylonites in the footwall formed by ductile normal shearing at depth during an early stage of this process, before and during intrusion of the granitoids. They were exhumed by brittle displacement along the cataclasite layer of the Grassi detachment fault, shortly following granitoid intrusion. The scenario in the Southern Alps during the Early Permian is thus remarkably similar, regarding tectonics, sedimentation, and magmatism, to the Miocene extensional core-complex formation in the Basin-and-Range province of western North America. Accordingly, the Salton Sea (California) has been proposed as an actualistic analogue for the intramontane lakes harbored by the Collio basin tectonic troughs (Sciunnach, 2001).

Sciunnach, D., *Terra Nova*, **13**, 150-155, (2001).

Thöni, M., Mottana, A., Delitala, M.C., De Capitani, L. & Liborio, G., *N. Jb. Miner. Mh.*, **1992**, 545-554, (1992).