Petrology of quartzphyllites and hornfelses from the Permian contact aureole at the southern rim of the Brixen Granodiorite (South-Tyrol/Italy)

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Contact metamorphosed pelitic mineral assemblages vary systematically with P and T and, therefore provide valuable quantitative information about the tectonothermal evolution of metamorphic belts. Unfortunately, very little attention has been devoted to examining the phase relations of low-pressure contact metamorphic pelites compared to regionally metamorphosed pelites, perhaps because spotted slates and hornfelses are spatially very restricted, extremely fine-grained, and commonly contain altered minerals such as pinitized cordierite. This is especially true when it comes to the study of Permian contact metamorphic rocks from the Eastern Alps. The Permian extensional event has recently been recognized in many units of the Eastern Alps, but due to the subsequent pervasive Alpine metamorphic overprint, pre-Alpine features have mostly been erased and hence very little geological evidence remains of the Permian contact metamorphic rocks in most units of the Eastern Alps. In contrast, the Southalpine basement with its large Permian intrusive complexes (Brixen-, Iffinger- and Kreuzberg pluton) lacks the Alpine overprint and thus provides a perfect opportunity to study Permian contact metamorphism. Contact aureoles have been identified at the rims of all three plutons but no *P-T-t* data are available from any of the contact aureoles so far.

The best preserved contact aureole is located at the southern rim of the Brixen Granodiorite near the village Franzensfeste where the pluton intruded into the quartzphyllite basement (Brixen Quartzphyllite). The termally unmetamorphosed country rocks were sampled near Waidbruck and contain the mineral assemblage muscovite + chlorite + albite + biotite + garnet + quartz ± K-feldspar. P-T conditions were calculated with the program TERMOCALC (Holland 2003 written in comm.) and reached peak metamorphic conditions at 0.56 GPa ± 0.09 and 507 ± 13°C. Approaching the granodiorite, based on mineralogical and textural features, three different zones can be discerned within the contact aureole. Approximately 300 m from the granite contact, the outer contact aureole (first zone) occurs. The rocks from the outer contact aureole are characterized by two texturally and chemically different generations of micas. The older micas are part of the relict Variscan foliation and the younger micas overgrow this foliation. The second zone is characterized by the first appearance of cordierite according to the reaction muscovite + chlorite = biotite + cordierite + H_2O. Cordierite coexists with the mineral assemblage muscovite + biotite + garnet + plagioclase + K-feldspar + quartz. The inner contact aureole starts

approximately 50 m from the granite contact and shows typical hornfelses. These rocks are macroscopically darker and much more compact and the Variscan foliation is thus nearly obliterated. They contain the mineral assemblage biotite + andalusite + cordierite + plagioclase + K-feldspar + muscovite. In the innermost area of the inner contact aureole, ca 5 m from the granite contact, spinel and corundum also occur. Calculation of a pseudosection for the rocks of the innermost part of the contact aureole with the program PERPLEX (Connolly, 2005 written comm.) yields P-T conditions for the assemblage biotite + cordierite + plagioclase + spinel + quartz of 560°C and 0.29 GPa. In addition, temperature conditions were also calculated with the zirconium-in-rutil geothermometer and yielded a temperature (55 ppm Zr) of 502 ± 50°C.