



## **Mineral chemical investigations in metapelites from the Permian contact aureole of the Southalpine Brixen Granite (S-Tyrol/Italy)**

Thöny Werner, Wyhlidal Stefan, Tropper Peter

Faculty of Geo- and Atmospheric Sciences, Institute of Mineralogy and Petrography,  
University of Innsbruck, Innrain 52, A-6020 Innsbruck, Austria

In the Southalpine domain, the Permian intrusive complexes of the Brixen-, Iffinger- and Kreuzberg granitic-granodioritic plutons are aligned along the Periadriatic Lineament, and cover an area of ca. 200 km<sup>2</sup>. Contact aureoles have been identified at the southern rims of all three plutons but no P-T-t data are available from any of the contact aureoles so far. Although the chemical evolution of these intrusive bodies is well established, and contact aureoles were identified and partly mapped at the turn of the last century, there are almost no quantitative mineral chemical and petrological (P-T) data available from any of the contact aureoles.

It is one of the aims of this investigation to obtain electron microprobe analysis of the minerals of the contact metamorphic quartzphyllites and the surrounding regionally metamorphosed Southalpine basement. These data are the prerequisite for subsequent thermobarometric investigations. Electron microprobe analysis also allows identification of chemical variations of mineral composition as a function of distance from the contact. This involves systematic analysis of minerals from zones with increasing metamorphic grades. Pattison and Harte (1991) showed that Mg/(Mg+Fe), K/(K+Na) and MgSi=Al<sub>-1</sub>Al<sub>-1</sub> (Tscherma's substitution) show systematic variations with increasing grade.

Besides textural evidence, the first chemical evidence of contact metamorphism can be found in newly grown biotite and muscovite from the outer contact aureole. These biotites are titanium-enriched (1.5 wt.% TiO<sub>2</sub>) compared to biotites from the thermally unmetamorphosed Brixen Quartzphyllite, which contain 0.3 wt.% TiO<sub>2</sub>. Newly grown muscovite also shows higher paragonite component, than muscovite from the relict

foliation. Approaching the intrusion the Ti-contents of biotite increases to values of about 3.5 wt.% TiO<sub>2</sub> in the innermost contact aureole. A systematic chemical variation of plagioclase composition was also observed. The thermally unmetamorphosed Brixen Quartzphyllites contain albite (An < 2 mol.%). In the outer contact aureole, anorthite contents increase to ca. 20 mol.% An. In the inner contact aureole, plagioclase contains up to 40 mol.% An-component and in the innermost contact aureole (<1 m from the granite contact) the anorthite content increases to 45 mol.% An. Calculation of T by using two-feldspar thermometry with SOLVCALC (Wen and Nekvasil, 1994) also yields an increase in T from 550°C to 620°C from the inner- to the innermost contact aureole. Cordierite shows a systematic variation in MgO and FeO contents from 4-5 wt.% MgO and 13 wt.% FeO from the rim of the inner contact aureole to 5.5-6.5 wt.% MgO and 11-12 wt.% FeO from the innermost contact aureole. No systematic variation in Na has been observed yet. In the innermost part of the contact aureole, spinel occurs. The spinel contains 28.5 wt.% FeO and 10 wt.% ZnO.

#### References:

Wen, S., Nekvasil, H. (1994): Computers & Geosciences 20, No. 6, 1025-1040.