

## Geochemistry and Petrology of the Oetztal-Stubai Amphibolites

### A. Mogessie (Innsbruck)

Geochemical investigations of amphibolites from the Oetztal-Stubai Complex show striking differences in the trace and major element values from NNW to SSE. The trace and major element data from NNW and central Oetztal amphibolites indicate a typical tholeiitic magmatic trend whereas those from SSE are found to be para-amphibolites. The K/Rb ratio decreases towards the SE, with a higher value in central Oetztal. The higher amount of Li, Rb and K in SSE Oetztal suggest a possibly higher fluid content in this region during Alpine metamorphism.

Petrologic studies of the regionally distributed amphibolites with a concentrated mass in central Oetztal have led to the better understanding of the polymetamorphism of this part of the Eastern Alps. Based on the combined rock and mineral analyses and the observed field and textural relationships, evidence for polymetamorphic nature of the Oetztal-Stubai amphibolites have been established. With increasing grade of metamorphism Na<sup>A</sup>, K, Na<sup>M</sup>, Al<sup>V</sup>, Al<sup>IV</sup>, and Ti contents of the amphiboles increase. The An-content of the plagioclase also increases. The garnet zonation also shows the same metamorphic trend. The zoned calcic amphiboles represent various combinations of core-rim composition, i.e. actinolite-hornblende and hornblende-actinolite. These types of textural relationships are considered to indicate multiple periods of mineral growth. The polymetamorphic situation can be summarized as follows:

- 1 - a high P & T metamorphism of pre Hercynian (Caledonian ?) age.
- 2 - a low grade greenschist facies metamorphism of possibly early Hercynian age (phase I)
- 3 - a low to medium P and high T metamorphism (amphibolite facies) of Hercynian age (phase II)
- 4 - a medium P Alpine overprint whose metamorphic grade decreases from SE (amphibolite facies) towards NW Oetztal (low greenschist facies)
- 5 - Early Alpine cooling (represented by retrograde mineral assemblages) in amphibolites of the old crystalline Basement bordering the Schneeberg Complex to the north).

### References:

- MOGESSIE, A., PURTSCHELLER, F., TESSADRI, R. (1985): Geochemistry of amphibolites from the Oetztal-Stubai Complex (Northern Tyrol, Austria). *Chem.Geol.* **51**, 103-113.
- MOGESSIE, A., PURTSCHELLER, F., TESSADRI, R. (1986): High Alumina Calcic Amphiboles (Alumino Pargasite - Magnesio Sadanagaite) from the Metabasites and Metacarbonates of Central Oetztal, Eastern Alps (Northern Tyrol, Austria). *N.Jb.Min.Abh.* **154**, 21-39.
- MOGESSIE, A., PURTSCHELLER, F. (1986): Polymetamorphism of the Oetztal-Stubai Basement Complex based on Amphibolite Petrology. *Jb.Geol.B.A.(Vienna)* **129**, 69-91.