



Petrological investigations of the Austroalpine Ötztal-Stubai-Complex in the Stubaital (Tirol, Austria)

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The paragenetic evolution of rocks from the Austroalpine Ötztal-Stubai-Crystalline (ÖSC) in relation with their polyphase deformation is subject of the current study focusing on the area around the Dresden Hütte in the Stubaital (European Eastern Alps).

Two broad classes of rocks may be distinguished there. Meta-magmatic and migmatic rocks occur in the southern parts of the area and meta-sedimentary rocks in the north. The former include meta-granodiorites and migmatic amphibolites that commonly form Schollen injected by leucocratic material. The felsic rocks commonly lack primary white mica and have a weak deformational overprint. Towards the contact to the metasedimentary rocks, these obviously higher-grade metamorphic rocks (compared to the metasediments) show an increasing deformational overprint and grade to more or less well developed and recrystallized mylonites. The metasedimentary rocks comprise mica schists alternating with gneissic layers.

The predominant deformational imprint formed a regional subvertically NW-SE striking foliation. A subhorizontal NW-SE striking intersection lineation is related with large-scale folding.

The metapelitic rocks may contain staurolite, garnet, kyanite, plagioclase, biotite, white mica, chloritoid and accessory apatite, tourmaline, rutile and ilmenite. Most of the rocks show late static retrogression manifested by chlorite-growth without preferred orientation as well as pseudomorphic replacement of kyanite, staurolite and chloritoid by fine-grained sericite aggregates. Microstructural investigations showed that kyanite is inter-tectonic and the staurolite inter- to syntectonic with respect to the prevailing foliation represented by micas. Chloritoid formed post-tectonically. Microprobe analyses and element distribution images show at least two-stages of garnet growth extending over the prevailing deformation. Garnet cores in Ca-poor metapelites (Grt1) show a high degree of element homogenization ($Mg\# = 0.129$, $X_{Ca} = 0.055$). Complex Mn-zoning at the Grt1 rim indicates Grt-resorption at elevated T-conditions postdating Grt 1 growth. Subsequently, Grt 1 is discontinuously overgrown by a Ca-rich garnet generation (Grt2, $Mg\# = 0.096$, $X_{Ca} = 0.26$) that already enclosed the major foliation. Grt2 is commonly intergrown with chloritoid pointing to their coherent formation. Chloritoid crystals grew without preferred orientation. Electron back scatter images of garnet from more Ca-rich metapelites show the same paragenetic features, but comprise distinct Ca-enriched cores ($X_{Ca} = 0.125$) indicating a still older garnet generation (Grt0). This early garnet growth stage has not been previously described from metapelites of the ÖSC. On-going work intends to refine and quantify the PT-evolution of the investigated rocks.