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Petrology of the polymetamorphic metapelites from the Michelbach Complex (Defereggen Complex, East Tyrol)

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The Austroalpine crystalline basement south of the Tauern Window is characterized by a polyphase metamorphic evolution. The dominant Variscan metamorphic imprint between 390 and 300 Ma was followed by a Permian HT/LP overprint at 270±30 Ma (SCHUSTER et al. 2001).
In order to distinguish between these events petrographical, mineral chemical and geochronological studies were carried out on the metapelites of the Michelbach Complex. This basement unit is located in the Defereggen Alps to the south of the Defereggen-Antholz-Vals Line.
The Michelbach Complex reached, similar to areas like the pre-Alpine Strieden Unit in the Kreuzeck Mountains (HOKE 1990), sillimanite- and andalusite-grade conditions during the Permian metamorphism. Petrographic investigations revealed that it can be subdivided into two zones: the andalusite-zone in the north-western part of the area of investigation and the sillimanite-zone in the south-east.
The mineral assemblage of the andalusite-zone is characterized by garnet + biotite + muscovite + plagioclase + staurolite + andalusite + quartz. In the sillimanite-zone a similar mineral assemblage occurs but with decreasing contents of staurolite and the occurrence of fibrolitic sillimanite instead of andalusite. Further differentiations of the two zones are reflected in the mineral chemical compositions of the coexisting minerals.
Staurolite and Garnet show two generations of crystal growth: old porphyroblastic and younger, smaller idiomorphic grains. The old garnets show continuous as well as discontinuous growth zonations. The garnet cores (garnet-I) are thought to have grown during the Variscan event and the garnet rims (garnet-II) are thought to represent the subsequent Permian HT/LP overprint. The formation of garnet-II occurs contemporaneous with the breakdown of staurolite according to the reaction staurolite + muscovite <--> garnet + fibrolite + biotite. The breakdown of garnet-I most likely occurs according to the reaction garnet + muscovite <--> kyanite/sillimanite + biotite + quartz, which might have been taken place during the Variscan retrograde, decompressional stage. Therefore, at first kyanite (Variscan?) grew and later on fibrolitic sillimanite (Permian).
Similar interpretations concerning the different stages of mineral growth can be done using other minerals such as monazite or plagioclase, which also show considerable chemical zoning.
Electron microprobe dating of monazite yielded Variscan ages in the sillimanite- and the andalusite-zone of 330±50 Ma and Permian ages of 240±50 Ma. The latter are supported by a garnet crystallisation age from a pegmatite located within the sillimanite-zone which was determined by the Sm-Nd method and yielded 253±7 Ma. Ar-Ar and Rb-Sr data of muscovites from the sillimanite-zone range from 190 to 206 Ma. These young ages are interpreted as cooling ages associated with the Permian event (SCHUSTER et al. 2001).
P-T calculations yielded comparable results. The conditions for the metapelites of the andalusite-zone are close to the *P-T* conditions of the alumosilicate triple point according to PATTISON (1992) with 450-550 °C and 0.35-0.50 GPa. Samples of the sillimanite-zone yielded slightly higher *P-T* conditions of 590-650°C and 0.51±0.08 GPa.

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Sedimentologische Untersuchung der Bohrung Wattens (Tirol)

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Die übertieften Täler der Alpen, insbesondere deren Bildung und Sedimentinhalt, stehen schon lange im Fokus der Quartärforschung. Generell besteht ein Grundkonsens, dass subglaziale Prozesse maßgeblich für die Übertiefung von schon prä-existenten fluviatil angelegten Tälern sind. Da die großen Alpinen Täler wichtigen strike-slip-faults folgen (z. B. Inn-, Enns-, Salzach-, Gail- und Drautal), die im Miozän aktiv waren und partiell gegenwärtig noch als aktiv angesehen werden, ist ein Beitrag von endogenen Prozessen an der Übertiefung d. h. durch Subsidenz in pull-apart Becken, durchaus möglich. Der Schlüssel zur Lösung dieser wichtigen Frage zur Morphogenese der Ostalpen liegt in der detaillierten Analyse der jeweiligen Sedimentfüllungen.
Für das Inntal ist die Bohrung Wattens (östlich von Innsbruck) die Schlüsselstelle zum Verständnis der Talübertiefung. Diese Spülbohrung wurde im Rahmen einer wasserwirtschaftlichen Untersuchung im Jahr 1989 abgeteuft um den geologischen Aufbau und nutzbare tieferliegende Aquifere im Inntal zu erkunden (WEBER et. al.