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Geochronological constraints on the exhumation of the Austroalpine Seckau Complex (Eastern Alps)

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New Rb-Sr biotite age data from meta-granitoids of the Seckau nappe (Eastern Alps) range from 83 to 87 Ma. These ages represent cooling ages associated with the exhumation of the Seckau Complex subsequent to Eo-Alpine greenschist facies metamorphism. Cooling below 300±50°C is related to extensional shearing within the higher structural levels of the Seckau Complex and its subsequent exhumation.

The Rb-Sr biotite age data range from 80 Ma to 76 to 86 Ma, with eight samples showing ages between 84 and 86 Ma. A sample from Hochreichart mountain has an age of 80.6 Ma, another sample west of the Ingering valley yielded only 76.3 Ma. The latter seems to be exceptional as it is sampled only about 250 meters from sample SP81, which has an age of 84.3 Ma and as both samples showing a nearly identical mineralogical and chemical composition. It is obvious that both samples underwent the same cooling history and we attribute the small difference in age to a slight contamination by chlorite, grain size and/or weathering effects. The Rb-Sr biotite ages are interpreted to date cooling below 300±50°C. Therefore the investigated part of the Seckau Complex cooled down below ~300°C at about 85 Ma in the Santonian.

Referring to microstructural observations, the contact between the Seckau Complex and the Rannach-Formation was strongly overprinted by the formation of distinct shear zones that are characterised by extensional fabrics. Kinematics is characterized by conjugate sets of top-to-the-WNW and top-to-the-ESE. As feldspar is deformed by cataclastic deformation mechanisms, whereas quartz show deformation mechanisms of dislocation creep and bulging dynamic recrystallization we assume that the conditions of deformation along the Seckau Complex with the Rannach-Formation are in the range of 300°C to 400°C. A comprehensive interpretation of the Rb-Sr biotite age data combined with deformation structures suggests that extension-related exhumation of the Seckau complex occurred around 80 Ma.