

### **The Oligocene Reifnitz Tonalite (Austria): implications for Oligocene-Neogene tectonics of southeastern Alps**

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The Reifnitz tonalite intruded into amphibolite-grade metamorphic Austroalpine basement south of the Wörthersee area and north of the Sarmatian-Pliocene Klagenfurt basin, which is the fill of a flexural basin at the northern front of the North Karawanken, the later representing a transpressive thrust sheet related to activity along the Periadriatic fault. The Reifnitz tonalite is dated for the first time, and its laser ICP-MS U-Pb zircon age is  $30.72 \pm 0.30$  Ma. The (U-Th-Sm)/He apatite age of the tonalite is  $27.6 \pm 4.0$  Ma. Based on Al-in barometry, the depth to intrusion is estimated minimum 2.4 kbar implying erosion of ca. 4 km overburden before deposition of the Sarmatian to Pliocene fill of the Klagenfurt basin. The area ca. 20 km to the north was always at the Earth's surface since Cretaceous as Upper Cretaceous-Eocene, Oligocene and Miocene sedimentary rocks of the Krappfeld basin testify. The new data imply, therefore, that the Reifnitz tonalite is part of a combined post-30 Ma antiform and peripheral bulge. In a first step, which is dated as ca. 31-27 Ma, rapid cooling to ca. 60 °C and exhumation occurred in an E-W trending antiform, which formed as a result of regional compression. In a second, Sarmatian-Pliocene, step final exhumation of maximum 1.5 km occurred in response to the lithospheric flexure in front of the overriding North Karawanken thrust sheet.

### **Cambrian acidic volcanics in the eastern Graywacke zone? The Stocker unit enigma**

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The Rad Schists in the easternmost part of the Northern Greywacke Zone are one of those pre-variscan phyllite areas which due to the lack of meaningful fossils have so far escaped stratigraphic classification. U/Pb dating of idiomorphic, zoned zircons from acid crystal-rich metatuffs of the Stocker unit produced a Cambrian age ( $511 \pm 13$  Ma). This age supports a previously proposed splitting of the Rad Schists into two units, the Rad and the Stocker unit, respectively. The pre-variscan sequence of the Veitsch area begins with the Blasseneck porphyroid (dated at Polster mountain 40 km west of Veitsch by our group as  $463.9 \pm 3.5$  Ma), overlain with sedimentary contact by the Rad unit. This unit is characterized by very fine-grained,  $\pm$  quartz-rich phyllites and contains at several localities a badly preserved macrofauna. On top of the Rad unit lies a sequence of laterally continuous limestones which has yielded conodonts of the lower, middle and upper Devonian. It can, therefore, be assumed that the Rad unit has been deposited during the upper Ordovician and Silurian. Above the limestones follows the Stocker unit, characterized by thin intercalations of acid volcanics and sandstones/quartzites. On top of the Stocker unit a second level of limestones of lower to upper Devonian occurs, this time laterally discontinuously. Stocker unit and limestones are overlain transgressively by the post-variscan Präbichl beds. The Stocker unit thus represents a stratigraphically low element in a tectonically high position and compensates the absence of the primary basis of the Blasseneck porphyroid in the Veitsch area.