Geophysical Research Abstracts
Vol. 21, EGU2019-3175, 2019
EGU General Assembly 2019

Opening and closure of the Penninic ocean basin at the Alpine-Carpathian transition: new structural data and U-Pb zircon ages

Franz Neubauer (1), Xiaoming Liu (2), Shuyun Cao (1,3), Yunpemg Dong (2), and Isabella Merschdorf (1)

(1) University of Salzburg, Dept. Geography and Geology, Salzburg, Austria (franz.neubauer@sbg.ac.at), (2) State Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an, China, (3) State Key Laboratory of Geological Processes and Mineral Resources, School of Earth Sciences, China University of Geosciences, Wuhan, China

In Alps, ophiolite formation has been poorly correlated with formation of adjacent passive margins, and uncertainties in mode of symmetric vs. asymmetric rifting and timing of passive margin formation and oceanic spreading exist. The Rechnitz window group of the Eastern Alps exposes Penninic Mesozoic oceanic and metasedimentary syn- and postrift continental margin successions along the South Burgenland basement High/Bohemian Spur, an inherited crustal-scale structure at the Alpine-Carpathian-Pannonian transition.

In the Rechnitz window group, two tectonic units are distinguished, the Schlaining unit with ophiolites, which show a Paleogene history of subduction, and the structurally underlying Kösczeg unit with distal passive continental margin successions indicated by their richness of continent-derived siliciclastic material. A blueschist with a plagiogranite protolith of the Schlaining yields a weighted mean zircon 206Pb/238U age of 142.5±2.8 Ma (earliest Cretaceous) interpreted to represent the age of oceanic spreading . The age is younger than the 166 to 148 Ma-ages of the ophiolites in the main Piemontais-Ligurian oceanic basin and older than the ca. 95 to 90 Ma-ages of the Valais basin. This new age, however, is consistent with the age of the main rift phase and subsidence of halfgraben on tilted blocks during Doggerian and Malmian in the east of the Bohemian Spur.

Detrital zircons of three samples from quartzitic rocks from the underlying Köszeg unit show a wide variety of U-Pb age populations and significant differences between the three samples suggesting heterogeneous sources. As a whole, single grain ages range from 215 to 2860 Ma, with some small peaks at 440, 600, 670, 1010, 1400, 2000 and 2500 Ma. Whereas one sample is dominated by Variscan ages, ca. 325 Ma, another sample is dominated by Panafrican age groups at 600 and 670 Ma. We interpret this heterogeneity and the different sources to derive from a rift shoulder, which shows either (1) a lateral transition from Variscan granites (with ages at ca. 325 Ma) to Panafrican sources (500 – 670 Ma), or (2) from two different passive margins during the rift stage. The presence of Permian and rare Triassic ages indicate the significance of Austroalpine and/or Southalpine sources. In model 1, the lateral transition from Variscan to Panafrican sources potentially correlate with the Moldanubian-Brunia transition along the Jurassic stable European continent in the northwest. The alternative model 2 implies derivation of dominant Variscan sources from the north, and derivation of Panafrican and subordinate Triassic zircons from Austroalpine/Southalpine sources in the southeast.

Missing Mesozoic magmatism in the Köszeg unit suggests asymmetric rifting and a lower plate position of the northern Bohemian Spur passive margin during rifting. Using crustal-scale reflection seismic lines (Grassl Weber, 2003, Mitteilungen Österr. Geol. Gesellschaft, 93, 129–138), we explain the control by inherited rift structures to the present-day architecture at the South Burgenland High during Paleogene nappe stacking and subsequent Early Miocene extension.