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Provenance and Geodynamic Significance of the Late Cretaceous to Paleogene Szolnok Flysch (Hungary)

B. Baresel (1), T. Mikes (2,3), D. Frei (4), B. Schmidt (5), and H. von Eynatten (5)

(1) Department of Earth Sciences, University of Geneva, Rue des Maraîchers 13, 1205 Geneva, Switzerland, (2) Biodiversity and Climate Research Centre (BiK-F), Senckenberganlage 25, D-60325 Frankfurt am Main, Germany, (3) Goethe-Universität Frankfurt, Altenhöferallee 1, D-60438 Frankfurt am Main, Germany, (4) Stellenbosch University, Central Analytical Facilities, Chamber of Mines Bldg, Private Bag XI, ZA-7602 Matieland, South Africa, (5) Geowissenschaftliches Zentrum der Universität Göttingen, Goldschmidtstrasse 3, D-37077 Göttingen, Germany

Upper Cretaceous to Miocene flysch successions occur in a small belt of isolated basins, extending from the Southern Alps along the outer margin of the External Dinarides up to the Eastern Carpathians. The Upper Cretaceous to Oligocene Szolnok flysch unit is situated in an exotic position in the Intra-Carpathian area in E Hungary, tectonically sandwiched between the Alcapa and Tisza "microplates". It underlies the Neogene fill of the Pannonian Basin and is known from drillcores only. This is a first attempt to adopt a combined sedimentary provenance approach using (1) sandstone petrography, (2) whole rock geochemical data, (3) Raman spectroscopic identification of heavy mineral assemblages, (4) electron microprobe single-grain analyses of garnet, tourmaline and Cr-spinel, and (5) LA-SF-ICPMS U-Pb geochronology of detrital zircon, in order to constrain the provenance and geodynamic significance of the Eocene portion of the Szolnok flysch.
The combined proxy data suggest the erosion of several distinct source lithologies in the Eocene, dominated by granitoids and low-to-medium-grade (up to lower amphibolite facies) metapelites, with subordinate yet variable proportions of Lower Cretaceous (Urgon facies) carbonates as well as ophiolitic rocks (dominated by harzburgitic peridotites). CL-controlled detrital zircon U/Pb geochronology reveals that the felsic magmatic source rocks were dominated by Ordovician, Variscan and Upper Permian units, and a minor but distinct Late Cretaceous age population is also present. We propose three competing scenarios for sediment dispersal into the Szolnok flysch basin in the Eocene. Ophiolite-bearing but dominantly continental detritus is derived from (1) detached ophiolitic slices in the Eocene accretionary prism of the subducting Penninic/Magura Ocean; (2) formerly obducted Jurassic ophiolites on the ALCAPA plate and/or their Lower Cretaceous erosional products (such as Vranduk and Gerecse turbidites); (3) a hitherto poorly constrained NE continuation of the Sava Zone (at the N margin of the Tisza unit), a remnant branch of the Neotethys closed in the latest Cretaceous. In either case, the majority of the carbonatic detrital components is probably derived from different parts of the paleo-catchments situated on the ALCAPA and/or Tisza units, as principal component analysis of the whole-rock geochemical data does not support a uniform erosion of siliciclastic/ophiolitic and carbonate source units. The new geochronological data strongly suggest that the bulk of the erosion took place on the Tisza unit, with a minor but well-constrained input from the Late Cretaceous magmatic arc products of the "Banatite Belt".