

Detrital chromian spinels from the Magura Unit (Western Carpathians, Eastern Slovakia): provenance implications

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Detrital chromian spinels in sedimentary rocks provide much information concerning the tectonics of their parent ultrabasic rocks. Chromian spinels occurring in the Eocene to Oligocene deposits from the Magura Nappe were examined to provide some constraints on the history of the Magura basin. The Magura Nappe is a part of the Flysch Belt belonging to the External Western Carpathians. The Magura Nappe is separated by a narrow zone associated with the Pieniny Klippen Belt and is divided into three principal tectono-lithofacies units (from the S to N): the Krynica, Bystrica and Rača units.

Cr-spinel is a common accessory mineral (2.3-5.9 vol% of heavy mineral spectra) in the siliciclastic rocks of the Rača and Krynica units. In terms of texture and chemical composition, two types of Cr-spinels were recognized: unaltered and altered. Unaltered spinels were found to contain silicate inclusions such as chromio-pargasite, enstatite, diopside, pargasite, plagioclase and forsterite. The Cr-spinels show wide variations in compositional parameters such as Cr# (0.3–0.7), Mg# (0.3–0.7), TiO₂ (<0.03–1.9 wt %) and Fe²⁺/Fe³⁺ (2.5–13) whereas the differences between the Rača and Krynica units are insignificant. These parameters suggest a peridotitic and volcanic origin of the spinels, respectively. The ophiolite source consisting of harzburgitic mantle peridotites was developed mainly in a supra-subduction zone setting; volcanic spinels indicate an origin in mid-ocean ridge basalts, back-arc basin basalts and sporadically in ocean-island basalts (Lenaz et al., 2000; Kamenetsky et al., 2001).

Taking into account the geochemical characteristics of the Cr-spinels and palaeoflow directions (in the Eocene especially), we propose that during the Eocene to Lower Oligocene, the ophiolitic detritus in the eastern part of the Magura Basin deposits may have been derived from a source area located in the Fore-Marmarosh Suture Zone (Eastern Carpathians) that is considered an equivalent of the Black Flysch and Ceahlau units (e.g., Ślaczka et al., 2006; Hnylko et al., 2015). Some Cr-spinels found in the Eocene sedimentary successions may have resedimented from older Late Cretaceous-Paleocene formations of the Magura Unit, which are considered as reworked sedimentary material from the Pieniny Klippen Belt.

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