



Back-arc basin affinities of the Nové Město (Central Sudetes) metasediment protholiths: results of major and trace element provenance study

Krzysztof Maliszewski (1,2) and Sławomir Ilnicki (1)

(1) Institute of Geochemistry, Mineralogy and Petrology, Faculty of Geology, University of Warsaw, Poland (k.maliszewski86@wp.pl, slawomir.ilnicki@uw.edu.pl), (2) Polish Academy of Sciences Museum of the Earth in Warsaw, Poland (kmaliszewski@mz.pan.pl)

The Orlica-Śnieżnik dome (OSD) in the easternmost part of the central Sudetes is one of the most important structures of the Bohemian Massif. The OSD is composed of the core and mantle units. From the west the core is bordered by the volcano-metasedimentary series of the Nové Město unit (NMU) composed partly of low grade metasedimentary rocks and often correlated with the Teplá-Barrandian zone.

The fine-grained phyllites and mica schists of the NMU are comprised mainly of quartz, albite, muscovite and biotite with subordinate K-feldspar, chlorite and opaque minerals - mostly iron and titanium oxides. Accessory tourmaline, zircon and also garnet grains are present in varying amounts throughout the unit. The NMU rocks show pronounced structural features with distinct directional strain characteristics.

Samples for the provenance study of the NMU metasedimentary rocks were collected from the outcrops in the Orlickie Mountains. The whole-rock geochemical analyzes were performed on 20 rock samples by means of XRF and ICP-MS. The rocks show consistent elemental compositions. The contents and ratios of major and minor elements indicate a source region dominated by felsic volcanic rocks, and also plot in the greywacke field in discrimination diagrams, showing immaturity of the source sediment.

The geochemical data concerning REE and high field-strength element (HFSE) contents are of major importance in the presented study. These elements are considered insensitive of most post-depositional processes and are good indicators of provenance. However, the acquired chemical data for major elements also indicate no significant episodes of weathering or alteration of geochemical features during diagenesis and metamorphism thus showing consistent characteristics of the source sediment.

The chondrite- and UCC-normalized diagrams indicate that the NMU rocks elemental compositions are typical of the continental crust and of felsic volcanic rocks. They show a distinct Eu anomaly ($\text{Eu}_{\text{CN}}/\text{Eu}^*\text{CN}$ from 0.67 to 0.84) as well as HREE depletion compared to LREE contents. The discrimination of major and trace elements point towards the same geotectonic setting for the source material of NMU metasediments and clearly suggests a continental island arc affinity of studied samples. This type of detritus prevailing in the basin together with sediment immaturity presumably indicates a back-arc basin sedimentation environment with relatively close vicinity of the sediments source region(s). Moreover, metasediments of the Młynowiec and Stronie formation in the core of the OSD are reported to share several of the aforementioned geochemical features (Szczeпаński & Ilnicki, 2014) thereby suggesting derivation of both core and mantle unit of the OSD from similar geotectonic environments thought undoubtedly separated in space in pre-Variscan (presumably Cadomian) realms.

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References:

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