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Albanian ophiolites as probes of a mantle heterogeneity study

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Most ophiolites are believed to be tectonically obducted slivers of oceanic lithosphere. As such they can provide information not only about the history of crust formation, but also about the composition of the chemical composition of the recent and ancient mantle composition. The occurrence of the well preserved Albanian Ophiolite Complex covers the length of Albania (ca. 150 km) is an ideal object not only for the study of the history of Jurassic tectonic event, but also for the study of the heterogeneity of the upper oceanic mantle from a millimeter to a 100 km scale. The occurrence of two almost parallel ophiolite chains, which have been described to be of different petrography presenting different parts of the upper mantle (MOR vs. SSZ type), allows the investigation of additional aspects of mantle heterogeneity.

In this study we want to take advantage of the geochemical characteristics of platinum group elements (PGE) and of lithophile elements to estimate the extant of mantle melting, metasomatic and mixing events of a large portion of mantle obducted contemporaneously. In a first step only peridotites from the mantle sections of the ophiolite complexes are studied for the PGE content and the osmium isotopic composition. Together with major and trace element compositional data, following tasks will be addressed: development of a strategy for field and lab sampling, identification of processes that happened before and after obduction such as melt depletion, metasomatism, serpentinisation etc. and the determination of the size of modified and “pristine” domains.

Samples from the western Albanian Ophiolite belt have been studied so far. Although the locations spread over the entire belt a remarkable similarity of PGE abundances is observed. In detail deviations from a correlation of Lu and TiO_2 concentration data are also reflected in aberrant mantle normalized PGE patterns. Interestingly enough, this behavior is not manifested in a trend in the 187Os/188Os distribution. As a result the Os isotopic compositions of the entire belt represent the range to be expected from a post Archean upper mantle. The observed heterogeneous distribution of osmium isotopic compositions is most likely an image of the long depletion and incomplete remixing history of the upper Earth’s mantle which was not significantly modified through event leading to the formation of ophiolite belts.