

DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Drift of continents that pull apart when new oceanic crust forms is preceded by stage of breakup of Earth's crust into fragments. The increased heat supply during breakup of the crust is related to significant magmatism. Crystalline massifs of western and central Europe contain numerous igneous rocks, both acid and alkaline, representing such thermal event that occurred in Cambrian and Ordovician (ca. 500 Ma) at the Gondwana supercontinent. Breakup of crust in northern parts of Gondwana in early Paleozoic resulted in opening of Rheic Ocean, which currently does not exist, but its record fragmentarily remained in Europe as rocks characteristic for oceanic crust. Felsic and mafic igneous rocks of that age were deformed and metamorphosed during Variscan orogeny (ca. 360-330 Ma), resulting in partial alteration of their original characteristics. However, these may be substantially reconstructed by applications of geochemical and isotopic studies.

Geochemical studies of felsic and mafic metamorphic rocks, albeit their close occurrence, commonly lead to different and even divergent conclusions on absolute age and origin. These include such constraints as to what degree igneous rocks originated from melting of the Earth's mantle or crust; when magmas were generated during continental drift cycle and which rocks formed in the intercontinental environment (initial stage of extension) or oceanic environment (mature stage of Rheic Ocean). In Poland, occurrences of rocks of this age are known from the Sudetes Mts., which geologically comprise NE part of the Bohemian Massif. The Sudetes attract attention of geologists for decades, because understanding of the phenomena recorded in these rocks is significant for reconstruction of Cambrian and Ordovician events within Gondwana supercontinent.

This project aims to answer above questions by application of integrated field, geochemical and isotopic studies. This approach will focus directly on crystalline rocks from the Sudetes Mts., where acid and alkaline rocks coexist forming so-called bimodal group. Complete characteristics and reconstruction of events that resulted in formation of such groups of rocks will be obtained by using in a broad scale the followings: field works, geochemical and isotopic Sm-Nd whole rock analysis, morphological analysis of zircon (mineral formed at the igneous stage and generally resistant to further metamorphism and alterations) and U-Pb zircon dating. Importantly, the project involves using a number of modern techniques, which previously have been not applied for reconstructions of early Paleozoic thermal event in Poland. These include trace element, Hf and O isotopes analyses in zircon, and a recent method of Pb isotopes analysis in feldspar inclusions in zircon, providing additional insights into constraints on the origin of primary magma. Complex application of numerous methods will allow us to verify divergent views and to significantly improve our knowledge on origin of bimodal group of crystalline rocks. Subsequently these will shed more light on the processes of rifting, breakup and drift of continents in Early Paleozoic.