Geophysical Research Abstracts
Vol. 16, EGU2014-14691, 2014
EGU General Assembly 2014

U-Pb Zircon Geochronology of Northern Metamorphic Massifs in the Biga Peninsula (NW Anatolia-Turkey): a new approach to the tectonostratigraphy of the region

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Metamorphic massifs of the Biga Peninsula can be divided into two approximately ENE-WSW-trending belts. It is believed that these two belts represent two different tectonic zones separated by a NE-trending Alpine ophiolitic suture. The Sakarya Zone lies to the S-SE of this Alpine suture, and consists of the Kazdağ metamorphic complex which is tectonically overlain by the Permo-Triassic Karakaya Complex. The metamorphic rocks, as an Alpine edifice located N-NW of the suture, have been assigned to the Rhodope and Serbo-Macedonian massifs of Bulgaria and Greece. The northern metamorphic belt is represented by the Karadağ massif in the west, which has been evaluated as a different unit from the others, the Karabiga massif in the east and the Çamlıca massif between them. All three massifs are mapped in detail in light of previous studies and LA–ICP–MS U-Pb zircon dating was applied to stratigraphically compare them. Contrary to previous studies; our data indicate that the basement metamorphic associations in these three areas show similar characteristics concerning their stratigraphical and lithological aspects and also spatial distribution of their outcrops. U–Pb LA–ICP–MS dating of zircons from the three individual metamorphic massifs yielded the following data: maximum sedimentation ages of the protolith of mica schists in the range of 559±17 to 582±30 Ma; crystallization age of the protolith of metavolcanic rocks of 577±20 Ma, and crystallization age of the protolith of eclogites at 565±9 Ma. These ages clearly show that the metamorphic units of the northern massifs are comparable to each other. Also the U-Pb zircon concordia diagrams from these three metamorphic massifs show remarkably similar patterns. In addition to the similar maximum sedimentation ages for all mica schists with crystallization ages of the protoliths of the metabasic rocks, there are two major complex tectono-thermal overprints (episodic lead loss events), at c. 330-300 Ma (Variscan ?) and c. 100-10 Ma (Alpine and late Alpine ?), respectively. Field mapping and analytical data indicate that the basement rocks of the northern massifs in the Biga Peninsula have a correlative Late Ediacaran to Early Cambrian stratigraphic range. In part, Permian strata unconformably overlie basement rocks in the Karadağ massif. Both tectono-thermal events are demonstrated by coeval episodic lead loss of many zircons in all samples from all areas. Finally; the results of this research do not support an Alpine suture between the two metamorphic belts of the Biga Peninsula. Therefore, the geological evolution of the region might require re-evaluation.

Key Words: U-Pb zircon dating, Ediacaran-Cambrian basement, Sakarya Zone, Biga Peninsula, Turkey.