Geophysical Research Abstracts
Vol. 19, EGU2017-509, 2017
EGU General Assembly 2017

Trace element composition of rutile in eclogite from the Karakaya Complex, NW Anatolia: Implications for rutile growth during subduction zone metamorphism

Fırat Şengün

Canakkale Onsekiz Mart University, Engineering Faculty, Department of Geology Engineering, Canakkale, Turkey (firatsengun@comu.edu.tr)

High-pressure/low-temperature (HP/LT) eclogite-facies terranes are widely regarded to represent exhumed fragments of subducted slabs. Therefore, the metamorphic studies of eclogites and associated high-pressure rocks yield crucial information about their P-T evolution and associated tectonometamorphic processes at depth in subduction zones. Especially rutile in eclogites record chemical history of subduction zones and also constrain metamorphic temperatures of subduction zone processes. Eclogites occur as a tectonic slice within metabasite-phyllite-marble intercalation of the Karakaya Complex. In this study, trace element geochemistry of rutiles and Zr-in-rutile thermometry have been investigated. The main mineralogical composition eclogites are composed of omphacite, garnet, glaucophane, epidote and quartz. Core-rim analyses through rutile grains yield remarkable trace element zoning with lower contents of Nb, Ta and Zr in the core than in the rim. The variations in Nb, Ta and Zr can be ascribed to the growth zoning rather than diffusion effect. The Nb/Ta and Zr/Hf ratios increase with a decrease in Ta and Hf contents, which could be ascribed to the effect of metamorphic dehydration at subduction zones on rutile Nb/Ta differentiation. The rutile grains from eclogites in the Karakaya Complex are characterized by subchondritic Nb/Ta and Zr/Hf ratios. It can be noted that the subchondritic Nb/Ta ratios may record rutile growth from local sinks of aqueous fluids from metamorphic dehydration.
The Zr contents of the all rutile grains vary between 81 and 160 ppm with the average of 123 ppm. The Zr-in-rutile thermometer yielded the metamorphic temperature of 559-604 oC (average 585 oC) for eclogites occurring in the Karakaya Complex. This average temperature suggests the peak growth temperature of rutile. Moreover, Zr contents and calculated temperatures in both inclusion rutile and matrix rutile from eclogites are identical to each other, which suggests that rutiles in eclogites experienced a similar metamorphic evolution.