EGU21-2025
https://doi.org/10.5194/egusphere-egu21-2025
EGU General Assembly 2021

Rodingitization of mafic and ultramafic rocks in ophiolites from Northern Greece, seen by non-traditional stable isotopes, such as Cu, Fe and Zn.

Nina Zaronikola[1], Vinciane Debaille[1], Aikaterini Rogkala[2], Petros Petrounias[2], Ryan Mathur[3], Panagiotis Pomonis[4], Konstantin Hatzipanagiotou[2], and Basilios Tsikouras[5]
[1]Universite Libre de Bruxelles, G-Time Laboratoire, Geosciences, Environment and Society, Belgium (nina.zaronikola@ulb.ac.be)
[2]Section of Earth Materials, Department of Geology, University of Patras, 265 04, Patras, Greece
[3]Juniata College, 1700 Moore Street, Huntingdon, Pennsylvania 16652, USA
[4]Department of Geology and Geoenvironment, National and Kapodistrian University of Athens, Athens, Greece
[5]Geosciences Programme, Faculty of Science, Universiti Brunei Darussalam, Jalan Tungku Link, BE1410, Bandar Seri Begawan, Brunei Darussalam

Rodingites are metasomatic rocks, frequently found in ophiolitic complexes. They offer important information about the interaction between ultramafic-mafic rocks and metasomatizing fluids, as well as about the post-magmatic evolution of ophiolitic suites (Tsikouras et al., 2009; Hu & Santosh, 2017; Surour, 2019; Laborda-Lopez et al., 2020). Metasomatism, such as rodingitization, is a very intricate process, which depends on the mineralogy of the initial rock, the nature of the metasomatic agent, the fluid/rock ratio, the duration of metasomatism and the chemical disequilibrium at the time of metasomatism between the host rock and the metasomatic medium (Poitrasson et al., 2013). Rodingites from the Veria-Naousa and Edessa ophiolites, in Northern Greece, were geochemically analyzed and characterized by substantial overprint of primary textures. Their field observation, their neoblastic mineral assemblages and metasomatic textures reveal that they derived from ultramafic and mafic protoliths. The mineral phases in the ultramafic derived rodingites (UDR) include mainly diopside, garnet, chlorite, epidote, tremolite and Fe-Ti oxides whereas mafic derived rodingites (MDR) consist of diopside, garnet, vesuvianite, chlorite, quartz, prehnite and actinolite. The studied rodingites present δ^{65}Cu values varying from -0.17‰ to 0.62‰ and for ultramafic and mafic parent-rocks from -0.49‰ to +0.50‰. The UDR and MDR from both ophiolites display δ^{66}Zn range from -0.06‰ to 0.74‰ and their photoliths present a narrower range from +0.04‰ to +0.41‰. Rodingitization affects in different way UDR and MDR samples. On one hand, Cu isotope ratios are systematically heavier in rodingites compared to their respective protoliths, except for one rodingite sample that requires confirmation due to large error bar. On the other hand, Zn isotopes show enrichment in light isotopes (group 1: comprising all UDR and some MDR samples), or in heavy isotopes (group 2, only MDR samples). Intriguingly, the same protolith can lead to both group 1 and 2 rodingites, as defined here. No mineralogical or geochemical trend can be found to understand the dual behavior of Zn stable isotopes during rodingitization so far. Fe isotopes do not show any significant fractionation of δ^{56}Fe, ranging from

+0.07‰ to +0.19‰ for the rodingites and from +0.12‰ to +0.23‰ for their protoliths, indicating that Fe isotopes are highly resistant to rodingitization. Our study shows that rodingitization enriches metasomatized samples in heavy Cu isotopes and has no impact on Fe isotopes. It remains unclear why Zn isotopes can be affected both ways.