

4th International Conference on

Oceanography & Marine Biology

July 18-19, 2016 Brisbane, Australia

The harrat al-birk basalts in southwest Saudi Arabia: A characteristic alkali mafic magmatism related to the red sea rifting

Rami A Bakhsh

Department of Mineral Resources and Rocks, Saudi Arabia

Harrat Al-Birk volcanics are products of Red Sea rift in southwest Saudi Arabia that started in the Tertiary and reached its climax ~5 Ma ago. This volcanic field is almost monotonous and is dominated by basalts that include mafic-ultramafic mantle xenoliths (gabbro, websterite and garnet-clinopyroxenite). The present work presents the first detailed petrographic and geochemical notes about the host basalts. They comprise vesicular basalt, porphyritic basalt and flow-textured basalt, in addition to red and black scoria. Geochemically, the volcanic rock varieties of the Harrat Al-Birk are highly metaluminous, low- to medium-Ti, sodic-alkaline olivine basalt with enriched oceanic island signature but extruded in a within-plate environment. There are evidences of formation by partial melting with a sort of crystal fractionation that is more likely dominated by clinopyroxene and Fe-Ti oxides. The latter are abundant titanomagnetite and lesser ilmenite. There is a remarkable enrichment of LREEs and depletion in their Ba, Th and K, Ta and Ti. Accordingly, the geochemical data materialized in this work suggest Harrat Al-Birk basalts represent products of water-saturated melt that is silica undersaturated as well. This melt was brought to the surface due to partial melting of asthenospheric upper mantle in the form of enriched oceanic island source. Such a source is evolved as a subducted continental mantle lithosphere with considerable mantle metasomatism of subducted oceanic lithosphere that might contain hydrous phases in their peridotites. The fractional crystallization process was controlled by significant separation of clinopyroxene followed by amphiboles and Fe-Ti oxides particularly ilmenite. Accordingly, the Harrat Al-Birk alkali practiced a significant history of crystal fractionation that is completely absent in the exotic mantle xenoliths in the host basalts (e.g. Nemeth et al., 2014).

Biography

I have completed my PhD at the age of 35 years from Royal Holloway, University of London. I participated in different international scientific field trips, published in several ISI journals, and most of my publications are in the field of geochemistry of the hard rocks. I used to be the head of the Rocks and Mineral Resources Department in the Faculty of Earth Sciences in King Abdulaziz University, Saudi Arabia, and currently I am the vice dean of the faculty.

rami_bk@yahoo.com

Notes: