Geophysical Research Abstracts
Vol. 15, EGU2013-13718, 2013
EGU General Assembly 2013

Preliminary observations and logs of BARB 1 and BARB 2: komatiites from the Tjakastad site

Grace Coetzee (1), Nicholas Arndt (2), and Allan Wilson (1)

(1) School of Geosciences, University of the Witwatersrand, Johannesburg, South Africa (allan.wilson@wits.ac.za), (2) ISTerre, Université Joseph Fourier, 38400 St Martin d'Hères, France (nicholas.arndt@ujf-grenoble.fr)

The BARB 1 and BARB 2 cores intersect a suite of komatiite flows and komatiitic basalts as well as fragmental rocks of the Komati Formation of the Onverwacht Group, Barberton Greenstone Belt. The cores give important and previously unattainable information on the structures, textures and contact relationships between individual komatiite flows and different lithological units within the flows.

BARB 1 was drilled at -48° on a 5° azimuth to a depth of 419.9 m. This core contains a unique volcanic tumulus succession in the stratigraphically lower 100 m and the rest of the core consists of about 59 flows of spinifex-textured komatiite (1-3 m thick), massive komatiite (0.5–10 m thick), komatiitic basalt (1-9 m thick) and a single basalt layer (10 m thick), intruded by gabbro (0.5-2 m thick) and a single dolerite dyke (18 m thick).

BARB 2, approximately 50 m from BARB 1 and parallel to it, was drilled at -45°on an 8° azimuth to a depth of 431.5 m. This core contains approximately 39 flows of komatiite (0.5–10 m thick) and komatiitic basalt (2-23 m thick) which contain possible selvages of pillows. Basalt flows are more numerous (0.3-4 m thick) in BARB 2 whilst gabbro (0.6-7 m thick) is less prevalent. The dolerite dyke observed in BARB 1 does not occur in BARB 2.

As the Barberton strata young towards the east, the cores intersected the stratigraphy in a reverse sequence. The cores were drilled such that there exists a 141 m overlap in stratigraphy between them. The section 141 m from the base of BARB 1 should theoretically correlate with the top 141 m of BARB 2. However, this overlap is not evident in the core or in the core logs. A single gabbro layer appears to be lithologically correlatable between both holes. There is no apparent correlation between the pattern of the komatiite flows leading to an initial conclusion that the komatiite flows were not laterally extensive or changed laterally in form over short distances. In both cores the proportion of komatiitic basalt appears to increase with depth. However, chemical analyses indicate that some of the units originally logged as komatiitic basalt are actually komatiite.

The rocks have all undergone alteration to serpentine, and in extreme cases are carbonated together with carbonate veins. Despite the alteration, the original spinifex and olivine cumulate textures, as a well as primary volcanic structures, including spectacular hyaloclastite in the cumulus unit, are well preserved. To date 140 samples have been analysed for major and trace elements and controls by olivine and possibly orthopyroxene have been demonstrated.