



Progress and Observations of the Tjakastad Core- Barberton ICDP

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

(1) School of Geosciences, University of the Witwatersrand, South Africa, (2) ISTERRE Université, Joseph Fourier 38400 St Martin d'Hères France

The Barberton International Continental Drilling Program (ICDP) has drilled and recovered cores from four sites in the Barberton greenstone belt in South Africa. The BARB 1 (417 m) and BARB 2 (431 m) cores are drilled through a section of the Komati formation. These cores are drilled at a 45° angle, 50 m apart, and have a 140 m stratigraphic overlap. The BARB 1 and BARB 2 cores contain discernible komatiite and komatiitic basalt flow units along with unique volcanic textures such as spinifex, hyaloclastite and harrisite. A tumulus feature is present within the top 100 m of the BARB 1 core.

The tumulus unit is 90 m thick and consists of a coarse-grained, basal olivine cumulate layer, a harrisite layer, a pyroxene spinifex layer and a hyaloclastite upper layer. Using major and trace element analyses together with petrological observations these layers are compared with komatiite flows (1-3 m thick) found in other parts of the core. The olivine cumulates from the tumulus layer are macrocrystic, ellipse shaped (2 cm in length) and contain a higher MgO content (45%) than the corresponding euhedral (0.5 mm) olivine cumulates of the komatiite flows which contain 34% MgO. Harrisitic texture forms by skeletal olivine megacrysts crystallizing upward from cumulate layers. The harrisite layer in the tumulus forms in the traditional fashion (above a cumulate layer) and is 14 m thick. It is similar in chemistry and texture to a unique harrisite layer (1.5 m thick) that has formed in a single komatiite flow. The harrisite in the tumulus has higher MgO content and larger skeletal olivines than the komatiite flow. The spinifex in the tumulus is predominantly pyroxene, whilst some flows contain olivine spinifex. The spinifex in the tumulus is commonly centimetres long and is light green grey in colour. The spinifex from the flows reaches a maximum of 5 cm in length; are green-grey to dark grey in colour and are often randomly oriented. The tumulus spinifex has 14-31% MgO whilst the spinifex in the flows has 25-32% MgO. The hyaloclastite, a quench fragmentation texture, in the tumulus section is analogous to the chill zones of the komatiite flows. It consists of fractured blocky fragments (30 cm in length) of lava, surrounded by a matrix of spherical particles of glass (0.5 mm to 1 cm) which have chill margins and inward cooling textures. It is important to determine which of these features is comparable to the chill margin of the flows and to establish if this glassy matrix material has been derived from a different source. The hyaloclastite comprises 24% volume of the tumulus, while chill margins comprise 15% volume. Comparing the chemistry and petrography of the tumulus to komatiite flows gives insight into processes occurring during tumulus formation.