Paper Number: 3560

Visiting the Shaka Ridge - a part of the Bouvet hotspot trail

Brekke, H.¹, Sandsta, N.R.¹, Minakov, A.², Tkacheva D.³, Vakueva O.³, Pedersen, R.B.⁴, Sushchevskaya N.⁵, Faleide, J.I.², Zarubin S.⁶, Alekseyev A.⁶, Nikitina D.⁶, Sand, M.¹, Leitchenkov, G.^{3,7}, Cherkashov G.^{3,7}

¹Norwegian Petroleum Directorate, Stavanger, Norway, <u>harald.brekke@npd.no</u>

²University of Oslo, Oslo, Norway
³VNIIOkeangeologia, St. Petersburg, Russia
⁴University of Bergen, Bergen, Norway
⁵Vernadsky Institute, Russian Academy of Science (GEOKHI RAS), Moscow, Russia
⁶GNINGI, St. Petersburg, Russia
⁷St. Petersburg State University, St. Petersburg, Russia

The volcanic Bouvet Island is located about 200 km east of the triple junction between the Mid-Atlantic, South American-Antarctic and South West Indian Ridges (MAR, SAAR and SWIR, respectively). The island surmounts the south-western part of the Bouvet hotspot trail, which may be traced back to eastern South Africa where it originated in Jurassic times [1]. In the Bouvet Island area, the hotspot trail is expressed as a distinct bathymetric anomaly that consists of a broad high ground in the south -west, on which the island is located, that merges north-eastwards with the Shaka Ridge. On a regional scale, the anomalous bathymetry is characterized by an axial mantle Bouguer gravity low implying a pronounced localized crustal thickening, which is also expressed by substantial residual mantle Bouguer anomaly [2]. The University of Oslo has analysed the currently available data on bathymetry, gravity and plate tectonic constraints on a more locale scale and derived a more detailed crustal model for the Bouvet Island-Shaka Ridge part of the hotspot trail, demonstrating a crustal thickness of 8 – 12 km and a residual topography of more than 1500 meters. Available geochemical trace element data show that the crust of the south-western part of the bathymetric anomaly, including the island, is built of ocean island alkaline magmatic rocks of hawaiite – trachyte – comendite series typical of hot spot magmatism [3] [4]. Preliminary petrographic results from rock samples acquired from the Shaka Ridge indicate the same magmatic character for the crust of the Shaka Ridge [5].

In March 2016, an expedition by RV Akademik Fedorov funded by the Norwegian Petroleum Directorate will acquire further rock samples and bathymetric data in the area. The expedition will concentrate on the Shaka Ridge and its continuity with the Bouvet Island. The rock samples will be subject to petrographic and geochemical analysis and, if possible, age dating. The new data are aimed at giving better knowledge about the crustal evolution of the hot spot trail and better constraints to models of its evolution through space and time. Results from the data acquisition and sample analyses will be presented, together with preliminary considerations of their implications for the plate tectonic reconstructions and hotspot evolution of the area.

References:

- [1] O'Connor J M et al. (2012) Nature Geoscience 5: 735 738
- [2] Georgen J E et al. (2001) EPSL 187: 283 300
- [3] Prestvik Tet al. (1999) NJG 79 (4): 205 218
- [4] Simonov V A et al. (2000) Petrologia 8 (1): 43 58
- [5] Lin J et al. (2001) AGU Fall Meeting, abtstract #T31D-10