

## NUNATAKS OF THE VAHSEL BAY, WEDDELL SEA, ANTARCTICA

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A number of rock outcrops of varying dimension crop out within the Polar Ice cap at the head of the Vahsel Bay, Weddell Sea, Antarctica. Two of these clusters namely Littlewood and Bertrab Nunataks, are exposed at the head and along the western wall of the valley into which the confluent Schweltar, Larchenfeld and Penck glaciers debouch. Third group - Moltke Nunataks - are exposed from within the ice front west of the valley.

Littlewood Nunatak, first reported by Behrendt (1966) were on examination found to be comprising dark brown Rhyolites which under the microscope show porphyritic texture with fragmental appearance. The ground mass is devitrified showing more than one colour components. Fine grained cognate fragments of rhyolite material is seen caught up within the ground mass along with phenocrysts. The rock is significantly poor in mafic minerals.

Bertrab Nunataks, on the other hand, as revealed by microscope study, chemical analysis along with the CIPW norm, show a broad spectrum having both acid and basic composition and are represented by granite granophyre, rhyolites, epidiorites, basalts and intrusive dolorites. Granophyre and rhyolites show a similar major element chemistry with same spatial distribution and equal degree of metamorphism indicating their common genetic parentage. Granophyre, however, shows higher abundance for Ba and Sr.

The major oxides of the acid and volcanic rocks of Littlewood and Bertrab are peraluminous and they are all corundum-normative while the

basic rocks of the Bertrab are hypersthene-quartz normative. Acid and basic phases have indicated two distinct geochemical domains. The basic and acidic rocks from the Bertrab and Littlewood Nunataks show good REE fraction trends and the fractionated nature of the source is also confirmed by  $\text{CaN}/\text{Yb}_N$  ratios. REE distribution in the basic volcanics from Bertrab differs from that of the acid volcanics with REE, low  $\text{Ca}_N/\text{Yb}_N$  and low REE/HREE ratios. The major and minor REE abundances and the mineralogical similarities in the two Nunataks show their common mode and source of origin.

The eastern outcrops of the Moltke Nunataks on examination was found to comprise limestone interbedded with lithic arkosic rock. Limestone is slightly metamorphosed but retains its sedimentary character, and in composition show CaO varying from 29% to 44%,  $\text{SiO}_2$  varies from 42% to 16%. Trace element abundances in both the varieties of rocks are more or less comparable to lithic arkose. Extremely higher abundance of arkose would indicate granitic rock provenance.

Nunataks of the Vahsel Bay thus expose an interesting geological section of Proterozoic age. Acidic variants, rhyolites of Littlewood as well as that of Bertrab show strikingly similar major element chemistry and the geochemical attributes are similar to those of continental rhyolites rather than of an oceanic environment Presence of igneous rock of both deep seated and shallow nature in Bertrab as indicated by mineral and chemical composition viz. granite granophyre - plagiogranites - and rhyolites associated with the diorites, basalts and intrusive dolerites i.e. an acid and basic magmatic phase activity is indicative of active margins. On the other hand, limestone and particularly the presence of epiclastic quartz and plagioclase grain in arkose would indicate a deposition in a shallow water environment probably in the low energy areas of the shallow shelf areas.

Nunataks which were hitherto thought to be an extension of one body, buried under thick ice cover, may in fact belong to different stratigraphic levels of upper Proterozoic age exposed as uplifted fault blocks along the eroded undulating coastal front.