Basaltic volcanism in NE-Russia; Evidence for metasomatized depleted mantle underneath Bering Sea Basalt Province

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Small volcanic fields, which are diffuse and widespread in the Bering Sea and in NE-Russia and Alaska define the Bering Sea Basalt Province (BSBP). The Late Neogene Enmelen volcanoes on Chukotka Peninsula, NE-Russia, belong to the BSBP and consist of nephelinites, olivine-melanephelintes and basanites that are relatively MgO-rich with average 1ooxMg# 58, 65 and 64, respectively. The nephelinites have the highest total alkalis (7.5 wt.%) and basanites the lowest (5 wt.%). The high concentrations of REE in the lavas indicate that they have been formed after low degrees of partial melting, whereas the high $(Dy/Yb)_N$ ratios (1.9-2.6) suggest melting in the garnet peridotite field, leaving garnet in the residue.

While the nephelinites have Ba/Ce ratio that vary around the Primitive Mantle value of 4.5, the olivine melanephelinites and basanites have considerably higher ratios ranging from 9 and 10 that point to LILE enrichments in their source.

Radiogenic Sr, Nd, Hf and Pb isotopic ratios aproach MORB-values, with $^{87}Sr/^{86}Sr$ ranging from 0.703094 to 0.703225, $^{143}Nd/^{144}Nd$ from 0.512990 to 0.513031, $^{176}Hf/^{177}Hf$ from 0.283069 to 0.2830907 and $^{208}Pb/^{204}Pb$ vs. $^{206}Pb/^{204}Pb$ values that lie on the NHRL line within the MORB field. Calculated melt segregation T and P vary around 1400 °C and 3.5 GPa respectivevely. For the estimated 0.15 % melt fraction, a Tp of 1450 °C can be inferred precluding any plume activity beneath BSBP. Similar geochemical characteristics have been described for the Pribilof Island, Alaska [1] suggesting that lavas along the BSBP reflect common petrogenetic conditions. Lithospheric extention with addition of LILE-rich fluids to the source could account for the magma generation.

The elevated LILE and high LREE/HREE all support an enriched source, while the radiogenic isotope ratios suggest recent enrichment of a long lived depleted source by fluids from the depleted upper mantle.

[1] Chang *et al*. (2009) *J. Petrol* **50**, 2249–2286.

The Barbados Cloud Observatory: Controls on precipitating shallow cumulus convection

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Shallow cumulus clouds are ubiquitous over the subtropical oceans in regions called the "trades", after the steady surface winds that once made foreign commerce flourish. These clouds help regulate the transport of moisture and heat between the ocean and the free troposphere and are therefore crucial to the climate system. Their small footprint and limited vertical extent, however, make it challenging to observe them from space or to simulate them accurately in coarse resolution models. Important questions regarding the statistical properties of trade-wind cumuli and what controls their aggregate behavior are therefore still left unanswered.

The cloud observatory on Barbados, an island exposed to the relatively undisturbed trade winds, is a collaborative initiative of the Max-Planck Institute for Meteorology and the Caribbean Institute for Meteorology and Hydrology, and strives to improve our understanding of the interplay between clouds, precipitation, the aerosol and large-scale meteorology. The instrument platform includes a scanning cloud radar and microwave radiometer, as well as a vertically-pointing Raman lidar, water vapor lidar, micro-rain radar and ceilometer, and is operational since April 2010 for a duration of at least three years.

We shall present one year of data from the observatory to indicate the large variability present in cloudiness, even within this meteorological regime (the undisturbed trades). Relationships between cloudiness and rainfall are explored in comparison with the humidity structure derived from Raman lidar water vapor profiles. The presence of features such as a well-defined inversion height and a transition layer near cloud base, and the extent to which they regulate convection, is discussed.