Influence of sub-volcanic crust and crust-mantle boundary on magma genesis, Egmont/Taranaki volcano, New Zealand

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The record of xenoliths from subduction zone magmas is not comprehensive with most examples of xenoliths in subduction volcanics coming from the western Pacific. These xenoliths are interpreted as predominantly cognate and supracrustal in origin. We suggest that remnants of sub-volcanic stratigraphy are also frequently preserved in arc basaltic andesite to andesite rocks, but in a more cryptic way than in intraplate alkaline basalts. Because the lower crust/upper mantle zone that interacts with arc magmas (the "hot zone" [1]) appears to be generally hotter and to contain a greater melt fraction than that encountered by alkaline basalts, the lower crustal lithologies are more easily disaggregated and recorded predominantly as either single crystals (xenocryst/antecryst), glomerocrysts or xenoliths. At Egmont, xenoliths also contain glass of rhyolitic to trachyitic compositions with up to 6 % K_2O, that represents partial melts of the sub-volcanic lower crust. We suggest that the andesite magma compositions erupted form by mixing with lower crustal restites. Decadal to century timescale [2] cycles of eruption are driven by recharge events in both the sub-crustal hot zone (major cycles) and mid to upper crustal recharge (2nd order cyclicity), which is shown by titanomagnetite compositions and zoning of plagioclase, amphibole and clinopyroxene phenocrysts/antecrysts. Importantly, these cycles correspond with the overall eruption frequency for this volcano [3].

[1] Annen, *et al.* (2006) *J Petrol* **47**, 505-539, [2] Turner *et al.* (2008a) *J Volcanol Geotherm Res* **177**, 1063-1076, [3] Turner *et al.* (2008b) *Geology* **36**, 31-34.

Hafnium and neodymium isotope composition of filtered particles from the Drake Passage

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Radiogenic hafnium (Hf) and neodymium (Nd) isotopes have been used as tracers for past continental weathering regimes and ocean circulation. To date, however, there are only very few data available on dissolved Hf isotope compositions in present-day seawater and there is a complete lack of particulate data. During expedition ANTXXIV/3 (February to April 2008) we collected 23 particulate samples by *in situ* pumping and 17 large volume samples for combined Hf/Nd isotope analysis of the particulate and dissolved fractions in the Drake Passage. The particulate samples (> 8 μm), which are the result of filtrations of 270–1500 liters of water, were separated from the filters, completely dissolved, and purified for Nd and Hf isotope determination by TIMS and MC-ICPMS, respectively.

The Hf isotope composition of the particulate fraction in the Drake Passage ranged from 0 to -27 εHf and is thus similar to that observed in core top sediments from the Southern Ocean in a previous study. The most unradiogenic and isotopically homogenous Hf isotope compositions in this study were found at the stations near the Antarctic peninsula. Two other stations further north, which are separated by the Polar Front, show a large variation in εHf between 0 and -23 within the water column and between the stations. Although the Hf isotope compositions are in the same range as the surface sediments, the analyzed stations are located far away from the supposed source areas. Nd, in contrast, was nearly absent throughout the entire sample set and the only measurable εNd data ranged from 0 to -6 closest to the Antarctic peninsula, which is in good agreement with the sediment data in that area.

These patterns in Hf isotopes and the nearly complete absence of Nd indicates that the particulate fraction does not contain a lot of terrigeneous material but is almost entirely dominated by biogenic opal. Our data therefore suggest a high scavenging efficiency of dissolved Hf onto opal, which is not observed for Nd. These results imply that the Southern Ocean is an efficient sink for dissolved Hf, which most likely results in a very short residence of Hf in the Southern Ocean.