Oxygen uptake during marine diagenesis of fresh volcanic material

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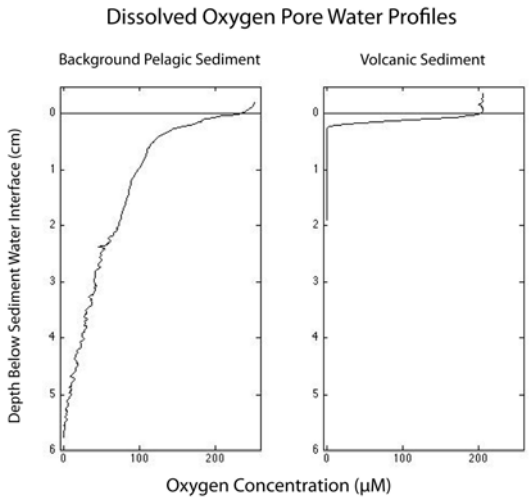
Arc volcanism generally occurs in close proximity to the oceans. In such cases, >90% of erupted volcanic material may be deposited in the ocean by various means. Biogeochemical effects of volcanic ash in surface seawater have previously been addressed, but the majority of submarine volcanic deposits are delivered directly to the sea floor. These rapidly emplaced deposits of fresh volcanic material can blanket many km^2 of seafloor. Little is known of the early diagenesis of this material, but it is likely to have a significant regional biogeochemical effect. The ongoing eruption of Montserrat, Lesser Antilles, provides an excellent case study for these processes. Microelectrode profiles taken in cores from close to the island show dissolved oxygen penetration depths ranging from <0.3cm in freshly deposited volcanic sediments to 5.6cm in background carbonate pelagic sediment (figure, below). We present these and other geochemical data from sediments and pore waters and demonstrate that oxygen consumption is not due to organic carbon oxidation, but most likely occurs by oxidation of Fe(II). The magnitude of oxygen consumption by volcanic material may be significant for atmosphere-ocean oxygen cycling, during susceptible periods in Earth's history and in enclosed basins.



Indian ridges, hotspots, interaction: Réunion central Indian ridge and Amstersdam St Paul Southeast Indian ridge cases

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Recent samples from the R. Revelle RR11Knox (2007) have allowed us to complete the study by Nauret *et al*. (2006) based on the GIMNAUT cruise samples (2000) of the interaction area between the Reunion plume and the Central Indian Ridge. New Helium data support the suggestion of Nauret *et al*. of a flux of ^{3}He enriched material through the off axis ridges Three Magi and Gasitao toward the southern end of the concerned segment of the CIR. Pb, Sr and Nd isotopes establish that this material derives from the Reunion plume and which must travel from the present position of it until the spreading axis. Witnesses of this transfer are the off axis ridges produced by melting of the underlying mantle through tension cracks in the lithosphere.

The cruise Pluriel (2006) on the St Paul-Amsterdam plateau has completed the cruise Boomerang 6 (1996) in investigating the off axis volcanism of the eponym plateau whereas the spreading axis was investigated by Nicolaysen *et al*. 2008. New radiogenic isotope data establish a link between the seamount chain, the plateau and the islands. Subtle changes in composition are due to the two stages construction process of the plateau and seamounts. Some of them, highly alkaline, derive from lithospheric melting during a late phase of off axis magmatism on the Australian plate.