

Sediments in the Peruvian upwelling region: Organic matter composition and sulfate reduction rates

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The sediments in the Peruvian upwelling region reflect the high productivity in the surface waters. During RV SONNE cruise 147 in June 2000 several sediment cores underlying bottom waters with varying oxygen contents were sampled.

Exceptionally high concentrations of organic carbon (up to 17%) were found in sediments from the center of the oxygen minimum zone. Highest sulfate reduction rates (SRR) however, were measured in shallower waters. In general SRR show a correlation with water depth rather than with organic carbon concentrations and appear to depend on the quality of the organic matter. We analysed the sediments for selected compound classes of the labile fraction, mainly lipids, chlorins, and amino sugars to assess the freshness of the organic material and to get information on its origin.

Lipid compositions, $\delta^{13}\text{C}$ -values and C/N-ratios indicate a predominating marine source of the organic material. Chlorin concentrations and the Chlorin-Index (a parameter assessing the freshness of phytodetritus) can in part explain the distribution of SRR. Amino sugars comprise an important part of the labile fraction of organic matter in marine sediments. Muramic acid derives exclusively from bacterial cell walls and may therefore provide a measure of bacterially derived organic matter. We compared the amino sugar composition of sediments deposited under different oxygen conditions at the sediment surface and in the overlying water column.

Petrology of parental melts of Sao Miguel and Pico, Azores islands: Magmatic inclusions study

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The Azores volcanic chain is frequently attributed to melting of an underlying hotspot. We have made a melt inclusion study of two islands in the Azores, Sao Miguel and Pico to investigate the compositions, origin and evolution conditions of their parental melts.

There are significant major element differences between lavas of Sao Miguel and Pico. At the same MgO, Sao Miguel lavas are richer in TiO_2 , FeO^* , MnO , K_2O , Ca/Al and poorer in SiO_2 , Al_2O_3 , Na_2O relative to Pico. These differences are possibly compatible with different degrees of melting, the involvement of different sources or melting conditions beneath the two islands. To address these questions we present preliminary data of mineralogy and parental melt petrology for Sao Miguel and Pico islands lavas.

Crystallisation temperatures and melt compositions determined from homogenisation and quenching experiments of melt inclusions in olivine phenocrysts Fo 89.5-77 for Sao Miguel and Fo 86-74 for Pico range from 1330° to 1125°C (MgO=15-5wt. %) and from 1230° to 1100°C (MgO=8.5 - 3.5 wt. %), respectively. In contrast to Sao Miguel, observed decreasing CaO in olivine and melt, and decreasing Cr# in spinel imply clinopyroxene as dominant liquidus phase during early crystallization of Pico parental melt (<Fo 86). Also, crystallisation of Pico melt occurred under more oxidised condition (+0.5 NNO) compare the Sao Miguel melt (QFM-NNO). Parental melt compositions of Sao Miguel and Pico demonstrate the same difference observable from lava compositions. Modeling shows that cooler and more differentiated parental melt of Pico could not result from olivine or clinopyroxene crystallisation from Sao Miguel parental melts. This suggests that differences in source compositions beneath the islands, not greatly evident in isotopic compositions, strongly influence the composition of melts produced.

"Primary" melts of Sao Miguel and Pico (equilibrium with Fo_{90}) were used to estimate the minimum pressure of the last equilibrium of these melts with peridotite mantle source. The pressure of primary magmas origin ranging from 25 to 32 kbar for Sao Miguel and from 18 to 22 kbar for Pico. Temperature of primary melts segregation under these pressures are 1430+/-50°C for Sao Miguel and 1360+/-20°C for Pico.