Chemical analysis of Saharan dust in marine aerosols

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The interaction between the ocean and the atmosphere is very important in understanding various factors that control the global climate. Amongst others, mineral dust deposition onto the oceans plays a vital role. Understanding the influence of mineral dust onto the ocean requires adequate information about its chemical composition.

The chemical composition of marine aerosols at the Cape Verde Atmospheric Observatory has been analyzed. The data were collected during six intensive field campaigns and continuous measurements from January 2007 until date. For the collection of samples, a high volume DIGITEL DHA-80 sampler (PM_{10}-inlet) was routinely operated throughout the year in a 72 h- sampling period collecting particles on 150 mm quartz fiber filters. In addition, a five-stage BERNER impactor with a PM_{10} cutoff (0.05-10 μm size range) was used to collect size-resolved samples. The samples were analyzed for ions, OC/EC and trace metals.

Our observations show both Saharan dust and marine influenced air masses. Air masses with Saharan dust storms contained significant amounts trace metals and organic carbon compared to marine air masses. Dust events were observed mostly during the winter months of the year. During the events, the contribution of sea salt to the total PM_{10} mass was found to be low. The sea salt and Saharan dust in the particle were found in the coarse mode fractions while the organics and non sea salt components were observed mostly in the submicron fraction.

Significant differences were observed in the trace metal composition (especially iron) between days of Saharan dust outbreak (about 4.2 Fe, 3.4 Ca, 0.3 Ti, and 0.1 Mn $\mu g/m^3$) and days without (less than 1.0 ng/m^3), confirming that the Sahara desert is an important source of trace minerals in this region of the tropical Northern Atlantic. Typically, ions contributed about 55 % to the PM_{10} mass but decreased to a minimum of about 7% during dust episodes. OC and EC were found in very low concentrations except during dust events where the concentration increase by about a factor of five due to the influence of air masses from the African continent.

Timescale of quartzarenite xenoliths assimilation by trachybasaltic melt: Case of 2001 Etna eruption

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Lavas of Etna 2001 eruption contain abudant quartzarenite xenoliths.

According to [1] and [2] we can suppose, that xenolith's source is located between 0 and 3 km b.s.l. Seismic data and direct observation [3] give us 12-19 days for magma to go through this layer and to stream out of vent. Reaction rims between xenolithes and host rock have width up to 300-500 μm, which give us time of interaction as 12-19 days ([4],[5]).

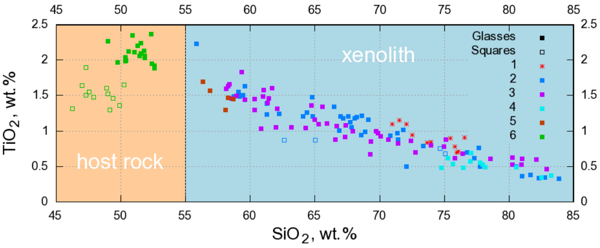

Figure 1: TiO_2 content in xenolithes (1 – inner parts; 2 – cracks in xenolith's surface with host rock groundmass penetration; 3 –near edge; 4 – near neogenic quartz dendrites) and host rock (5 - mingled zone near xenolith; 6 – outside xenolith). Filled squares for glass, open squares for square analyses.

A sample plot for compositions of glasses and whole-rock squares inside and outside xenoliths is presented on Fig.1. Analyses for host rock give us single clouds of compositions for all elements. We suppose, that 0-200 μm mingled zone is insignificant. In xenoliths we estimated good linear mixing trend. Sharp border between two mediums give us significant gap in SiO_2 content.

We conclude, that influence of assimilation on melt composition is insignificant in comparison with crystal differentiation.

[1] Cristofolini *et al.* (1979) *Boll. Soc. Geol. Ital.* **98**, 239-247. [2] Bonforte *et al.* (2009) *Tectonophys.* **471**, 78-86. [3] Viccaro *et al.* (2008) *Per. Min.* **77**, 21-42. [4] Donaldson (1985) *MinMag* **49**, 683-693. [5] Watson (1982) *Cont. Min. Petr.* **80**, 73-87.