Atmospheric Sciences (A) SESSION:

A42. Impacts of Mineral Dust Aerosol on Global and Regional Climate

TITLE:

Characterization of Saharan Dust in Marine Aerosol at Cape Verde Island São Vicente

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INDEX TERMS:

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ABSTRACT BODY:

The chemical composition of marine aerosols at the Cape Verde Atmospheric Observatory has been analyzed. This was performed through six intensive field campaigns and continuous measurements from January 2007 until now. 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 that air masses from the African continent usually accompany Saharan dust storms and contained significant amounts trace metals and organic carbon. 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.

Iron and calcium showed good correlation with the total particulate mass especially during dust events. 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 µg/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.

Saharan dust is a main source of mineral nutrient input to the northern tropical Atlantic Ocean with dust deposition of about 20-100 g m^{-2} per year. The deposition of particulate matter on the ocean surface, affects its chemistry and thus the oceanic ecosystem therefore influencing the global carbon cycle. In order to assess the role mineral dust plays in marine biota, it is important to characterize and quantify its content. Islands provide ideal locations for carrying out sampling of dust particles prior to deposition since due to their proximity, a good insight into the composition of the aerosol particles deposited onto the ocean can be obtained.

Thus our measurements revealed significant concentrations of particulate matter during winder periods with minimal near greound conc. During the summer months, During periods of high dust concentrations the majority of the particulate matter came from the sahara desert with a high composition of crustal metal being detected. As shown on figure 5 a linear correlation between the measured iron content and the total PM10 mass shows a good relation showing that the sourve of these material have similar origin. A similar correlation was found for other metals including ca and Ti.