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Aerosol physical properties and their impact on climate change processes

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Characterizing aerosols involves the specification of not only their spatial and temporal distributions but their multi-component composition, particle size distribution and physical properties as well. Due to their light attenuation and scattering properties, aerosols influence radiance measured by satellite for ocean color remote sensing.

Studies of marine aerosol production and transport are important for many earth sciences such as cloud physics, atmospheric optics, environmental pollution studies, and interaction between ocean and atmosphere. It was one of the reasons for the growth in the number of research programs dealing with marine aerosols.

Sea salt aerosols are among the most abundant components of the atmospheric aerosol, and thus it exerts a strong influence on radiation, cloud formation, meteorology and chemistry of the marine atmosphere. An accurate understanding and description of these mechanisms is crucial to modeling climate and climate change.

This work provides information on combined aerosol studies made with lidars and sun photometers on-board the ship and in different coastal areas. We concentrate on aerosol optical thickness and its variations with aerosol advections into the study area. We pay special attention to the problem of proper data collection and analyses techniques.

We showed that in order to detect the dynamics of potential aerosol composition changes it is necessary to use data from different stations where measurements are made using the same techniques. The combination of such information with air mass back-trajectories and data collected at stations located on the route of air masses provides comprehensive picture of aerosol variations in the study area both vertically and horizontally.

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