5.024 Size-resolved source apportionment of particulate matter in the South China Sea/West Philippine Sea during the 2011 Vasco Cruise.

Early Career Scientist

Presenting Author:
Miguel Ricardo HILARIO, Department of Physics, Ateneo de Manila University, Quezon City, Philippines, miguel.hilario@obf.ateneo.edu

Co-Authors:
Melliza CRUZ, Manila Observatory, Ateneo de Manila University campus, Quezon City, Philippines
Maria Obiminda CAMBALIZA, Manila Observatory, Ateneo de Manila University campus, Quezon City, Philippines
Jeffrey REID, Marine Meteorology Division, Naval Research Laboratory, Monterey, CA, USA
James SIMPAS, Manila Observatory, Ateneo de Manila University campus, Quezon City, Philippines
Nofel LAGROSAS, Manila Observatory, Ateneo de Manila University campus, Quezon City, Philippines
Sherdon UY, Manila Observatory, Ateneo de Manila University campus, Quezon City, Philippines

Abstract:

The South China Sea/West Philippine Sea (SCS/WPS) is a receptor of various natural and anthropogenic aerosol species. In combination with its archipelagic/peninsular terrain and strong Asian monsoon climate, the SCS/WPS hosts one of the most complex aerosol-meteorological systems in the world. However, aside from the well-known biomass burning emissions from Indonesia and Borneo, the current understanding of aerosol sources is limited. In September 2011, a 2-week research cruise was conducted near Palawan, Philippines. Size-segregated aerosol data was collected using a Davis Rotating-drum Uniform size-cut Monitor sampler and analyzed for concentrations of 28 selected elements. Positive Matrix Factorization (PMF) was performed separately on the coarse, fine and ultrafine size ranges to determine possible sources and their contributions to the total particulate matter mass. Additionally, size distribution plots, time series plots, back trajectories and satellite data were used in interpreting factors. Using tracers of various sources, a linear regression analysis of key species showed the presence of biomass burning, oil combustion, sea spray and soil dust. For comparison, the PMF analysis resolved five sources across the three size ranges: biomass burning, oil combustion, soil dust, a crustal source/sea spray and a background factor largely composed of heavy metals. The agreement between the PMF analysis and the linear regression shows the robustness of the factors. In both analyses, anthropogenic and biomass burning sources were identified solely in the ultrafine and fine size ranges while biogenic sources such as

soil dust were found in the coarse and fine ranges. While biomass burning is indeed a key source of aerosol, the study shows the presence of other important sources in the SCS/WPS. Understanding these sources is key to characterizing the chemical profile of the SCS/WPS and, by extension, developing our understanding of aerosol-cloud behavior in the region.