LONG-TERM AEROSOL CLIMATE DATA RECORDS FROM MODIS AND SEAWIFS OVER LAND AND OCEAN

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The impact of natural and anthropogenic sources of air pollution has gained increasing attention from scientific communities in recent years. Indeed, tropospheric aerosols not only perturb radiative energy balance by interacting with solar and terrestrial radiation, but also by changing cloud properties and lifetime. Furthermore, these anthropogenic and natural air pollutants, once generated over the source regions, can be transported out of the boundary layer into the free troposphere and can travel thousands of kilometers across the oceans resulting in important biogeochemical impacts on the ecosystem. Due to the relatively short lifetime (a few hours to about a week), the distributions of these airborne particles vary extensively in both space and time. Consequently, satellite observations are needed over both source and sink regions for continuous temporal and spatial sampling of dust properties.

With the launch of SeaWiFS in 1997, Terra/ MODIS in 1999, and Aqua/ MODIS in 2002, high quality comprehensive aerosol climatology is becoming feasible for the first time. As a result of these unprecedented data records, studies of the radiative and biogeochemical effects due to tropospheric aerosols are now possible. In this talk, we will demonstrate how this newly available MODIS/ SeaWiFS aerosol climatology can be useful in reducing the uncertainty of estimated climate forcing due to aerosols. We will start with the global distribution of aerosol loading and their variabilities over both land and ocean on short- and long-term temporal scales observed over the last decade. The recent progress on improving accuracy of these MODIS/ SeaWiFS aerosol products in particular over land will be discussed. The impacts on quantifying physical and optical processes of aerosols over source regions of adding the Deep Blue products of aerosol properties over bright-reflecting surfaces into MODIS/ SeaWiFS data suite will also be addressed.

We will show the validation results of MODIS/ SeaWiFS retrieved aerosol optical thickness (AOT) using data from AERONET sunphotometers over land and ocean. The comparisons in the retrieved MODIS AOT values between the Dark Target and Deep Blue approaches will also be investigated in the overlapping regions, as part of the ongoing efforts to achieve a merge dataset between these two. These new satellite products will allow scientists to determine quantitatively the aerosol properties near sources using high spatial resolution measurements from SeaWiFS and MODIS-like instruments. The multiyear satellite measurements since 1997 from SeaWiFS will be utilized to investigate the interannual variability of source, pathway, and dust loading associated with these dust out-

breaks. The monthly averaged aerosol optical thickness from SeaWiFS will also be compared with the MODIS Deep Blue products. Finally, the trends observed over the last decade based upon the combined MODIS/ SeaWiFS time series in the amounts of tropospheric aerosols due to natural and anthropogenic sources (such as changes in the frequency of dust storms and/ or emissions of air pollutants from developing countries) will be discussed.

References:

AERONET: AErosol **RO**botic **NET**work, http://aeronet.gsfc.nasa.gov/