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RECENT PROGRESS ON DEEP BLUE AEROSOL ALGORITHM AS APPLIED TO MODIS, SEAWIFS, AND VIIRS, AND THEIR INTERCOMPARISONS WITH GROUND BASED AND OTHER SATELLITE MEASUREMENTS

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The impact of natural and anthropogenic sources of aerosols 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 particles, 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 oceans and continents resulting in important biogeochemical impacts on the ecosystem. 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 SeaWiFS/MODIS aerosol climatology can provide an important piece of puzzles in reducing the uncertainty of estimated climatic 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 made in Deep Blue aerosol algorithm on improving accuracy of these SeaWiFS/MODIS 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 SeaWiFS/MODIS as well as VIIRS data suite will also be addressed.

We will also show the intercomparison results of SeaWiFS/MODIS retrieved aerosol optical thickness with data from ground based AERONET sunphotometers over land and ocean as well as with other satellite measurements. The trends observed in global aerosol loadings of both natural and anthropogenic sources based upon more than a decade of combined MODIS/SeaWiFS data (1997-2011) will be discussed. We will also address the importance of various key issues such as differences in spatial-temporal sampling rates and observation time between different satellite measurements could potentially impact these intercomparisons results, especially for using the monthly mean data, and thus on estimates of long-term aerosol trends.