Monitoring aerosols from space: What we can say, and what we can't

R.A. Kahn, NASA Goddard Space Flight Center, Greenbelt MD 20771;
e-mail: ralph.kahn@nasa.gov

Aerosols are understood to play a significant role is the global energy balance, and especially on atmospheric as well as surface energy balances regionally. A combination of direct radiative cooling of the surface, atmospheric warming through diabatic heating, and indirect effects of aerosol on clouds are all thought to contribute to the net aerosol effect, though the magnitudes of each are both highly variable in space and time, and highly uncertain. Passive space-based remote sensing is a key tool for constraining these effects, due to the frequent, global coverage satellites can provide. However, information from such observations about total-column aerosol amount (i.e., aerosol optical depth or AOD), and especially about aerosol type, is limited.

The current generation of passive aerosol remote-sensing instruments, including the Multi-angle Imaging SpectroRadiometer (MISR) and the MODerate resolution Imaging Spectroradiometer (MODIS) offer vast improvements over previous instruments, including AOD over water and much of the land surface, fine vs. coarse particle type over ocean from MODIS, and discrimination of about a dozen aerosol types from MISR under good retrieval conditions, based on particle size, shape, and single-scattering albedo (SSA) constraints. This presentation will summarize the capabilities and expected improvements in the currently available aerosol products, in light of required energy budget constraints. Ways of addressing the need for detailed information about particle microphysical properties, especially SSA, unobtainable from MISR or MODIS, will be discussed.