

Aerosol remote sensing: Key measurements for climate change

LORRAINE A. REMER¹, ROBERT C. LEVY² AND
J. VANDERLEI MARTINS¹

¹JCET-University of Maryland Baltimore County, USA.
remer@umbc.edu

²NASA Goddard Space Flight Center, Greenbelt MD USA.
Robert.c.levy@nasa.gov

Aerosol remote sensing from satellites offers insight into the global aerosol system like no other existing observational tool. Fifteen years ago, with the launch of Terra, a quantitative data set of global aerosol properties was produced for the first time using the observations from the MODIS and MISR sensors. The community has come to depend on the availability of these data, and yet the sensors and the satellites they ride upon are now operating way beyond their life expectancy. Soon we must anticipate the end of the MODIS and MISR era.

The VIIRS sensor launched on the Suomi-NPP satellite in 2011 offers a similar configuration as MODIS and is the likely candidate to continue the MODIS aerosol data record. Currently an aerosol product consisting of the spectral aerosol optical depth (AOD) over land and ocean and size parameter over ocean (Angstrom Exponent) is produced and archived by NOAA. The product has been validated against AERONET observations and compared with MODIS. The product is meeting and exceeding its expectations. Even though both the MODIS and VIIRS aerosol products are “validated”, they do not produce exactly the same results. We have gone through an exercise applying a MODIS-like algorithm to the VIIRS-measured radiances in order to isolate whether the differences are due to instrument differences or algorithmic differences. The answer is, both.

Even if VIIRS might be able to continue the MODIS aerosol record, it is a single-look imager with no multi-angle capability. Thus, it will not be able to provide the more detailed aerosol characterization available from MISR. To provide the particle properties that will be essential to push aerosol and climate science forward, we will need new technology in space. The Hyperangle Aerosol Rainbow Polarimeter (HARP) is a technology demonstration on a 3U Cubesat to be launched in 2016. It will provide unprecedented observations of aerosols and clouds and is a vanguard of the type of aerosol remote sensing we should expect in the future.