Geophysical Research Abstracts
Vol. 13, EGU2011-457, 2011
EGU General Assembly 2011

Ten-Year Aerosol Optical Mapping from Remotely-Sensed Data over Land Surface in China

Yong Xue (1,2), Hui Xu (1), and Linlu Mei (1)

(1) Chinese Academy of Sciences, Beijing, China (yx9@hotmail.com), (2) London Metropolitan University, London, United Kingdom (yx9uk@yahoo.com)

Aerosols affect our environment at the local, regional, and global levels. It is very important that we are able to build up a complete picture of aerosols across the globe, so that we may understand how they vary in both time and space. It is even more important, however, that such observations be on-going, so we may monitor any build-ups which may be occurring. After all, since our present climate is a reflection of our current atmosphere - including its greenhouse gases and aerosols - it is the changes in these components which will lead to climate change. Before the satellite era, information on aerosols came from limited surface based observations, which are not sufficient to describe their spatial and temporal variability of aerosols (Levy and Pinker 2006).The only way to achieve an on-going global coverage is by satellite observation.

Aerosol could be sampled remotely, from satellite, but only indirectly, by means of a combination of various wavelengths of upwelling radiation (Rosenfeld and Lensky, 1998). Even then numerous assumptions are required. Determination of aerosol optical depth from satellite remote sensing measurements is extremely complex due to the large variability of aerosol optical properties. Significant simplification occurs when measurements are taken over water since the ocean reflection signal can be taken as negligible in the near infrared. Unfortunately, over land, most of the signal can be attributed to ground reflectance.

For years, many algorithms have been applied to these satellite datasets to retrieving information useful for studying aerosol over land (Kokhanovsky et al., 2007, Kokhanovsky and de Leeuw 2009). In this paper we propose a new approach to retrieve aerosol properties over land surfaces, especially high reflectance surface including arid, semiarid, and urban areas, where the surface reflectance is usually very bright in the red part of visible spectrum and in the near infrared, but is much darker in the blue spectral region (Xue and Cracknell 1995). The algorithm developed makes full use of the high frequency multi-temporal information and multi-spectral information from MODIS, without any a prior knowledge of the underlying land surface characteristics (Tang et al. 2005). The quantitative retrieval of aerosol optical thickness from satellite data for land surface has been successfully conducted in China using MODIS data. Fused with the national aerosol measurement network data, the ten-year national AOT maps at 10km and 1km resolutions have been produced on the daily base. The results agreed with AERONET in situ measurement very well with averaged relative error less than 15%. This national climate aerosol optical thickness data will be useful for the research of regional response to the global climate change.