Geophysical Research Abstracts
Vol. 12, EGU2010-9828, 2010
EGU General Assembly 2010

Aerosol retrievals over Asian mega cities with the AATSR Dual-View Algorithm

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The increase of anthropogenic pollutants in Asia is evident along with the continuously increasing population and strong economic growth. Several studies have shown, that the mean aerosol mass concentration can be well above national and international standards especially in the Asian mega cities, such as Shanghai, Beijing, and New Delhi. Large emissions of aerosols and precursor gases exported from these areas can have significant impacts on air quality and climate on both regional and global scales.

AATSR (Advanced Along Track Scanning Radiometer) on board ENVISAT (ENVIronmental SATelite) is used for monitoring various environmental parameters. The parameters include e.g. aerosol optical properties over land (Dual View algorthm (ADV)), and ocean (Single View algorithm (ASV)). The ADV-algorithm exploits the AATSR measurements made in two different viewing angles (nadir and forward) to eliminate the surface contribution from the top of the atmosphere (TOA) reflectance. Hence an additional surface reflectance model is not needed in the retrieval. AATSR reaches global coverage of about five days, while at the mid-latitudes the return time is about three days.

In this study the ADV-algorithm is applied for observing aerosol optical depth (AOD) over Asia, focusing especially on the aerosol contents at the largest cities, and the impact of these cities on the air quality at the surrounding areas. Two years of AATSR data (Jan 2008- Dec. 2009) has been retrieved and validated against the collocated groundbased AERONET (AErosol RObotic NETwork) measurements. Good agreement with the AERONET measurements was obtained both in clean (AOD below 0.2 at 555 nm wavelength) and polluted (AOD well above 1.0 at 555 nm wavelength) cases. Results also showed that the AOD was dominated by the anthropogenic submicron particles.