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Aerosol retrievals over India with the AATSR Dual View Algorithm

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India is one of the world's most populated countries. Along with the continuously increasing population and economic growth the increase of the anthropogenic pollutants is evident. Large emissions of aerosol and precursor gases transported from these regions can have significant impacts on air quality and climate on both regional and global scales.

The AATSR (Advanced Along Track Scanning Radiometer) on board ENVISAT (ENVIronmental SATelite) is used for monitoring various environmental parameters, such as land and aerosol properties. The AATSR instrument provides measurements at two different viewing angles, nadir and 55 deg. forward. This property is used in the AATSR dual view algorithm (ADV) to eliminate the surface contribution from the top of the atmosphere reflectance. The ADV algorithm is used for retrieving aerosol properties over land. Over ocean the single view algorithm (ASV) is used. The retrieved parameters include aerosol optical depth (AOD) at three different wave lengths (0.555, 0.659 and 1.61 μm), and mixing ratio describing the contribution of the fine mode aerosols (in this context particles having effective radius about 0.1 μm) to the total aerosol extinction.

In this study the ADV algorithm is applied to observation of AODs and mixing ratio over India. Two years of data between January 2008 and 2010 has been retrieved and analysed. The annual datasets have been divided in to four seasons based on prevailing meteorological conditions; dry (Dec.-Mar.), pre-monsoon (Apr.-May), monsoon (Jun.-Sep.), and post-monsoon (Oct.-Nov.) season. The validation of the AATSR AOD retrievals is done by using the AERONET (AErosol RObotic NETwork) ground based measurements. Results show e.g. that the retrieved AOD pattern is similar over the seasons but absolute values vary. Hot spots of high AODs are observed around urban, industrialized and densely populated coastal regions. Over these areas the fine particles can account for over 80% of the total aerosol extinction, indicating significant anthropogenic activity.