Retrieval of Aerosol and Cloud Properties using (A)ATSR

T. H. Virtanen[(1)], L. Sogacheva[(1)], P. Kolmonen[(1)], E. Rodriguez[(1)], G. de Leeeuw[(1,2)]

[(1)]Finnish Meteorological Institute, P.O.BOX 503, FI-00101 Helsinki, Finland
[(2)]Department of Physics, P.O. Box 64, FI-00014 University of Helsinki, Finland

The ATSR Dual View (ADV) and ATSR Single View (ASV) aerosol retrieval algorithms have been developed for use with the Along Track Scanning Radiometer ATSR-2 which flew on the ERS-2 satellite (1995-2003) and the Advanced ATSR (AATSR) which flew on the ENVISAT satellite (2002-2012) (both from the European Space Agency, ESA).

The ATSR instruments provide two views: one near-nadir and the other at 55 degrees forward. Each view provides the radiances at the top of the atmosphere (TOA) in 7 wavebands from the visible (VIS) to the thermal infrared (TIR) which are used for the retrieval of aerosol and cloud properties. The dual view algorithm provides information on the aerosol properties over land with a quality which is similar to that of other satellites.

Using the dual view, no prior knowledge is needed on surface properties to retrieve the aerosol optical depth (AOD) which thus can be used in the atmospheric correction to provide the surface reflectance as an independent parameter. Over ocean the AOD is retrieved in a single view, also with a quality similar to that of other instruments. The ATSR-2/AATSR combination provides a time series of 17 years, which will be further expanded with those from the Sea and Land Surface Temperature Radiometer (SLSTR) on the ESA/EU GMES Sentinel-3 mission planned to be launched in December 2015.

The retrieval of aerosol and cloud properties in the same scene can be used to obtain information on aerosol-cloud interaction. In the presentation an overview will be presented of the aerosol and cloud remote sensing activities in Helsinki, in particular algorithm improvement to deal with differences in aerosol loading, aerosol type and reflectance of the underlying surface. Procedures developed for areas where many independent validation data are available but where the AOD is relatively low (USA, Europe) are revisited for their use over areas with much higher AOD. An initial analysis will be presented to illustrate the spatial and temporal variations in different parts of the world, contrasting the temporal behavior over different continents.

References

[1] de Leeuw, G., T. Holzer-Popp, S. Bevan, W. Davies, J. Descloitres, R.G. Grainger, J. Griesfeller, A. Heckel, S. Kinne, L. Klüser, P. Kolmonen, P. Litvinov, D. Martynenko, P.J.R. North, B. Ovigneur, N. Pascal, C. Poulsen, D. Ramon, M. Schulz, R. Siddans, L. Sogacheva, D. Tanré, G.E. Thomas, T.H. Virtanen, W. von Hoyningen Huene, M.Vountas, S. Pinnock, "Evaluation of seven European aerosol optical depth retrieval algorithms for climate analysis", *Remote Sensing of Environment*, 162, 295-315, doi:10.1016/j.rse.2013.04.023, 2015.

[2] Kolmonen P., Sogacheva L., Virtanen T.H., de Leeuw G., and Kulmala M., "The ADV/ASV aerosol retrieval algorithm: current status and presentation of a full-mission AOD data set", *Digital Earth*, in press.