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# Production of satellite-derived aerosol climate data records: current status of the ESA Aerosol_cci project

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Within the ESA Climate Change Initiative (CCI) project Aerosol_cci (Phase 1: 2010 –2014; Phase 2: 2014-2017) intensive work has been conducted to improve algorithms for the retrieval of aerosol information from European sensors ATSR (3 algorithms), PARASOL, MERIS (3 algorithms), synergetic AATSR/SCIAMACHY, OMI and GOMOS. Whereas OMI and GOMOS were used to derive absorbing aerosol index and stratospheric extinction profiles, respectively, Aerosol Optical Depth (AOD) and Ångström coefficient were retrieved from the other sensors. The cooperation between the project partners, including both the retrieval teams and independent validation teams, has resulted in a strong improvement of most algorithms. In particular the AATSR retrieved AOD is qualitatively similar to that from MODIS, usually taken as the standard, MISR and SeaWiFS. This conclusion has been reached form several different ways of validation of the L2 and L3 products, using AERONET sun photometer data as the common ground-truth for the application of both 'traditional' statistical techniques and a 'scoring' technique using spatial and temporal correlations. Quantitatively, the limited AATSR swath width of 500km results in a smaller amount of data. Nevertheless, the assimilation of AATSR-retrieved AOD, together with MODIS data, contributes to improving the in the ECMWF climate model results. In addition to the multi-spectral AOD, and thus the Ångström Exponent, also a per-pixel uncertainty is provided and validated. By the end of Aerosol_cci Phase 1 the ATSR algorithms have been applied to both ATSR-2 and AATSR resulting in an AOD time series of 17 years.

In phase 2 this work is continued with a focus on the further improvement of the ATSR algorithms as well as those for the other instruments and algorithms, mentioned above, which in phase 1 were considered less mature. The first efforts are on the further characterization of the uncertainties and on better understanding of the cloud screening in the various algorithms. Other efforts will focus on surface treatment and possible improvement of aerosol models used in the retrieval. Furthermore, the validation results, showing differences between regions, will further be analyzed in an attempt to better understand the working of different algorithms. The results, if successful, will be implemented in the various algorithms. A yearly re-processing is planned to evaluate the effect of different changes and to monitor further improvement. Each re-processing will be done on the full 17-year global ATSR-2/AATSR data set. The work on stratospheric aerosols and on absorbing aerosols is continued and a new element in Phase 2 is the inclusion of dust aerosols retrieved from thermal infrared IASI observations over a limited area. After the launch of Sentinel-3, planned for the autumn of 2015, the aerosol retrieval using SLSTR and OLCI data are planned to be included in the Aerosol_cci project. PARASOL retrieved data over a limited area will be used as a 'standard' for comparison with other sensors.

A new aspect of Phase 2 are the use cases where representatives of several relevant users communities, climate, stratospheric aerosol and aerosol-cloud interaction, will evaluate the use of Aerosol_cci products in their own work as regards the usefulness and added value. This will be done in close cooperation with the data providers to further improve the products and meet users' needs, both as regards data quality and presentation. The latter also requires data availability and easy accessibility through good data management which is another important aspect in Aerosol_cci.

An overview will be presented of the current status of the various aspects of the Aerosol_cci project.