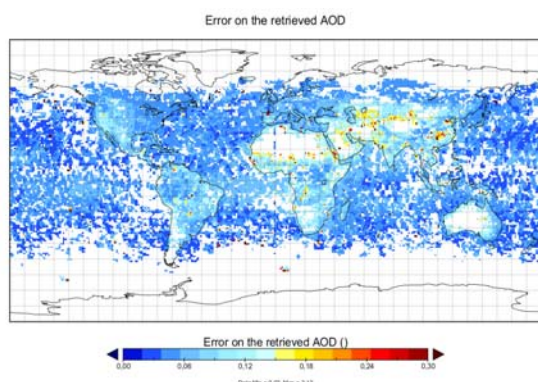


→ CLIMATE CHANGE INITIATIVE

Aerosol CCI

Newsletter

Issue n. 2 | July 2011



The map above shows an example product level uncertainty for September 2008 derived by an experimental approach for the synergetic SYNAER product (ENVISAT AATSR+SCIAMACHY). Such information is crucial for e.g. data assimilation into aerosol models. This will thus be an intrinsic part of the products and undergo validation as well.

First project year ends

The Aerosol_cci project finishes its first year on 26 July 2011 with the annual meeting at ESA-ESRIN. After completing the first document cycle currently intensive test dataset processing with several improved and harmonized algorithm versions is conducted and global datasets are analysed

The initial assessment of user requirements for satellite aerosol products led to a refinement of the underlying GCOS requirements – especially linking accuracy and stability requirements to temporal and spatial resolution. On this basis the original product specifications were then updated. In parallel requirements and initial specifications for a future operational system which allows repeated reprocessing of satellite data collections were derived.

Aerosol_cci held three dedicated thematic workshops to share the principles underlying the participating retrieval algorithms with a focus on the most critical modules. For each of these three topics an assessment of the algorithms was made and recommendations for improved / harmonized setup and possible external reference data were worked out.

In the first year the project assured open communication and collaboration with the wider aerosol retrieval and user community. This included participation of US and other European experts as well as from other CCI projects to the meetings and workshops and presentations at various conferences. Furthermore, joint partnership assured continuous exchange with AEROCOM, GEWEX, WMO-GAW and MACC.



In this issue:

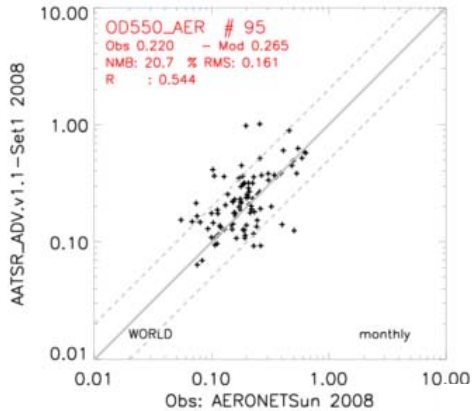
- First project year ends
- Dataset processing and analysis
- Product specifications
- Aerosol_cci at EGU
- Project meeting in Lille





Dataset processing and analysis

One major goal in the first 18 months of the Aerosol_cci project is to better understand the uncertainties in the different retrieval algorithms due to necessary assumptions made for the mathematically ill-posed problem.



Source: AEROCOM

Example validation with AEROCOM tools of one dataset version of the ADV algorithm for AATSR for September 2008 – here an AEROCOM monthly / 1° climatology is used to prescribe aerosol optical properties

These uncertainties determine the accuracy of the final products and lead to apparent differences between different instruments and algorithms which are not due to physical reasons.

Therefore, a large effort is currently conducted to reprocess a reference dataset (global, all September 2008) with all algorithms. Starting from a baseline dataset, all algorithms are consecutively upgraded and a new reference dataset version is processed with each of them.

With regard to aerosol optical properties a harmonized definition of four basic components was used to prepare new lookup tables for all algorithms. Then a free retrieval and the use of an AEROCOM / AERONET based climatology to prescribe the spatial distribution were tested.

For cloud flagging a common cloud mask produced with DLR's APOLLO from AATSR was distributed and is used by all algorithms.

Further work will focus on surface treatment over land and ocean.

Product specifications

Several products are specified: from single sensor to synergetic and merged results for AOD and type.

The tropospheric / nadir product portfolio exploits measurements from the (A)ATSR(-2) and MERIS instruments, SCIAMACHY / GOME / OMI spectrometers, and the POLDER instrument. Level2 (for data assimilation) and level3 (for model comparison) products are foreseen together with an aerosol type climatology. Additionally, GOMOS is used to derive stratospheric extinction profiles.

Product name	Parameter(s)	sensors	level	comment
Tropospheric / total column products				
Single-sensor AOD / type	Multi-spectral AOD Aerosol type probability	ATSR-2 / AATSR MERIS POLDER	Level2,3	Ångström coefficient can be derived from multi-spectral AOD. Aerosol type may include information on fine / coarse mode fraction and chemical components, which together best describe the observations
Synergetic AOD / type	Multi-spectral AOD Aerosol type probability	AATSR/SCIAMACHY ATSR-2/GOME AVHRR/GOME-2	Level2,3	
AAI	Absorbing aerosol index averaging kernel	OMI SCIAMACHY GOME	Level2,3	
Merged AOD / type	Multi-spectral AOD Aerosol type probability	Combining several level2 with appropriate weighting	Level3	
Aerosol type "climatology"	Aerosol type probability / dominant aerosol type	All AOD products	Level3	
Stratospheric products				
Extinction	Gridded extinction profile	GOMOS (SCIAMACHY)	Level3	



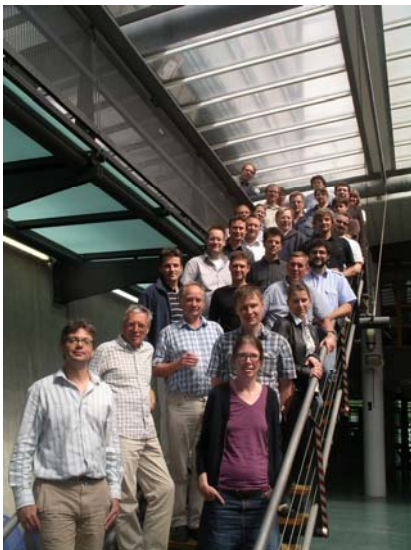
Aerosol_cci at EGU

At the annual assembly of the European Geophysical Union Aerosol_cci presented its concept of algorithm inter-comparisons and held a specific side meeting to discuss the conclusions from three thematic workshops on major algorithm modules: aerosol optical properties, cloud masking, surface treatment.

These three modules of each aerosol retrieval algorithm are regarded as key to determine the product accuracy. Thus, Aerosol_cci strives for improvement and as far as possible harmonization of them between the different algorithms. The table on the right shows the common definition of basic aerosol components to be used by all retrieval algorithms in the inter-comparisons. It should be noted, that the refractive index (real and imaginary part) for dust varies with wavelength.

Aerosol component	Real part Refr. Index (550 nm)	Im. Part Refr. Index (550 nm)	Reff* (μm)	Geom. stdv	Geom. mean radius (μm)	Comment	Aerosol layer height
Dust [§]	1.56	0.0018	1.8	1.82	0.79	Non-spherical	2-4km
Sea salt	1.4	0	1.82	1.7	0.9	AOD threshold constraint	0-1 km
Fine mode very weak-abs	1.4	0.003	0.142	1.7	0.07	(ssa at 500 nm: 0.98)	0-2 km
Fine mode strong-abs	1.5	0.025	0.142	1.7	0.07	(ssa at 500 nm: 0.80)	0-2 km

Project meeting in Lille



The third progress meeting was held at the ICARE center in Lille. With the first global test datasets for the reference month September 2008 becoming available an intensive discussion of the validation tools was made.

The project team shown in the image on the left side saw the first presentation of its validation partners of the tools to be repeatedly applied to the different product versions. These tools build on existing software used within activities of AEROCOM, the ICARE data center and scientific scoring of aerosol products (satellite and model).

Technical issues such as standards for the netCDF format used in the project were discussed as well as suitable means for assessing both level2 (orbit projection) and level3 (gridded daily or monthly) datasets. Another focus was the identification of parameters beyond AOD which can be produced with the different retrieval algorithms and can be validated with AERONET.