AEROSAT
International Satellite Aerosol Science Network

Thomas Holzer-Popp (DLR), Gerrit de Leeuw (FMI) and Simon Pinnock (ESA)

AEROSAT initial feedback

- Overall very supportive feedback
- Some constructive questions on goals
- No single statement like "yet another new network ..."

- Interest confirmed also by:

  Christina Hsu, Angela Benedetti, Istvan Laszlo

  Terry Nakajima/ Tishihiko Takemura, Thorsten Fehr,

  Bojan Bojkov, Didier Tanre / Philips Goulob (13-14 hrs)

Goals of today

- Constitute AEROSAT

- Define first concrete actions

- Good balance of enthusiasm and realism

- Allow everyone to present his / her thoughts

AEROSAT goals

⇁ unfunded, open, independent, international network of aerosol remote sensing scientists (retrieval experts, validation experts, data centers) and users of satellite data

⇁ close collaboration with related initiatives: AEROCOM (models), ICAP (forecasts) and AERONET (sun photometers)

⇁ Goals

   ⇁ promote the use of satellite data

   ⇁ achieve open and active exchange of information

AEROSAT / AEROCOM

➤ Explicitly seek close link

➤ Benefit from AEROCOM experiences on open communication

➤ Remain independent to "speak for the satellite community"

➤ This constituting meeting "by invitation only"

➤ Further meetings fully open / explicitly invite (model) users

AEROSAT
Draft Terms of Reference

Thomas Holzer-Popp (DLR), Gerrit de Leeuw (FMI)
and Simon Pinnock (ESA)

AEROSAT motivation

- Undisputed importance of atmospheric aerosol
- Acknowledged complementary information content of satellites

- Many satellite aerosol retrieval groups
- Benefit proven for active collaboration between groups (critical mass), e.g. NASA, ESA-CCI
- Coordinate better across sensors / agencies: **AEROSAT**
- Constituting meeting today
    - Based on initial discussions and feedback
    - Endorse Terms of Reference
    - Activate AEROSAT with first concrete steps

AEROSAT goals

- **promote the use of satellite data**
  - as **complementary** to other sources of information
  - to better understand the role of aerosols on climate, climate change, air quality and atmospheric processes

- **achieve open and active exchange of information**
  - retrievals and their strengths and limitations
  - match requirements of users to technical capabilities
  - benefit from the latest technological advances
  - standardization (data formats, data standards)

AEROSAT activities

- Communication / coordination (producers + users)

  -> consensus towards international programs, space agencies
- Partnerships
  - WMO, CEOS, IPCC, GCOS, GEWEX, GEOSS, AEROCOM, ICAP
  - harmonize international efforts advance satellite science
- Promoting long-term continuity of satellite aerosol data sets (operational services, new generation satellite missions, integration of complementary satellites)
- Developing / harmonising user access (data, metadata)
- Helping users to understand the strengths and weaknesses (activities to inter-compare data sets, assess product accuracies, common reproducible way)
- Encouraging open exchange of satellite, model and *in-situ* aerosol data, establishing an interoperable global data access network
- Organizing Technical Advisory Groups (development, use of satellite data, promote scientific insight and innovation, identify best-practices, to facilitate the transfer of new science into applications)

➤ Serves to assure sustainable activity of AEROSAT

➤ AEROSAT defines its role to lead on all aspects of satellite retrievals

➤ Meetings
  ➤ one meeting per annum in alternating locations (Europe, Americas, Asia)
  ➤ all meetings open to interested scientists worldwide; as far as appropriate associated with AEROCOM workshops
  ➤ host and location of next meeting to be agreed at each meeting

AEROSAT management (2)

⤳ AEROSAT working groups:

- ⤳ retrieval aspects (technical, scientific, etc.)
- ⤳ consistency
- ⤳ user requirements and the use-ability of aerosol products
- ⤳ open to contributors
- ⤳ led by a small steering group which a chair
- ⤳ limited duration
- ⤳ report during AEROSAT meetings
- ⤳ results documented and (publications, web).
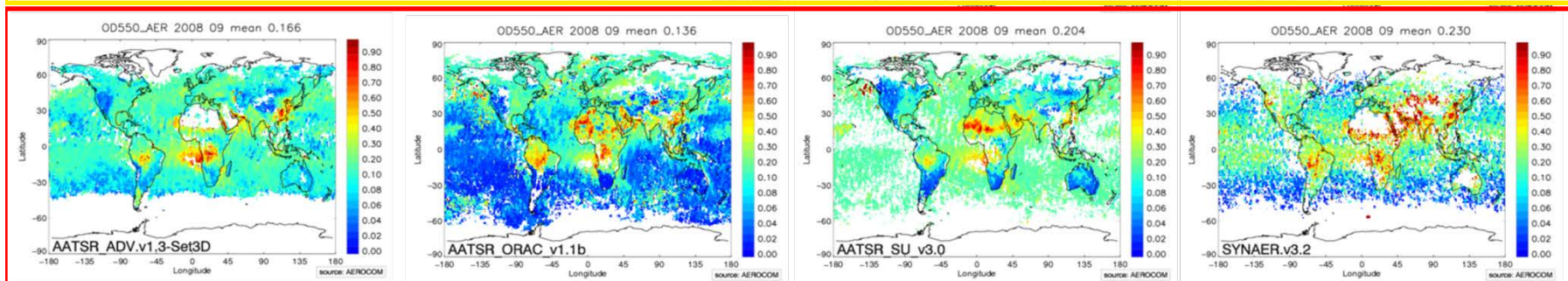
- Intensive algorithm experiments led to improvement before round robin exercise
- Large differences between baseline datasets were significantly reduced
- Products are approaching reference datasets quality and GCOS needs
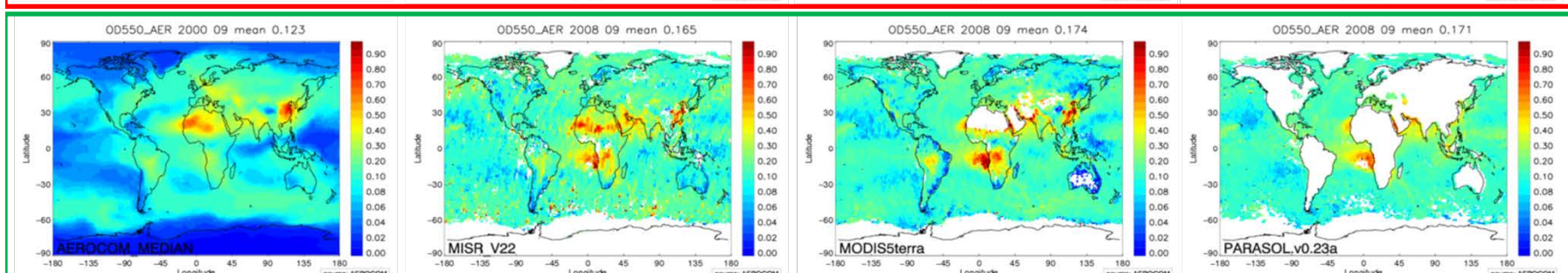- Algorithm improvement continued after RR and used in ECV dataset production

Standards for validation
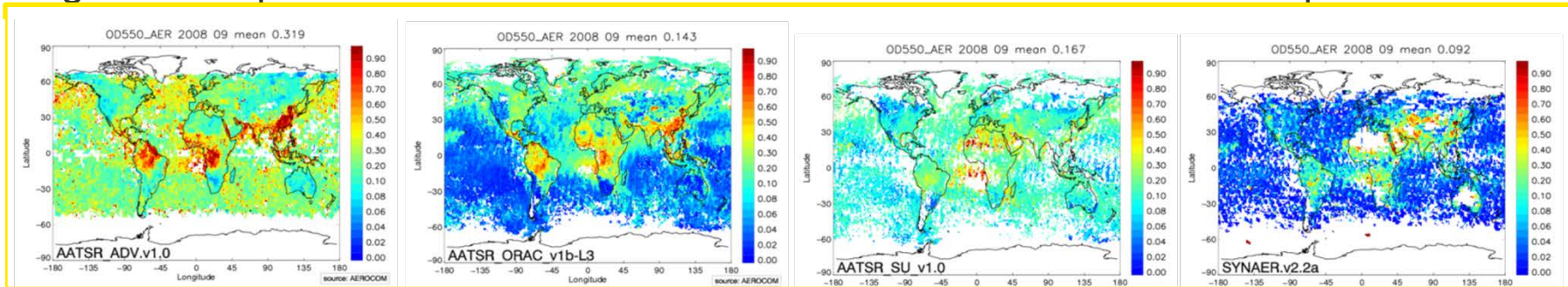
Algorithm name	NumObs #	R-CORR	RMS	NMB %	RMSbc
AATSR_ADV.v1.42	1394	0,822	0,102	-29,7	0,105
AATSR_ORAC.v2.02	1394	0,823	0,091	-9,4	0,091
AATSR_SU_v4.0	1394	0,863	0,081	-7,7	0,083
MISR_V31_1x1	276	0,856	0,085	-11,2	0,081
MODIS5.1aqua	1185	0,749	0,114	7,1	0,108
MODIS5.1terra	1285	0,744	0,114	1,5	0,113

- Common point filter reduces number of data points (land, 4 AATSR algorithms)

No filter

Common point filter

Ranking:

Filter	ADV	ORAC	SU 3.1	SU4.0
China	1	4	2	3
India	3	2	1	4
East asia	1	4	2	3
Europe	1	3	4	2
Samerica	2	3	4	1
Nafrica	2	3	1	4
Namerica	1	4	3	2
DJF	1	2	4	3
MAM	2	4	1	3
JJA	1	3	2	4
SON	4	2	2	1

Average: 1,75   3   2,625   2,5

Ranking:

Filter	ADV	ORAC	SU 3.1	SU4.0
China	3	2	1	4
India	3	2	1	4
East asia	3	2	1	4
Europe	2	4	3	1
Samerica	3	2	4	1
Nafrica	3	4	2	1
Namerica	2	4	3	1
DJF	2	3	4	1
MAM	3	4	1	2
JJA	1	4	2	3
SON	4	2	3	1

Average: 2,5 3,375 2,75 1,375

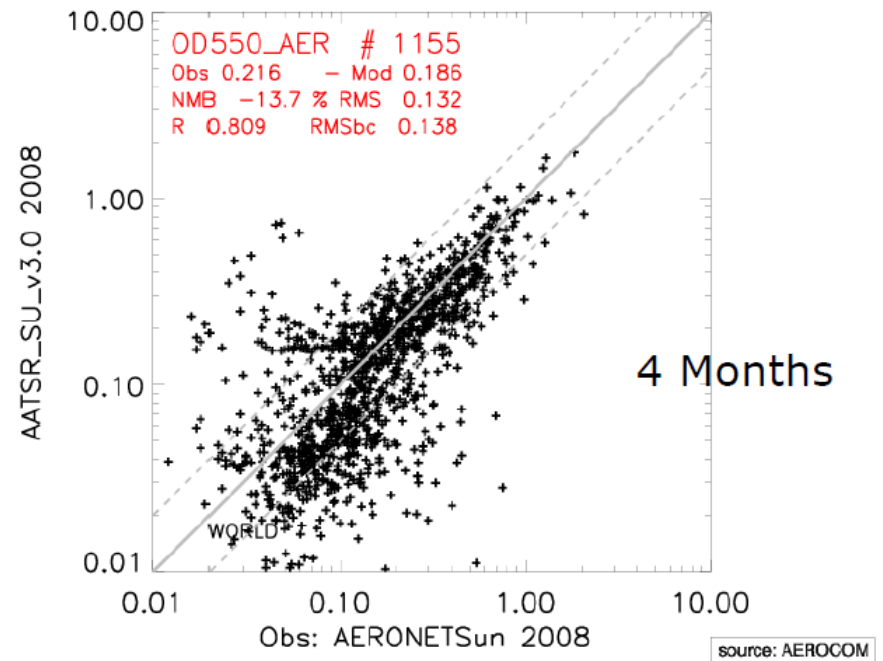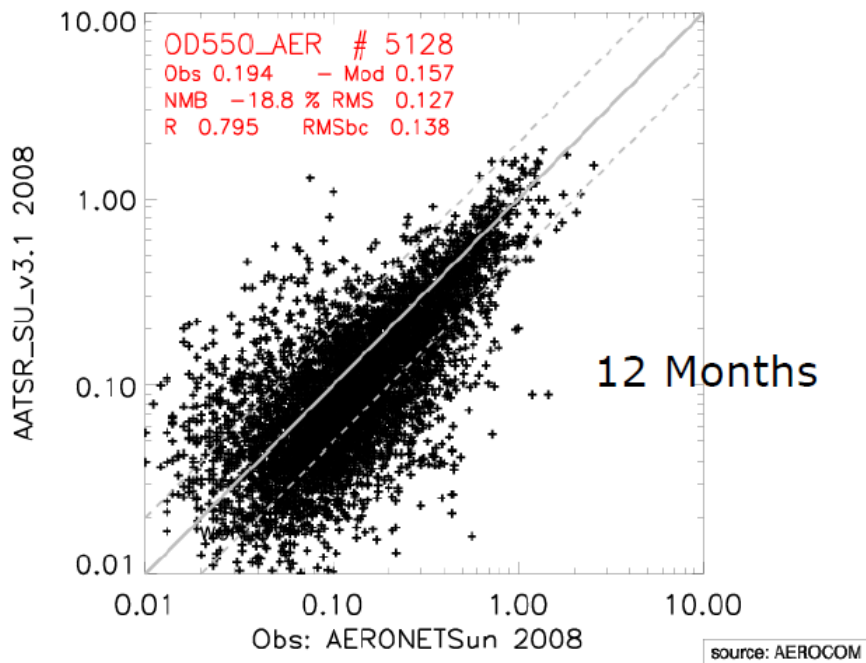Average excluding china, india and east asia due to low number of measurements

Harmonized documentation
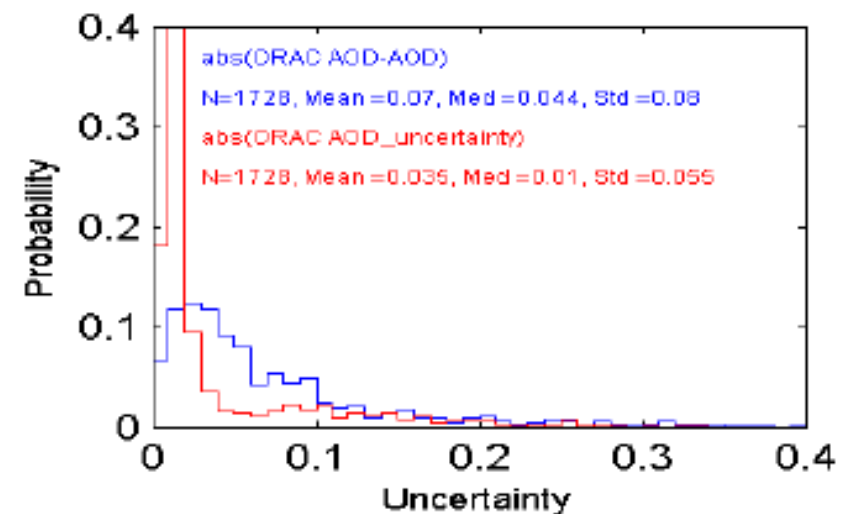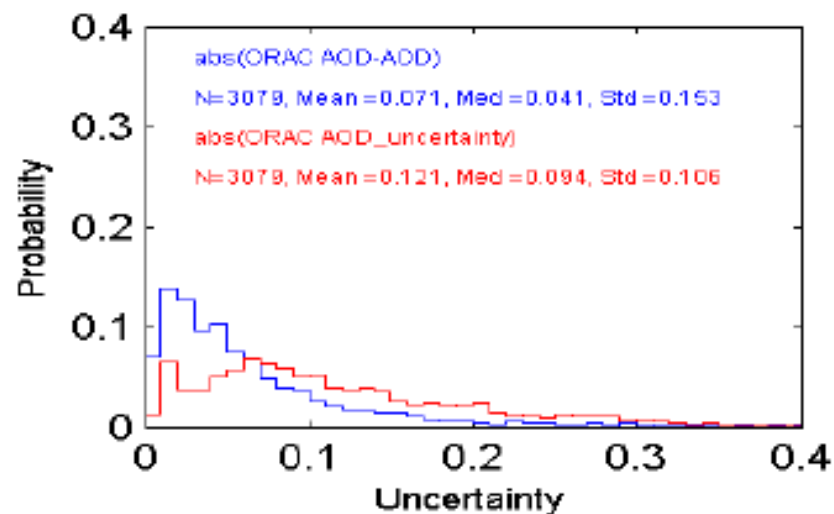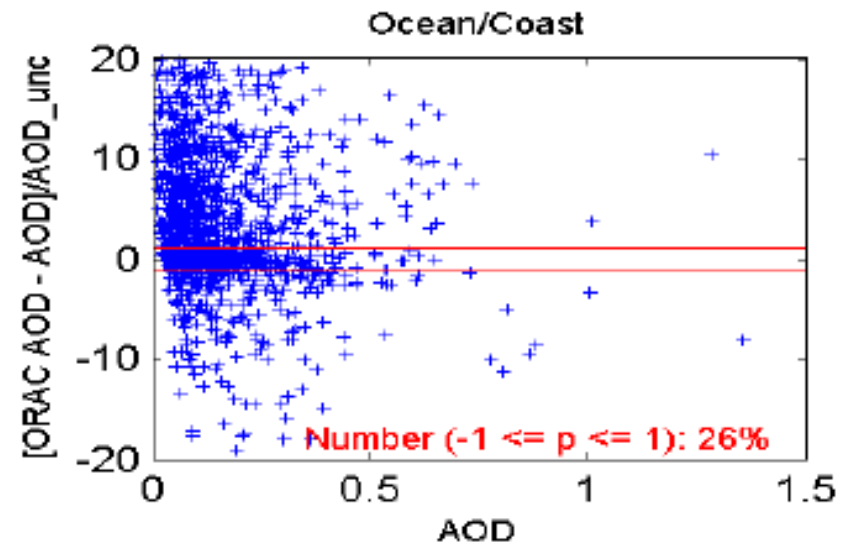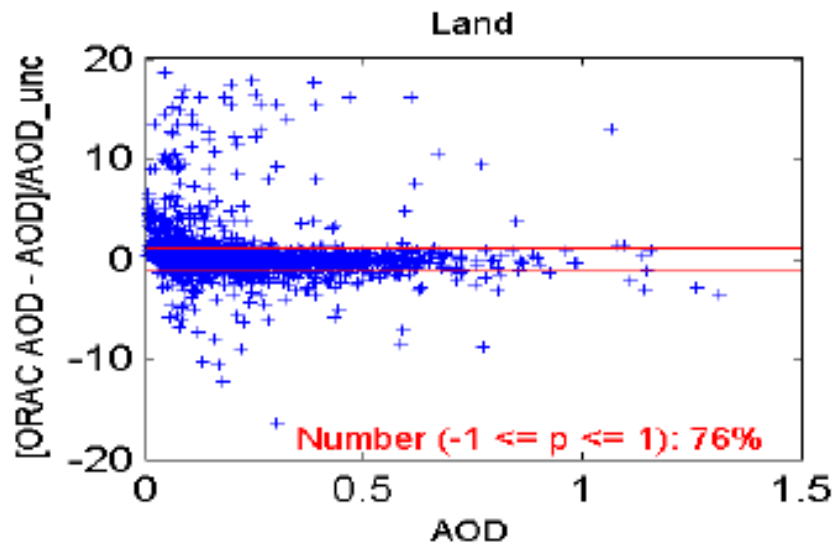
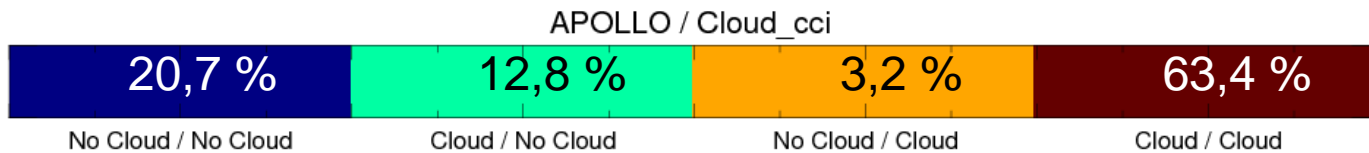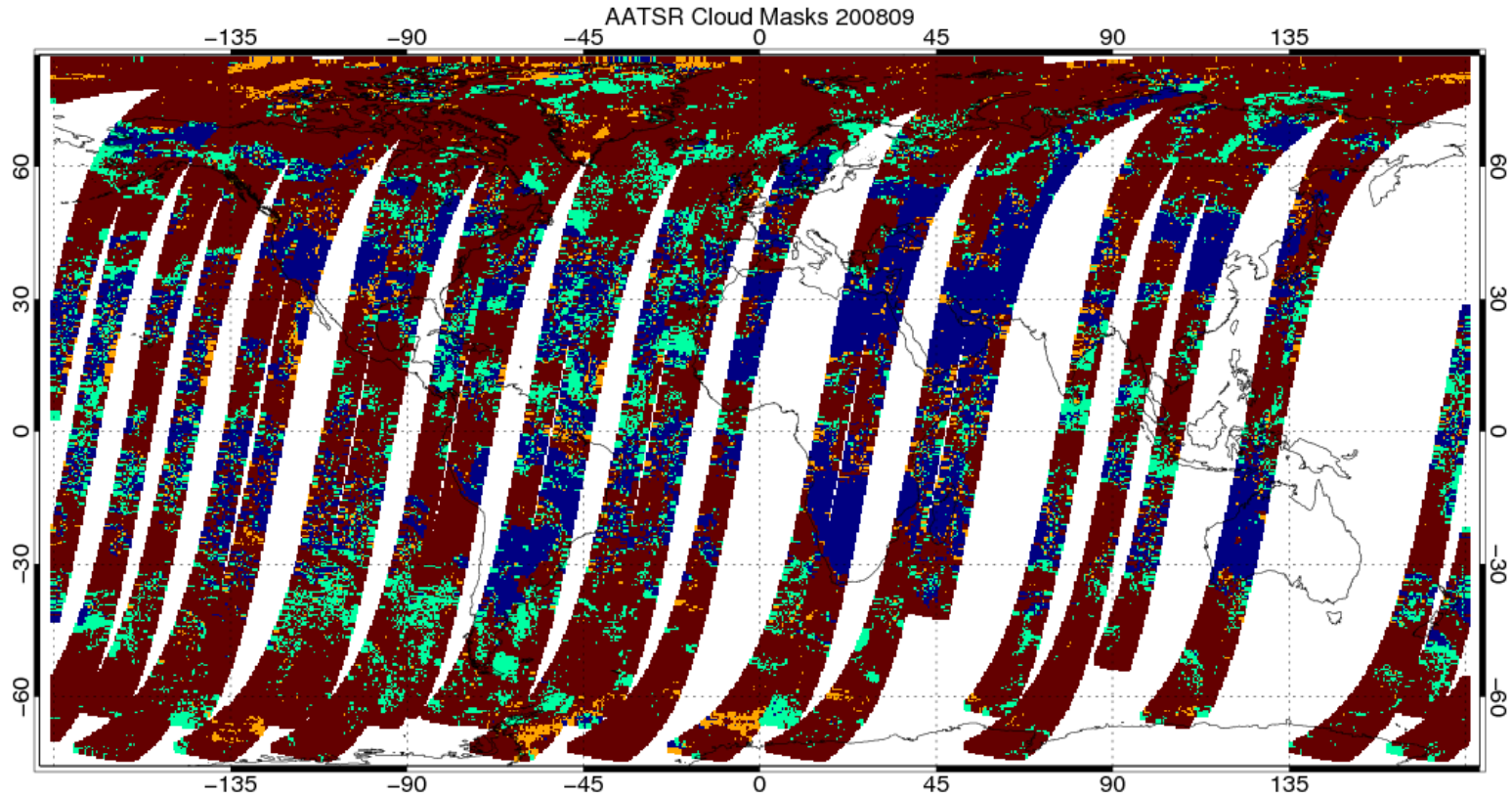| Characteristics	Information
name	**SU algorithm v4.0** ENVISAT / AATSR + ERS-2 / ATSR-2
provider	Swansea University
contact	P.R.J.North@swansea.ac.uk
parameters	4 AOD, 3 mixing fractions, Ångström coefficient
algorithm features	**Main principle: Dual view**
	Cloud mask: ESA standard
	Aerosol model: Aerosol_cci 4 common components
	Surface: BRDF model
	Other: -
main advantage	**17 year time series, high accuracy, good cloud filter**
limitations	**coverage (512 km swath), accuracy over ocean**
rmse/bias/correlation (land)	0.08 / -0.01 / 0.86 (daily 1° ADO550 vs. AERONET – 1394 pts.)
rmse/bias/correlation (sea)	0.08 / -0.02 / 0.78 (daily 1° AOD550 vs. AERONET – 87 pts.)
coverage	2008, global (except polar latitudes)
resolution	Daily, 10x10 km2
continuation	Sentinel-3 / SLSTR

Model name	NumObs	R-CORR	RMS	NMB	RMSbc
AATSR_SU_v3.0	1155	0,809	0,132	-13,7	0,138
AATSR_SU_v3.1	5128	0,795	0,127	-18,8	0,138

AATSR Cloud Masks 200809

APOLLO / Cloud_cci

20,7 %	12,8 %	3,2 %	63,4 %
No Cloud / No Cloud	Cloud / No Cloud	No Cloud / Cloud	Cloud / Cloud

- Chair
- 3 co-chairs (one from Europe, US, Asia) for 3 years
    - major responsibility: organize annual meetings
- steering committee (SC), including chair and co-chairs
- mandate for three years, with a possible second period
- rotation: half the SC replaced every 3 years

- AEROSAT website
    - Terms of Reference (including goals and definition of AEROSAT)
    - Presentations
    - Conclusions
    - Announcements
    - …