



Satellite derived Climate Data Records in the ESA Aerosol_cci project

**Thomas Holzer-Popp (DLR),
Gerrit de Leeuw (FMI & UHEL),
Simon Pinnock (ESA)
Lars Klüser (DLR)
& the Aerosol_cci team**





- **Available datasets (validation ongoing)**
 - ATSR-2 / AATSR 17 years / 3 algorithms
 - Full validation / one algorithm
 - GOMOS 10 years stratospheric extinction profiles
 - Different resolution on user request
 - IASI round robin datasets 2013 / 4 algorithms
 - POLDER GRASP multi-pixel algorithm reference 2008



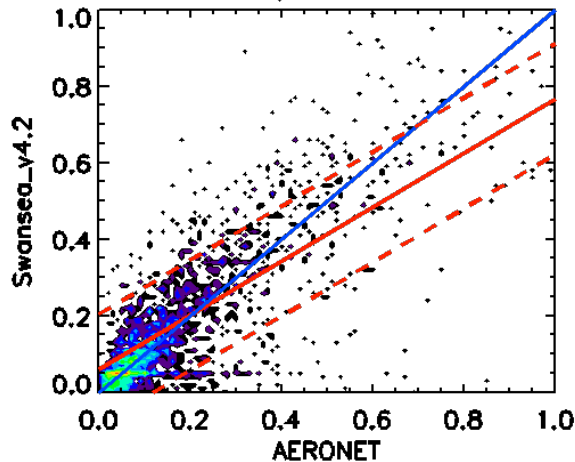
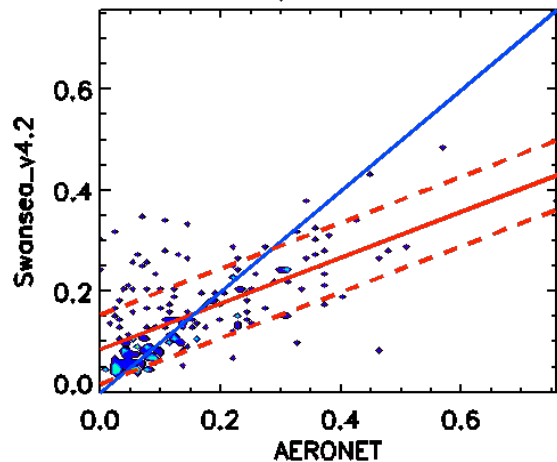
L2 data:
 ± 30 min, 35 km from
 AERONET stations

ATSR-2 (1995-2003)

AATSR (2002-2012)

AOD, 550 nm

AOD, 550 nm

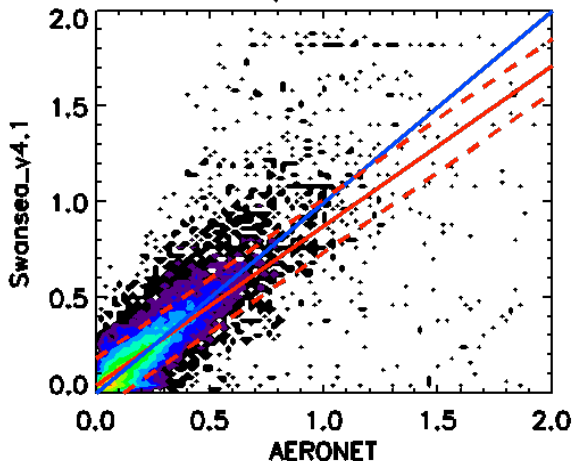
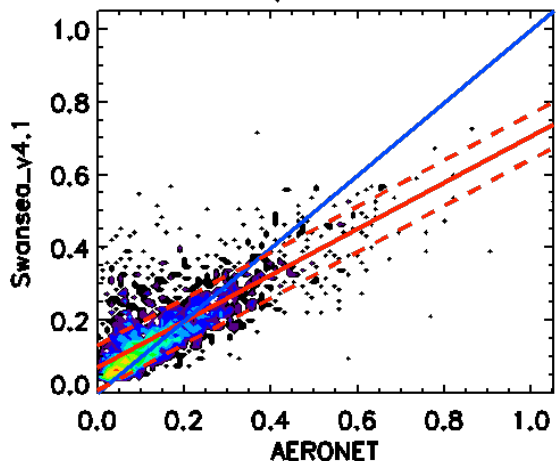


$K=0.648$ $a=0.45$ $b=0.09$ $RMSE=0.098$

$K=0.763$ $a=0.71$ $b=0.06$ $RMSE=0.161$

AOD, 550 nm

AOD, 550 nm

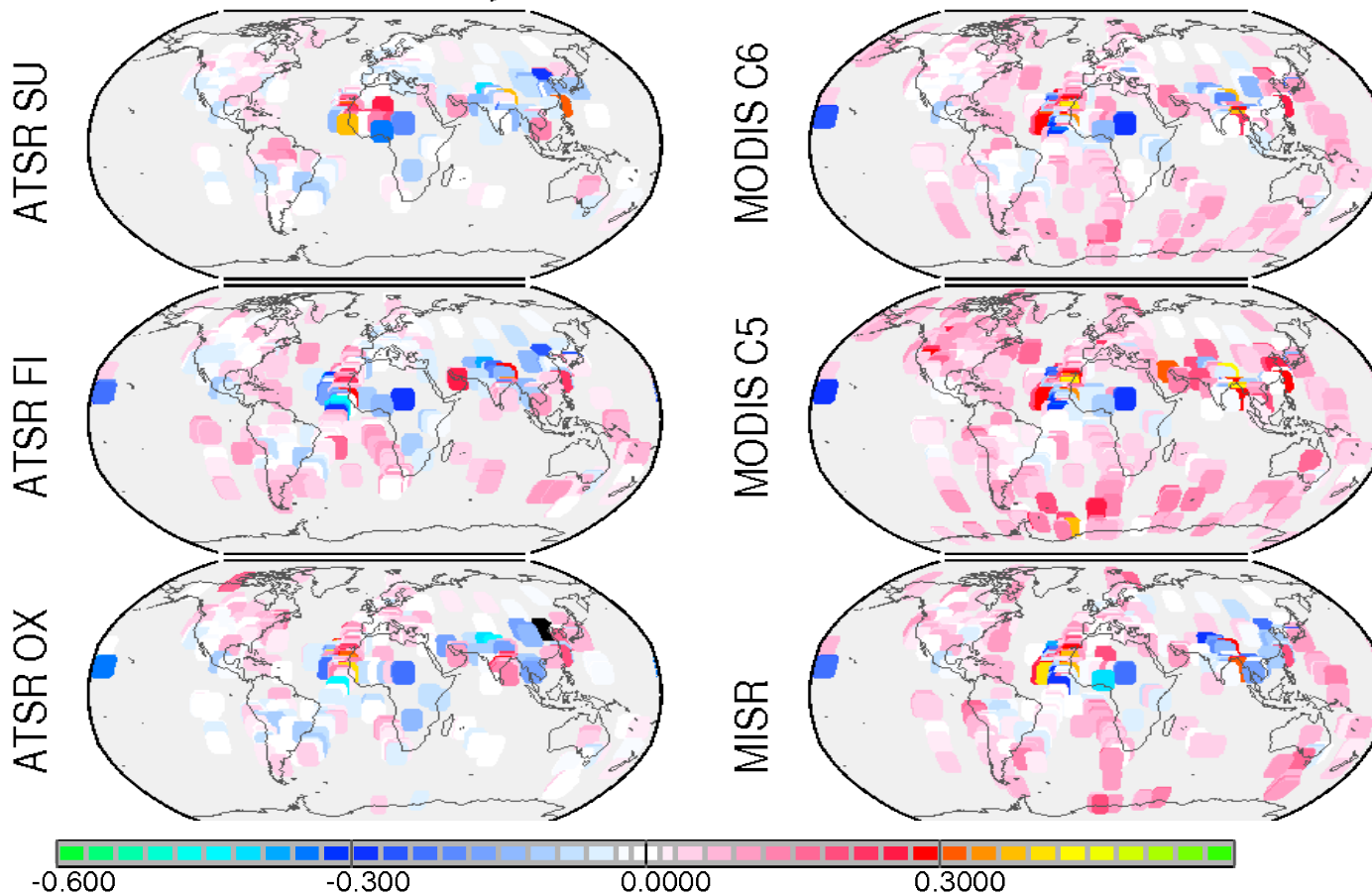


$K=0.787$ $a=0.64$ $b=0.07$ $RMSE=0.079$

$K=0.802$ $a=0.83$ $b=0.04$ $RMSE=0.145$

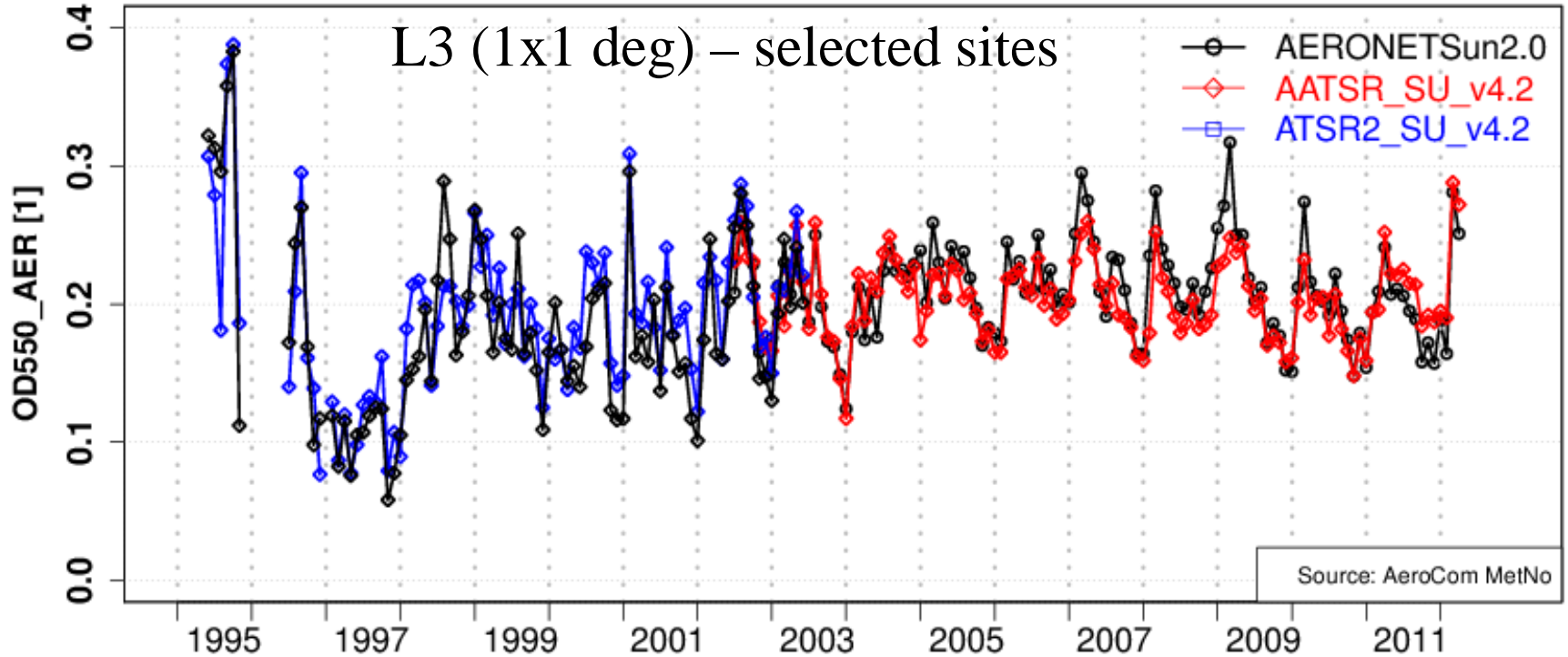


diff in AOD, 550nm

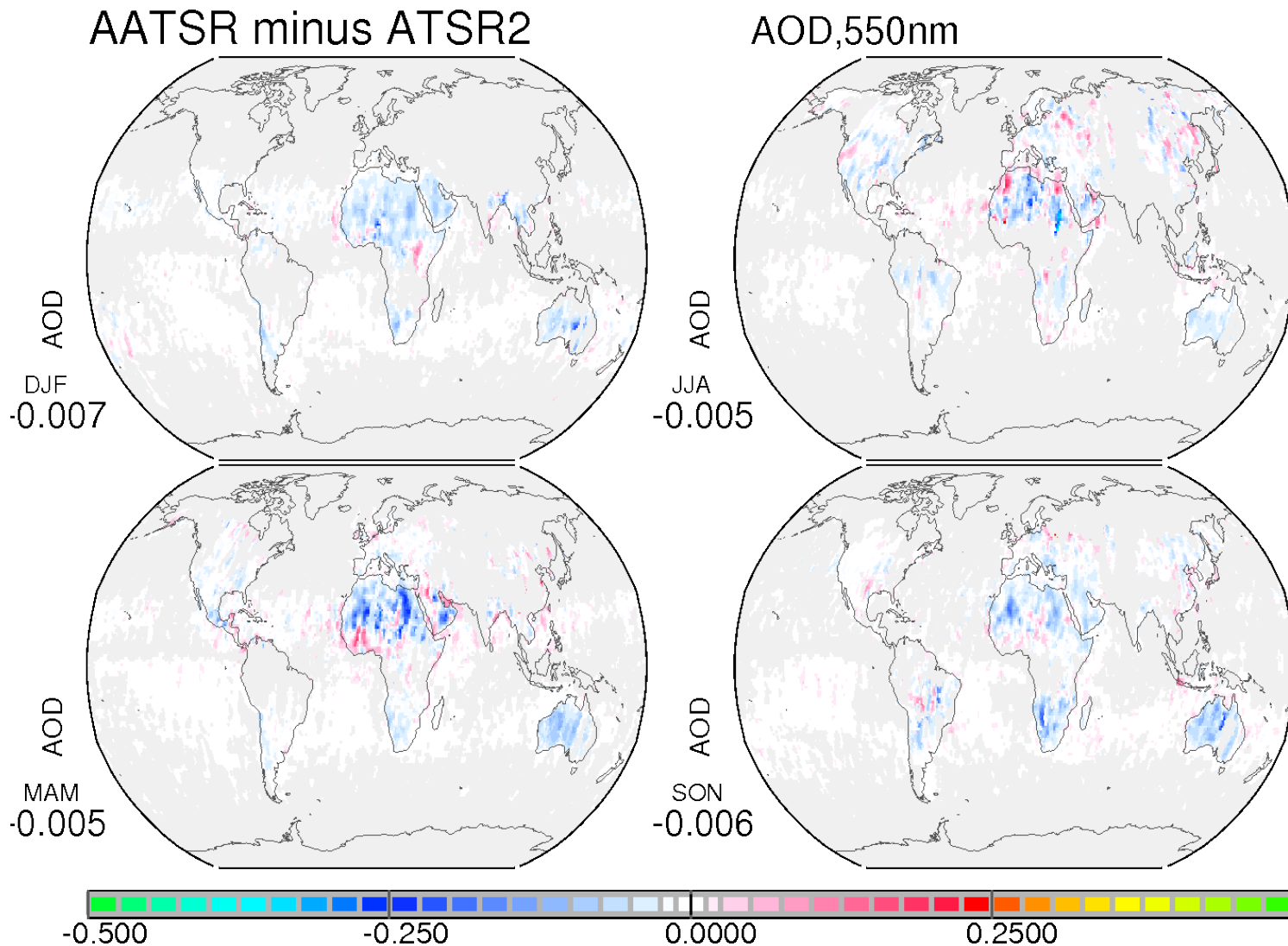


2008

Stability vs. AERONET



Consistency: Overlap ATSR

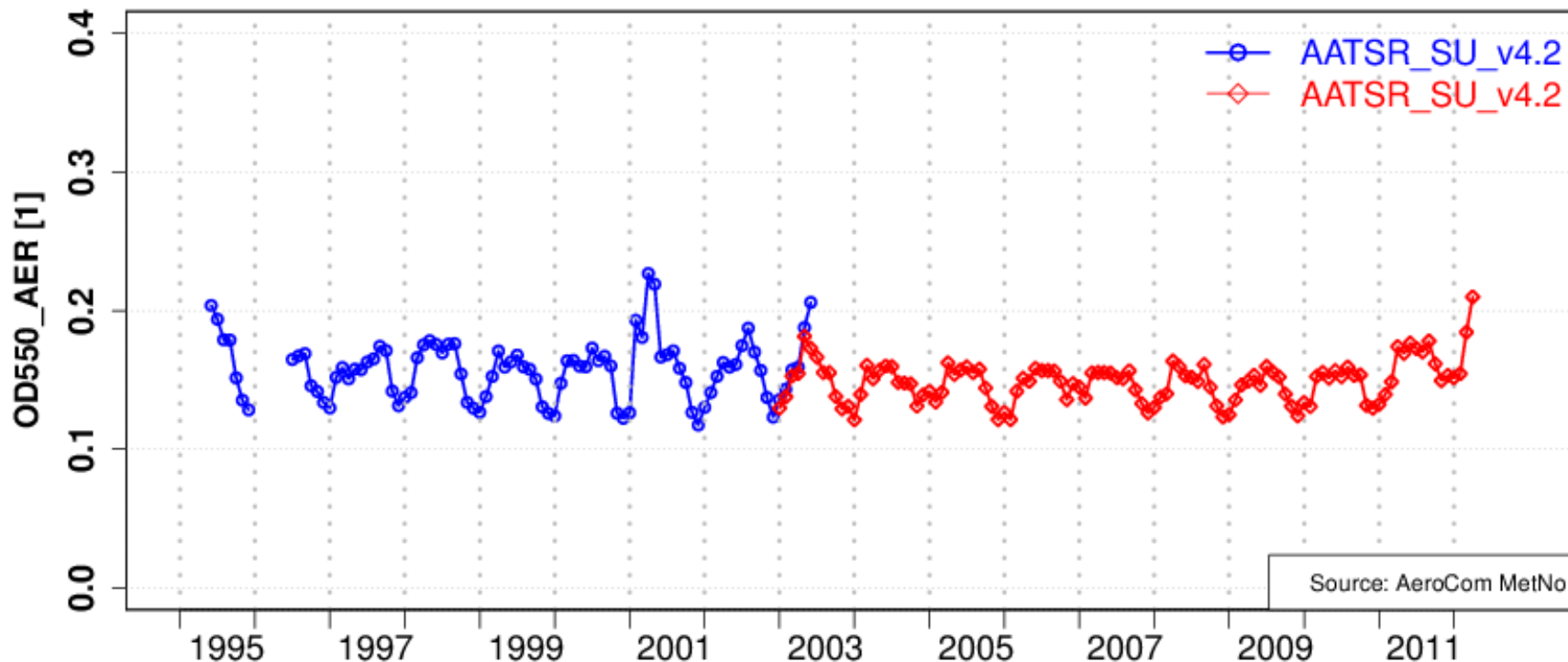


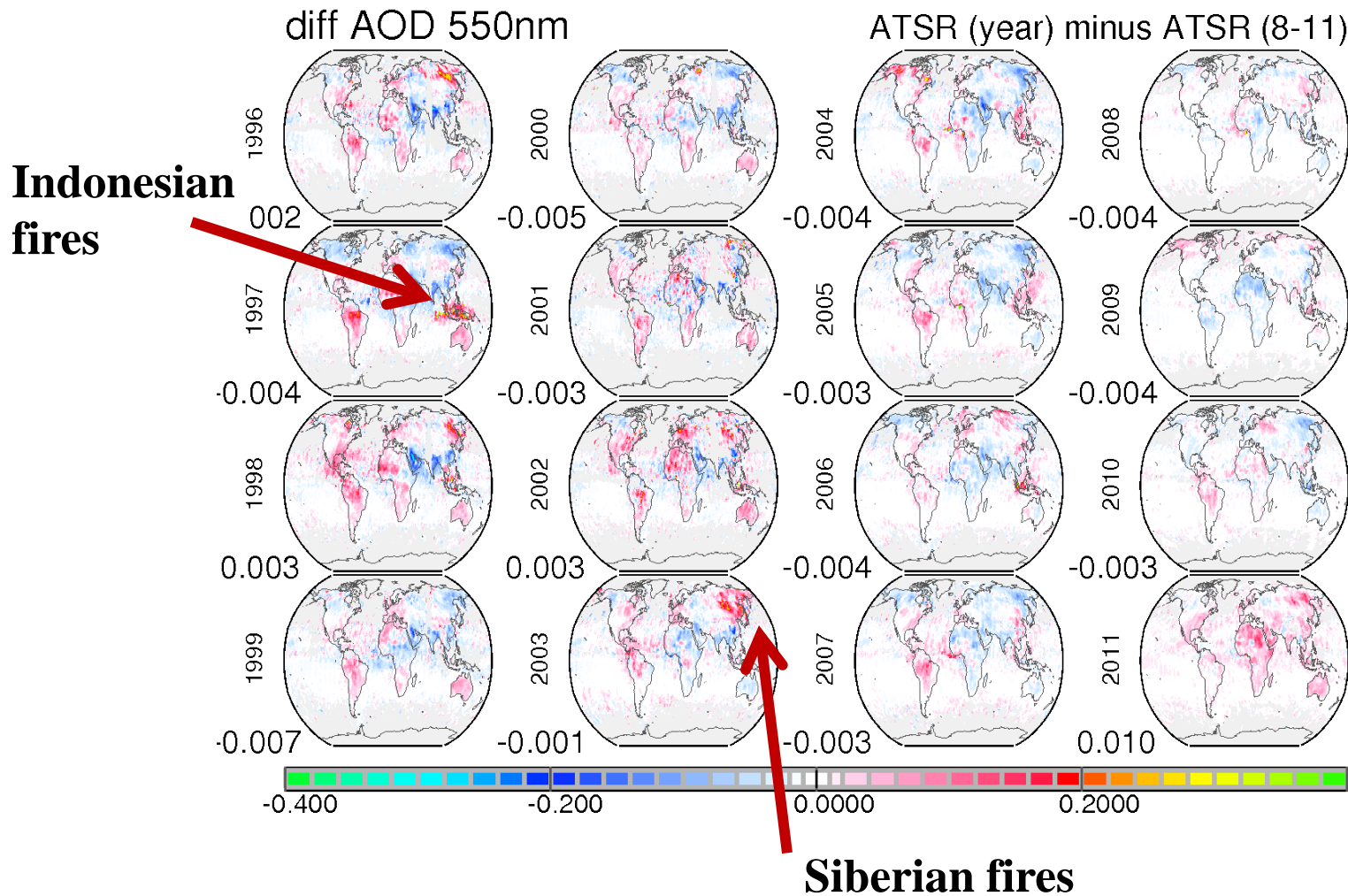
ATSR time series

Evaluation report



WORLD – Trend_in_Area_Mean



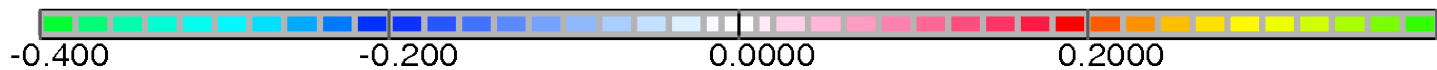
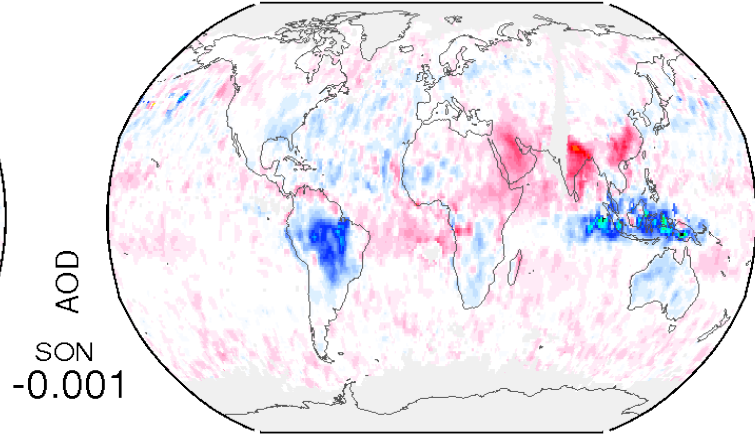
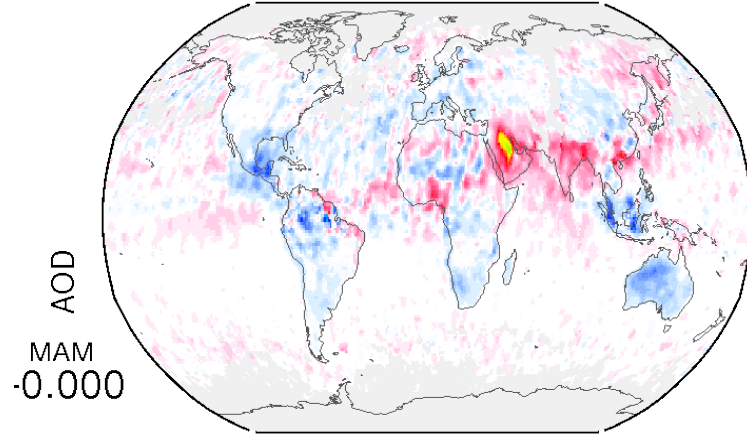
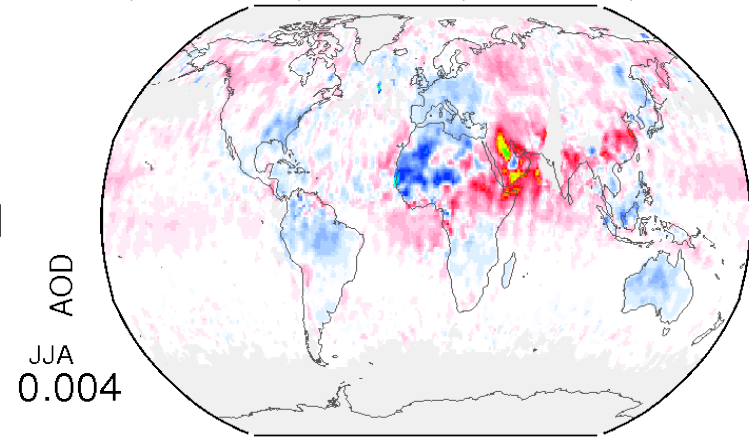
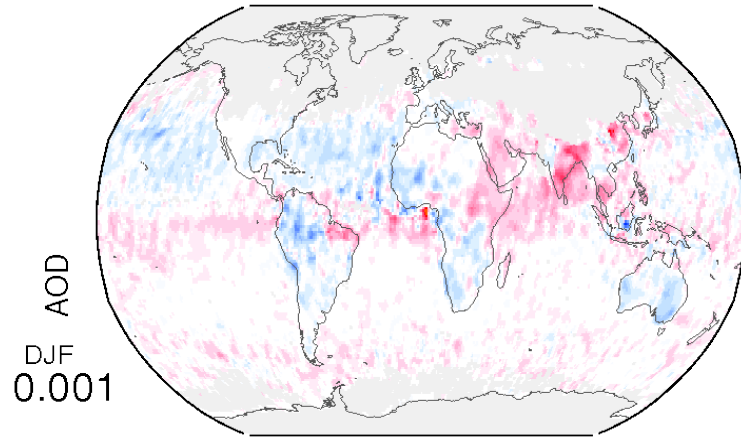


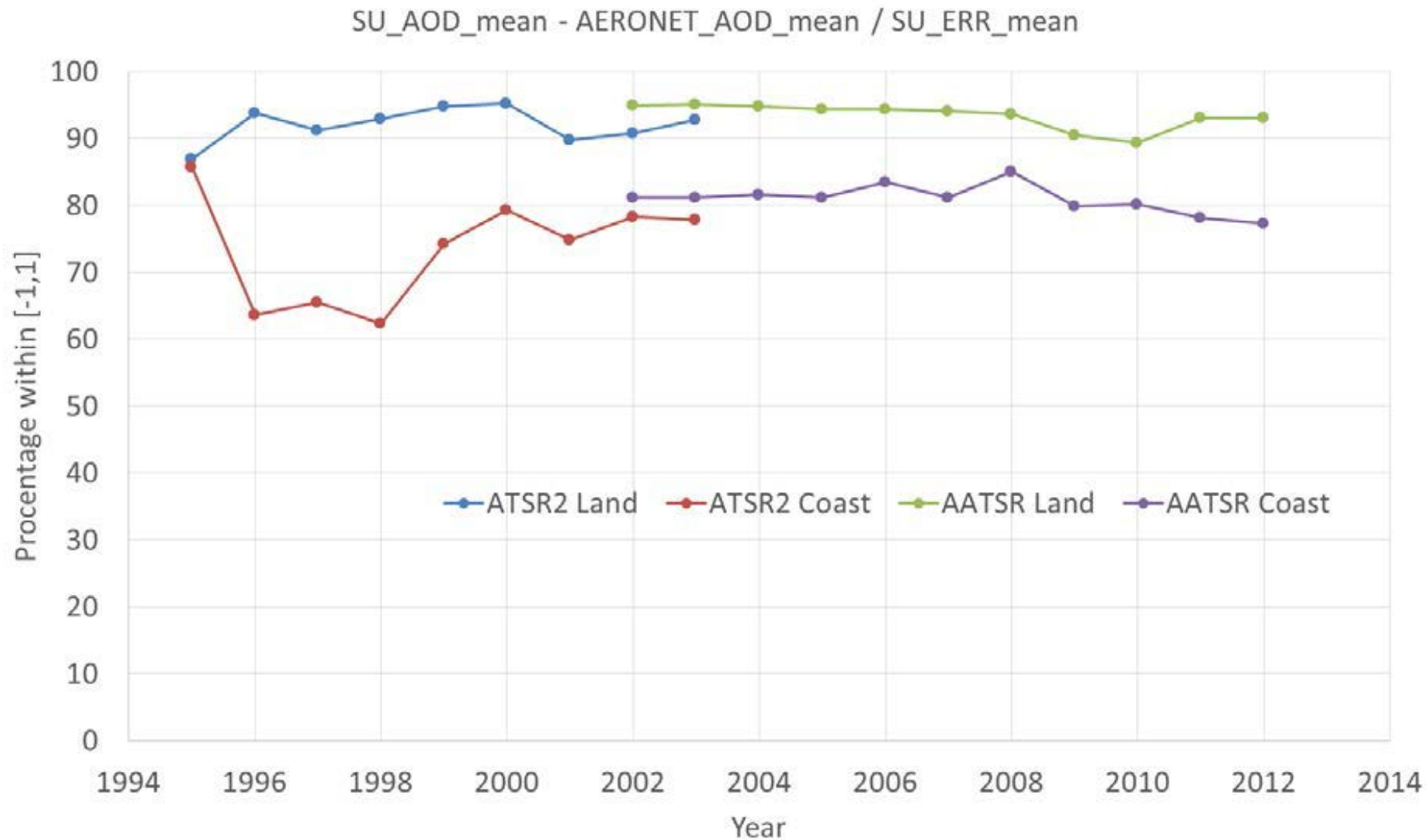
"Trends"



AOD decadal trends

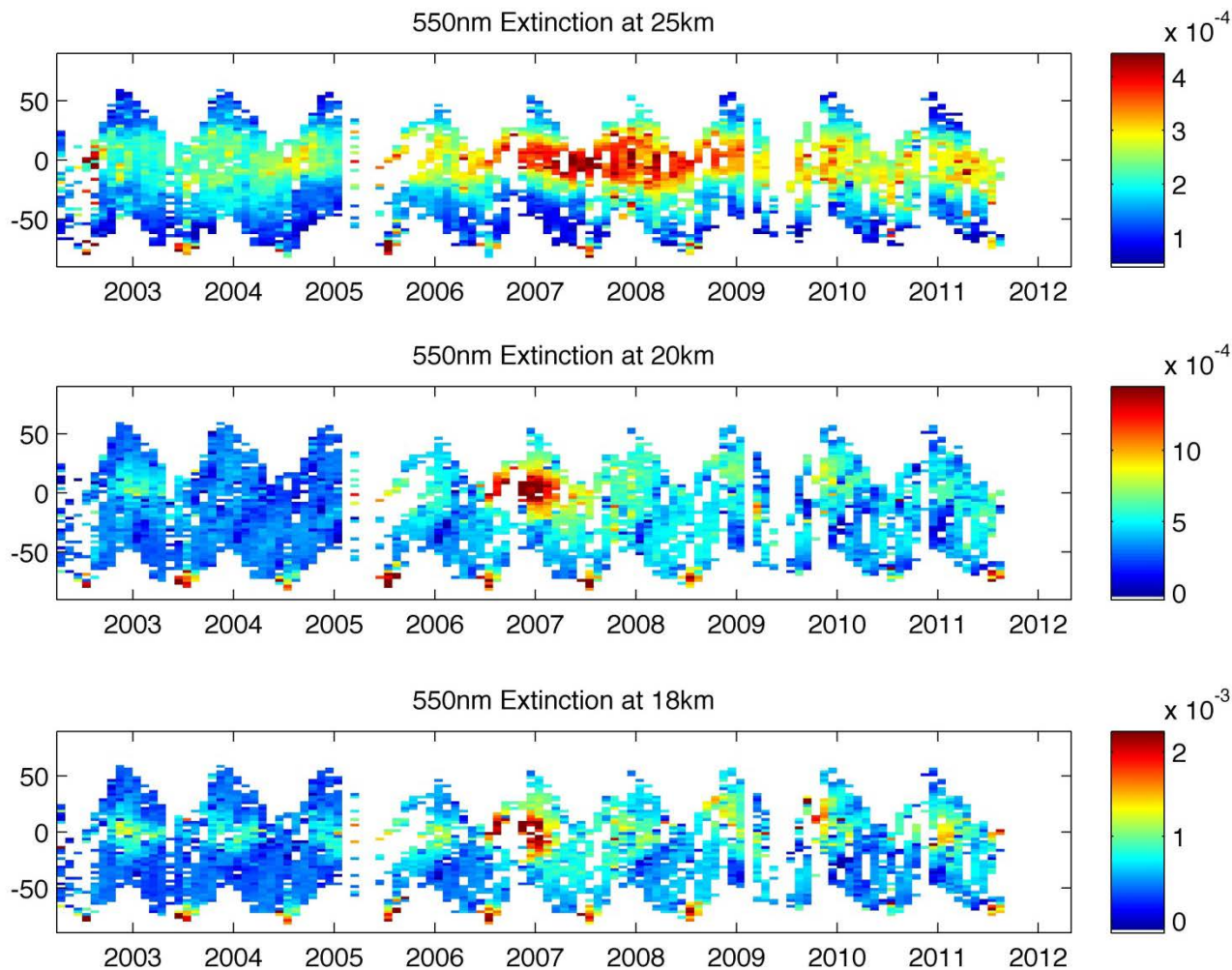
(2008-11) minus (1996-99)





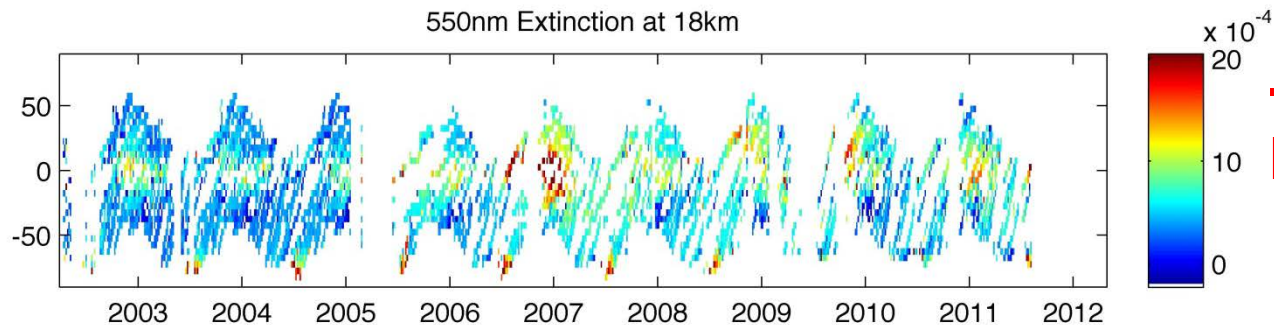
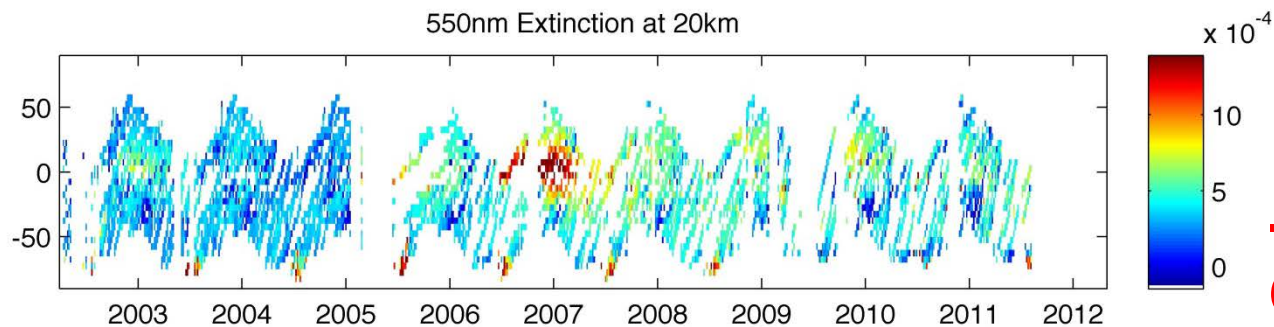
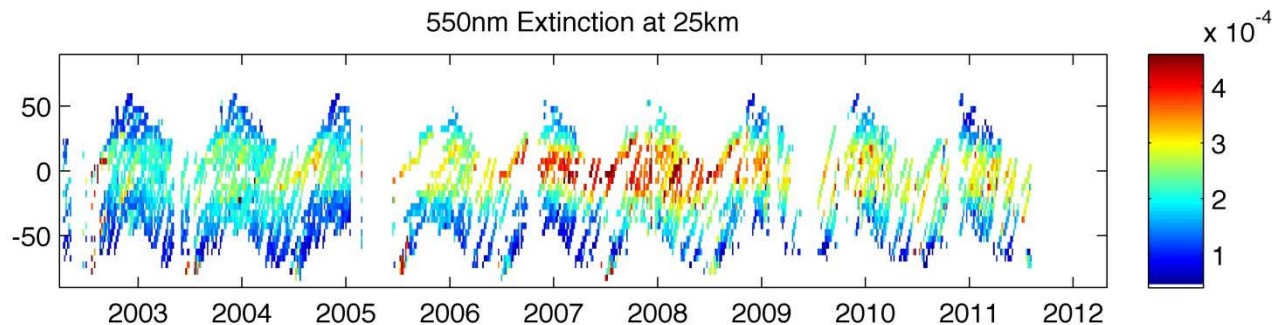


GOMOS time series version GOMOS_AERGOM.v.2.14





New time series with adapted grid (v2.15) (5° latitude x 60° longitude x 1 km altitude x 5 days)

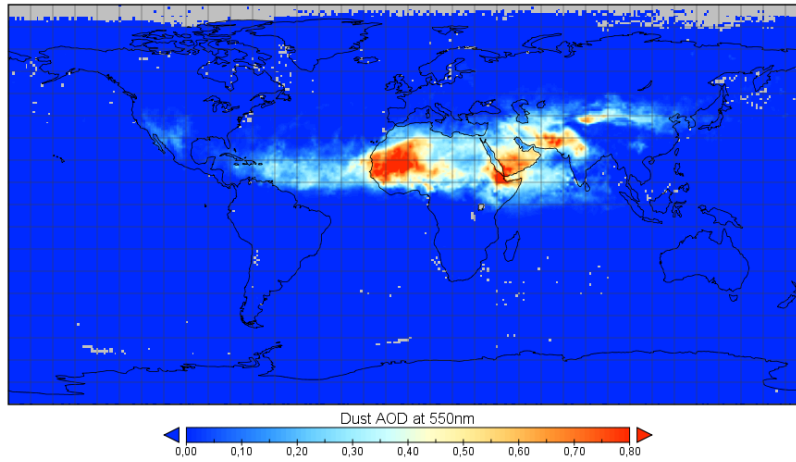


**-> see talk by
Christine Bingen**

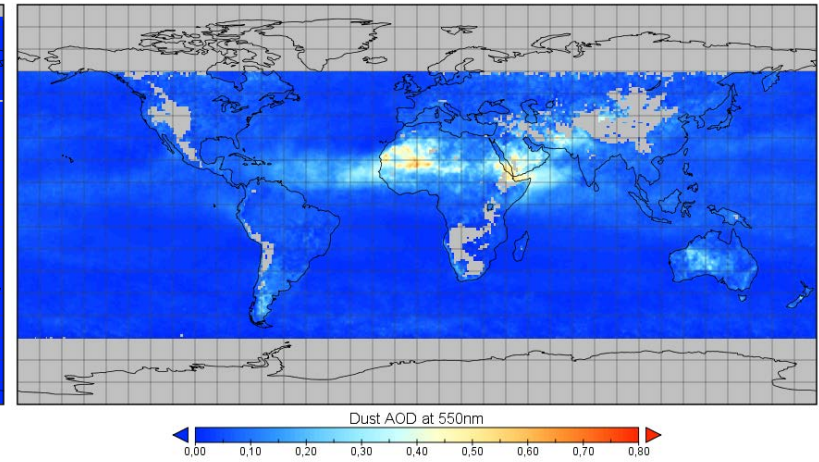
**-> see poster
Robert et al.**



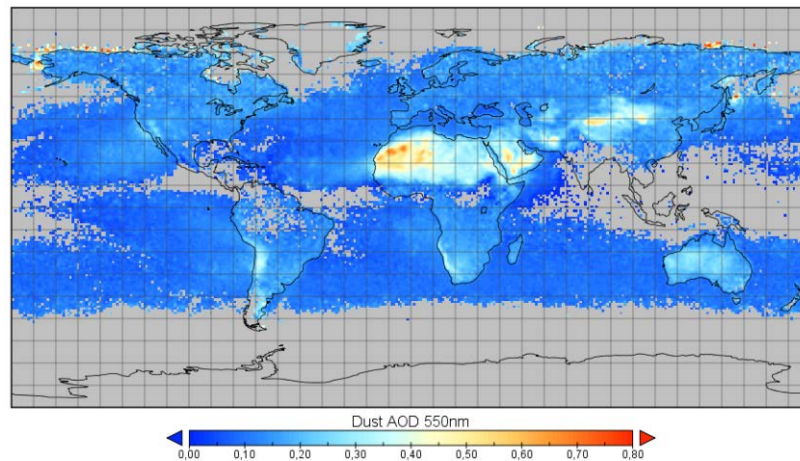
ULB



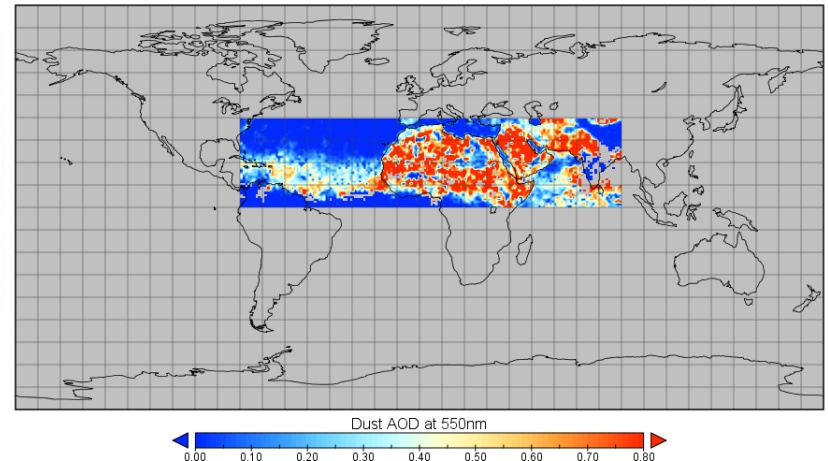
LMD



DLR IMARS v4.0 beta



BIRA



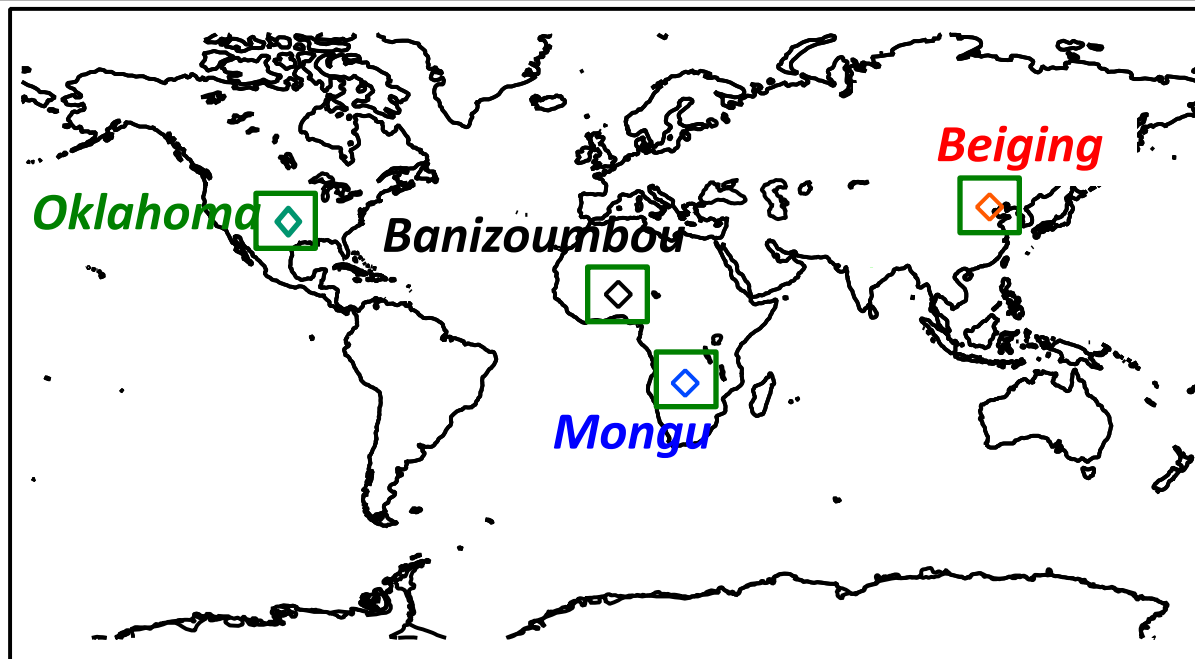
-> see talk by Sophie Vandebussche



- Mainly on Level 2 for product agreement
- At 550nm and 11000 nm
- Comparison of dust/no dust decision (contingency matrix) agreement percentages for 2, 3 and all 4 algorithms
- Comparison of product correlation (AOD magnitude) between 2 IASI algorithms (matrix of all possible combinations).
- For full year 2013 and individual seasons, all observations as well as land and ocean separately.
- SALTRACE comparison with LIDAR observations at Barbados (quantitative comparison of dust AOD)
- Dust plume evolution comparison with MACC dust fields



- Level 2 and Level 3 vs. AERONET SDA coarse mode AOD 550
- Conversion factors 11000 nm -> 550 nm
 - Using algorithm specific conversion factors (can be fixed values or pixel-dependant)
 - Conversion factors can be extracted from product files
 - Use of Kinne „climatology“ not straight forward
- Comparison to AEROCOM dust fields



- **4 selected** regions (1200 km x 1200 km) + Africa
- **1 year (2008)** of **POLDER-3** data processing with GRASP

Banizoumbou:

Surface: Grassland. Aerosol: Coarse mode is dominated (**dust**).

Mongu:

Surface: Savanna. Aerosol: Fine mode is dominated (**biomass burning**).

Beijing:

Surface: Urban. Aerosol: Fine and Coarse modes (**industrial/dust**).

Cart_Site (Oklahoma):

Surface: Grassland. Aerosol: Fine and Coarse modes (**rural**).



ORAC: June 2008

Uncertainty validation -> see poster K. Stebel et al



- **The issue: coverage vs. Cloud contamination**
- Comparison of 3 AATSR cloud masks
 - vs. Manual /neural network ATSR/MERIS cloud masks
 - vs. SYNOP observations
 - vs. CALIOP matches
 - shows similar „order of conservativeness“
- Analysis of „wrong cases“ vs. CALIOP cloud / aerosol types
 - -> identify improvement opportunities per algorithm
- Collaboration with GlobTemperature round robin

**An alternative: joint or combined aerosol / cloud retrieval
-> see talk by Gerrit de Leeuw and poster A. Povey, et al.**



- Full mission time series becoming available
 - ATSR AOD 17 year
 - GOMOS stratospheric extinction 10 year
 - Evaluation ongoing
- New datasets added / round robin ongoing
 - IASI mineral dust
 - POLDER multi-pixel reference
- Algorithm improvements under way
 - Uncertainties
 - Cloud masking
 - **Surface treatment -> see poster M. Kosmale et al.**