Joint Accuracy Assessment of Aerosol Retrievals from Multiple Satellite Sensors and GEOS-5 model

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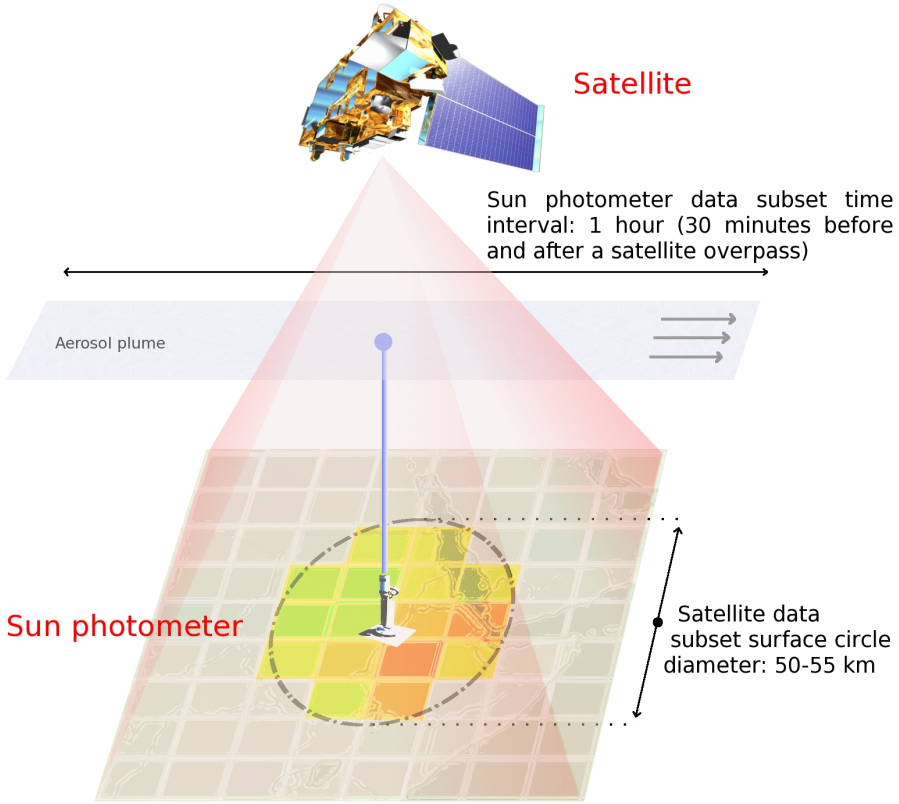
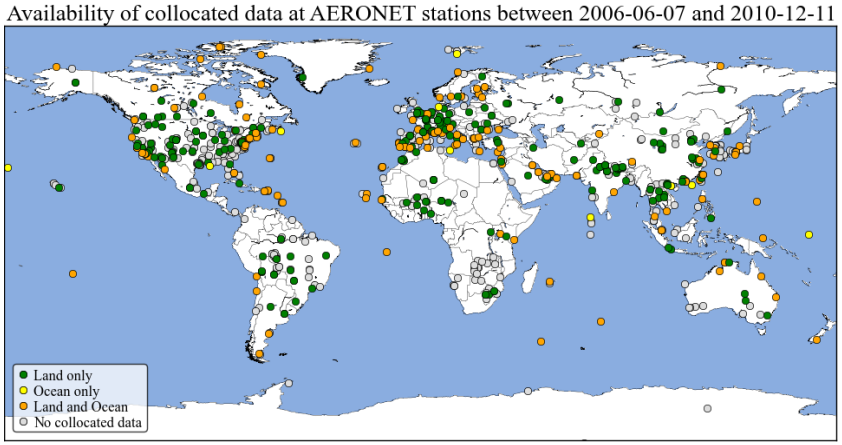
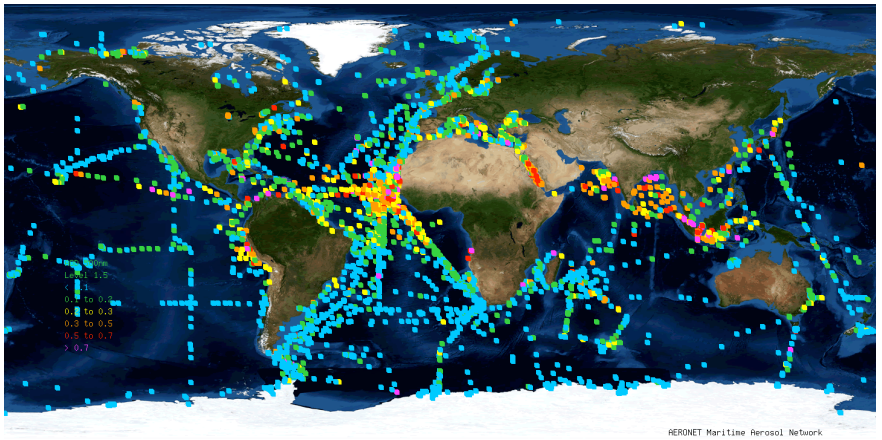
Presented at 13th AeroSat / AeroCom Workshop 29 September - 2 October 2014, Steamboat Springs, Colorado

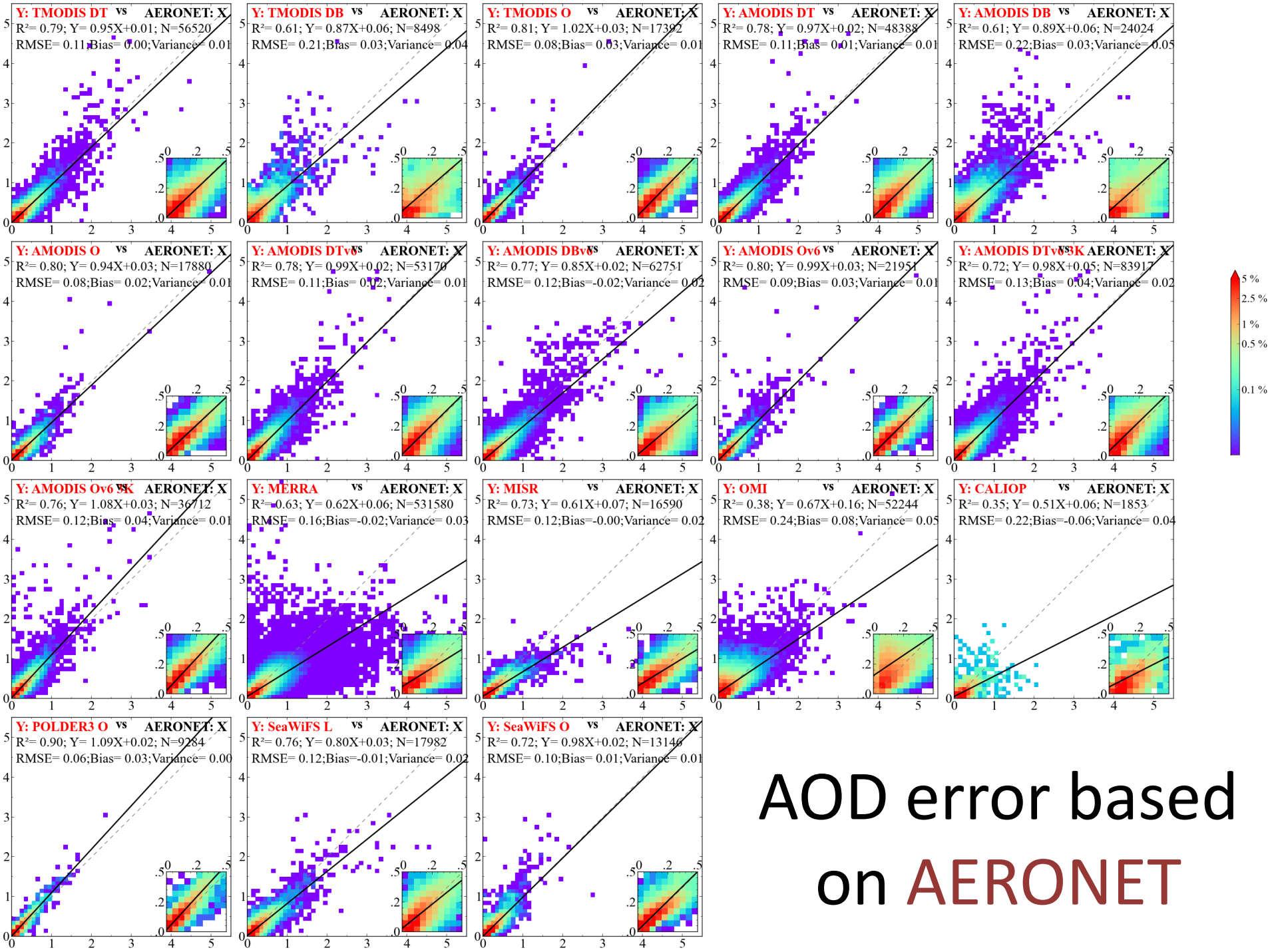
MAPSS: Multi-sensor Aerosol Products Sampling System



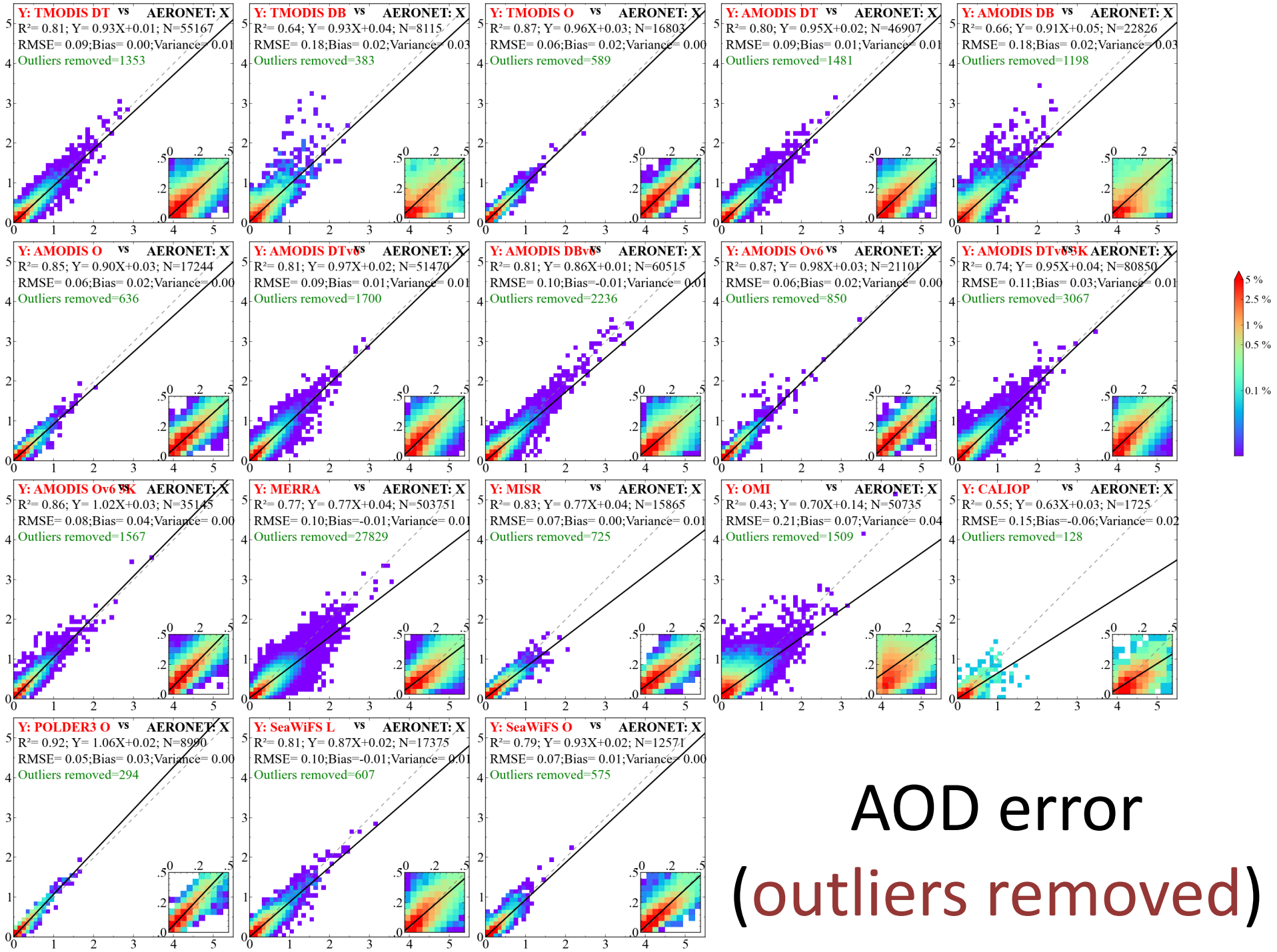
- MAPSS uniformly samples Level-2 aerosol products from multiple sensors over uniform areas of 55km centered around sun photometer AERONET ground stations and MAN cruise locations
- MAPSS supports Level 2 aerosol data from different spaceborne sensors and a model, including MODIS, MISR, OMI, POLDER, CALIOP, SeaWiFS, VIIRS, MERRAero







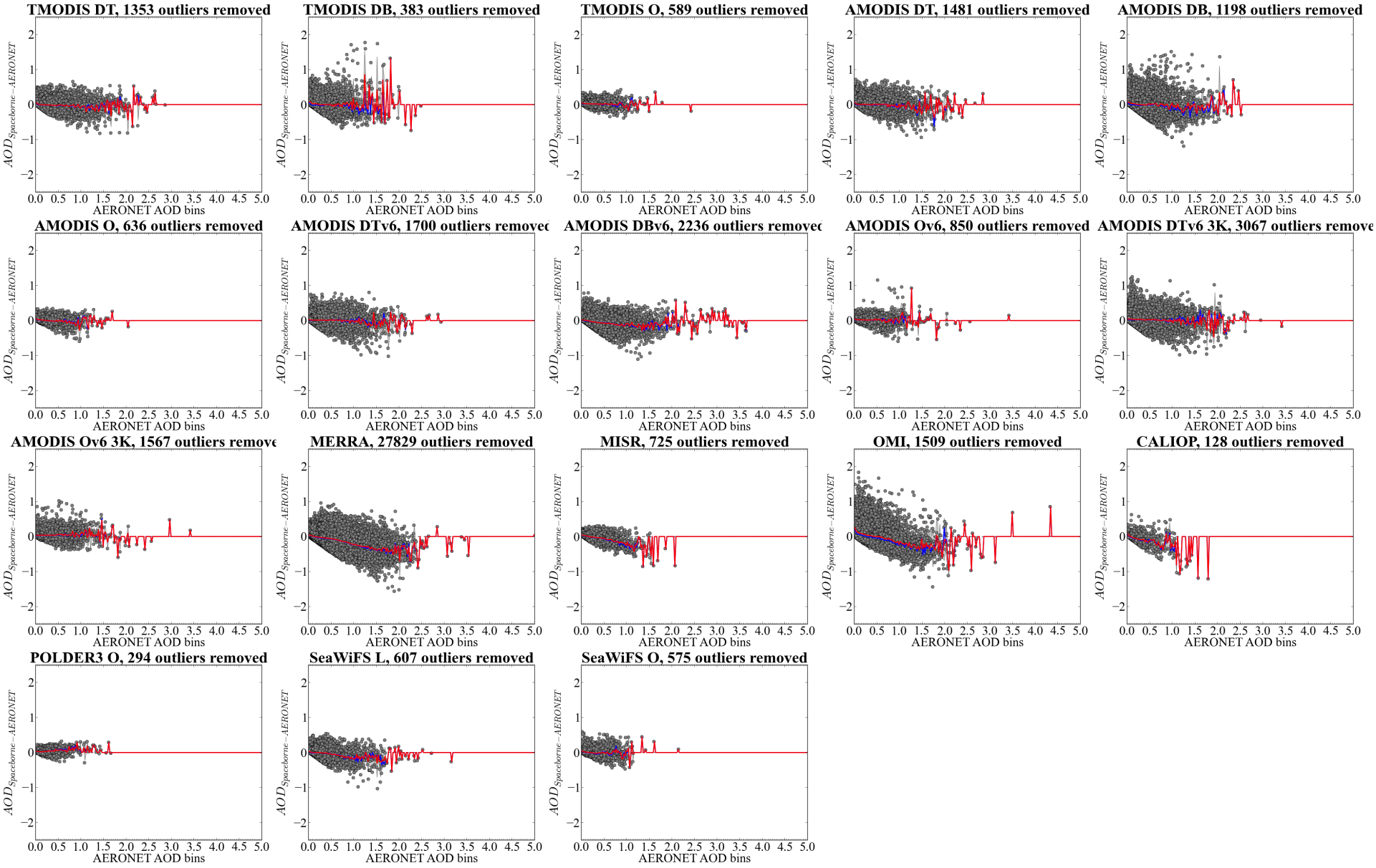
AOD error based on AERONET

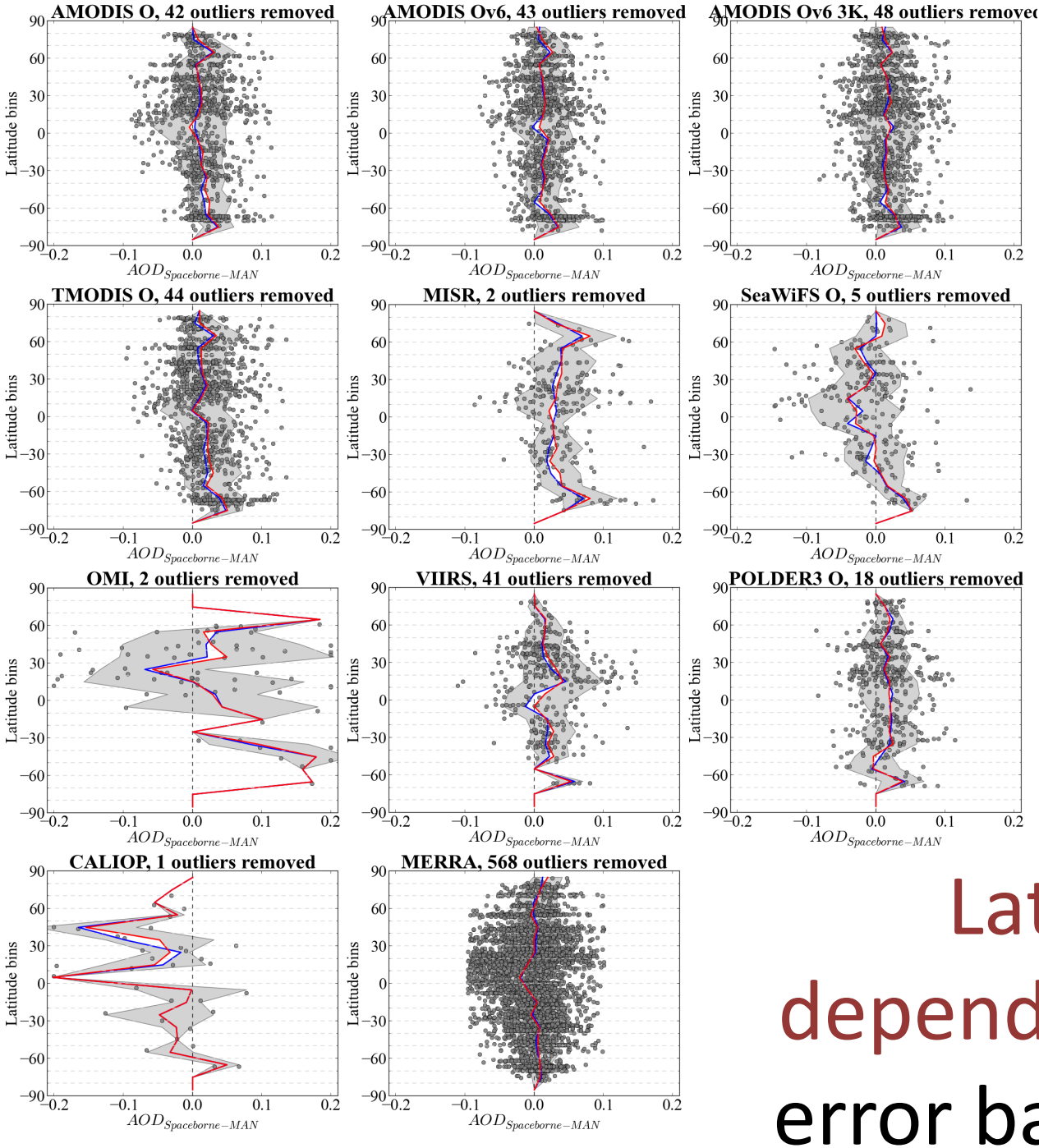


AOD error

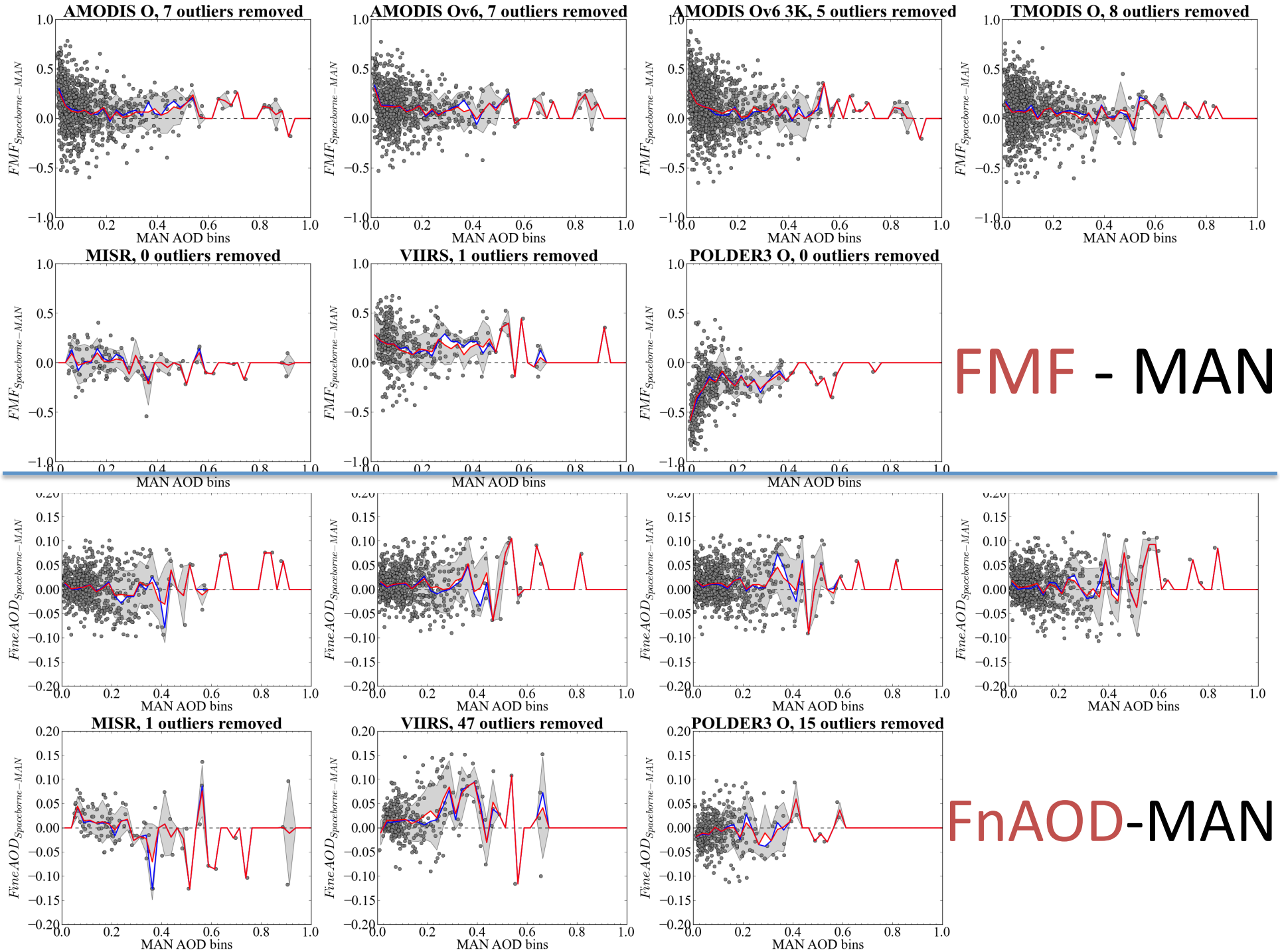
(outliers removed)

AOD error depending on loading





Latitudinal dependence of AOD error based on MAN

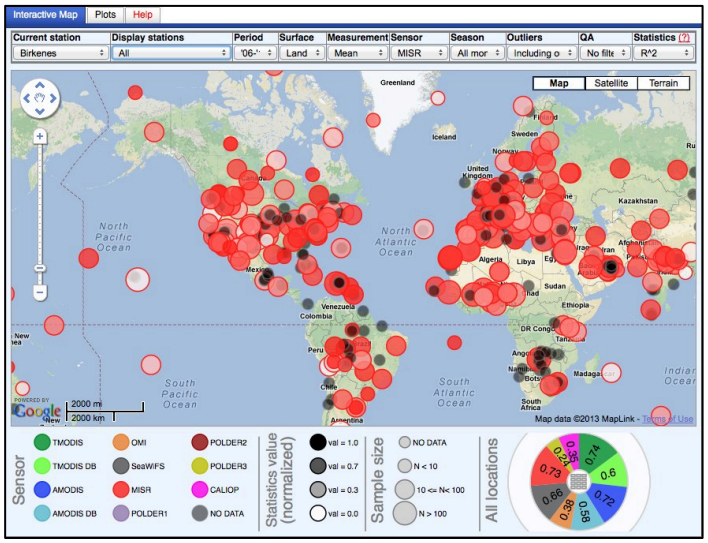

AMODIS O, 7 outliers removed
AMODIS Ov6, 7 outliers removed
AMODIS Ov6 3K, 5 outliers removed
TMODIS O, 8 outliers removed
MISR, 0 outliers removed
VIIRS, 1 outliers removed
POLDER3 O, 0 outliers removed
FMF - MAN
MISR, 1 outliers removed
VIIRS, 47 outliers removed
POLDER3 O, 15 outliers removed
FnAOD-MAN
MAN AOD bins
FMF_Spaceborne−MAN
FineAOD_Spaceborne−MAN

Challenges of the multivariate analysis

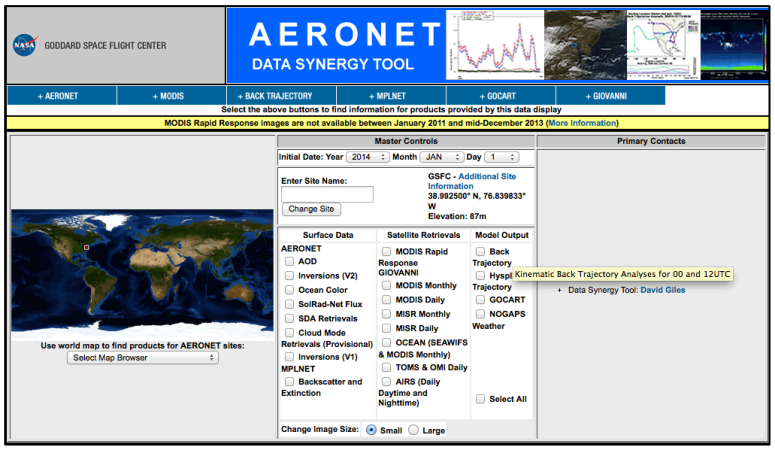
- Near impossible to report results at each individual site
- Additional parameters further complicate the analysis
  - Multiple statistics (R2,RMSE, Error Envelope, etc.)
  - Multiple seasons
  - Multiple validation strategies (mean vs closest pixel)
  - Different QA filters, outliers, and so on
- Looking at your own data becomes problematic!
- Possible solutions
  - Tables can fit more data than plots, but are harder to read and understand (besides, they can not fit everything either)
  - Digital supplements and archives are a tempting solution, but are they actually read?
  - Interactive tools and data services

Interactive multi-sensor tools

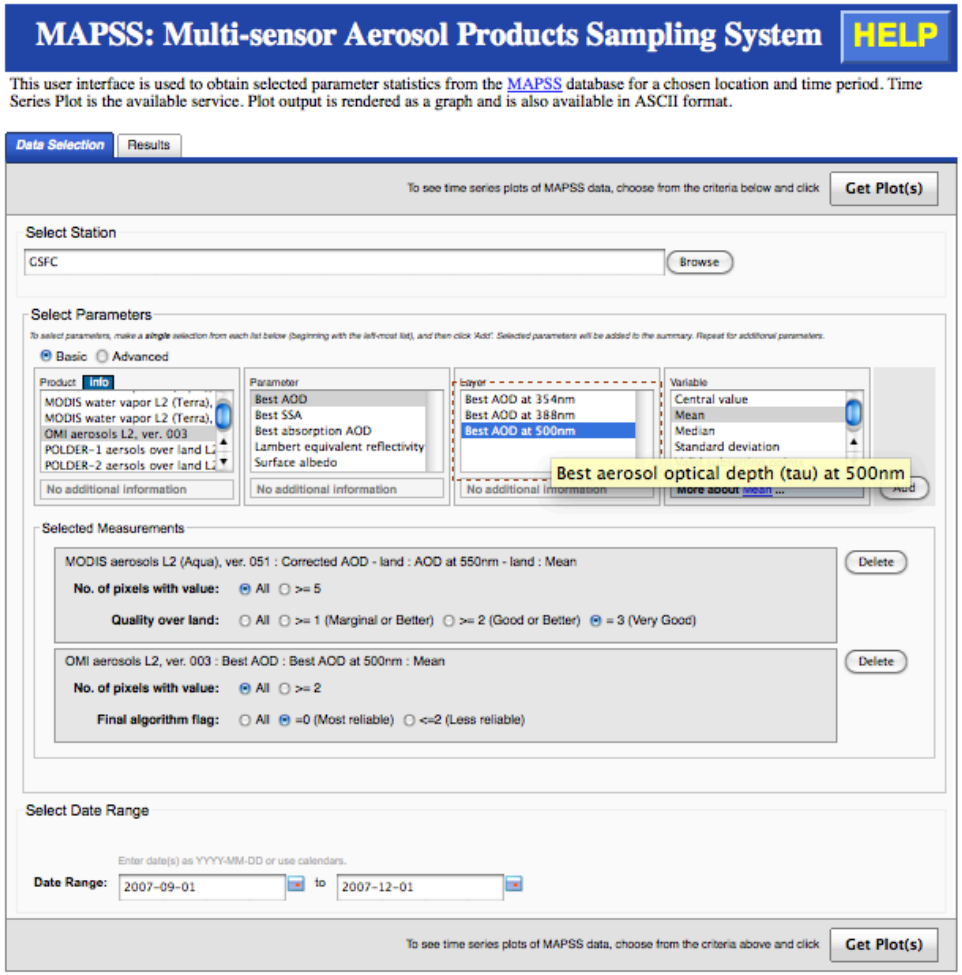
MAPSS data explorer:
http://giovanni.gsfc.nasa.gov/mapss_explorer/



AERONET data synergy tool:
http://aeronet.gsfc.nasa.gov/cgi-bin/bamgomas_interactive



MAPSS in Giovanni:
http://giovanni.gsfc.nasa.gov/mapss/



Benefits of multi-sensor systems for end users of the data

- Dramatically cut learning curve necessary to access multiple data products, including proprietary data formats, proper use of QA flags, usage recommendation, and so on
- Enable quick and efficient what-if analysis
- Reduce overall analysis time

Pitfalls

- Greater potential for abusing the data
- Analysis types are limited to those implemented in the system
  - Need to provide a unified L2(G) data for multiple sensors