



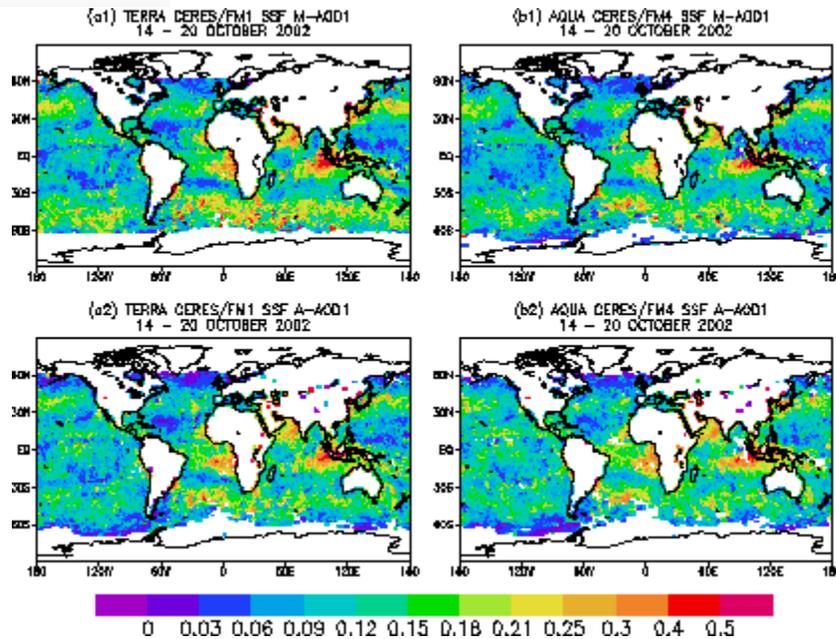
Spectral Aerosol Optical Depth
from *Terra/Aqua* MODIS over ocean
(Preliminary results)

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NOAA/NESDIS

U.Lille/GSFC: Didier Tanré, Lorraine Remer, Yoram Kaufman (analyses)
LaRC: Kathleen Morris, Erika Geier (data help)

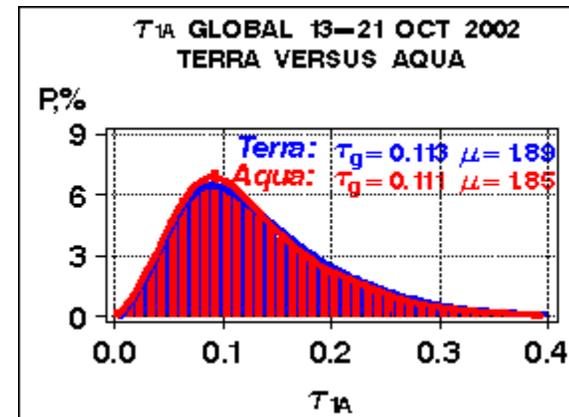
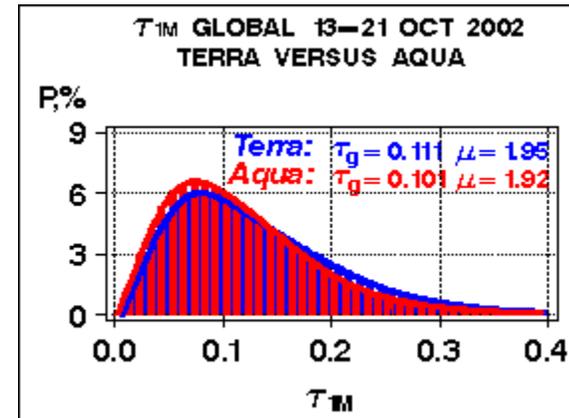


Previous analyses: AOD consistency



M

A



CERES2 STM-2 (Nov 04):

Check $\tau_1(0.659 \mu\text{m})$ for cross-consistency
Terra vs. Aqua, Multi- vs. single-channel

Two aerosol products over ocean on Terra/Aqua. JAS, April 2005.

Consistency of two aerosol products over ocean on Terra/Aqua. Proc. SPIE Symp., Jan 2005.



Spectral AOD consistency



This meeting:

Check consistency of MOD04 *spectral* AODs (collection 003):

Global $(1^\circ)^2$ 13-21 Oct 2002 *Terra* FM1 Ed1A/Aqua FM4 β

61,459 spectral MODIS AODs (7 λ from 0.47-2.13 μm)

Compare functions (7-dimensional variables):

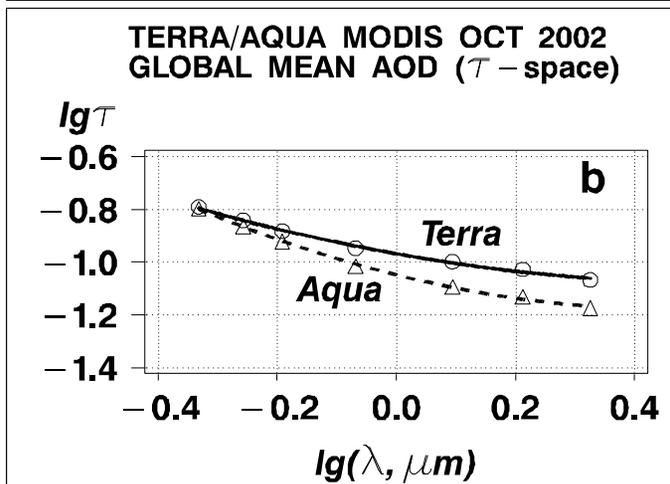
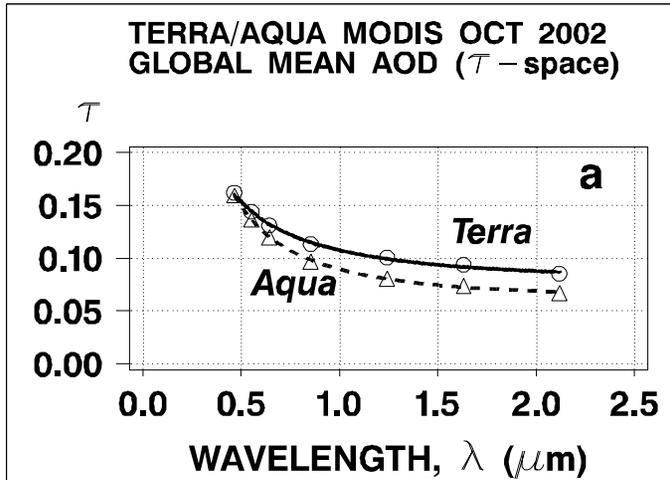
Compress spectral AOD using PCA

$$\tau(\lambda) = e_0(\lambda) + \alpha_1 e_1(\lambda) + \alpha_2 e_2(\lambda) + \alpha_3 e_3(\lambda)$$



Global mean spectral AODs

$$\tau(\lambda) = e_0(\lambda) + \alpha_1 e_1(\lambda) + \alpha_2 e_2(\lambda) + \alpha_3 e_3(\lambda)$$

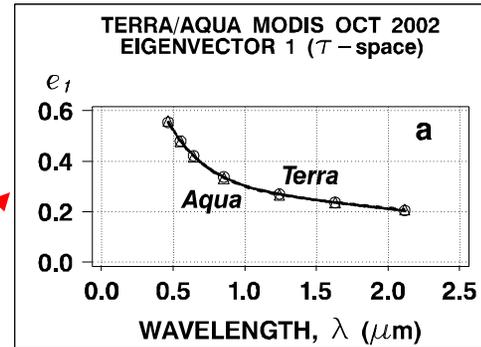
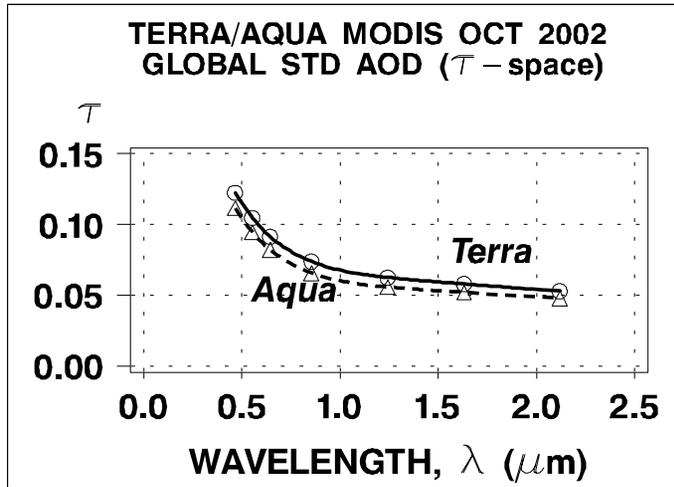


Terra/Aqua: Mean AODs Differ

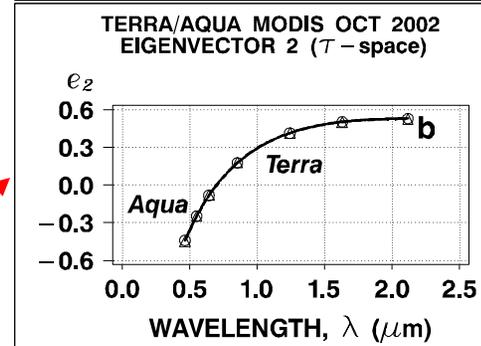
Effective Angstrom exponent, α :
~ 0.3 Terra, ~ 0.5 Aqua



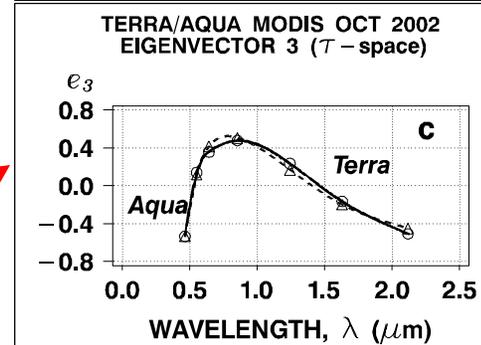
Global STD and PCA



~94.2%



~5.5%

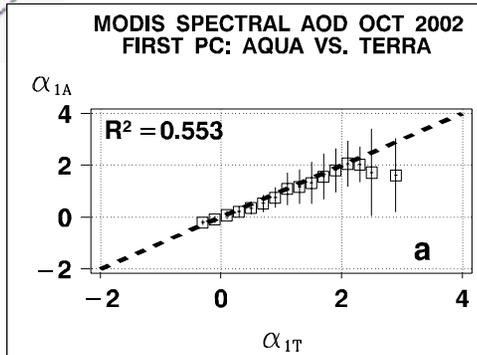


~0.2%

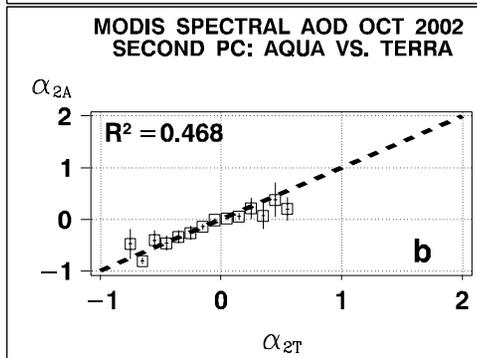
$$\tau(\lambda) = e_0(\lambda) + \alpha_1 e_1(\lambda) + \alpha_2 e_2(\lambda) + \alpha_3 e_3(\lambda)$$



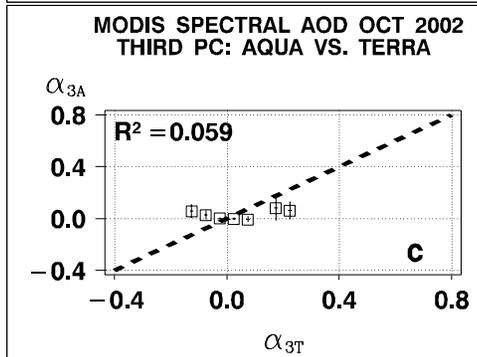
Terra/Aqua PC correlations



1st PC: Highly correlated; Differ at high AOD



2nd PC: Highly correlated; Differ on both ends



3rd PC: No correlation; Noise



Preliminary conclusion to collection 003(?)



- Global mean spectral AODs from *Terra* and *Aqua* differ (Angstrom exponent: ~ 0.3 from *Terra* and 0.5 from *Aqua*)
- EOFs: Well reproducible from *Terra/Aqua*
- Two PCs: Explain 99.7% variability; Correlate between *Terra/Aqua*
- 3rd PC: Noise

Future work

- Repeat calculations with collection 004 MOD04
- Extend spectral AOD analyses and document
- Attach long-term perspective to the analyses



Gridded $(1^\circ)^2$ -aerosol & ancillary data (by-product of ADM processing)



- Norman Loeb wrote original version of the code
- Generated 8-month of TRMM/VIRS data (analyses done, drafted write-up)
- Nitchie Manalo-Smith modified code for MODIS (Generated sample 1-week worth of data/Looks good)
- Acquired disk space to stage data
- Will generate time series of Terra and Aqua aerosols



AVHRR-like aerosol LUTs delivered for SEVIRI

- Steve DeWitte (RMI/Belgium)
- Helen Brindly (Imperial/UK)
- Pat Minnis/Sunny Sun-Mack (NASA/LaRC)
- Marianne König (EUMETSAT)

Ignatov visited EUMETSAT in April 2005 to assist with AVHRR-like algorithm implementation & evaluation

Brindly drafted a paper with her AVHRR like analyses

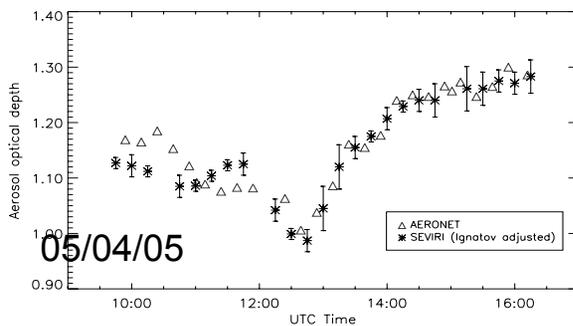
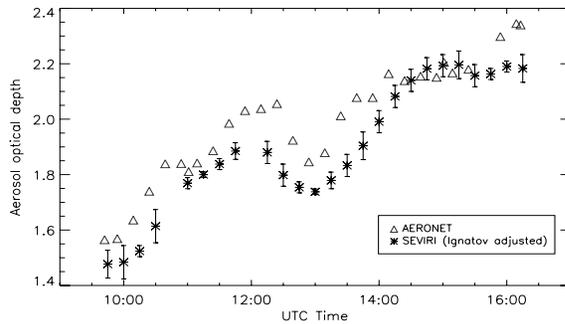
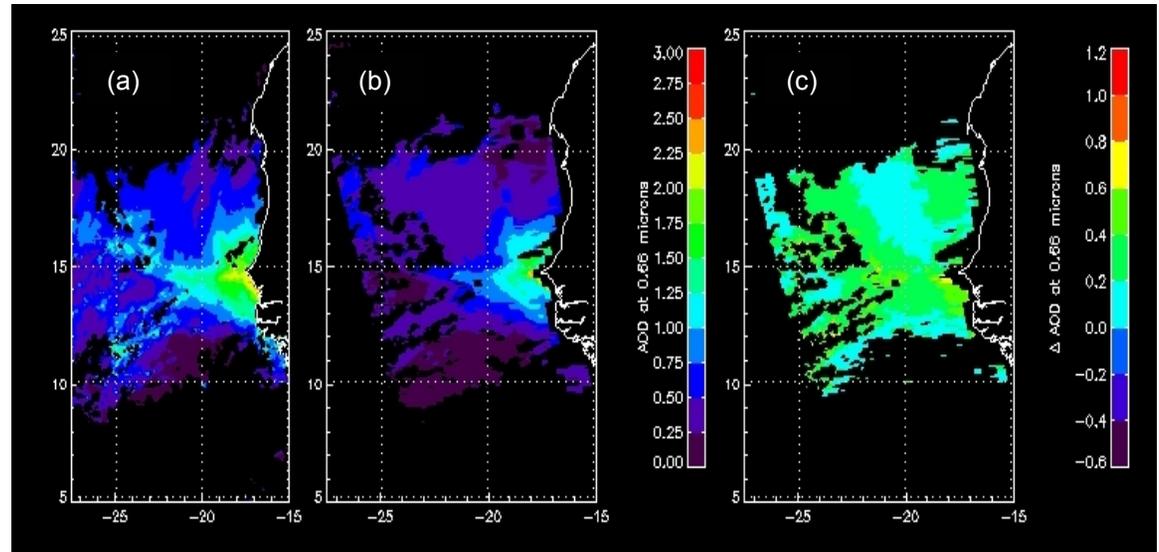


Preliminary results by Dr. Helen Brindley (IC, UK)



MSG/SEVIRI Aerosol

- (a) AOD (0.66 μm) from SEVIRI (1515 UTC, 12 Oct 2004) using adjusted NESDIS aerosol model
- (b) Same but from MODIS (1510 UTC).
- (c) Difference of (a) and (b)



Validation of temporal evolution of SEVIRI AOD versus AERONET ground truth:

Top: 12 October 2004

Bottom: 13 October 2004



Documenting CERES aerosols

- *Two MODIS Aerosol products over ocean on CERES SSF datasets. (JAS CLAMS Special issue, April 2005).*
- Consistency of two MODIS aerosol products over ocean on Terra and Aqua CERES SSF datasets, Proc. SPIE Symposium Remote Sensing, 8-12 Nov 2004, Honolulu, HI, **5652**, 89-98.