



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

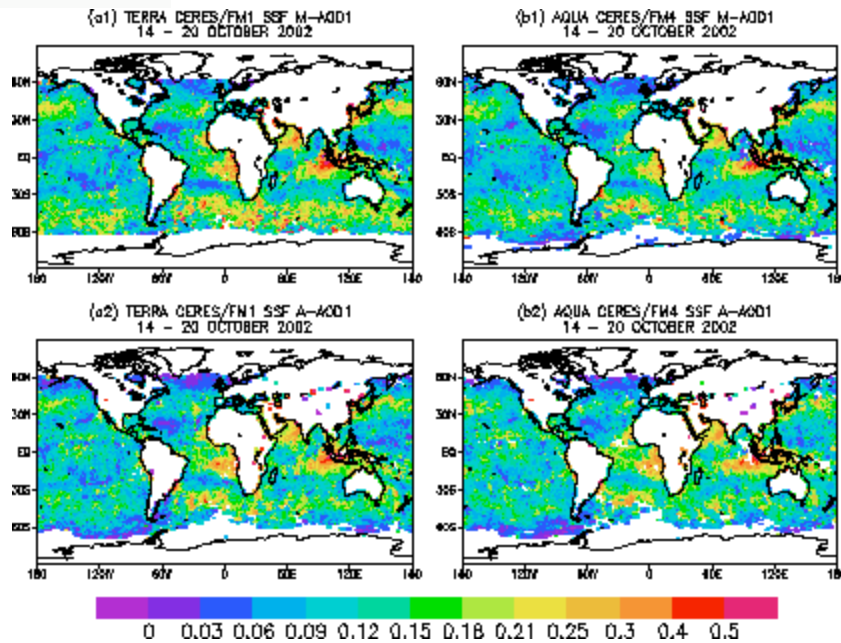
Alexander Ignatov  
NOAA/NESDIS

U.Lille/GSFC:  
LaRC:

Didier Tanré, Lorraine Remer, Yoram Kaufman (analyses)  
Kathleen Morris, Erika Geier (data help)

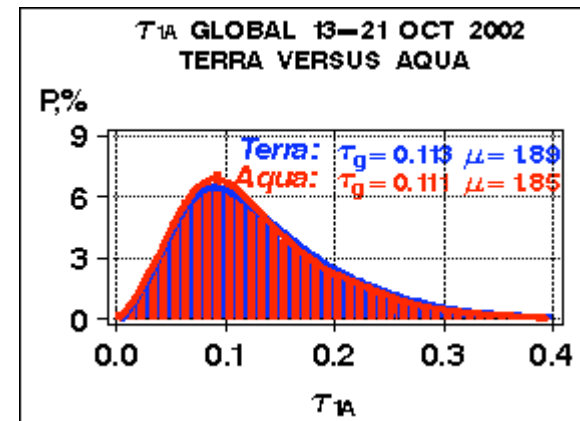
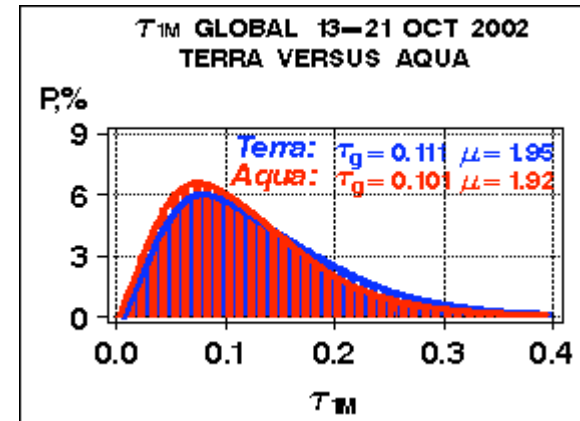


# Previous analyses: AOD consistency



M

A



CERES2 STM-2 (Nov 04):

Check  $\tau_1(0.659 :m)$  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, 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 \_  
61,459 spectral MODIS AODs (7 \_ from 0.47-2.13 \_m)

Compare functions (7-dimensional variables):

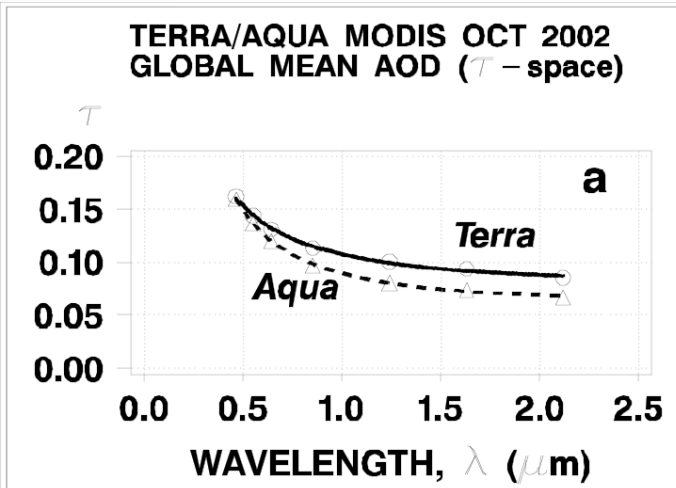
Compress spectral AOD using PCA

$?(?) ? e_0(?) ? ?_1 e_1(?) ? ?_2 e_2(?) ? ?_3 e_3(?)$

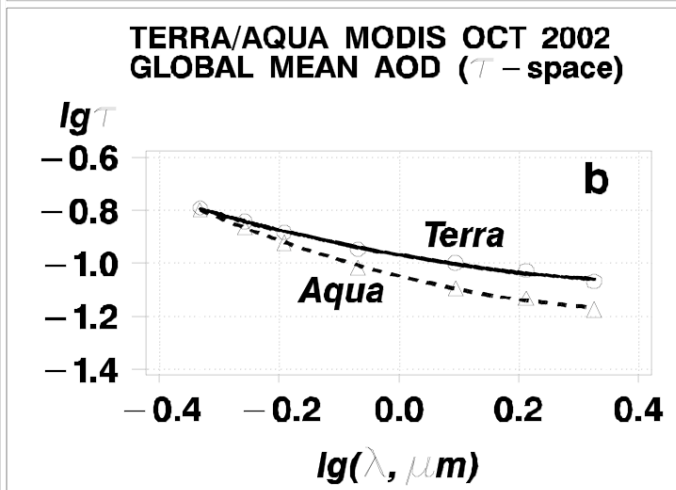


# Global mean spectral AODs

$$? (?) ? e_0 (?) ? ?_1 e_1 (?) ? ?_2 e_2 (?) ? ?_3 e_3 (?)$$



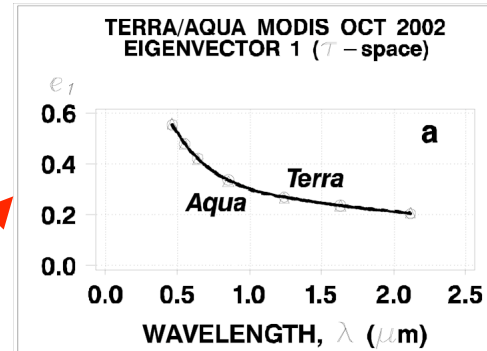
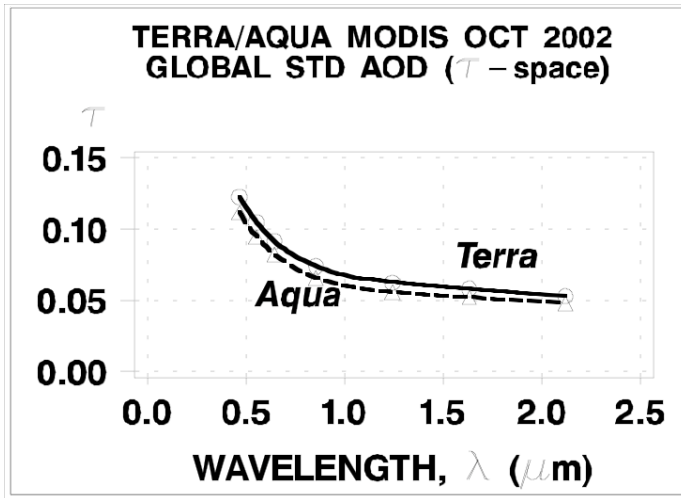
Terra/Aqua: Mean AODs Differ



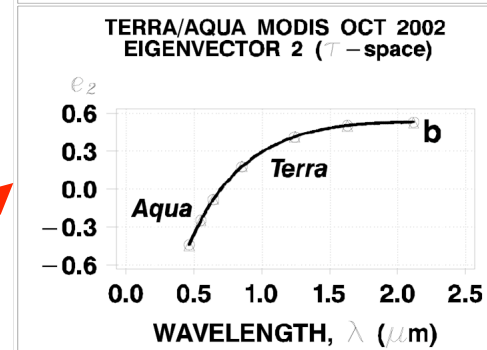
Effective Angstrom exponent,  $\alpha$ :  
~ 0.3 Terra, ~ 0.5 Aqua



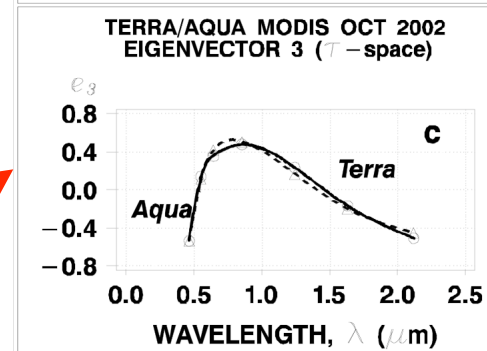
# Global STD and PCA



~94.2%



~5.5%

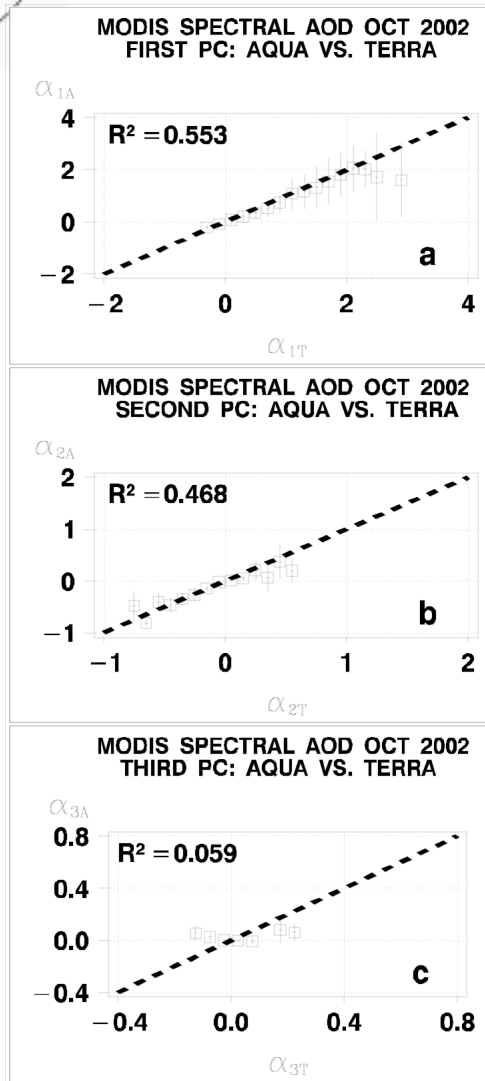


~0.2%

$??_0 e_0(?) ? ?_1 e_1(?) ? ?_2 e_2(?) ? ?_3 e_3(?)$



# Terra/Aqua PC correlations



*1<sup>st</sup> PCs: Highly correlated; Differ at high AOD*

*2<sup>nd</sup> PCs: Highly correlated; Differ on both ends*

*3<sup>rd</sup> PCs: No correlation; Noise*



## Preliminary conclusion to collection 003(?)



- Global mean spectral AODs differ from *Terra/Aqua*  
(Angstrom exponent: *Terra* ~0.3, *Aqua* ~0.5)
- EOFs: Well reproducible from *Terra/Aqua*
- Two PCs: Explain 99.7% variability; Correlate between *Terra/Aqua*
- 3rd PC: Noise
- (Implications for info content/Assimilation/Climate?)

### Future work

- Repeat calculations with collection 004 MOD04
- Extend spectral AOD analyses/Document
- Extend analyses to long-term (climate)



## 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 implemented A-retrievals w/SEVIRI/Drafted paper

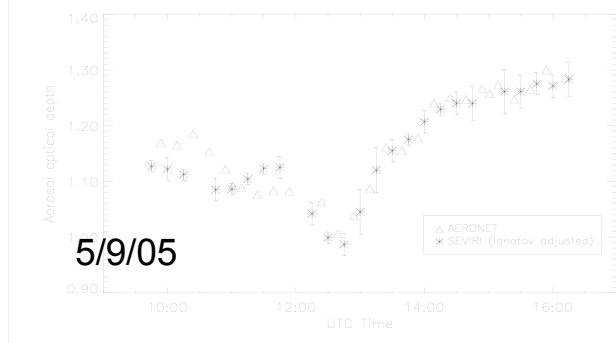
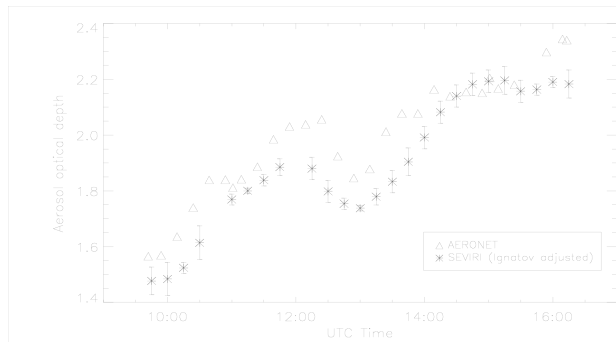
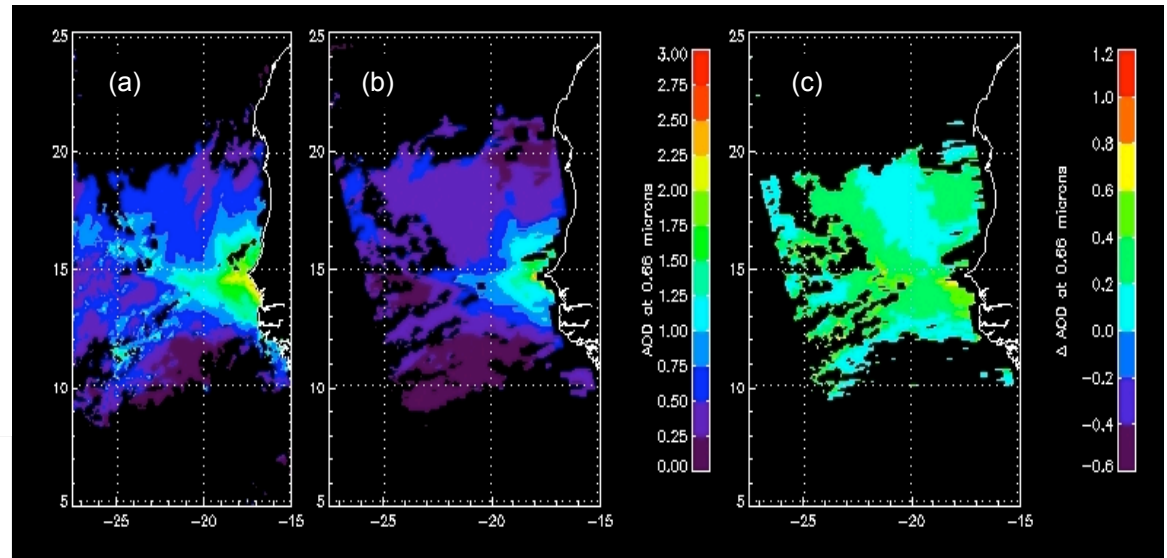


# Preliminary results by Dr. Helen Brindley (IC, UK)



## MSG/SEVIRI Aerosol

- (a) AOD (0.66  $\mu$ m) 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