

Investigating VIIRS aerosol retrievals during the SEAC4RS experiment

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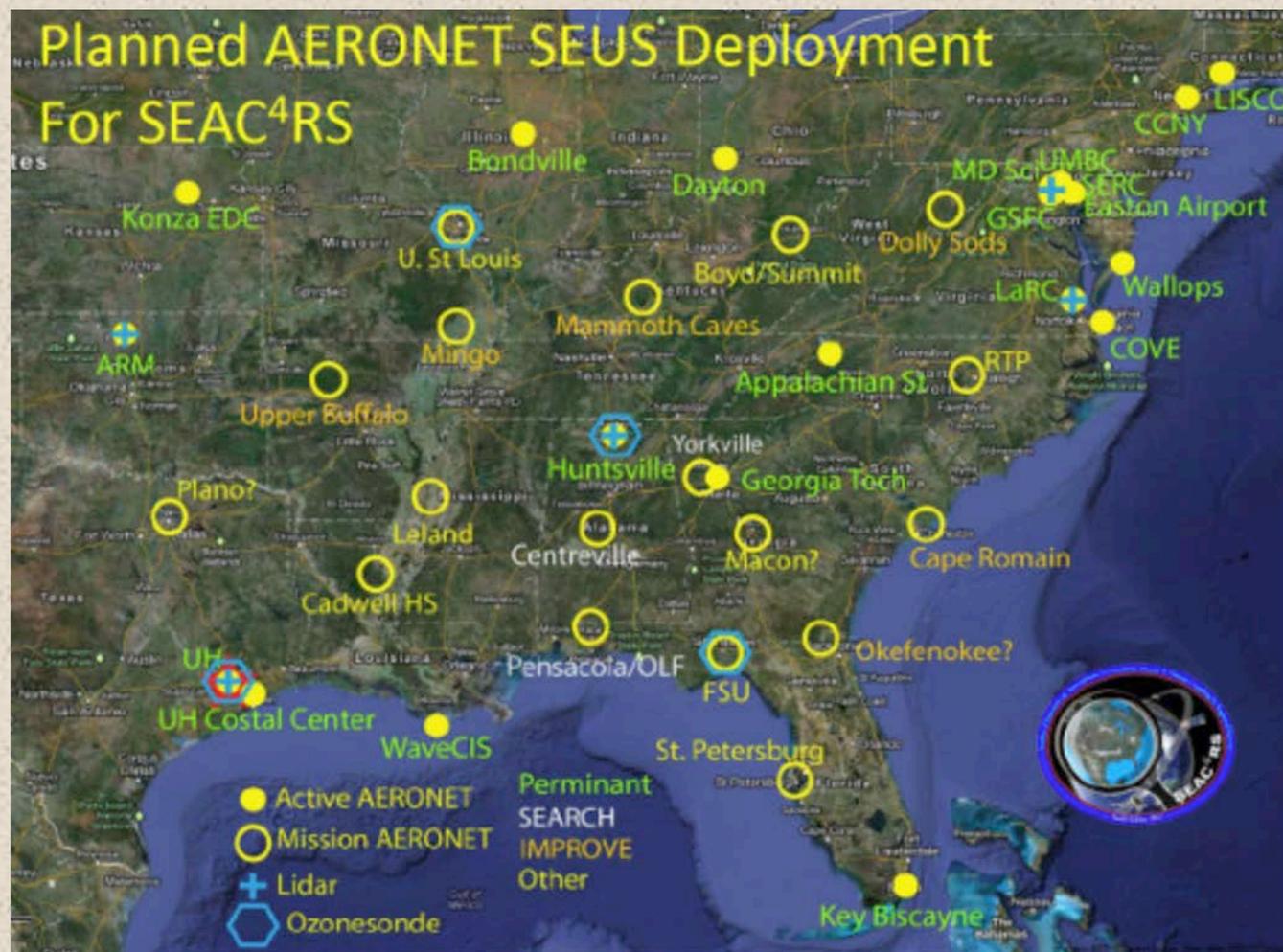
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The logo for the SEAC4RS experiment, featuring the text "SEAC4RS" in a bold, white, sans-serif font. The background of the logo is a satellite image of a coastal region with green land and blue water.

Studies of Emissions, Atmospheric Composition, Clouds and Climate Coupling by Regional Surveys

SEAC4RS across the southeast U.S. (SEUS) Aug/Sep 2013 Aircraft and AERONET

AERONET grid
spacing about
400 km



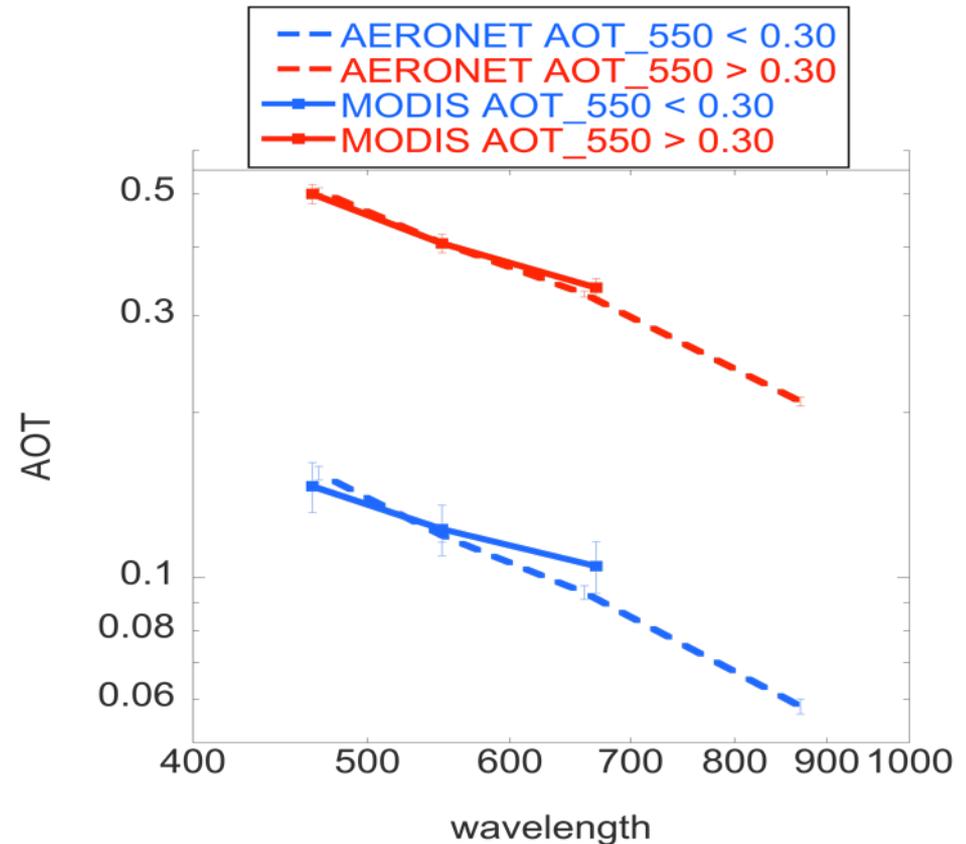
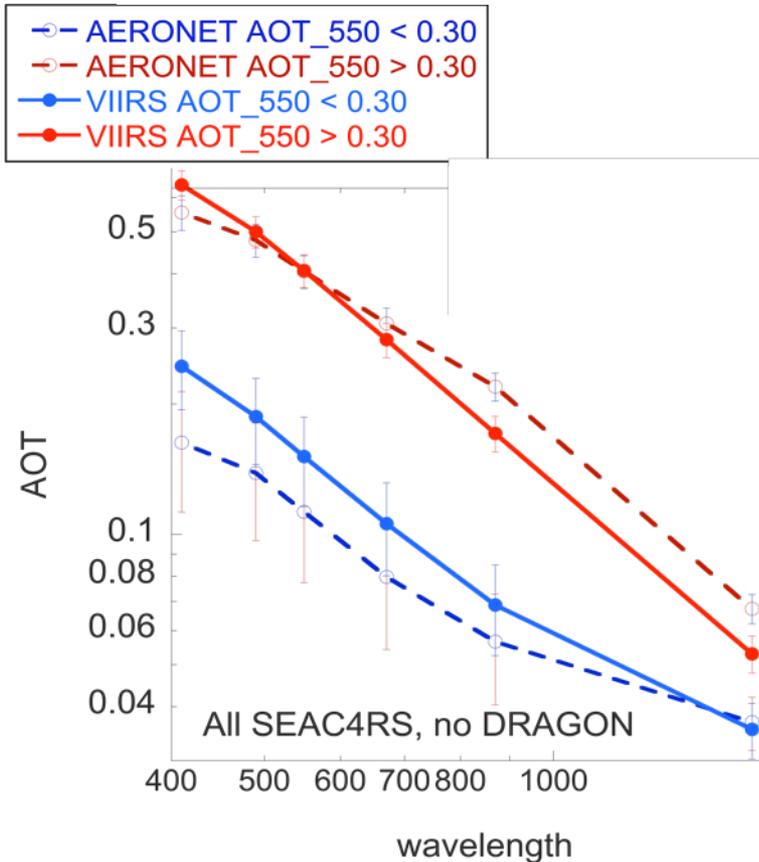
Provided opportunity for deep dive into VIIRS aerosol retrieval

AERONET station at SEARCH_Centreville



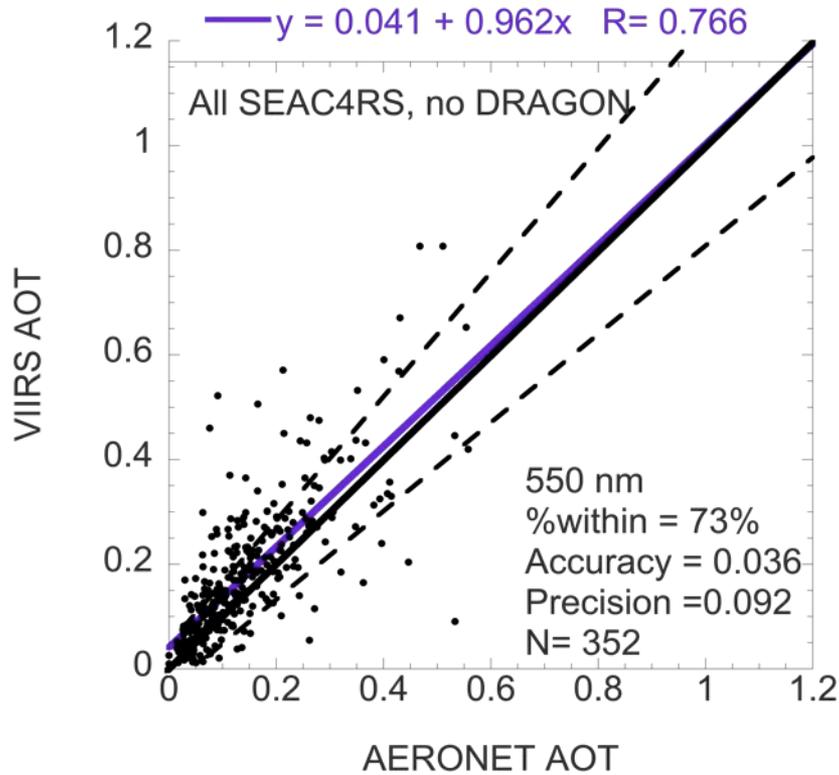
VIIRS SEAC4RS

MODIS SEAC4RS

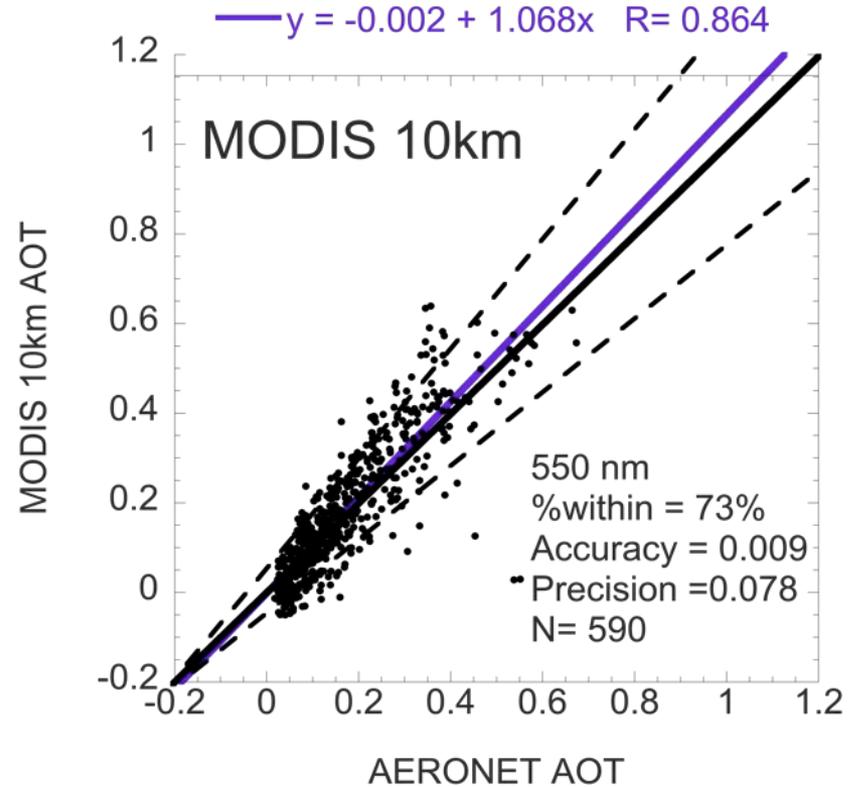


Collocated data set SEUS stations Aug/Sep 2013
VIIRS AOT(λ) collocated with AERONET
MODIS AOT(λ) collocated with AERONET
VIIRS and MODIS not collocated with each other

VIIRS 6km EDR

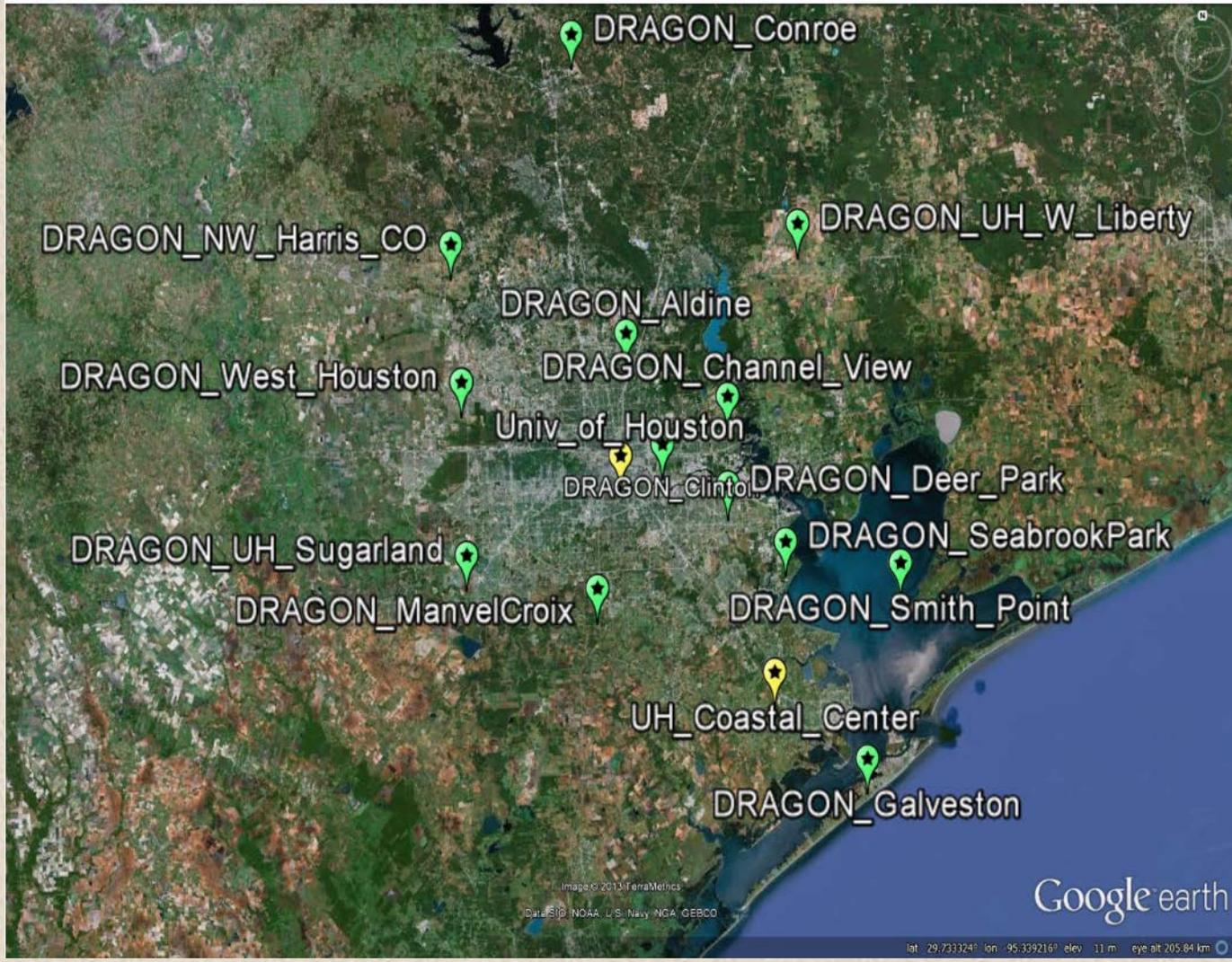


MODIS 10 km



Both products validating very well
MODIS has slightly higher accuracy, better precision and more samples
(MODIS also allows negatives)

Houston DRAGON network within SEAC4RS AERONET grid spacing about 10 km



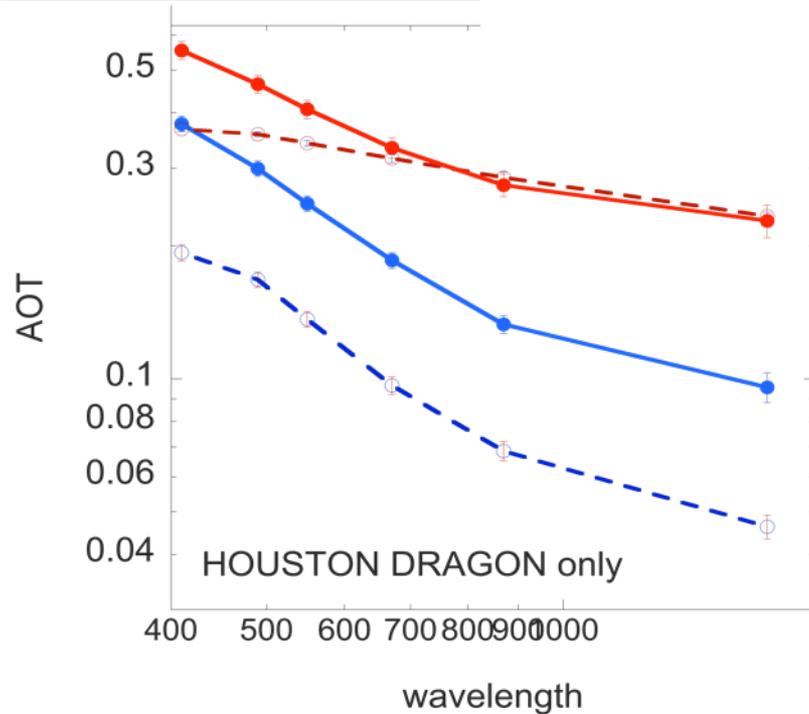
AERONET station at the University of Houston

(Note downtown Houston within the collocation circle)



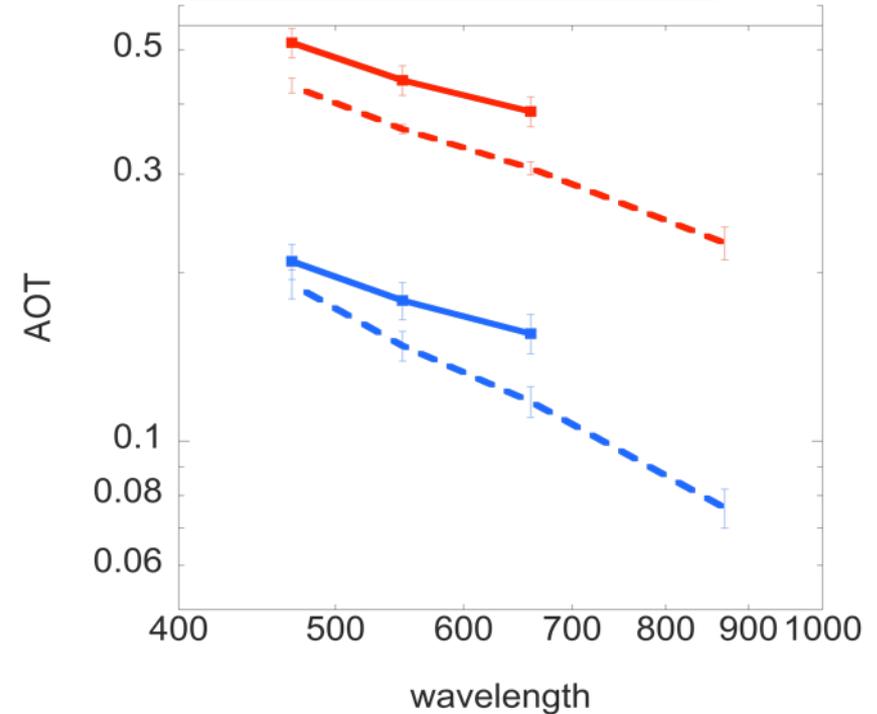
VIIRS 6 km EDR

- AERONET AOT_550 < 0.30
- VIIRS AOT_550 < 0.30
- AERONET AOT_550 > 0.30
- VIIRS AOT_550 > 0.30



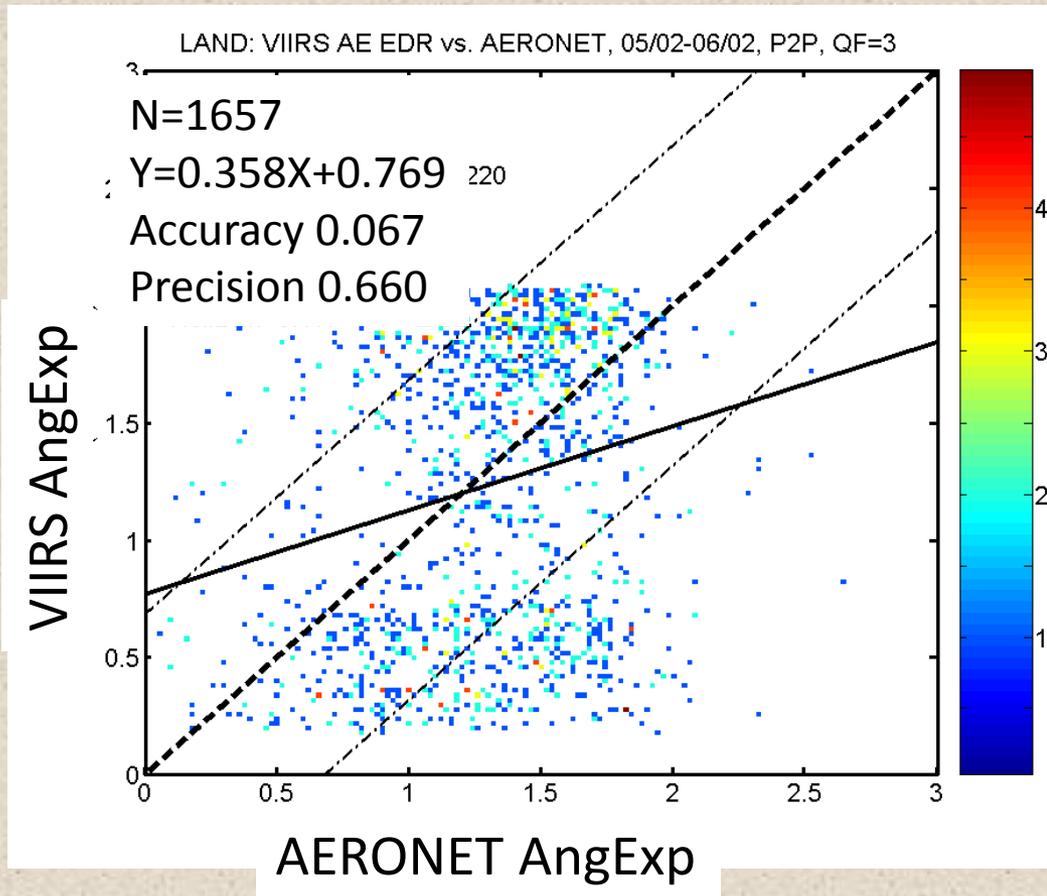
MODIS 10 km EDR

- AERONET AOT_550 < 0.30
- MODIS AOT_550 < 0.30
- AERONET AOT_550 > 0.30
- MODIS AOT_550 > 0.30



VIIRS and MODIS products are biased high in urban areas
Especially when AOT is low

Early validation of Angström Exponent

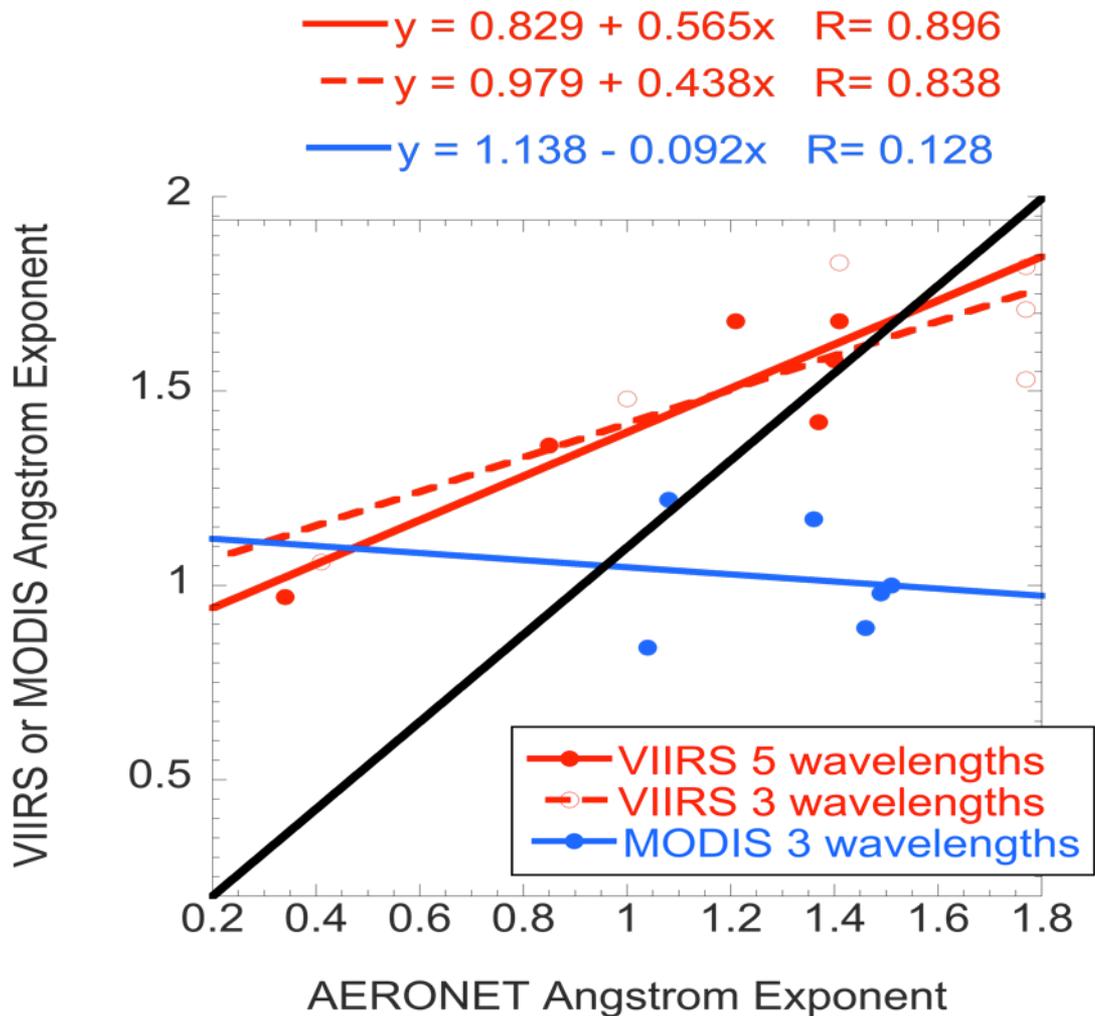


In first analysis for Beta level validation, it appeared as though VIIRS AngExp over land had little skill

Not surprising because MODIS had no skill over land either

In SEAC4RS,
MODIS definitely has no
skill

But VIIRS IDPS product
shows skill at producing
an AngExp over land, as
compared with
AERONET

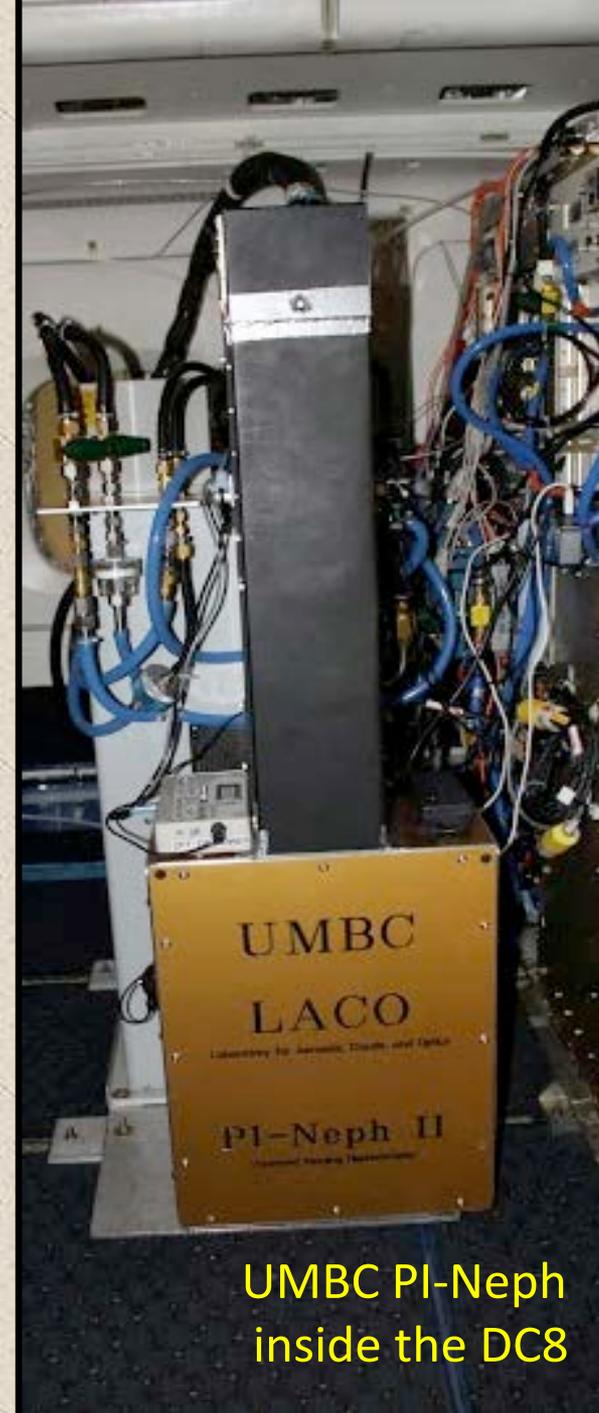


3 different AOT ranges
SEAC4RS and Houston DRAGON
6 points

NASA DC8 SEAC4RS Aug/Sep 2013



Inlets grabbing air into the DC8



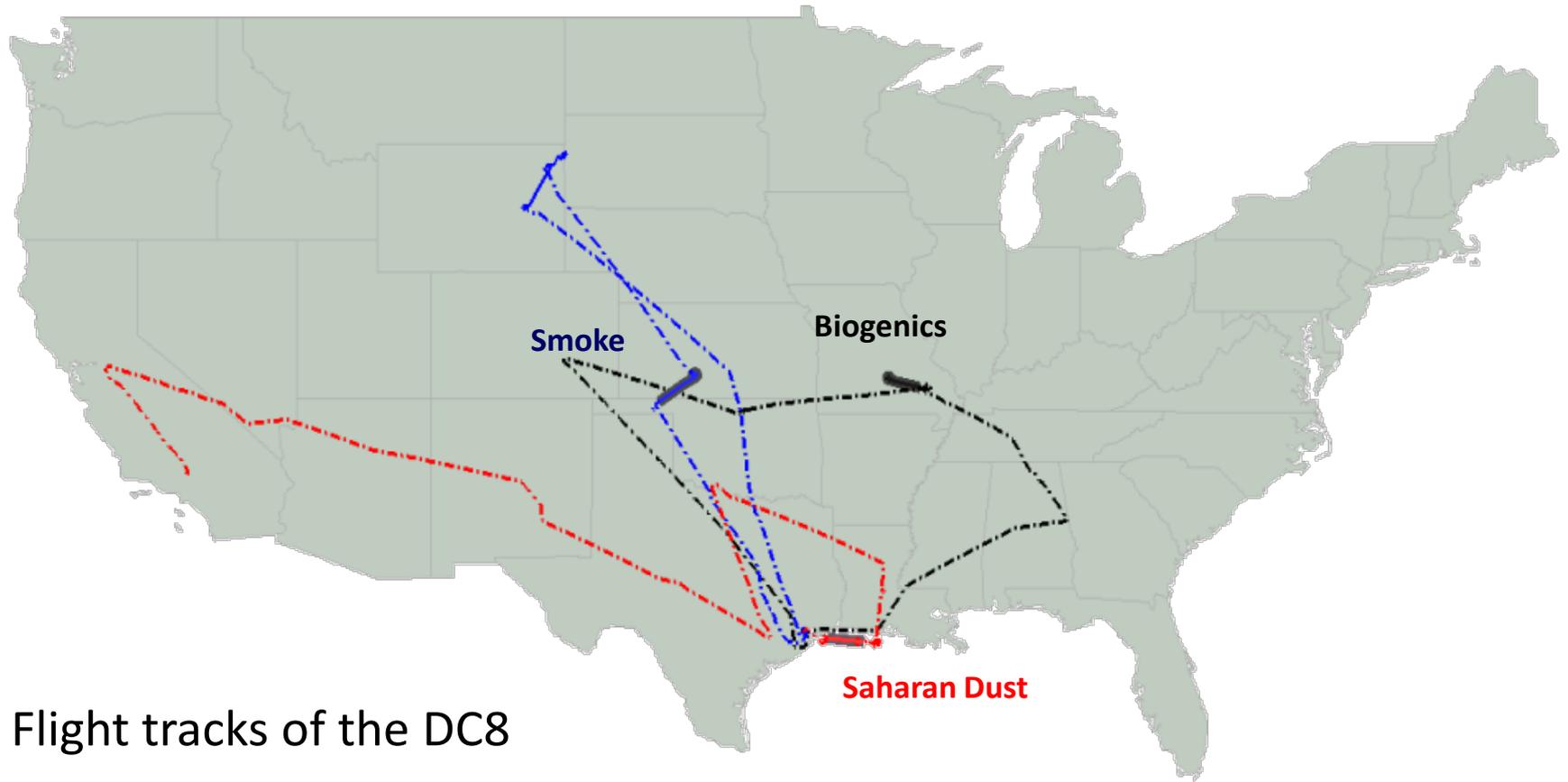
UMBC PI-Neph inside the DC8

3 case studies from SEAC4RS:

Saharan dust 8 Aug 2013

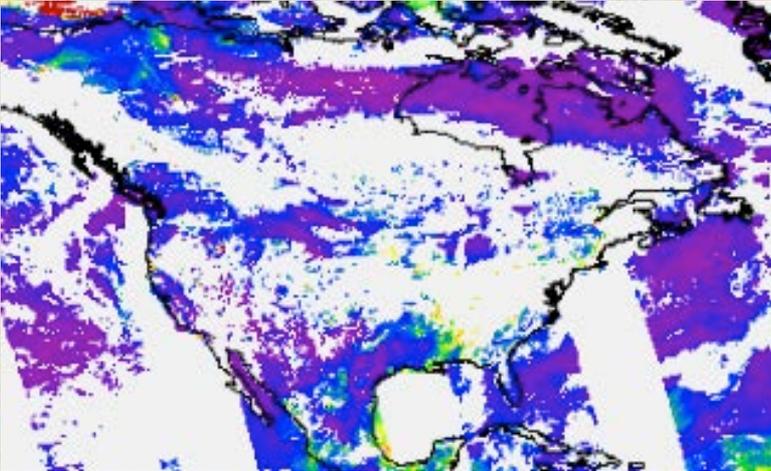
Aged smoke 19 Aug 2013

Biogenics 19 Sep 2013

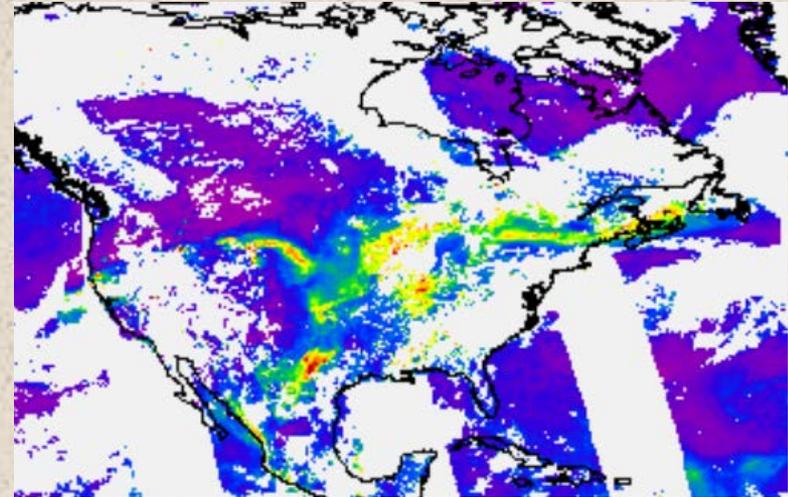


Flight tracks of the DC8

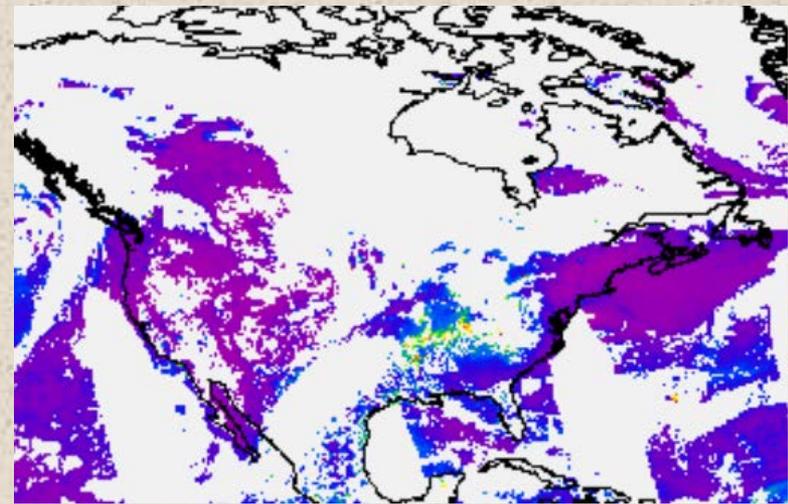
8 Aug 2013 Saharan Dust



19 Aug 2013 Aged Smoke

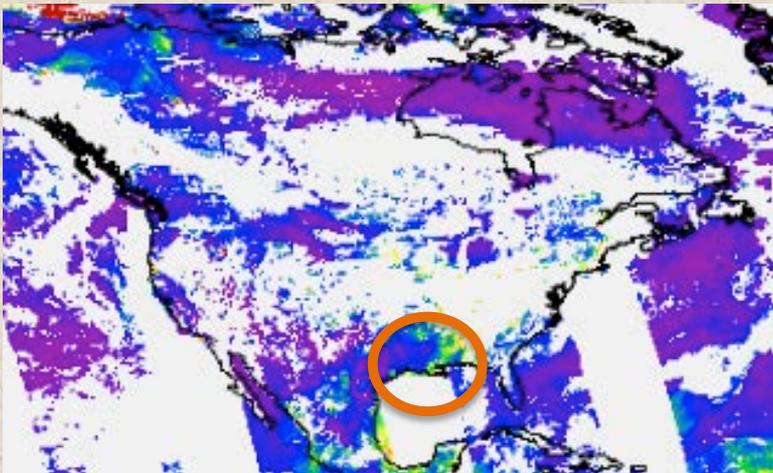


19 Sep 2013 Biogenics

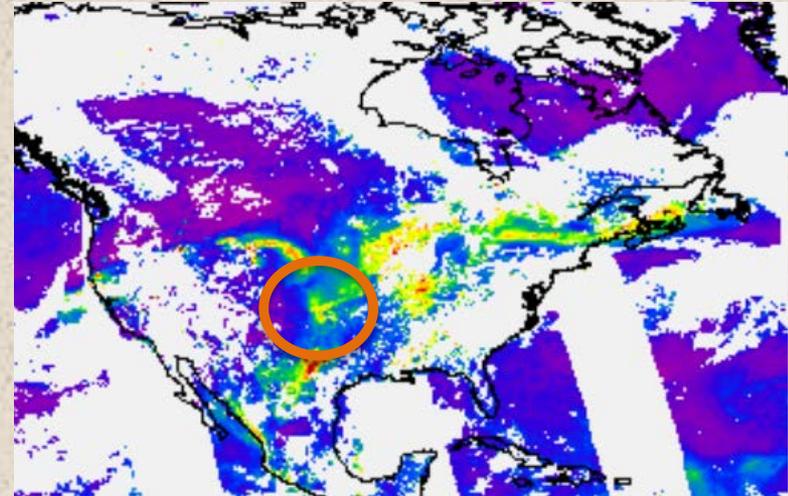


NOAA STAR VIIRS AOT 550 nm
Gridded $0.25^\circ \times 0.25^\circ$
Available as image or data

8 Aug 2013 Saharan Dust

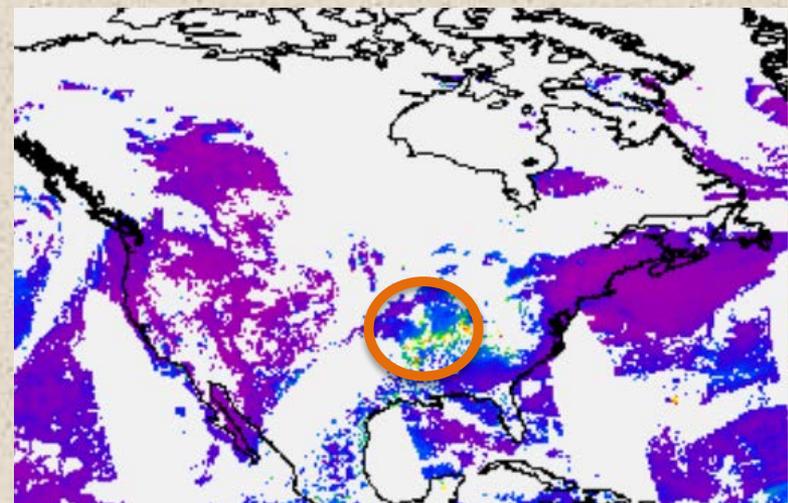


19 Aug 2013 Aged Smoke



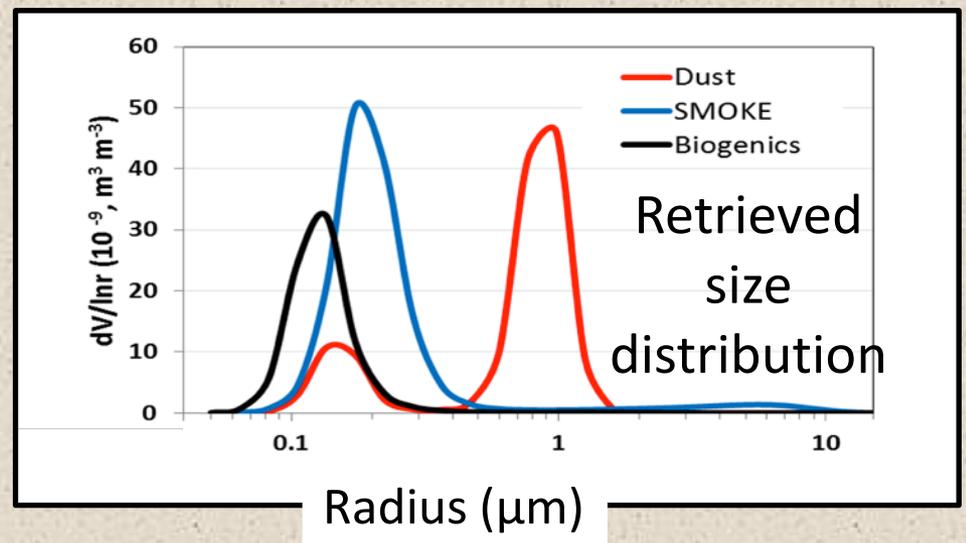
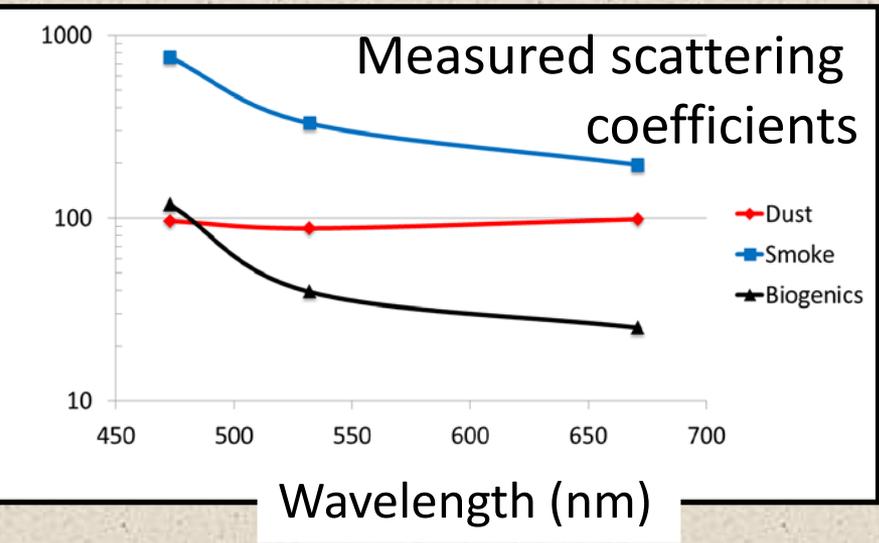
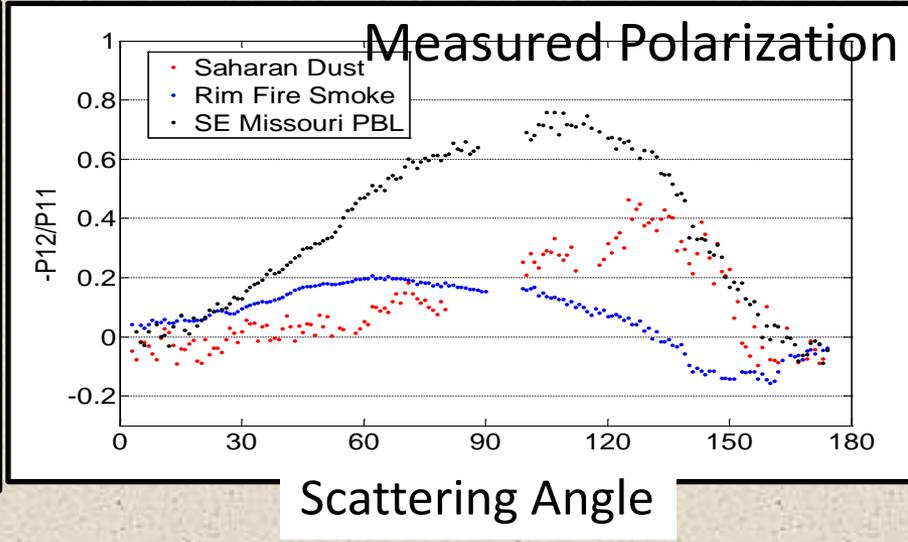
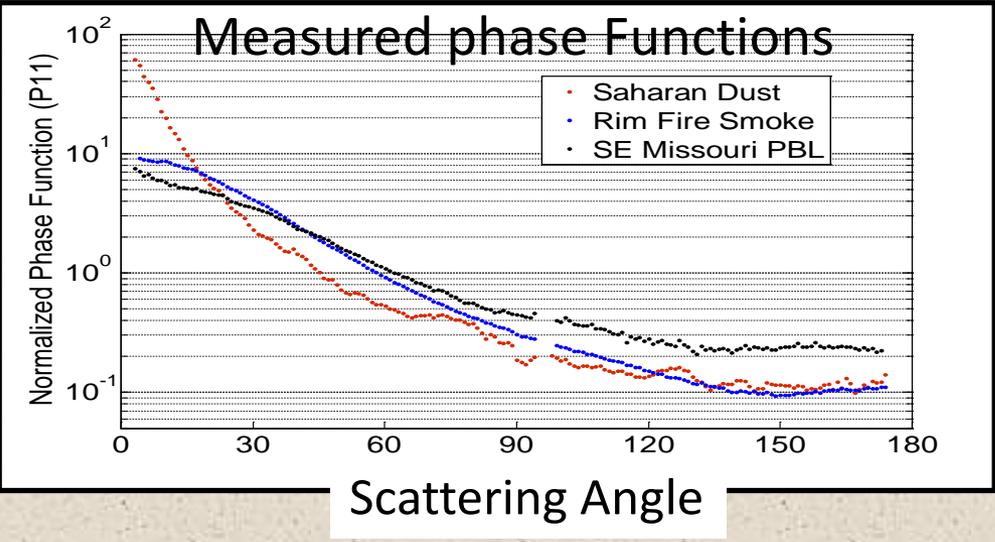
NOAA STAR VIIRS AOT 550 nm
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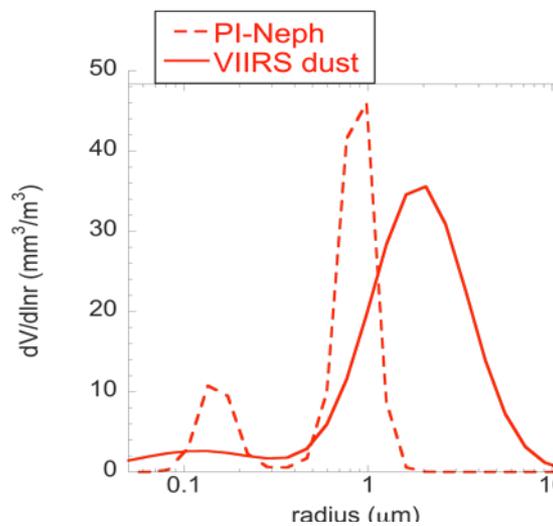


http://www.star.nesdis.noaa.gov/smcd/emb/viirs_aerosol/products_gridded.php

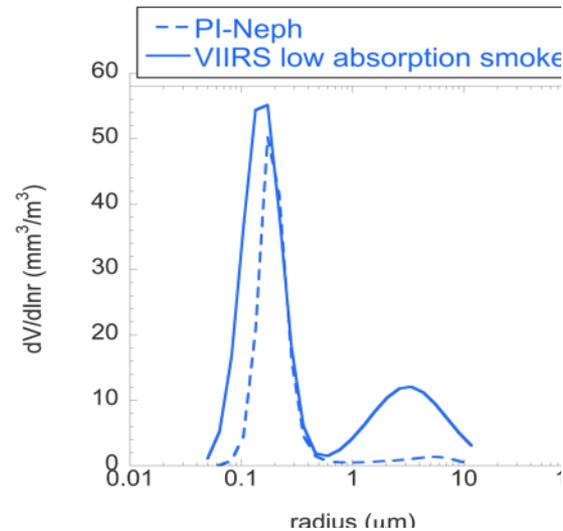
Dubovik GRASP retrieval transforms measurements into retrieved aerosol properties



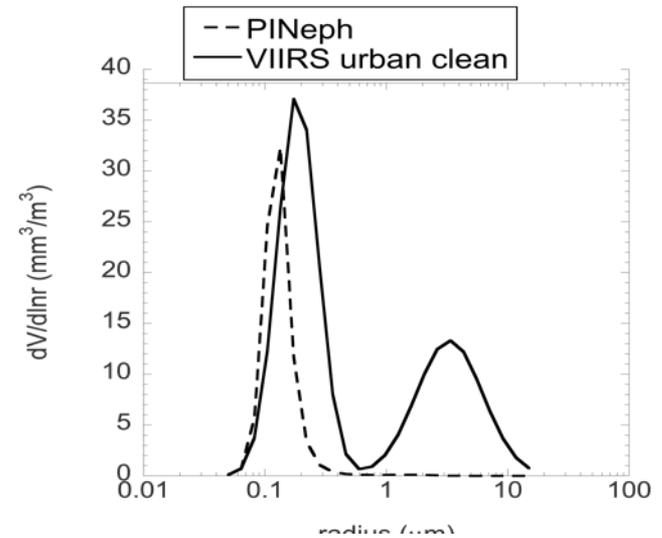
In 3 examples, the VIIRS IDPS algorithm chooses an aerosol model VERY CLOSE to that measured by PI-Neph



08Aug Saharan Dust
VIIRS AOT₅₅₀ = 0.40
VIIRS chose Dust model



19Aug Aged Smoke
VIIRS AOT₅₅₀ = 0.60
VIIRS chose low abs smoke



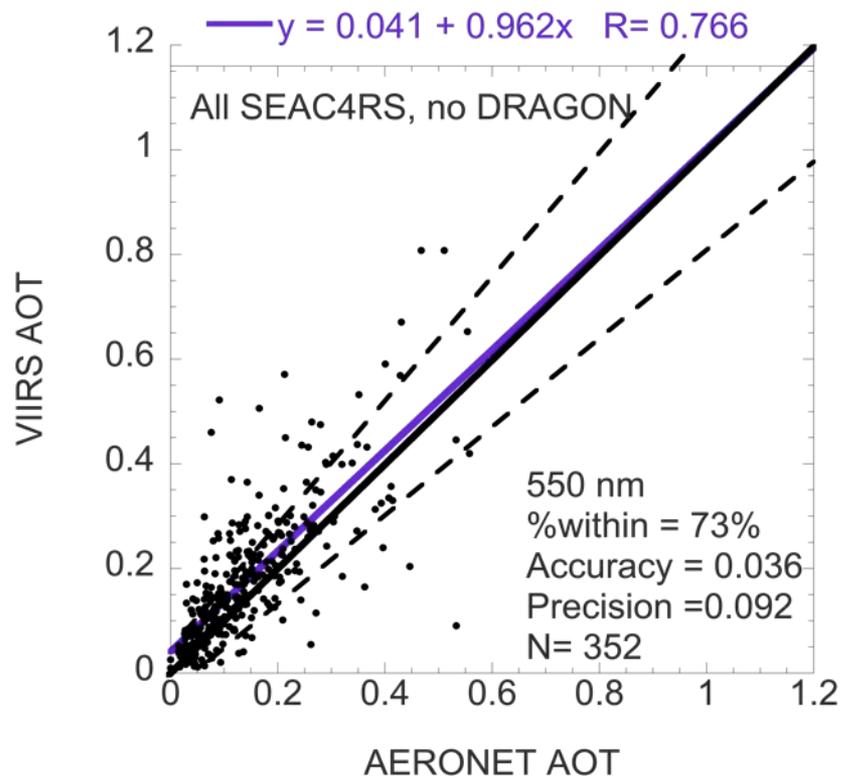
19Sep Biogenics
VIIRS AOT₅₅₀ = 0.40
VIIRS chose low abs urban

Conclusions:

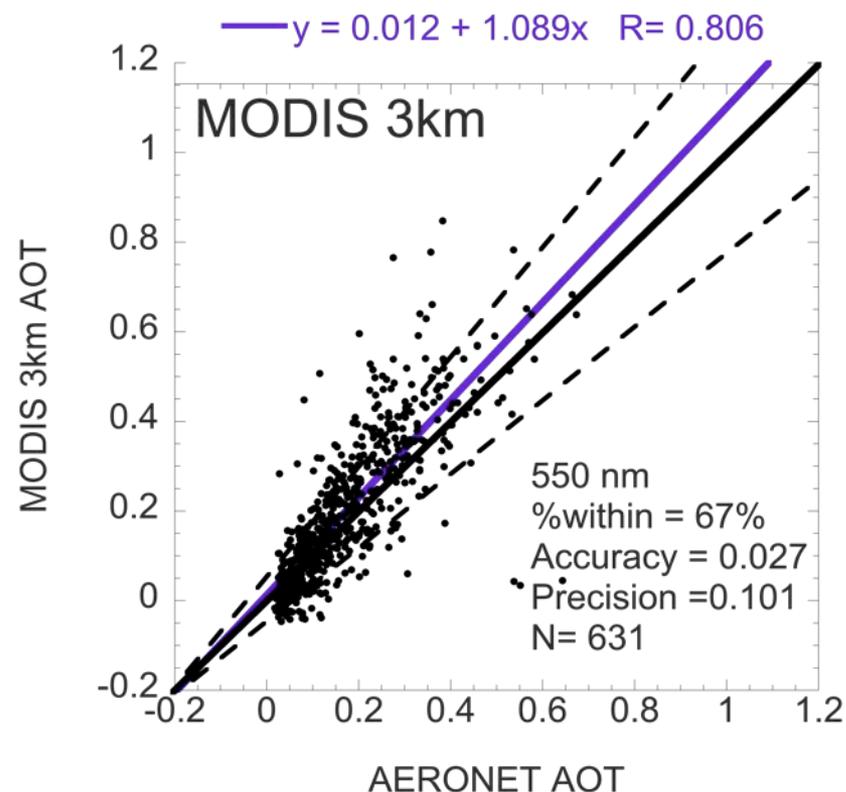
- VIIRS IDPS AOT retrievals at 6 km matched AERONET well over the southeast U.S. during August/September 2013.
- VIIRS IDPS AOT retrievals are less capable over the urban surface in greater Houston.
- Unlike MODIS, the VIIRS algorithm is showing some skill at deriving *size parameter* over land.
- The VIIRS IDPS algorithm seems to be able to choose the correct aerosol model.

Back up

VIIRS 6km EDR



MODIS 3 km



VIIRS 6 km validation statistics more comparable to MODIS 3 km