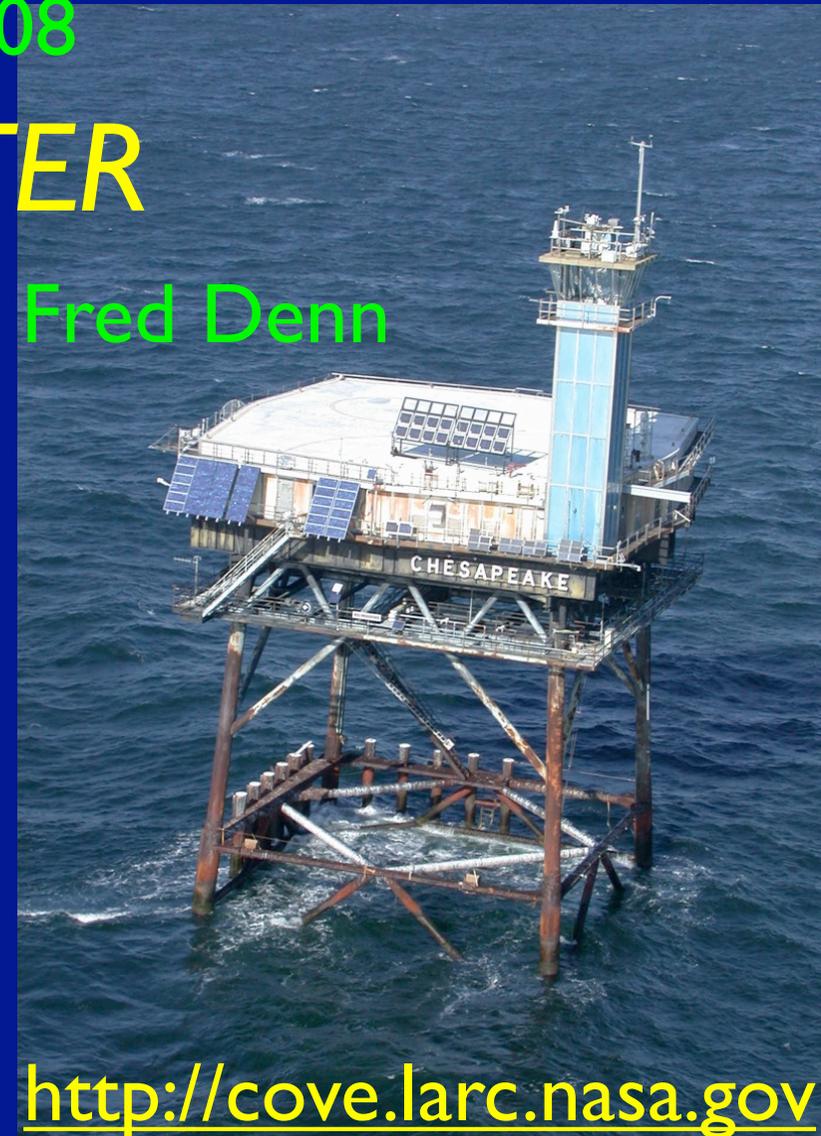
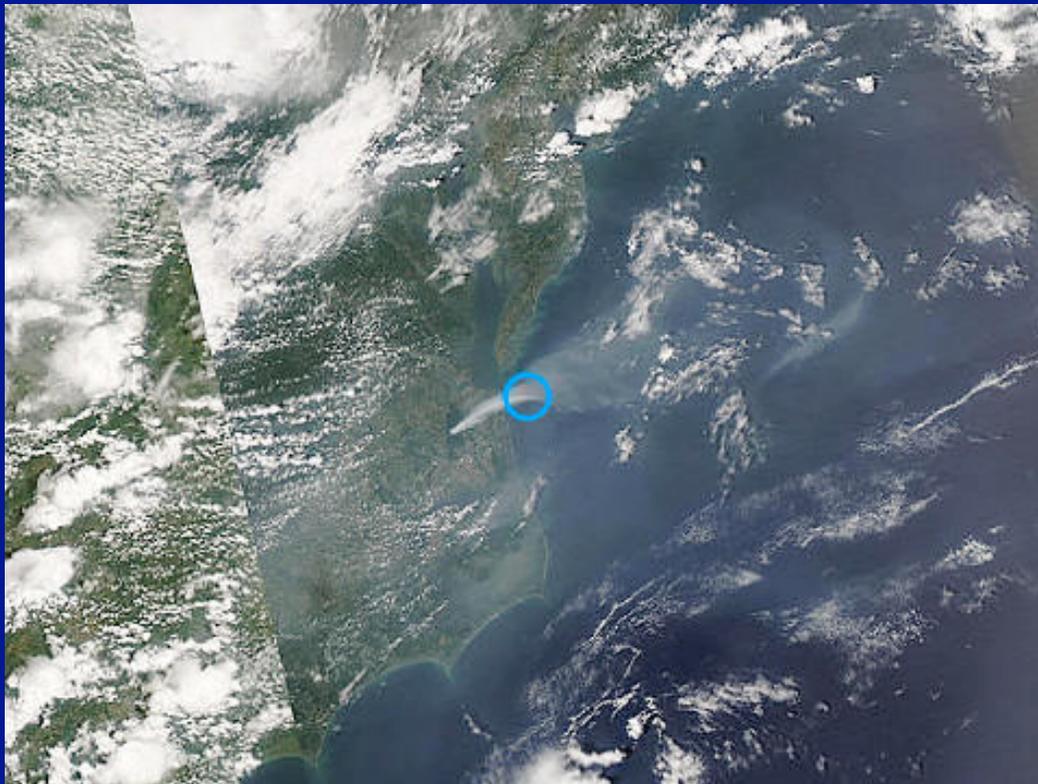


CERES Science Team Meeting
NASA GISS
New York, NY
October 27-29, 2008

SMOKE ON THE WATER

Bryan Fabbri, Greg Schuster and Fred Denn



<http://cove.larc.nasa.gov>

- Evans Road Fire

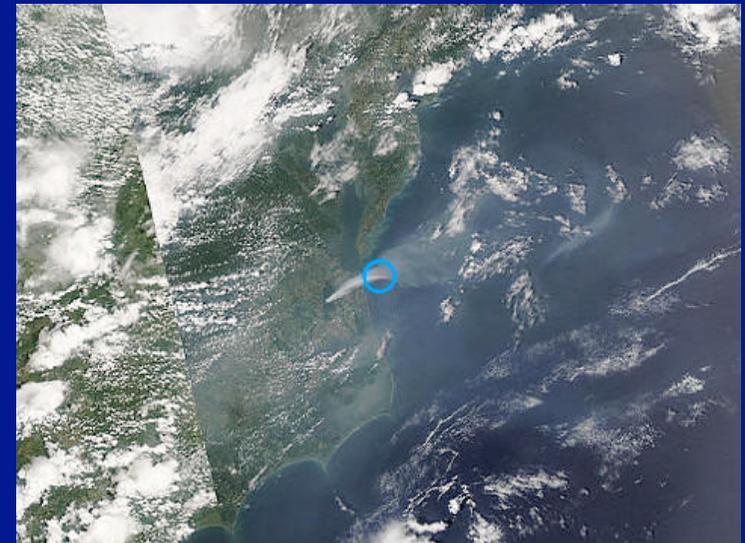
➔ Began June 1, 2008 (DOY 153).



- Great Dismal Swamp fire

➔ Began June 9, 2008 (DOY 161)

➔ Extinguished by Oct. 8 (DOY 282)

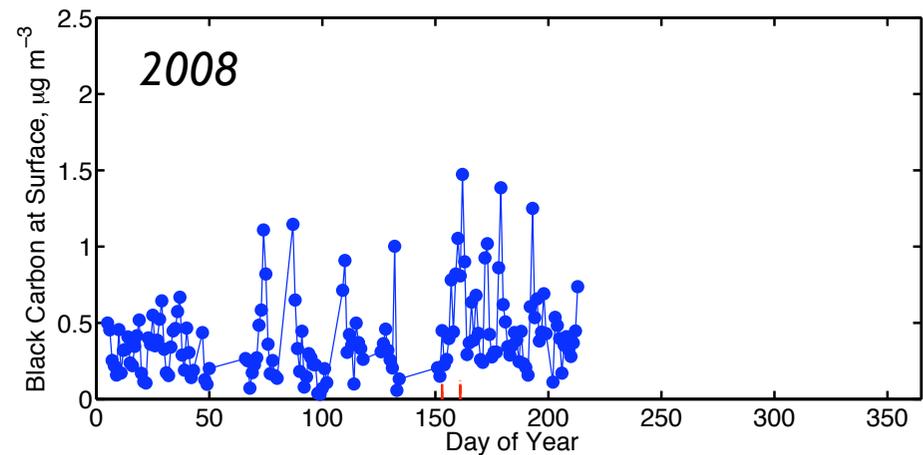
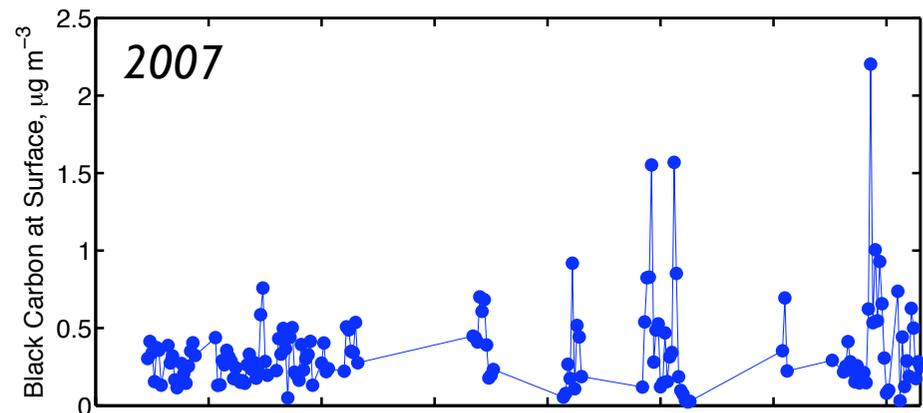
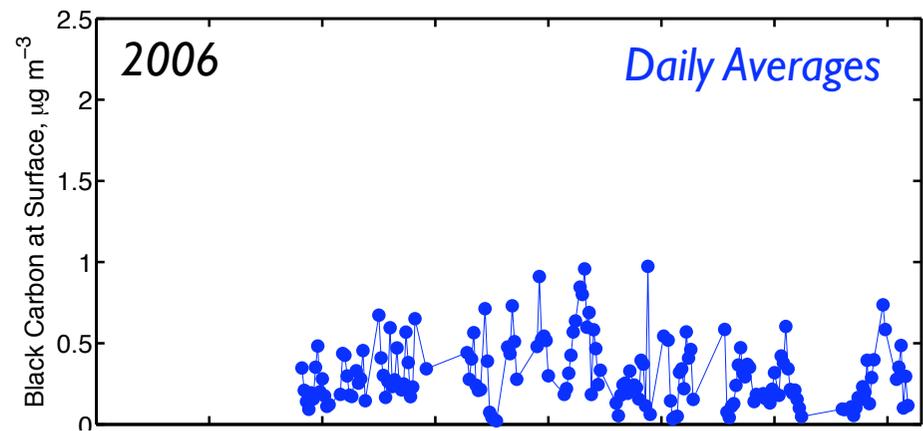


Outline:

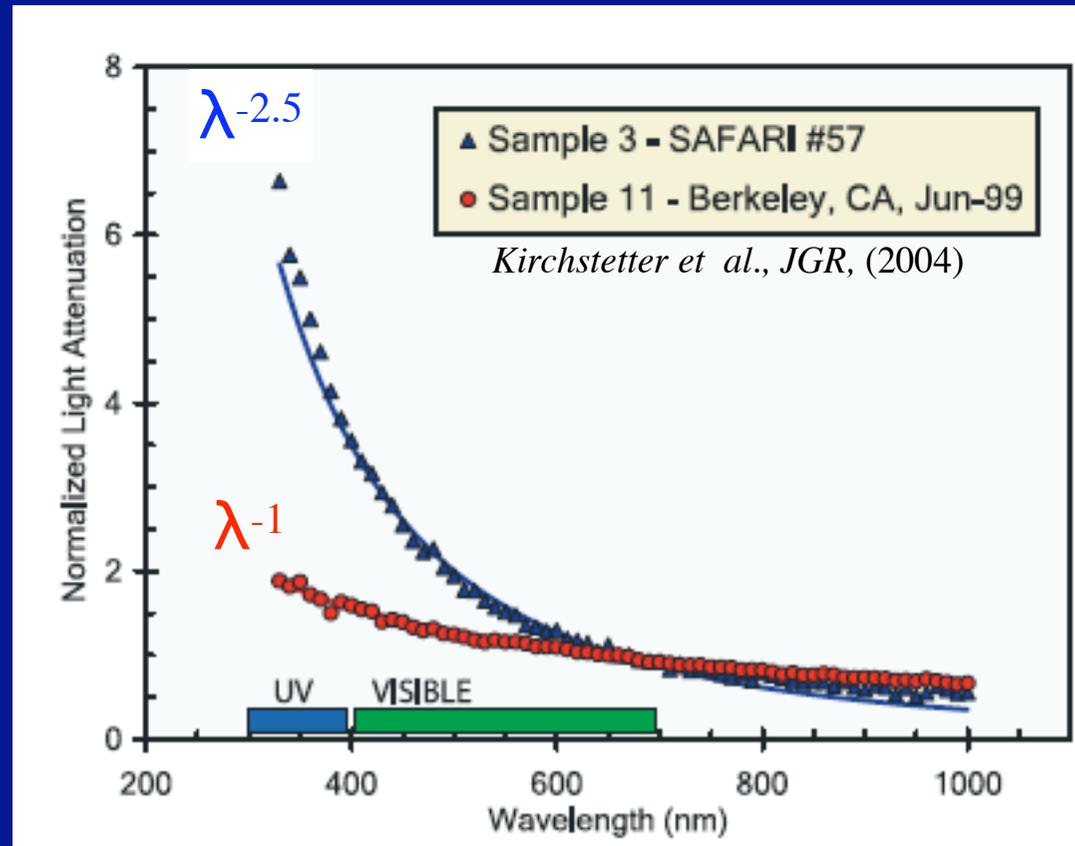
- Quantify how smoke aerosol from fires affected COVE
- Fictive OC (Magee Scientific) can be used as a tracer for smoke
- Satellite retrievals for chlorophyll may be confounded by smoke



Aethalometer
converts absorption
measurement to BC
concentration

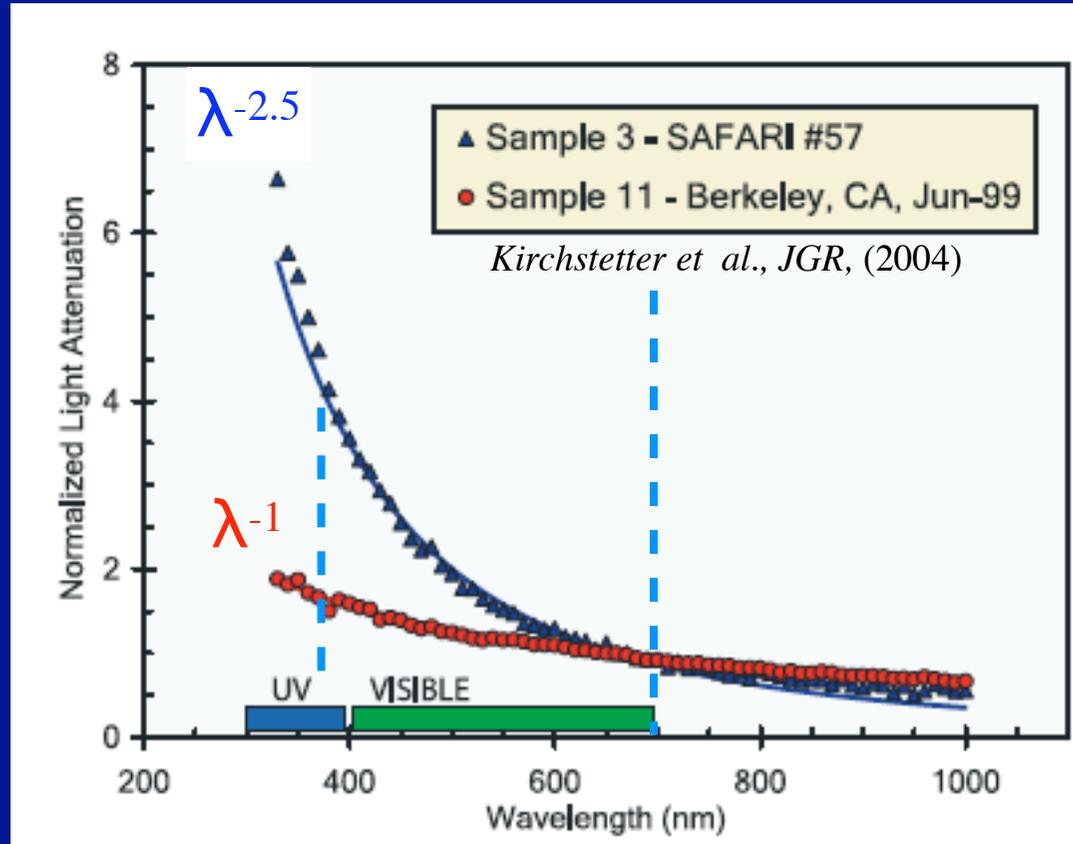


Spectral dependence of absorption



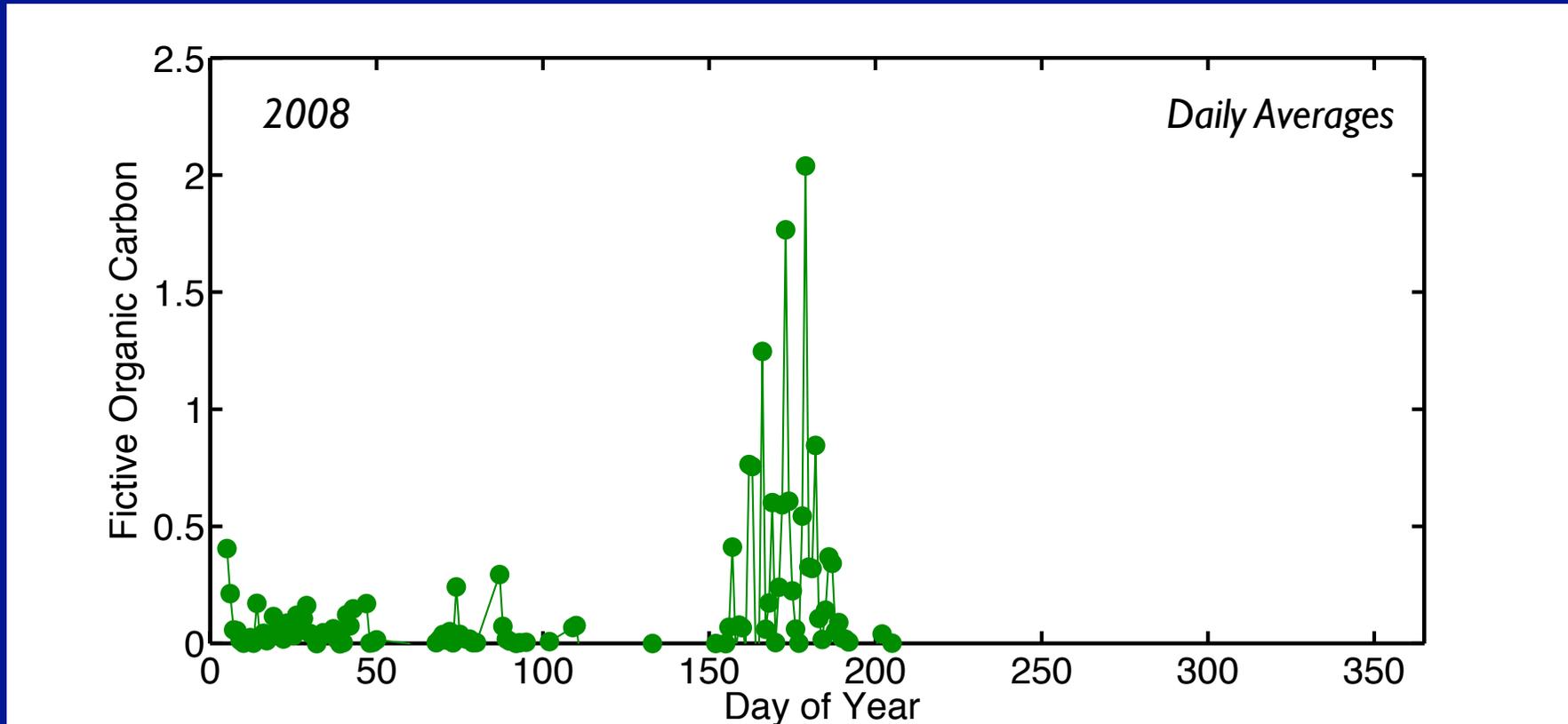
- Organic aerosols cause smoke to have greater absorption in the UV than conventional pollution

Spectral dependence of absorption



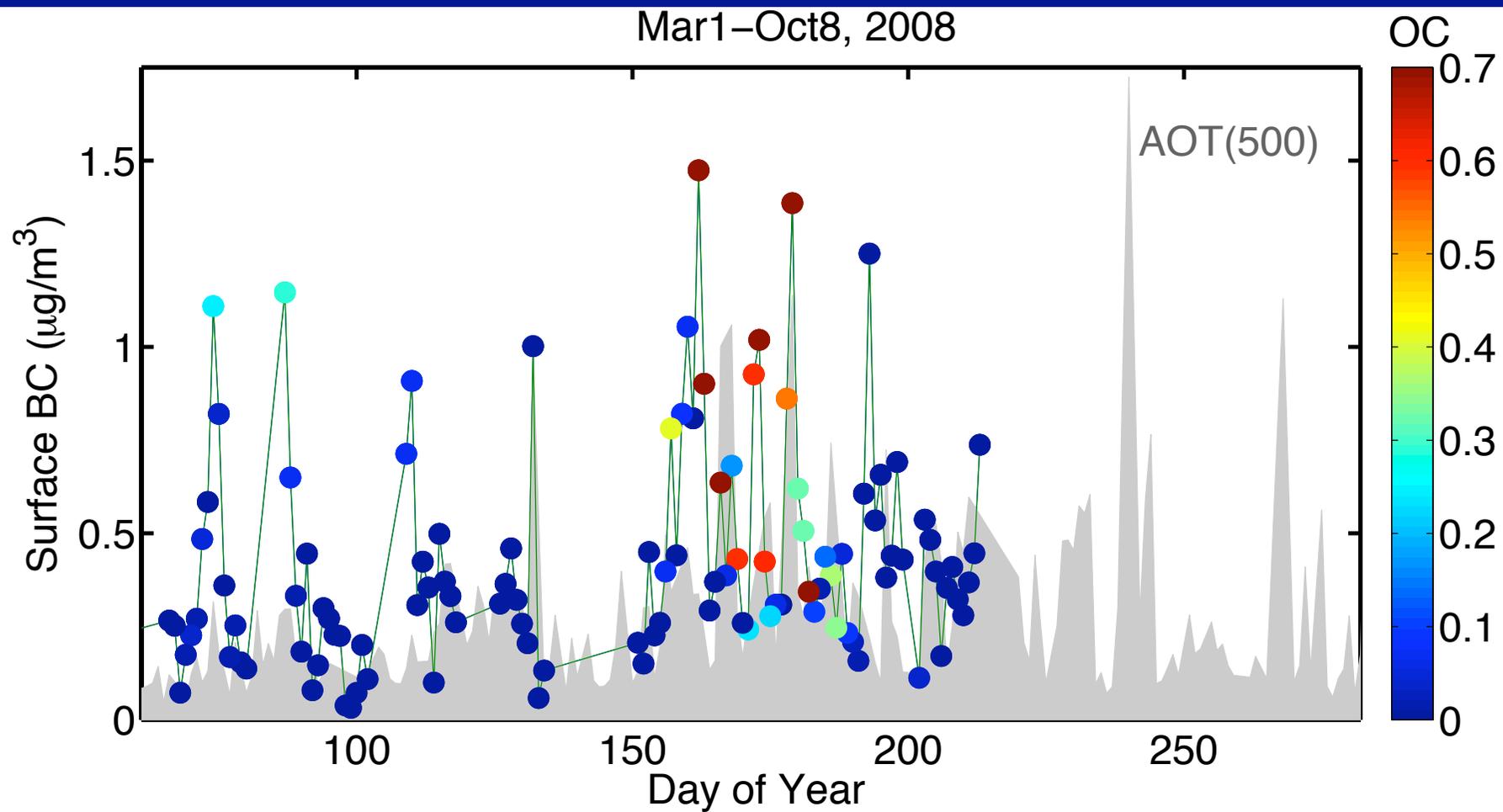
- Organic aerosols cause smoke to have greater absorption in the UV than conventional pollution
- 7-wavelength Aethalometer is tuned for conventional pollution
 - ▶ Fictive OC = BC (370 nm) - BC(700 nm)

Fictive OC clearly indicates when fires are present

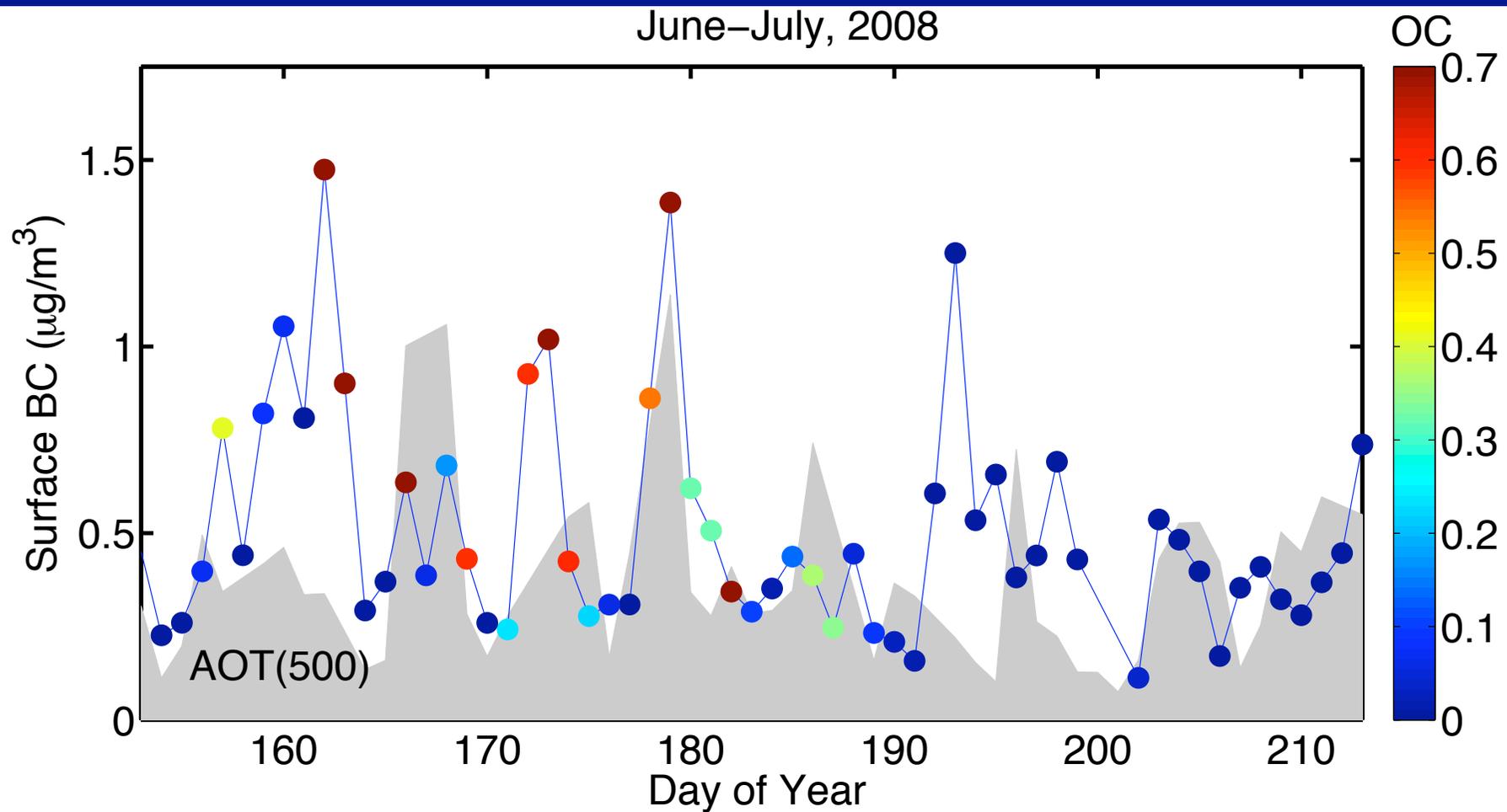


- COVE was influence by smoke for nearly all of June, 2008.
- Substantial FOC presence appears to have ended by DOY 190 (July 8).
- FOC record ends on DOY 214 (Aug 1) when Aethalometer failed.

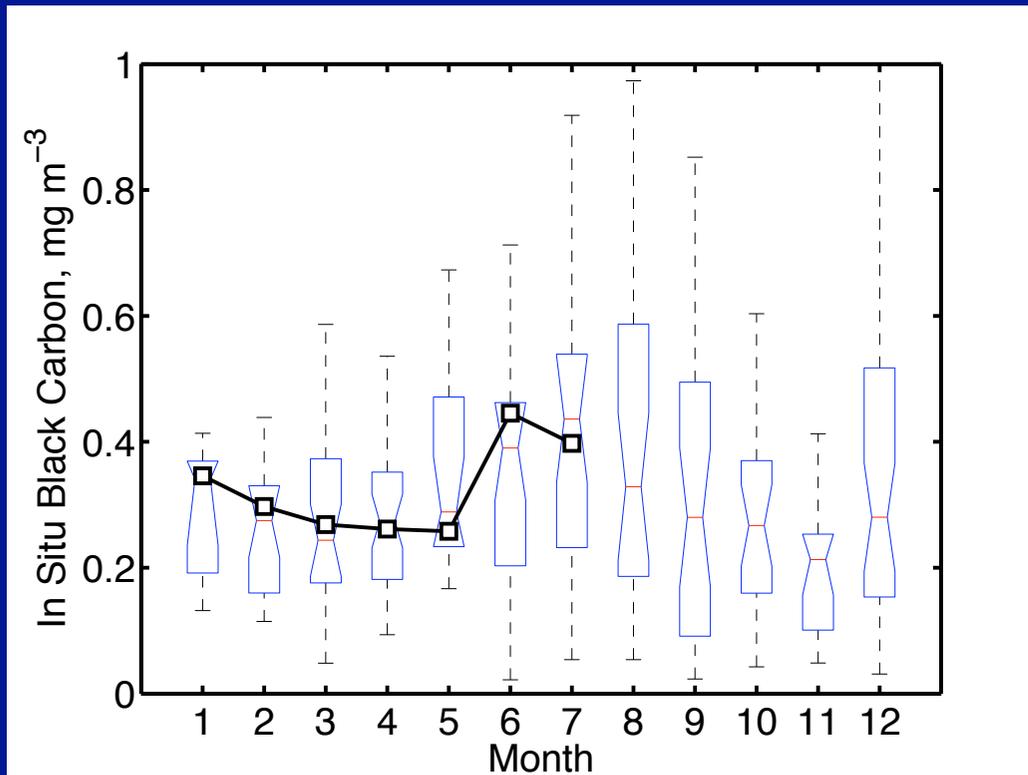
Another look at BC, FOC, and AOT



Another look at BC, FOC, and AOT



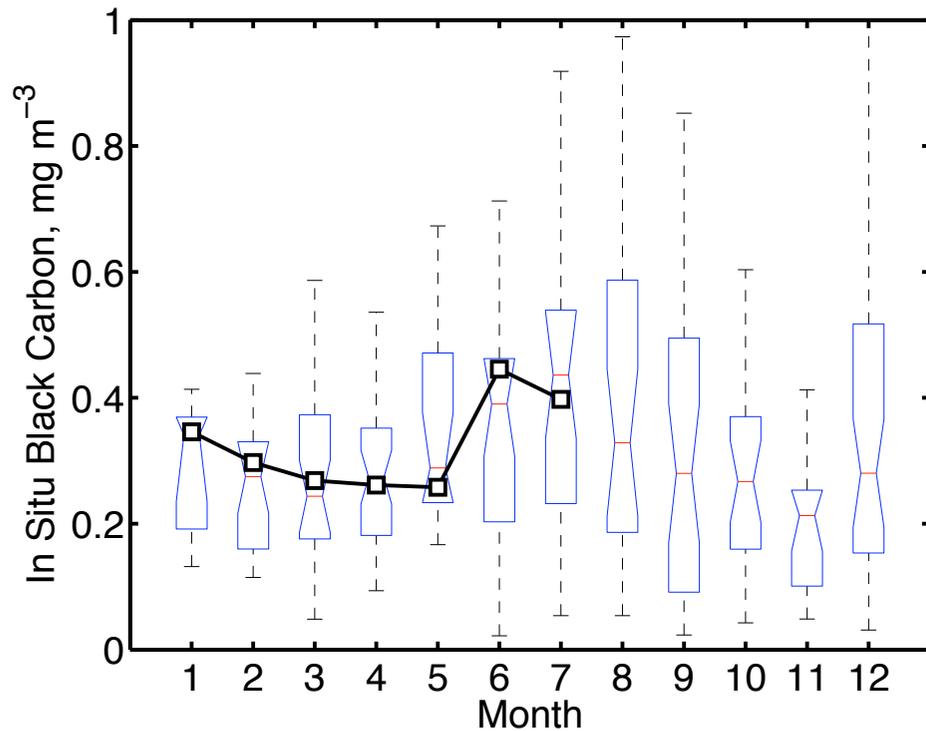
BC and FOC Monthly Medians.



Black carbon is slightly elevated during June 2008.

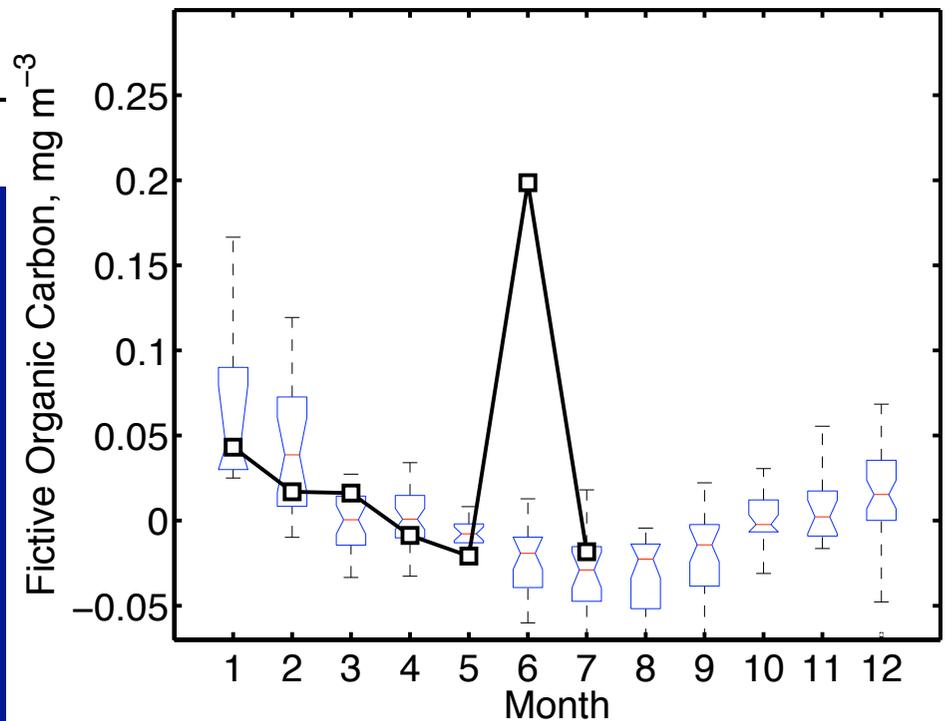
Boxplots are 2006 and 2007.
Black lines are monthly medians for 2008.

BC and FOC Monthly Medians.



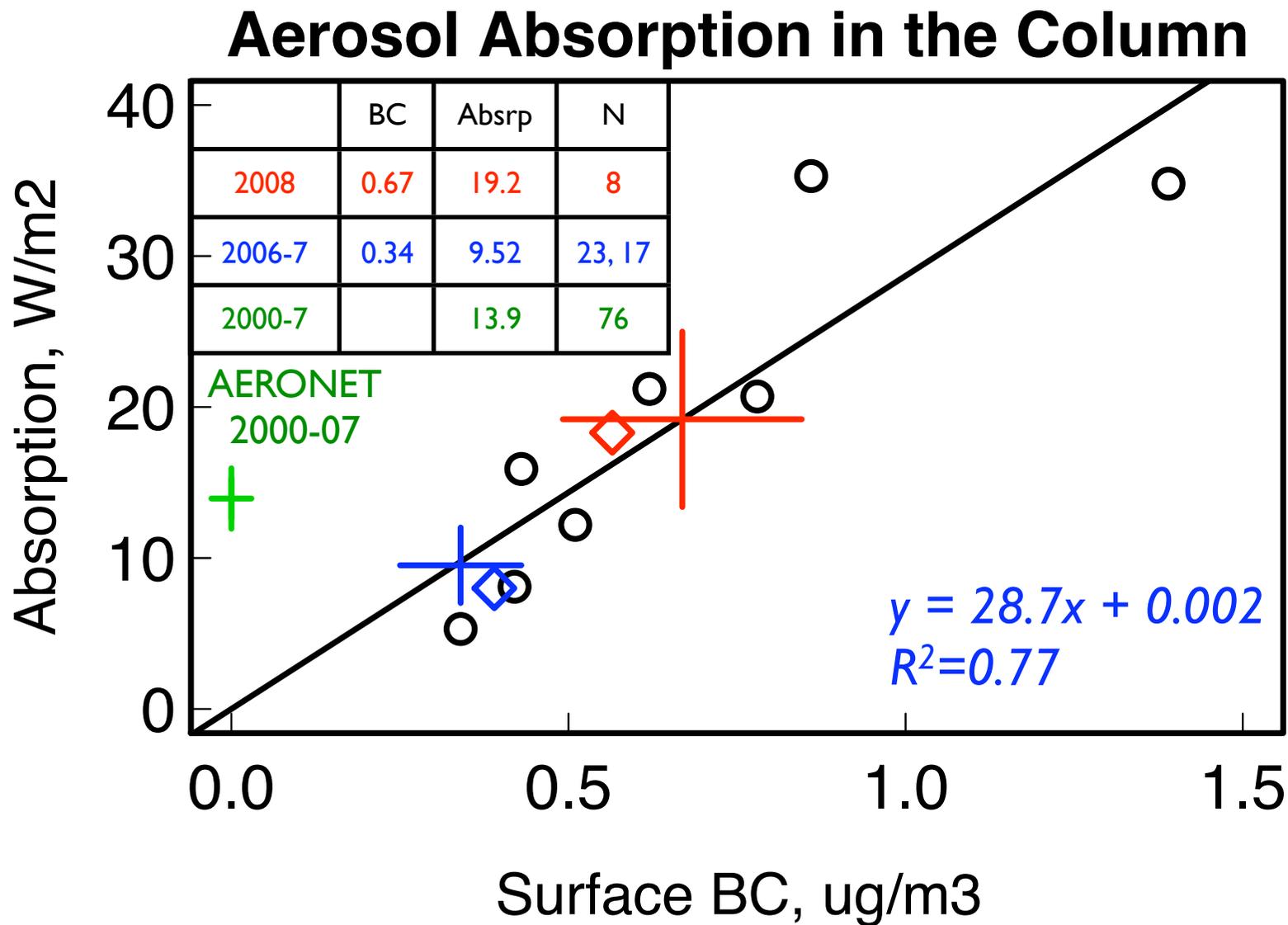
Black carbon is slightly elevated during June 2008.

Fictive OC is highly elevated!

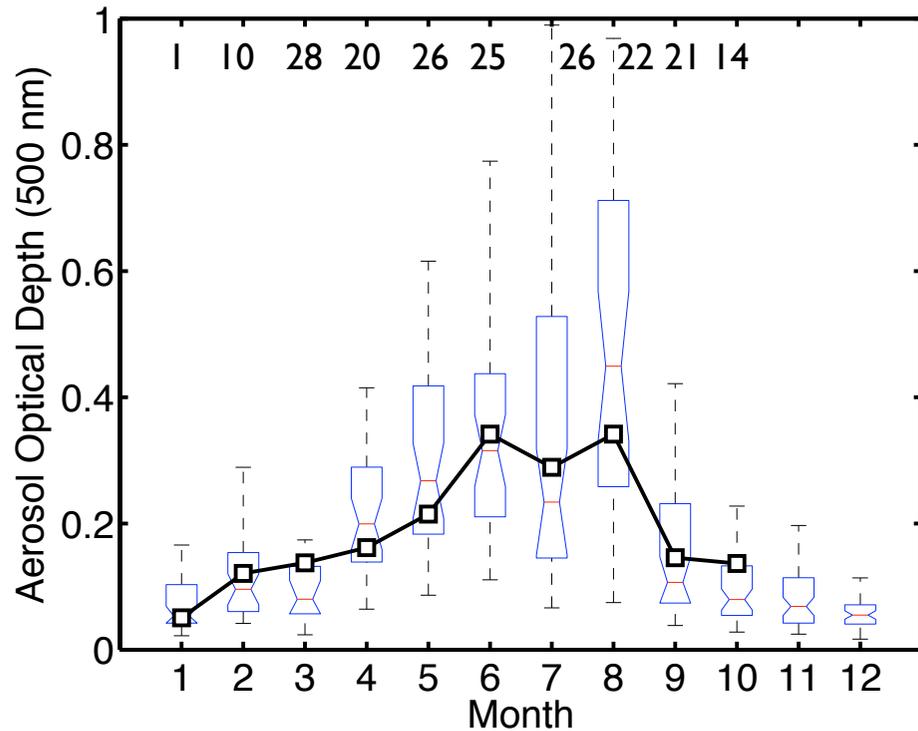


Boxplots are 2006 and 2007.
Black lines are monthly medians for 2008.

Column Absorption during 8 fire days with FOC > 0.2

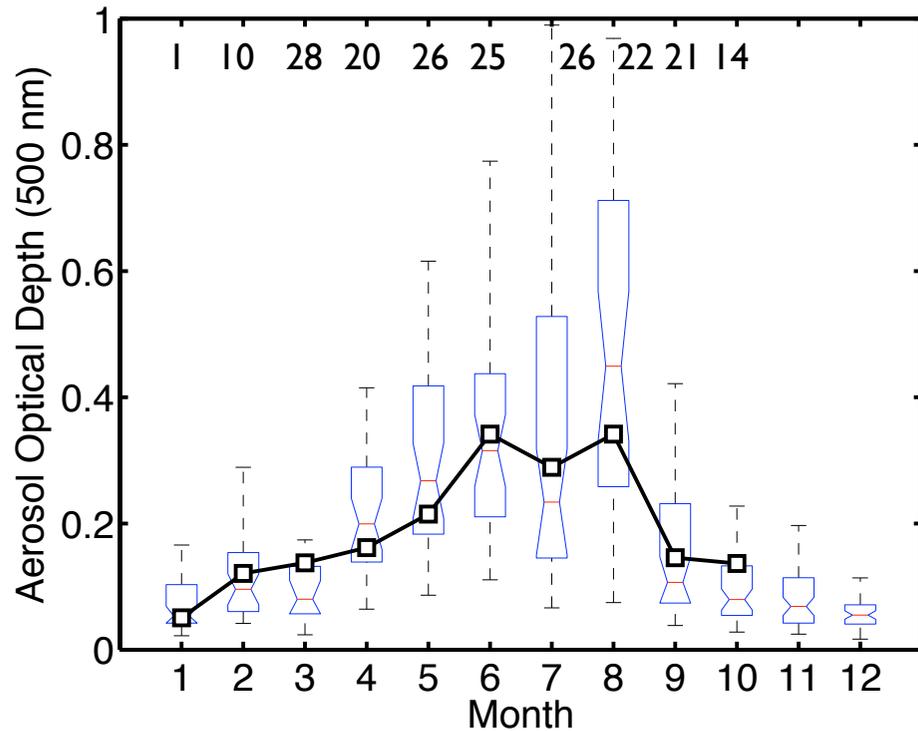


AOT and Angstrom Exponent Monthly Medians



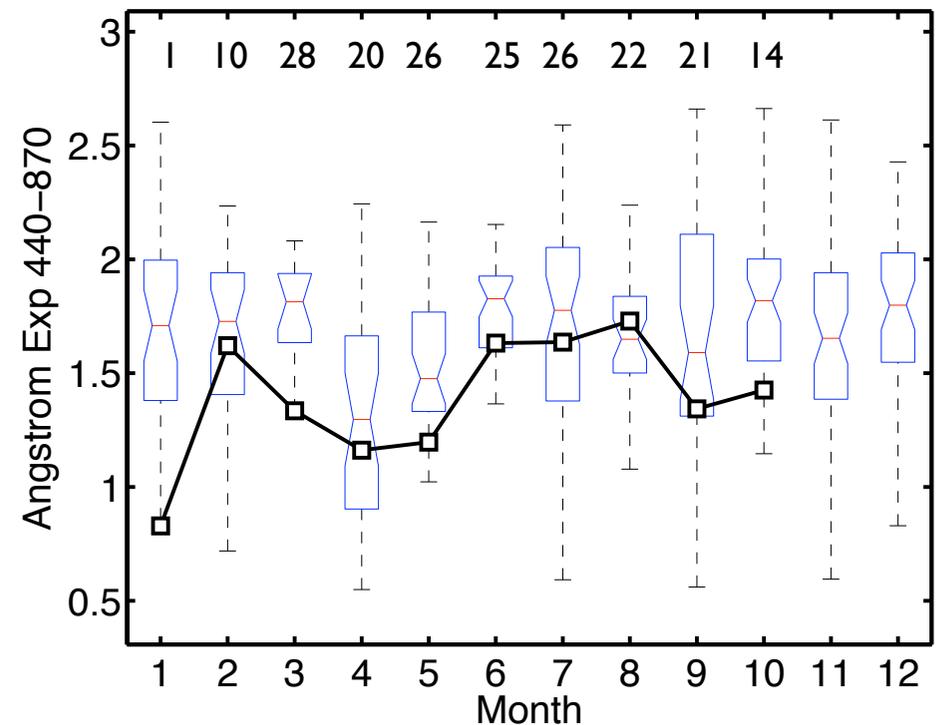
- AOT is only slightly elevated during June 2008
 - ➔ Slight impact on climate for the month

AOT and Angstrom Exponent Monthly Medians



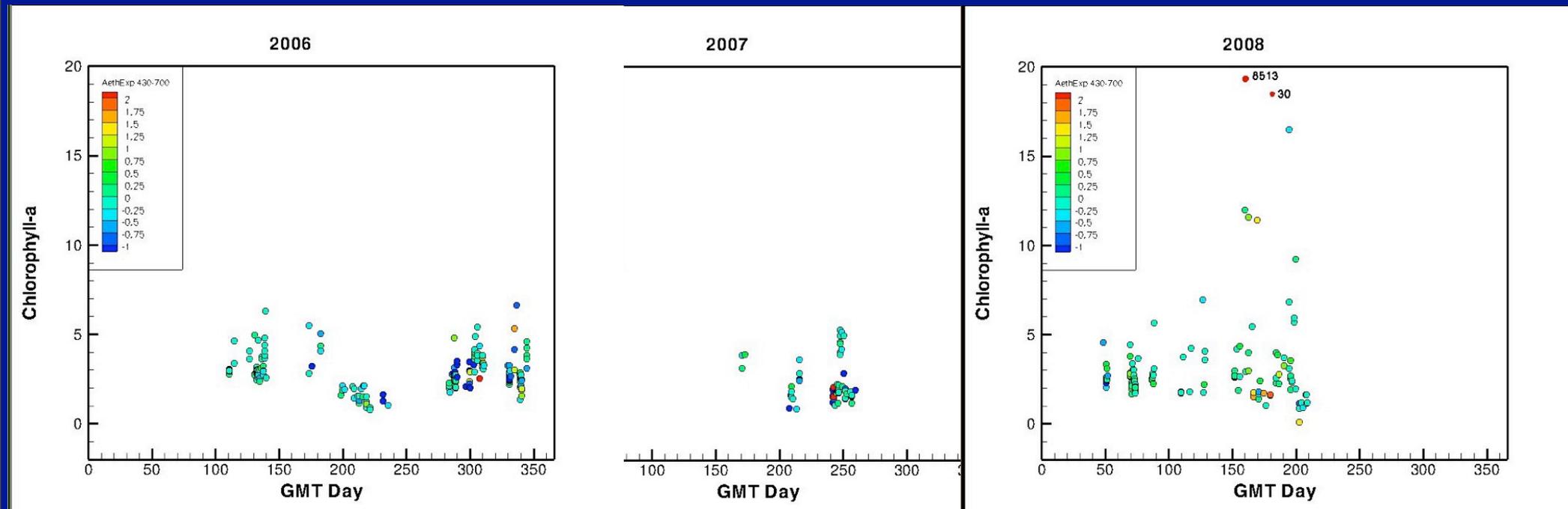
- AOT is only slightly elevated during June 2008
➔ Slight impact on climate for the month

Angstrom Exponent is substantially lower than the established climatology in June 2008, but it has been lower nearly all year.



An Aside: The Smoke caused some anomalously high Chl-a retrievals for the Sea Prism retrieval

- Sea Prism is a down looking scanning radiometer at COVE.
- Retrieval is similar to SeaWifs, but close to the surface.
- ➔ Smoke could confound satellite retrievals of Chl-a as well.



Conclusions

- BC and aerosol column absorption are statistically higher on smoky days in 2008 than on clear days in June 2006-7 (when both instruments are available).
- However, column absorption is not statistically higher than the 2000-2007 climatology.
- Pollution BC can be as high as the fire BC
- Fictive OC is greatly elevated during fires, so it makes a nice tracer.
- AOT is slightly elevated in June 2008 compared to June climatology.
- Smoke can be troublesome for radiometric retrievals of Chl-a.