



**A Recent April PM<sub>2.5</sub> Episode Over Georgia:  
*Possible Trans-Atlantic Transport of  
Saharan Dust***

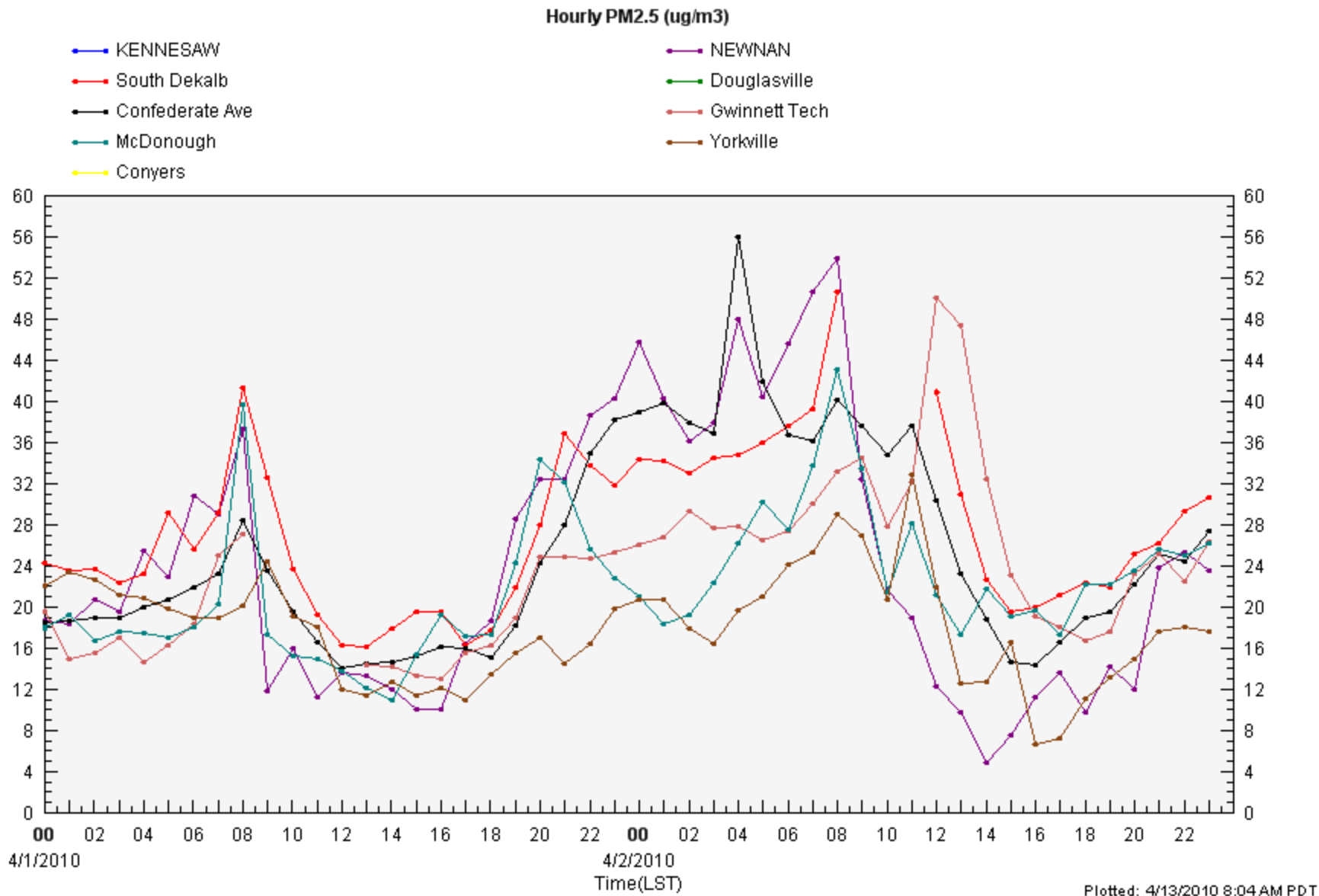
by  
**Bill Murphey, GA EPD**

**Contributors: Nyasha Dunkley, Sean Miller, Scott Sutherland, Katy Misel**

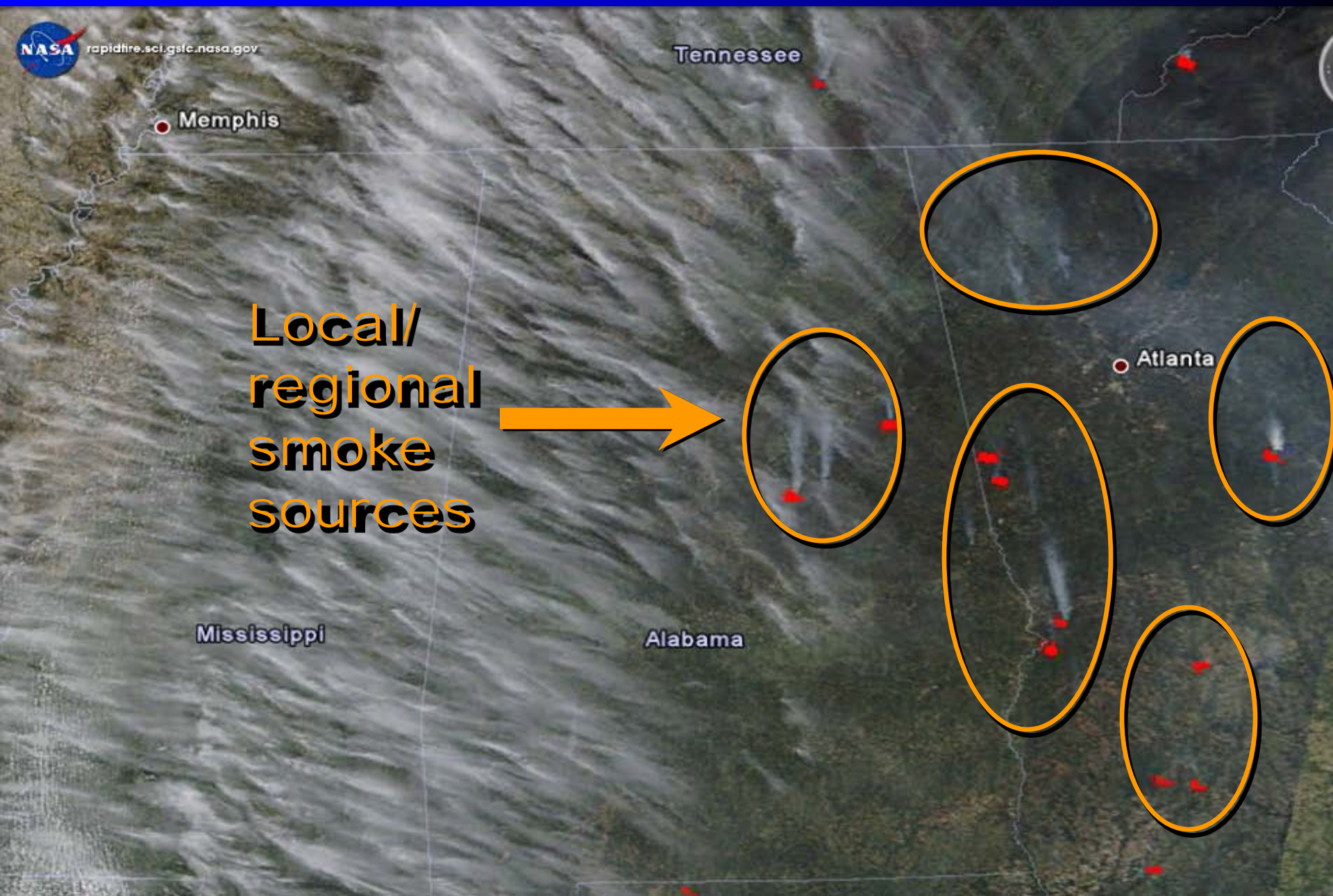
# PM<sub>2.5</sub> Episode (*April 1-3, 2010*)

- Elevated 1-hr and 24-hr averaged PM<sub>2.5</sub> readings recorded at Metro Atlanta sites and areas of S. Georgia, April 1<sup>st</sup> and 2<sup>nd</sup>.
- Fire and smoke activity noted on satellite imagery with local and regional smoke sources
- Trans-Atlantic transport of Saharan dust possibly mixed in with fire/smoke activity to produce the elevated readings
- North GA mountains also reflected ozone violations on April 2<sup>nd</sup>, though likely unrelated to dust transport

# Elevated Hourly PM<sub>2.5</sub> – Metro Atlanta

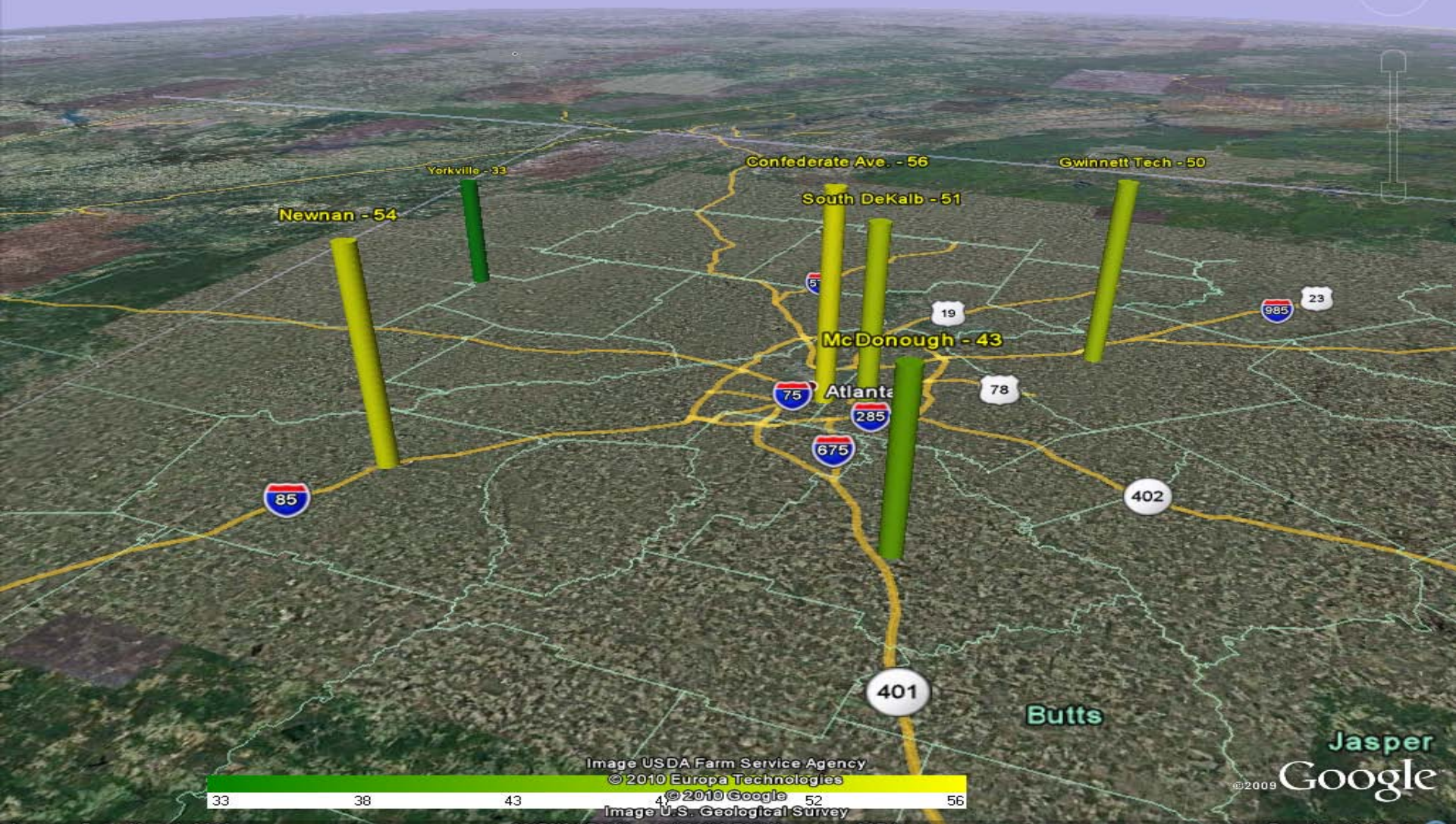


# MODIS Terra 4/2/10 1715 UTC



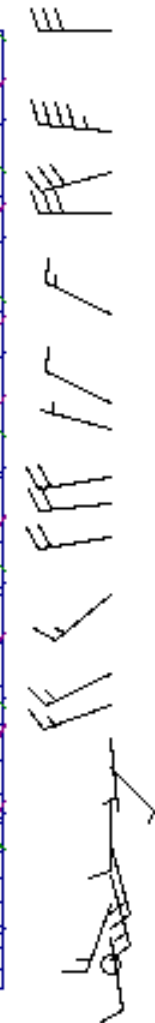
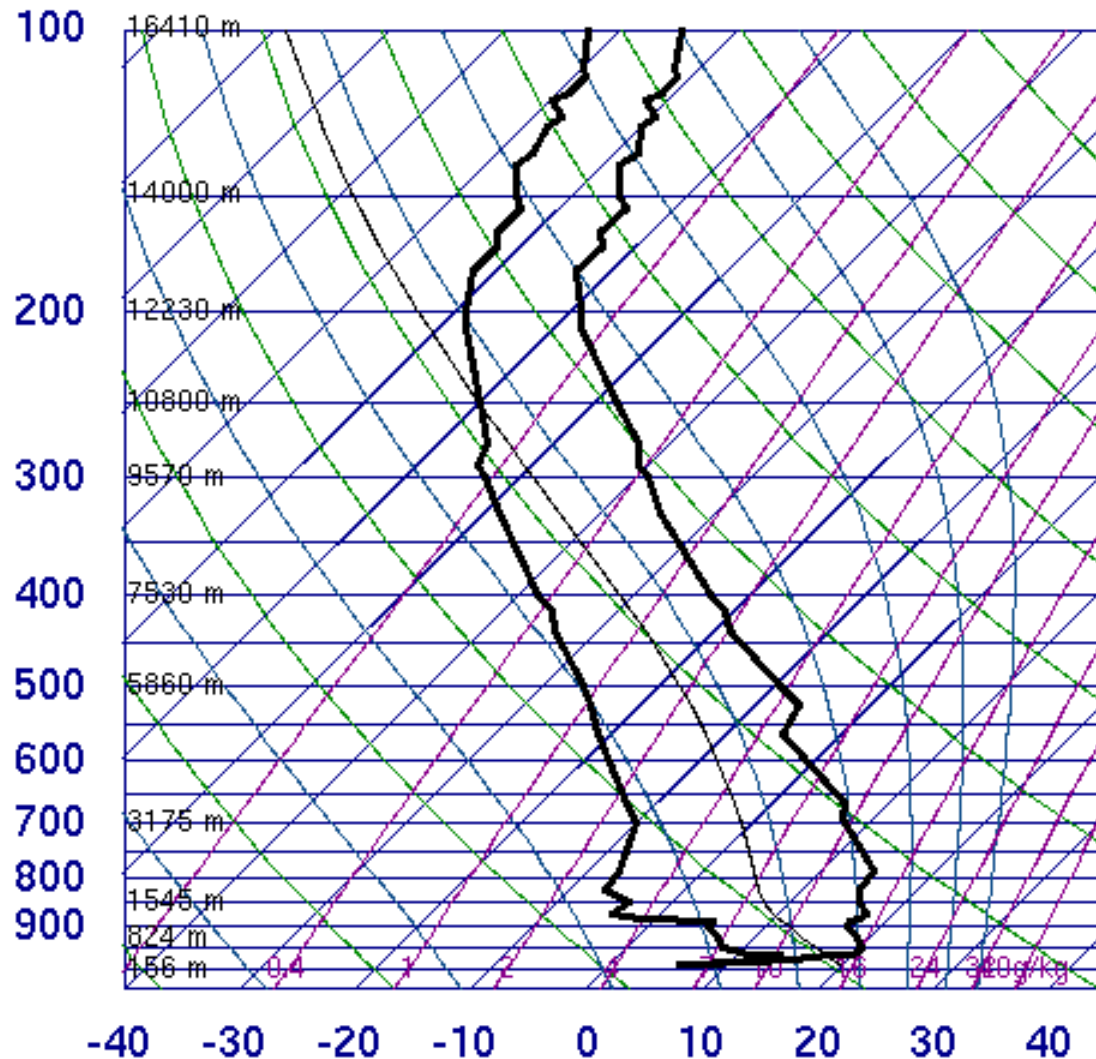
# Spatial Distribution of PM<sub>2.5</sub>

Maximum Hourly PM 2.5 Concentrations 4/2/10  
[micrograms per cubic meter]



# FFC Sounding – 12Z April 2

72215 FFC Peachtree City

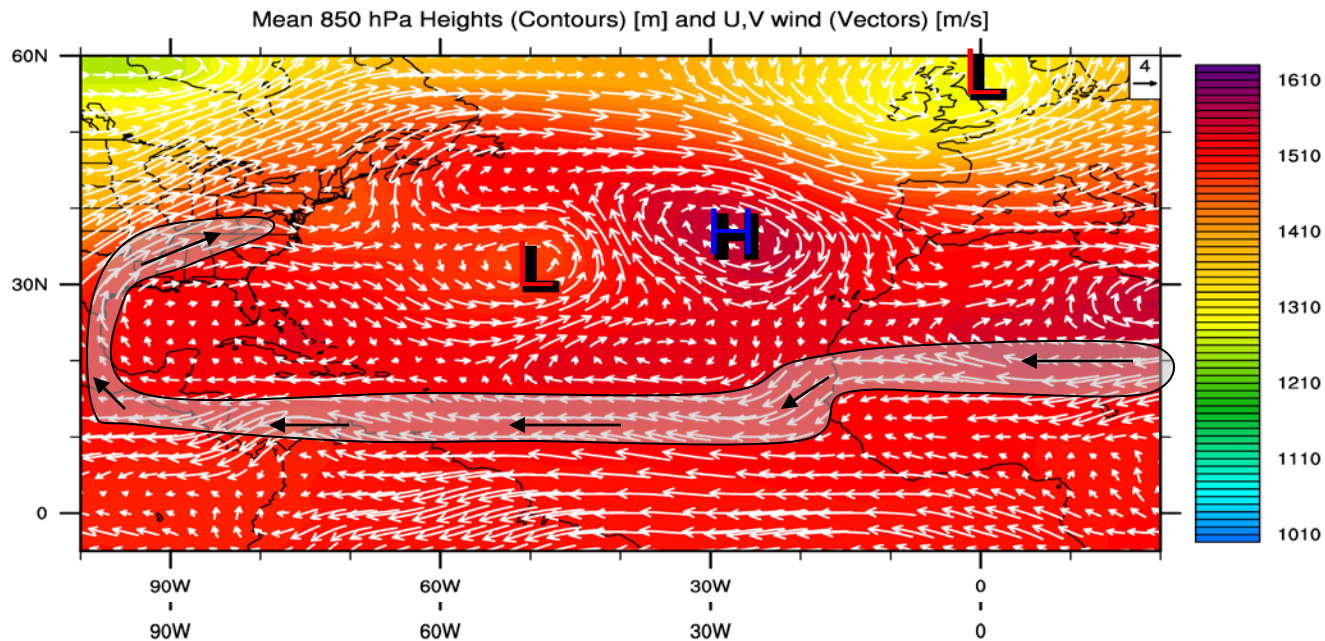
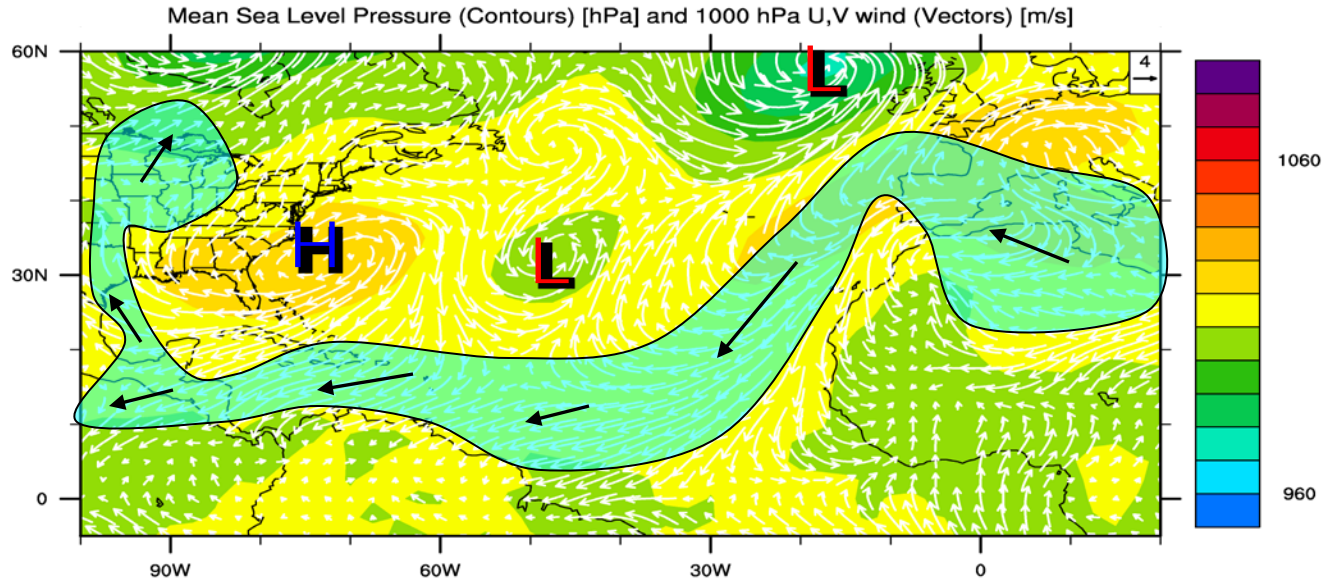


SLAT	33.36
SLON	-84.56
SELV	244.0
SHOW	10.51
LIFT	8.61
LFTV	8.46
SWET	40.00
KINX	3.90
CTOT	5.70
VTOT	25.70
TOTL	31.40
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	281.3
LCLP	859.4
MLTH	293.8
MLMR	8.09
THCK	5704.
PWAT	17.48

12Z 02 Apr 2010

University of Wyoming

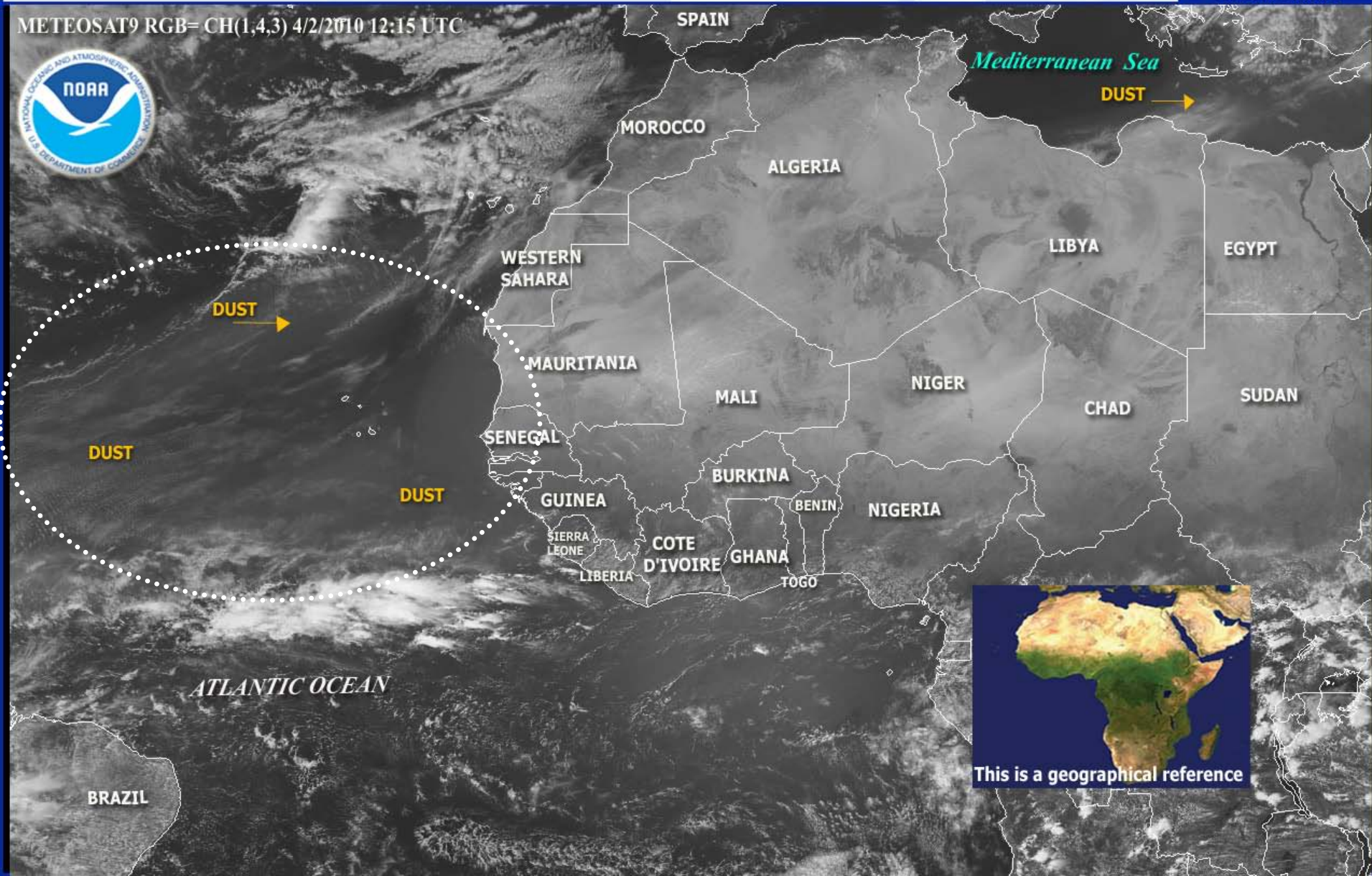
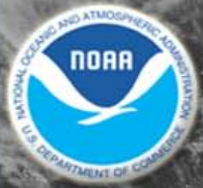
# NCEP/NCAR Reanalysis Means (31 March to 4 April)



This METEOSAT9 satellite image taken at 1215 UTC on April 2, 2010, shows thick dust plumes blowing off the northeast coast of Libya into the Mediterranean Sea you can also see cloud of dust stretching across the Atlantic Ocean from the west coast of Africa to South America.

Credit: NOAA

METEOSAT9 RGB= CH(1,4,3) 4/2/2010 12:15 UTC

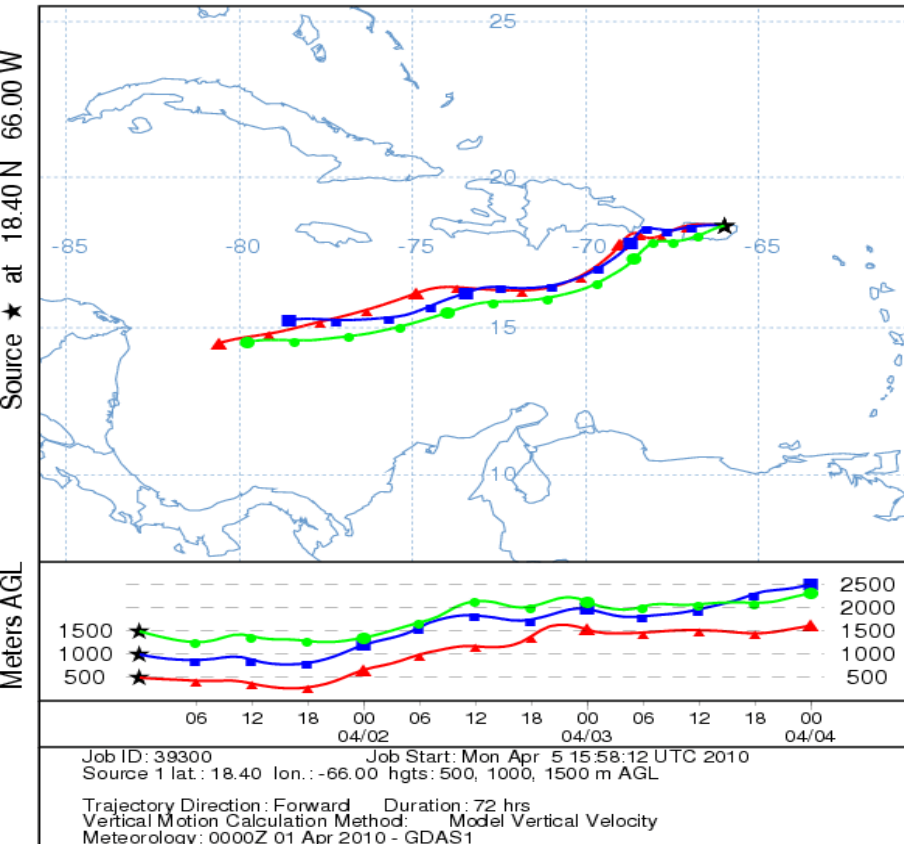




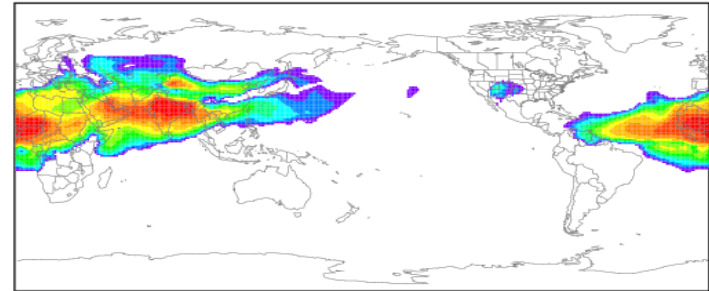
# NOAA HYSPLIT

72-hr forward trajectory  
initializing from Puerto  
Rico on March 31<sup>st</sup>

NOAA HYSPLIT MODEL  
Forward trajectories starting at 0000 UTC 01 Apr 10  
GDAS Meteorological Data



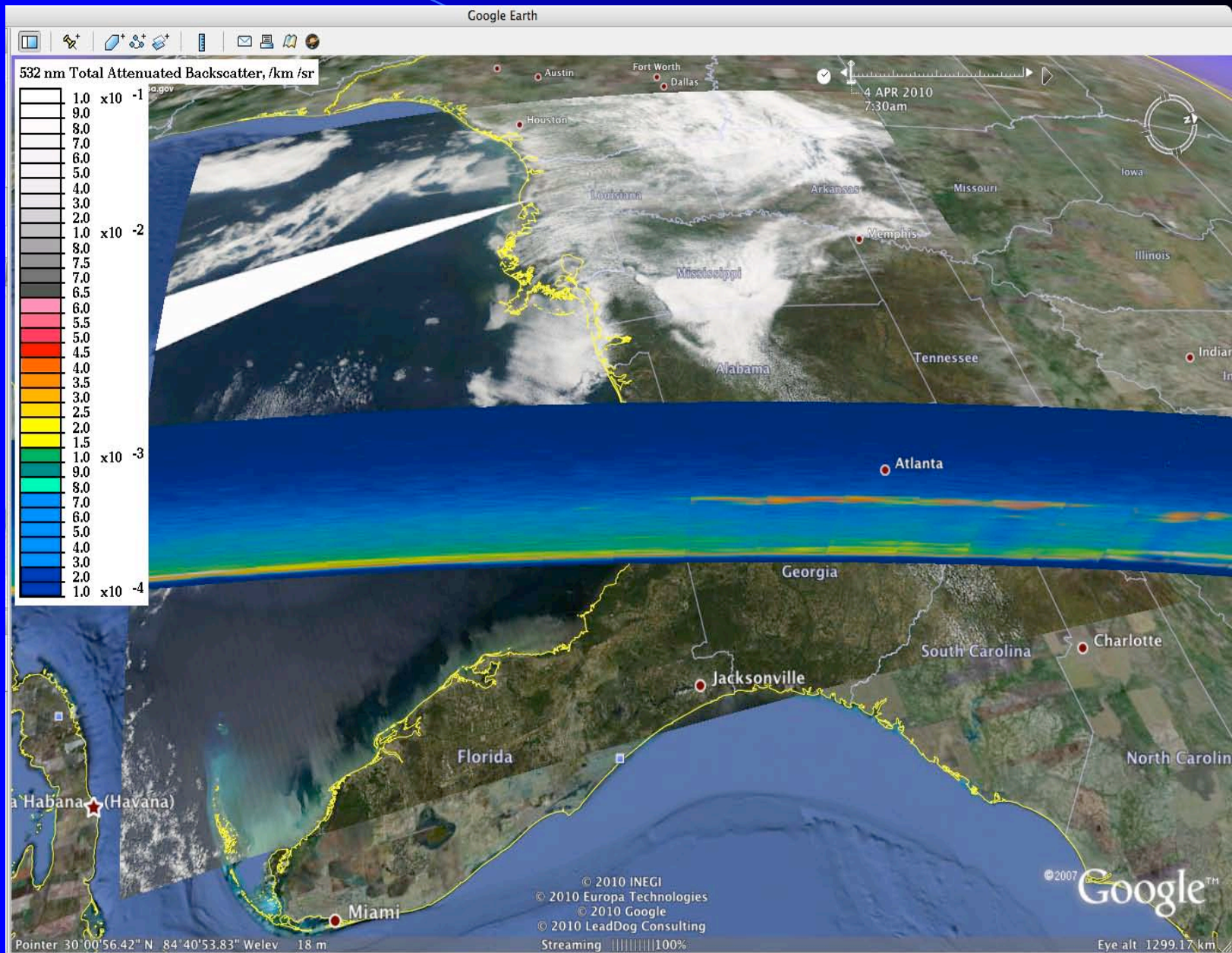
NOAA HYSPLIT DUST FORECAST  
6z 1 Apr 10; species = P001; level(m) = 25894



Column Integrated AOD

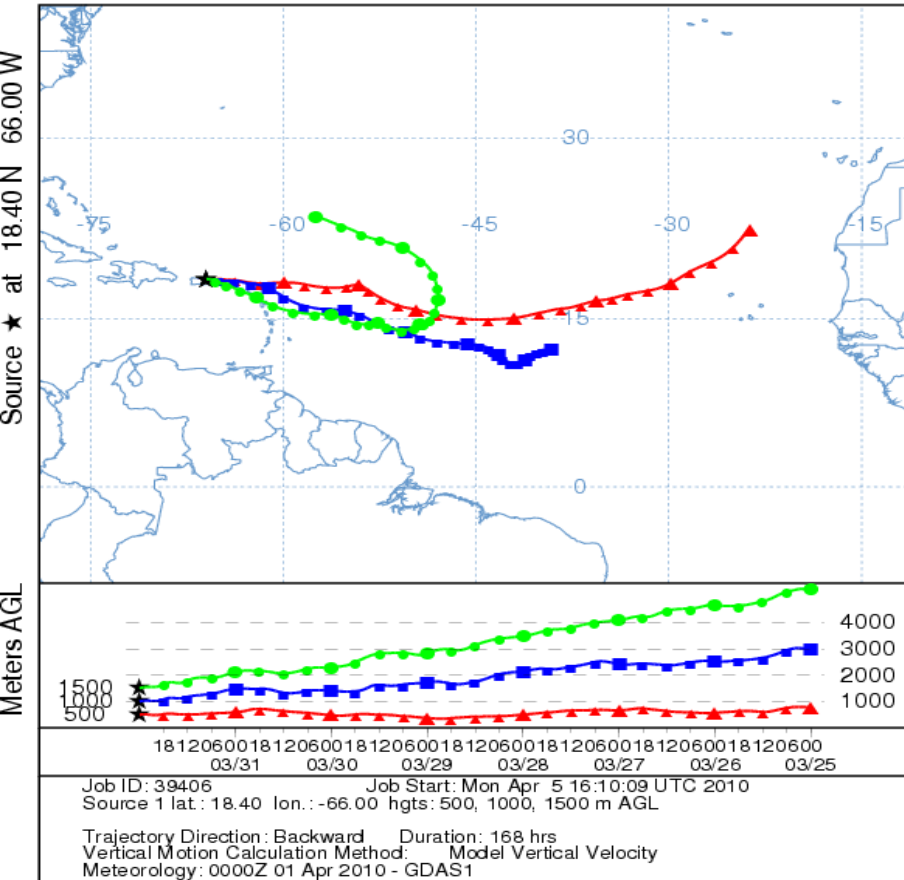
NOAA Dust forecast from 6z 1 Apr 10,  
showing Saharan dust  
reaching regions of Central America and  
South America

# CALIPSO Backscatter – April 4<sup>th</sup>



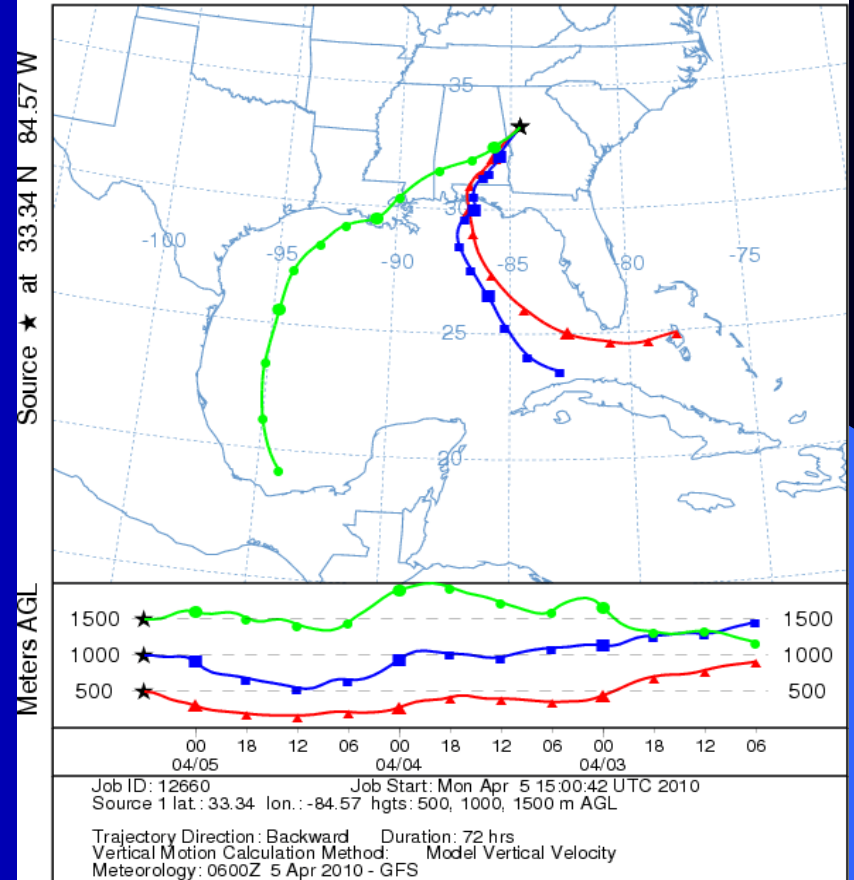
# Back Trajectory Analysis

NOAA HYSPLIT MODEL  
Backward trajectories ending at 0000 UTC 01 Apr 10  
GDAS Meteorological Data



Back trajectory initializing from  
Puerto Rico on March 31<sup>st</sup>

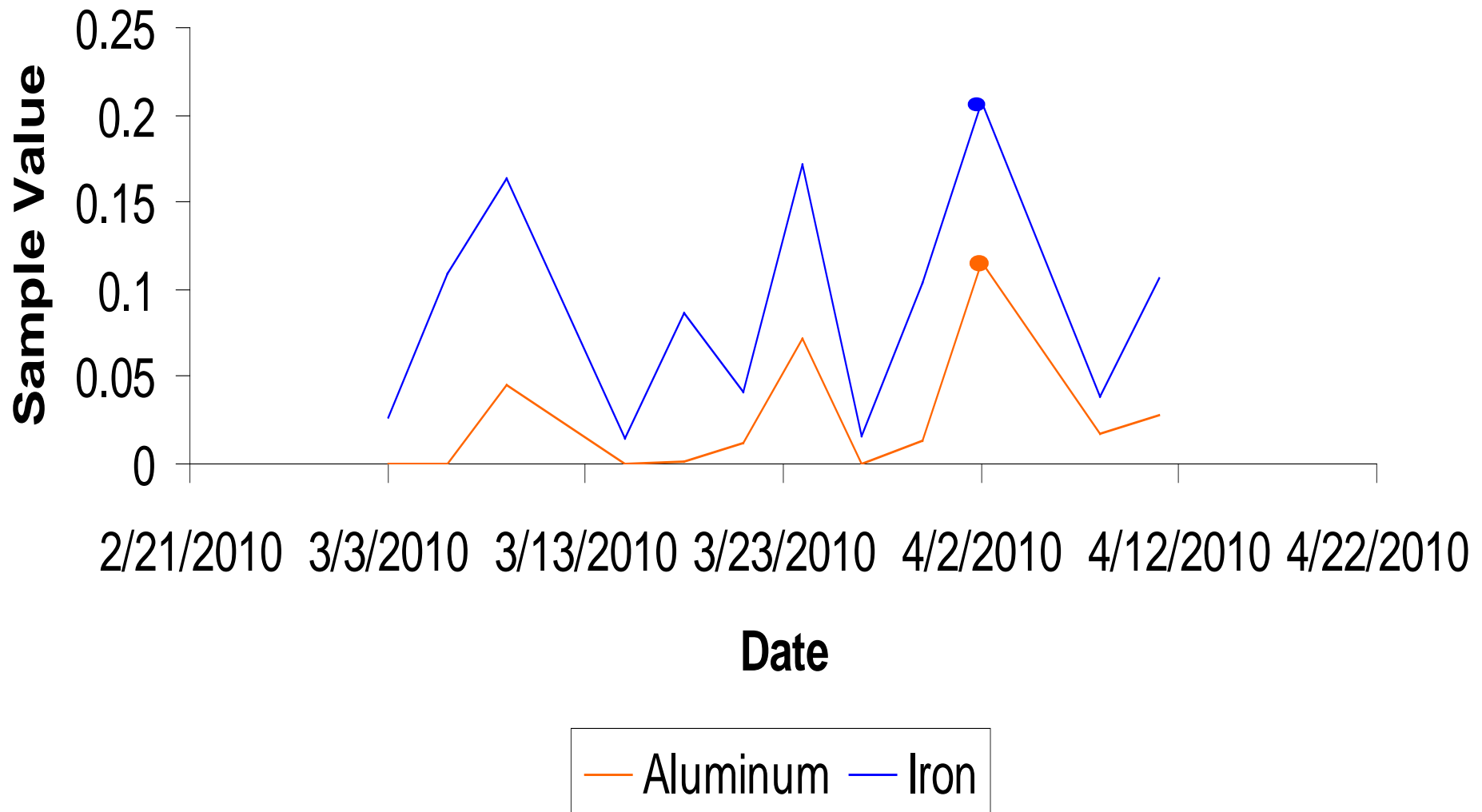
NOAA HYSPLIT MODEL  
Backward trajectories ending at 0600 UTC 05 Apr 10  
GFSG Meteorological Data



72-hr back trajectory from Atlanta,  
GA initializing on April 5<sup>th</sup>

# Speciation - Aluminum and Iron (microg/m<sup>3</sup>)

## South DeKalb Monitoring Site



# Conclusion

- Gigantic dust storm was observed over West Africa March 21-24, 2010.
- Elevated PM<sub>2.5</sub> levels observed across north and south GA April (1st-2<sup>nd</sup>) could be attributed to fire/smoke and possible dust component.
- Preliminary meteorological and trajectory analysis indicates possible transport pathway (~ 850mb) existed for SD wrapping around Atlantic subtropical High.
- Elevated levels of Fe and Al from South Dekalb speciation data indicate components of Saharan Dust layer or mineral dust.