



Mercury Measurement Programs within NOAA/ARL

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I. Intensive Monitoring

Previous Intensive Measurements:

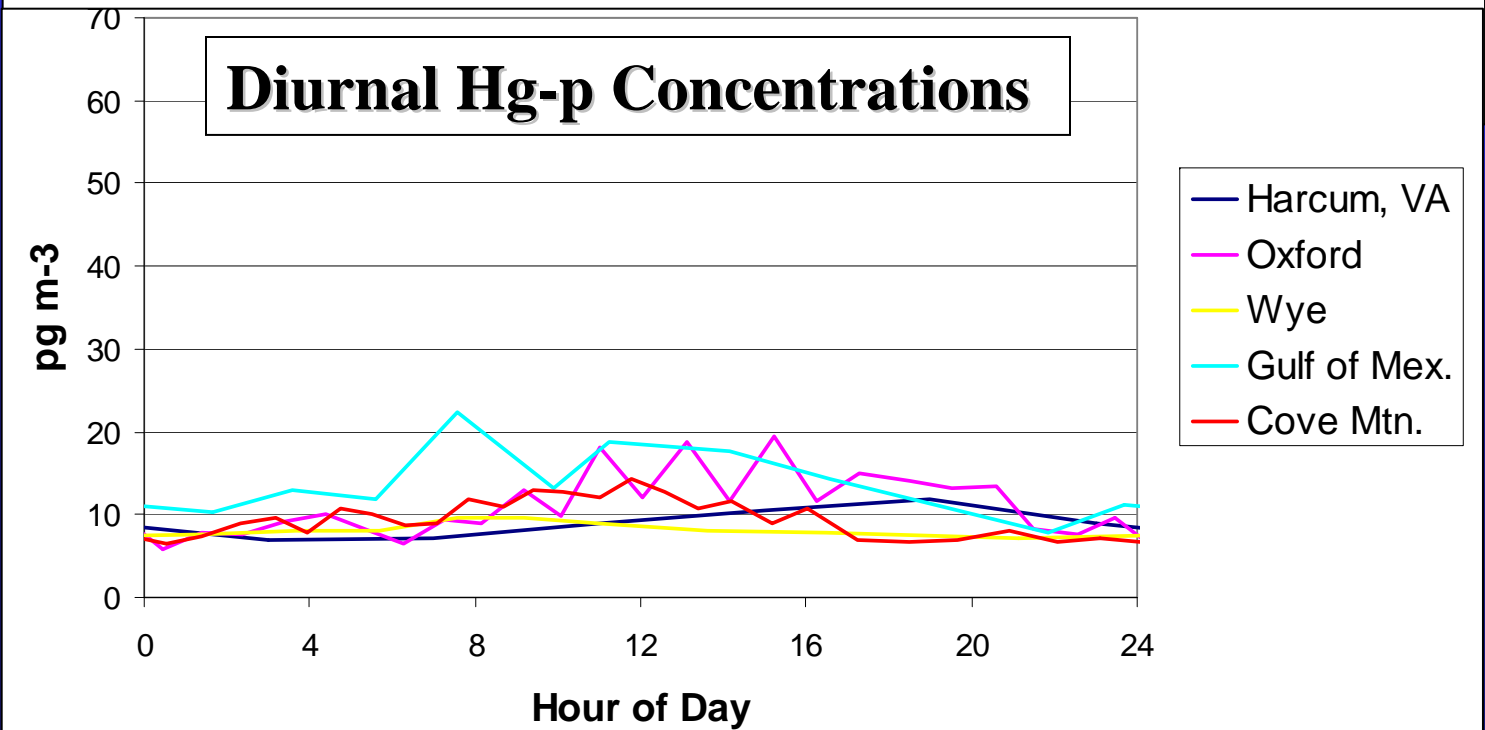
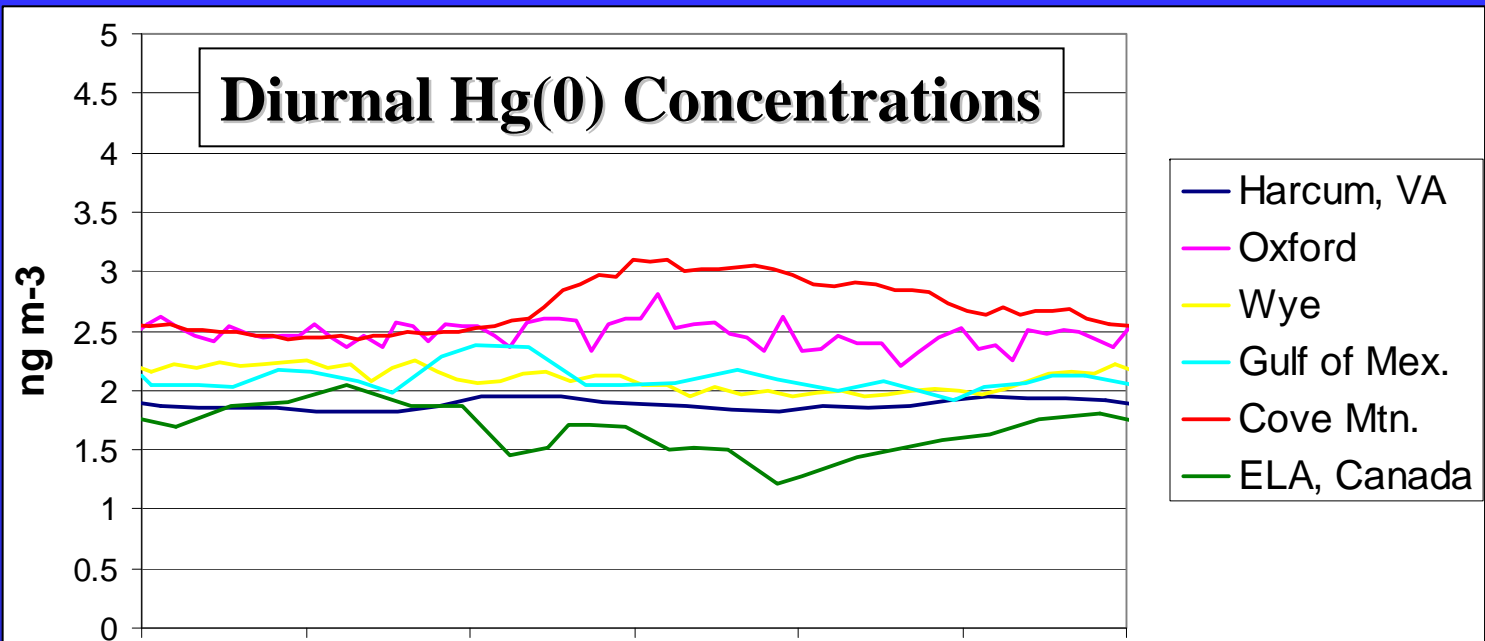
Cove Mtn, TN -Summer 2002

Gulf of Mexico (Ship) –Summer 2003

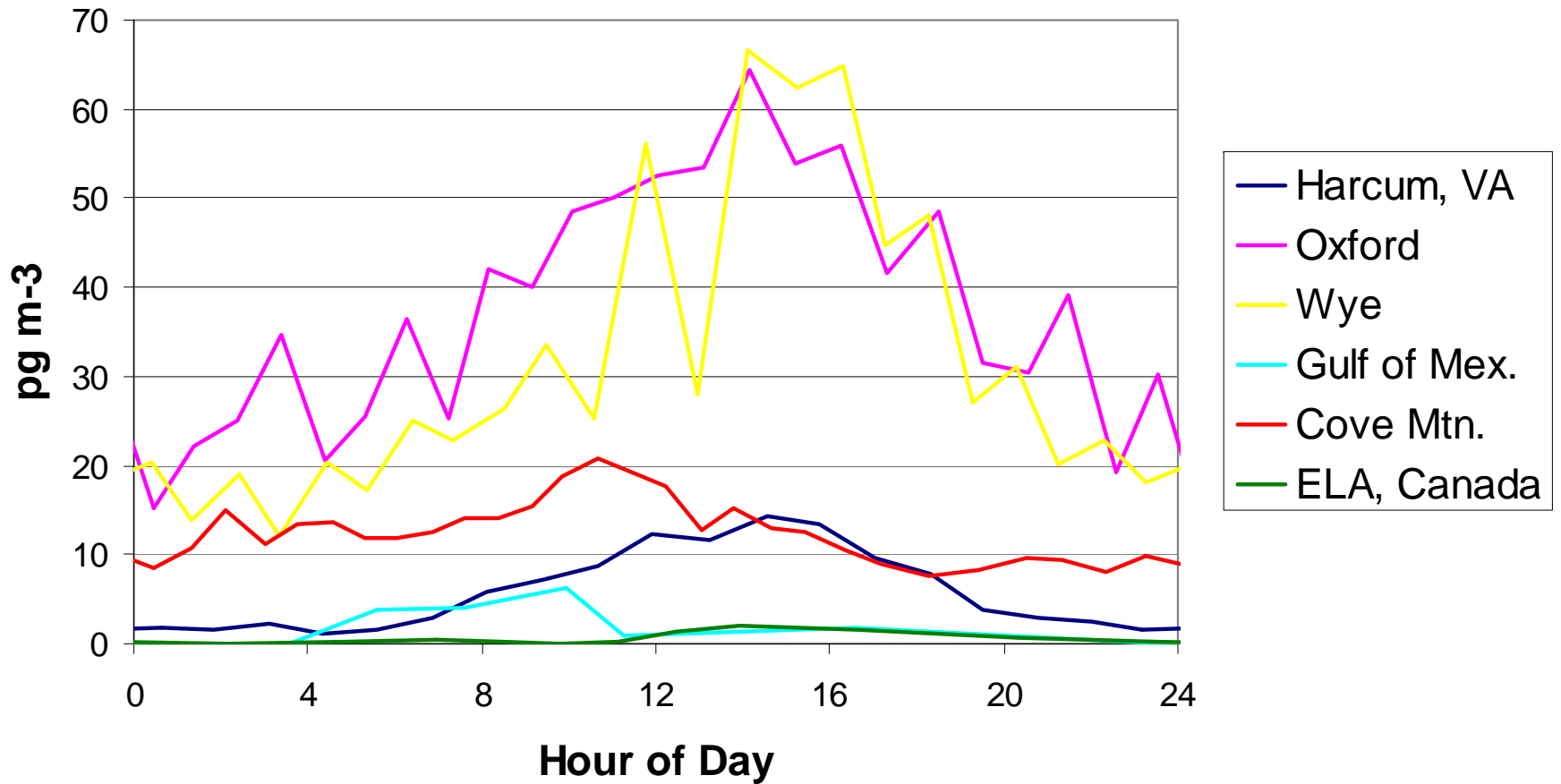
Oxford and Wye, MD –Summer 2004

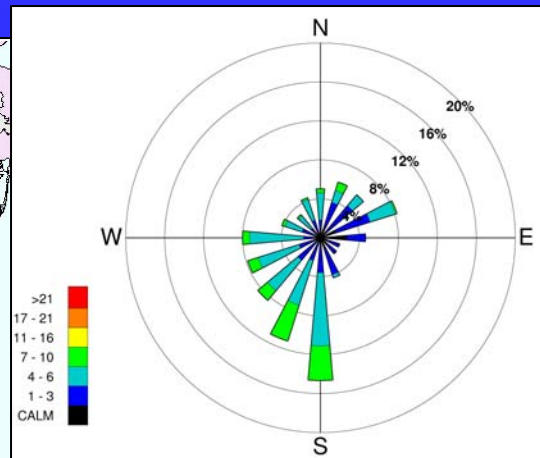
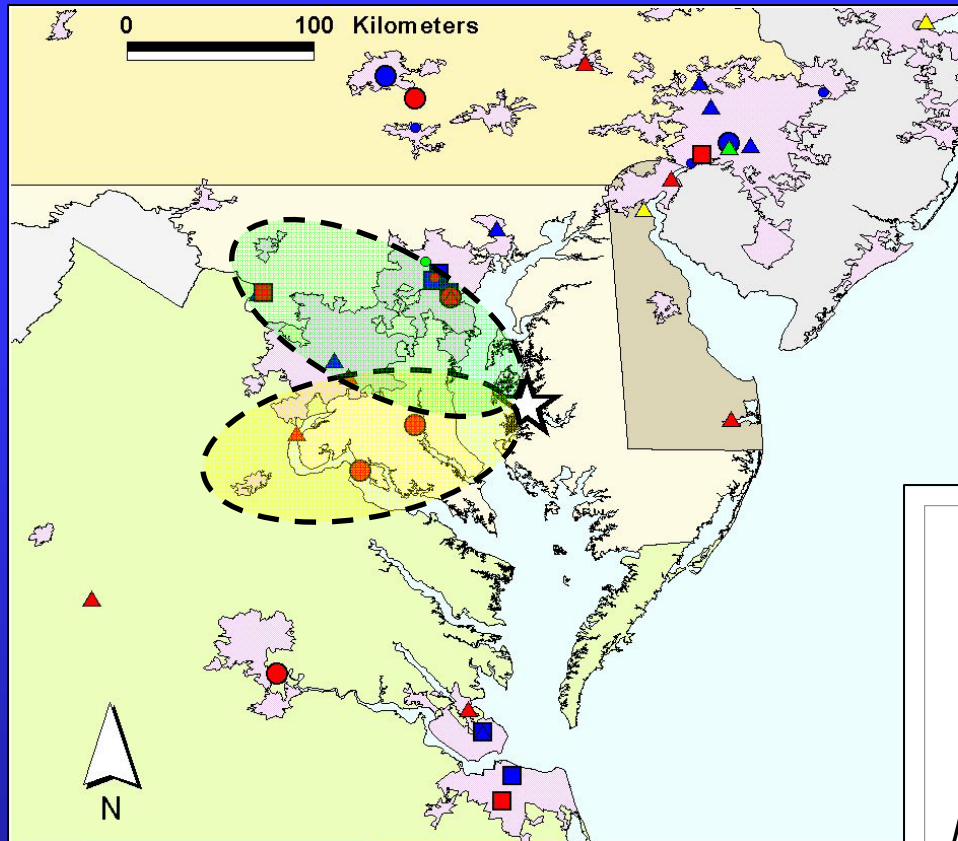
Harcum, VA –Summer 2005

TEXAQSI, Moody Towers –Summer 2006



Diurnal RGM Concentrations





Wind speed and direction at Oxford (Jun-Aug, 2004)

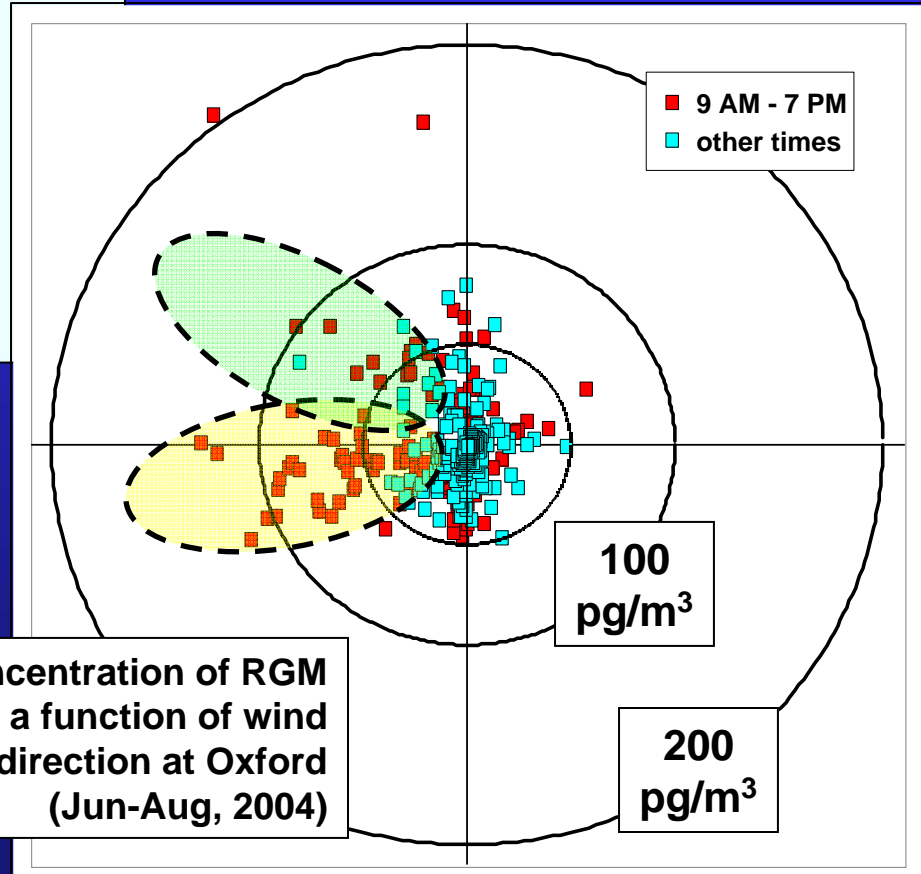
1999 RGM emissions near Oxford, Maryland

Symbol color indicates type of mercury source

- coal
- incinerator
- metals
- manuf/other
- other fuel

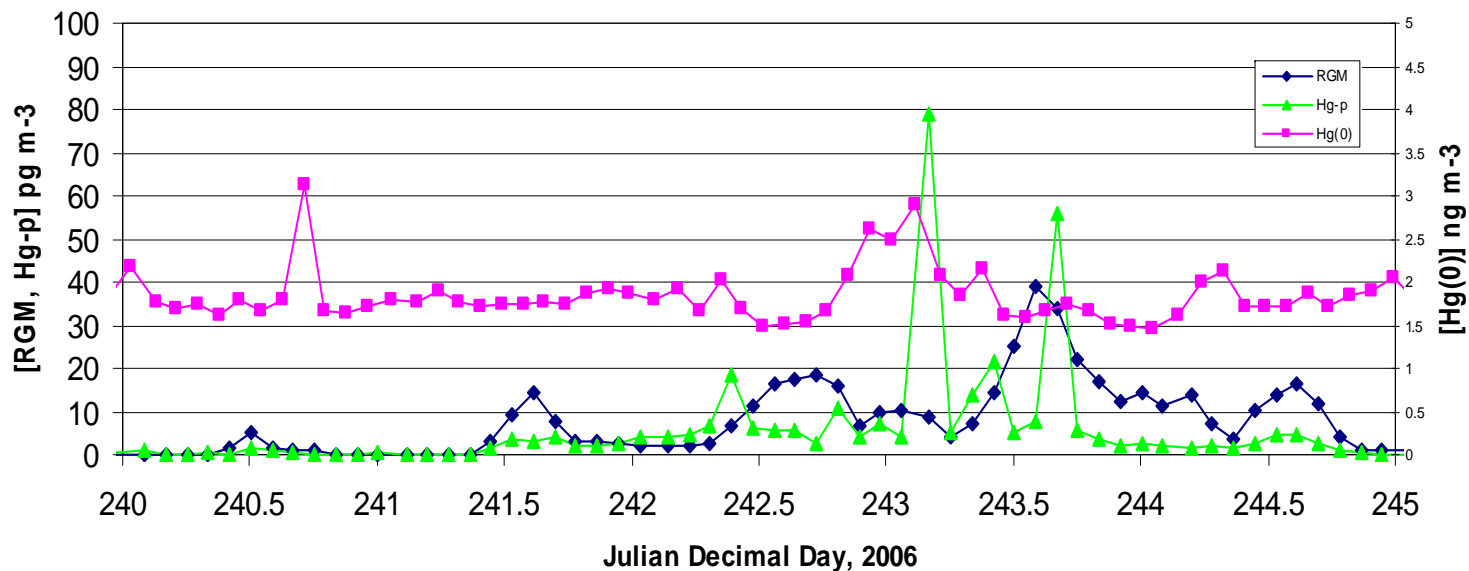
Symbol size and shape indicates 1999 emissions of Hg(II) (kg/yr)

- 10 - 20
- △ 20 - 50
- 50 - 100
- 100 - 200

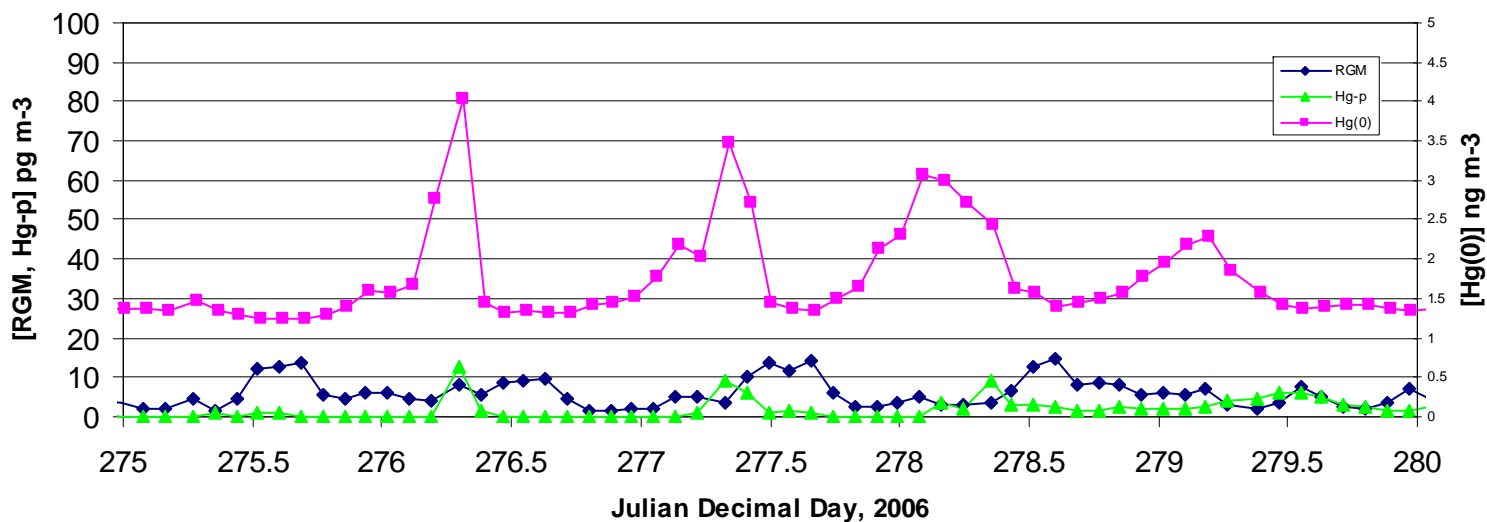


Concentration of RGM as a function of wind direction at Oxford (Jun-Aug, 2004)

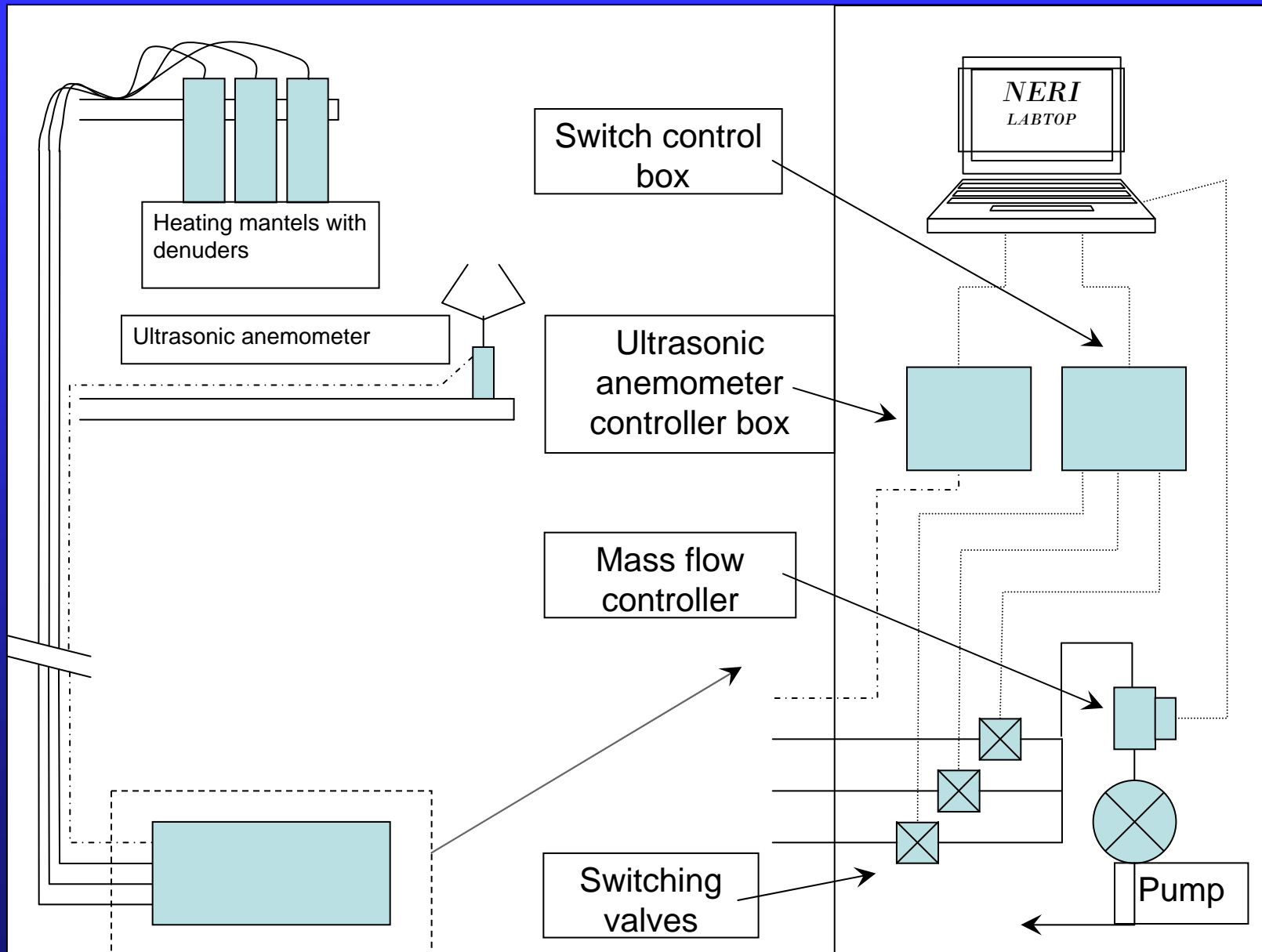
Hg(0), RGM, Hg-p -TEXAQSI/ Moody Towers 2006



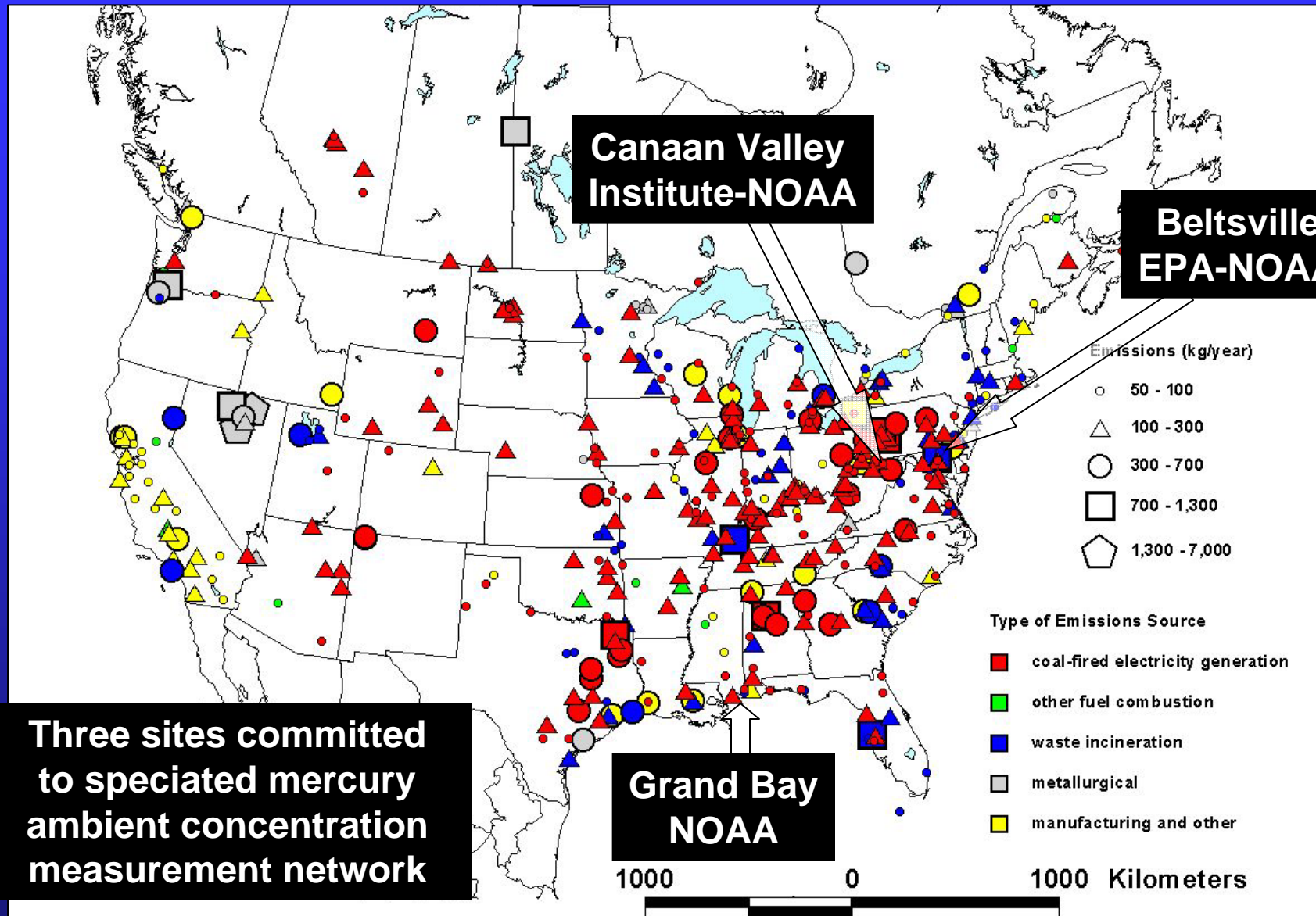
Hg(0), RGM, Hg-p -TEXAQSI/ Moody Towers 2006



II. Relaxed Eddy Accumulation (RGM)



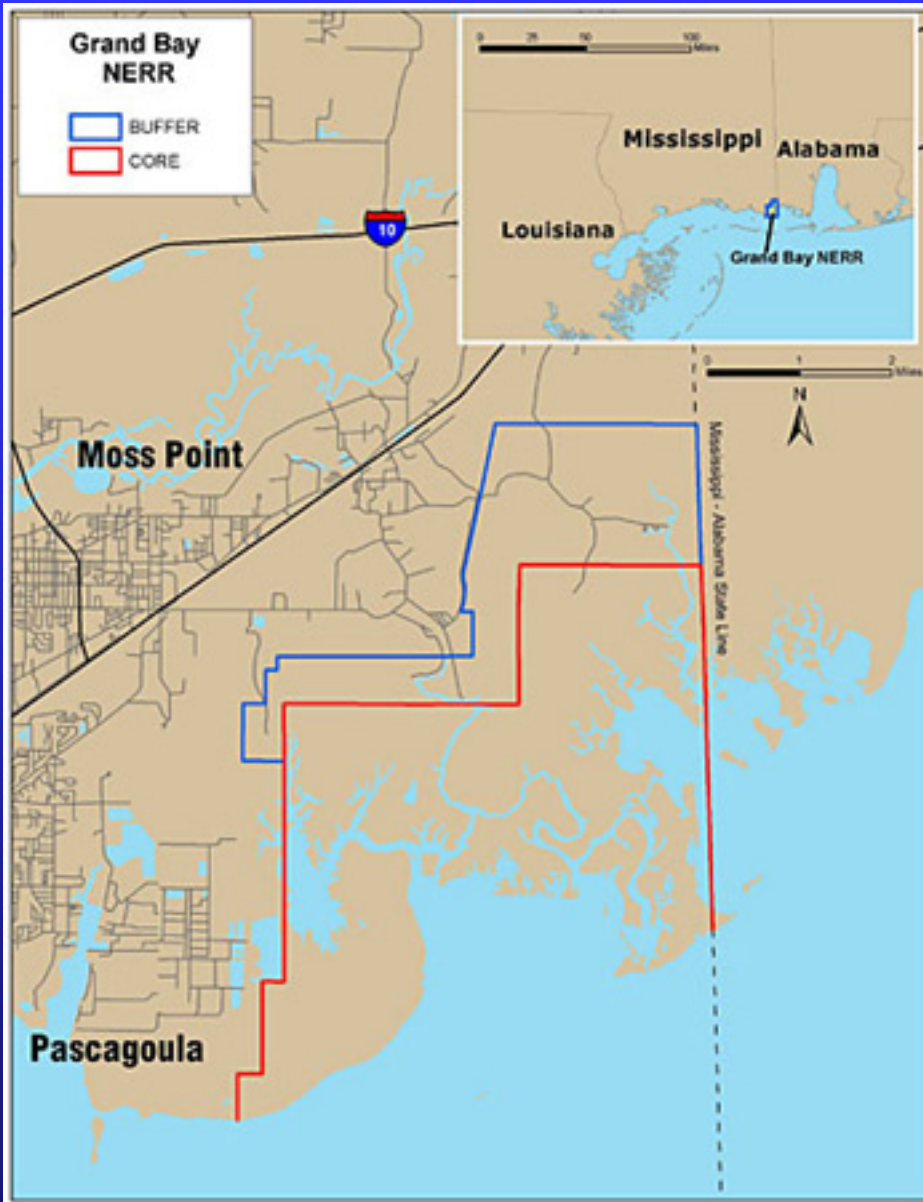
III. Long-term Monitoring



Motivation and Goals

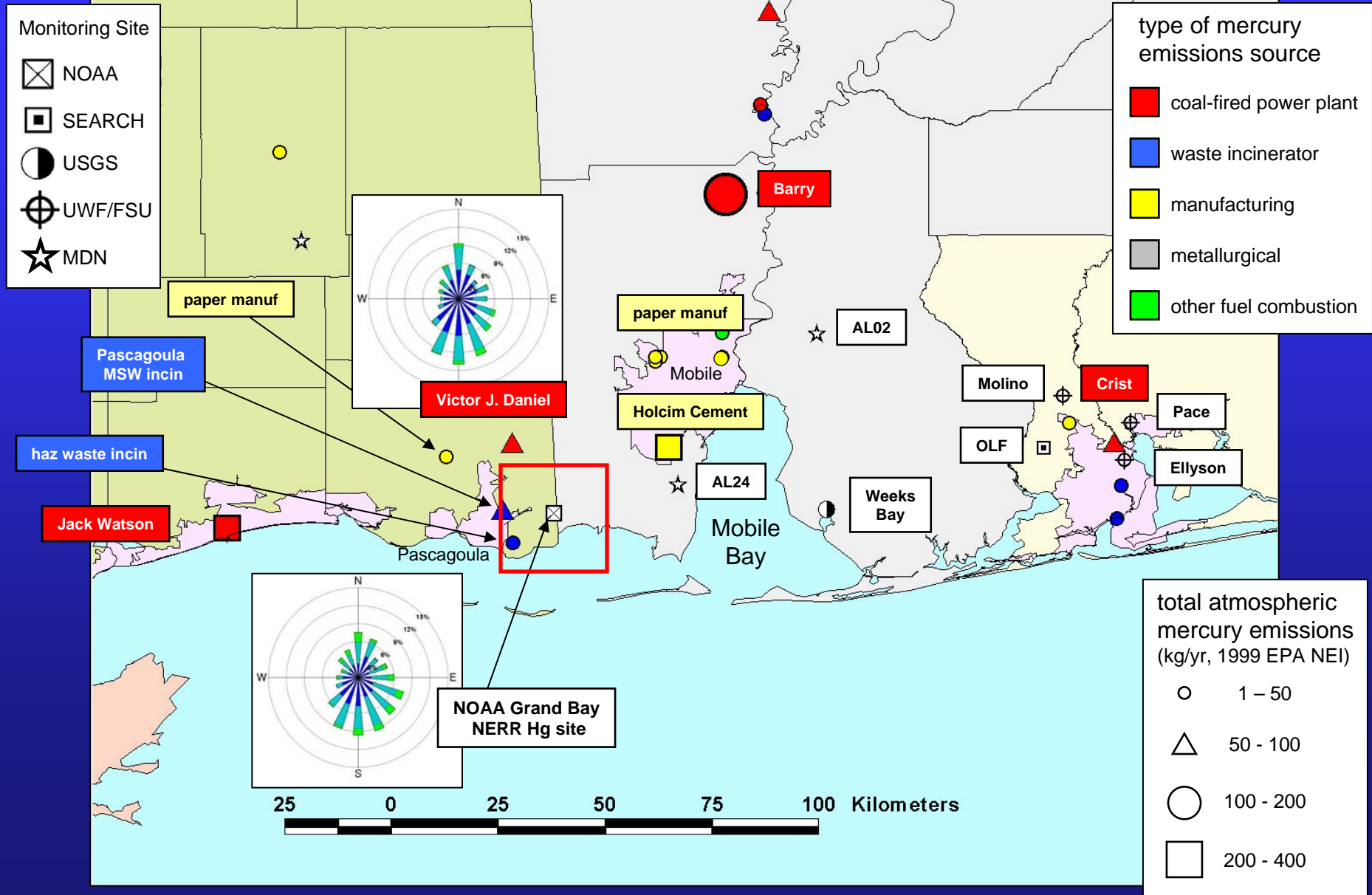
- Establish long-term data record of ambient concentrations (Hg^0 , RGM, FPM) & Wet Deposition
- Discern trends in atmospheric concentrations
- Derive dry deposition estimates
- Concurrent measurements of secondary and co-emitted primary pollutants
- Elucidate source-receptor relationships
- Correlation with ancillary trace species to better understand the origins and chemical cycling of mercury in the atmosphere
- Data set for model evaluation

Grand Bay NERR Site

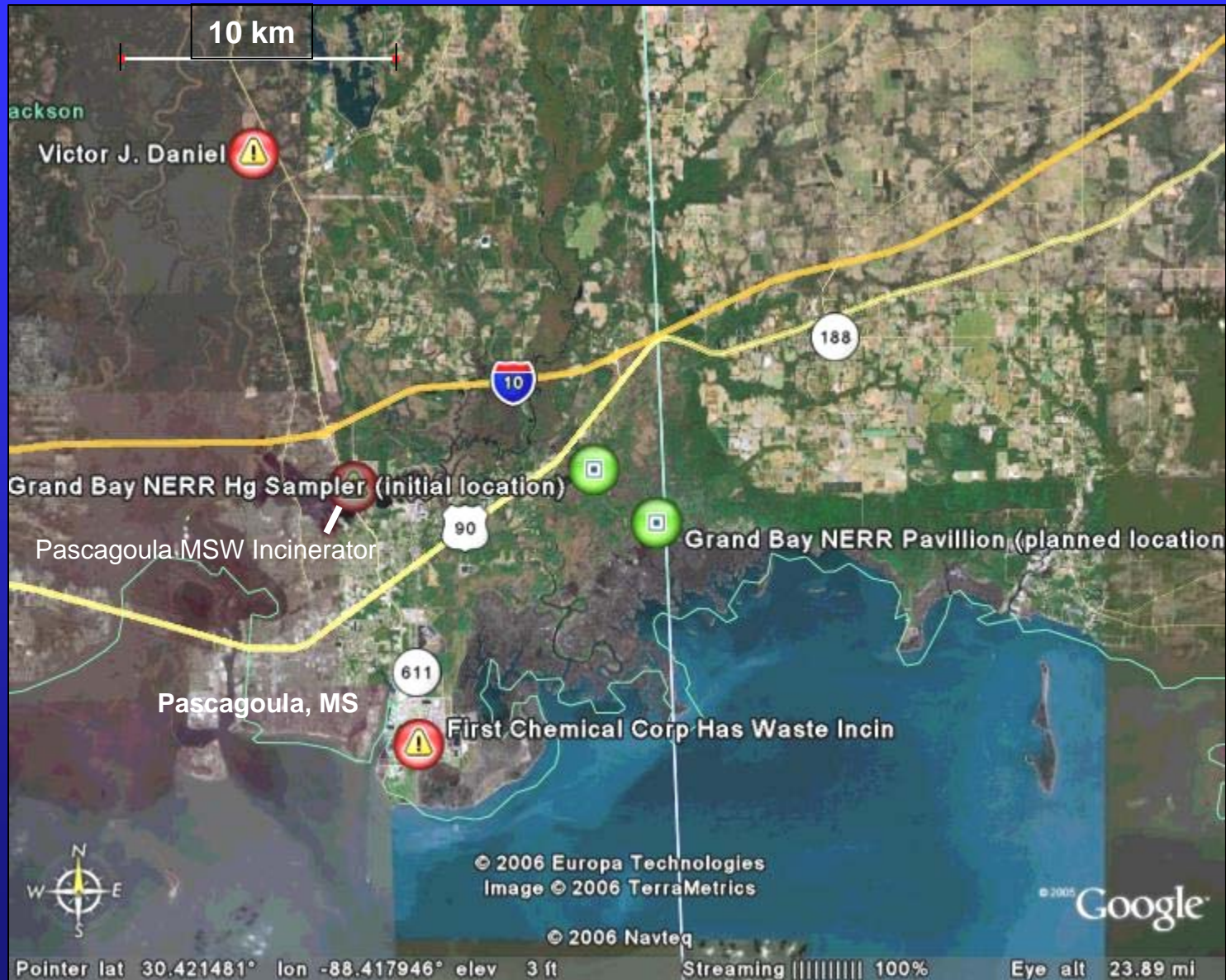


**Grand Bay
Estuarine
Research Reserve**

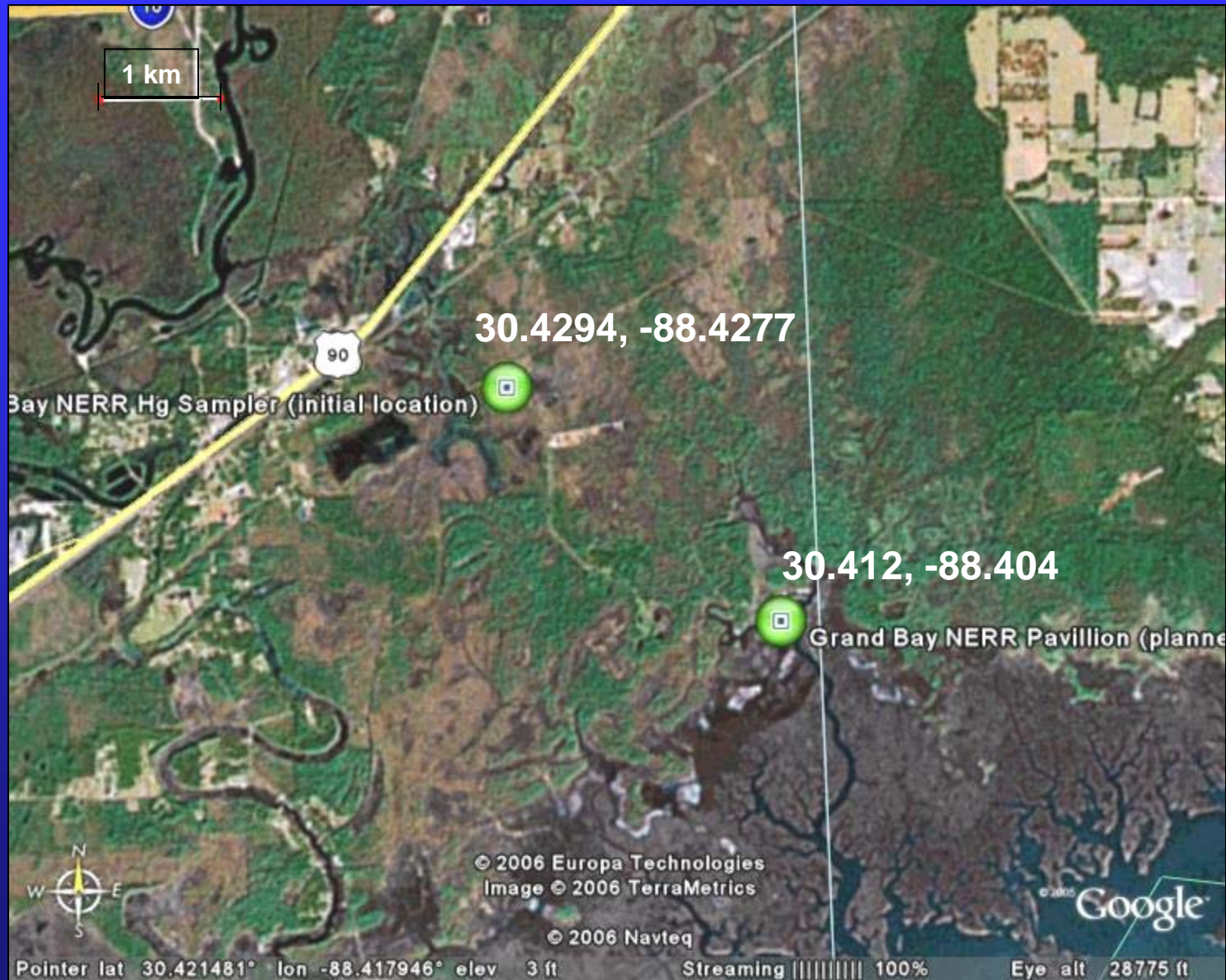
Location of the new NOAA Grand Bay NERR Atmospheric Mercury monitoring site, other atmospheric Hg monitoring sites, and major Hg point sources in the region (EPA 1999 NEI emissions inventory)



Grand Bay NERR Site



Grand Bay NERR Site



Status of Atmospheric Measurements at Grand Bay NERR, Mississippi

Type of Measurement:
 A = concentration in ambient air
 B = concentration in precipitation
 C = meteorological parameter



Measurement	Type	Start Date
Elemental mercury	A	Sept 2006
Fine particulate mercury	A	Sept 2006
Reactive gaseous mercury	A	Sept 2006
Sulfur dioxide	A	Oct 2006
Ozone	A	Oct 2006
Carbon Monoxide	A	Oct 2006
Nitrogen Oxides (NO, NOy)	A	*
Wind speed	C	*
Wind Direction	C	*
Relative Humidity	C	*
Temperature	C	*
Precipitation	C	*
Total mercury in precipitation	B	*
Major ions in precipitation	B	*

* to be established

Pictures of Planned (Eventual) Monitoring Site

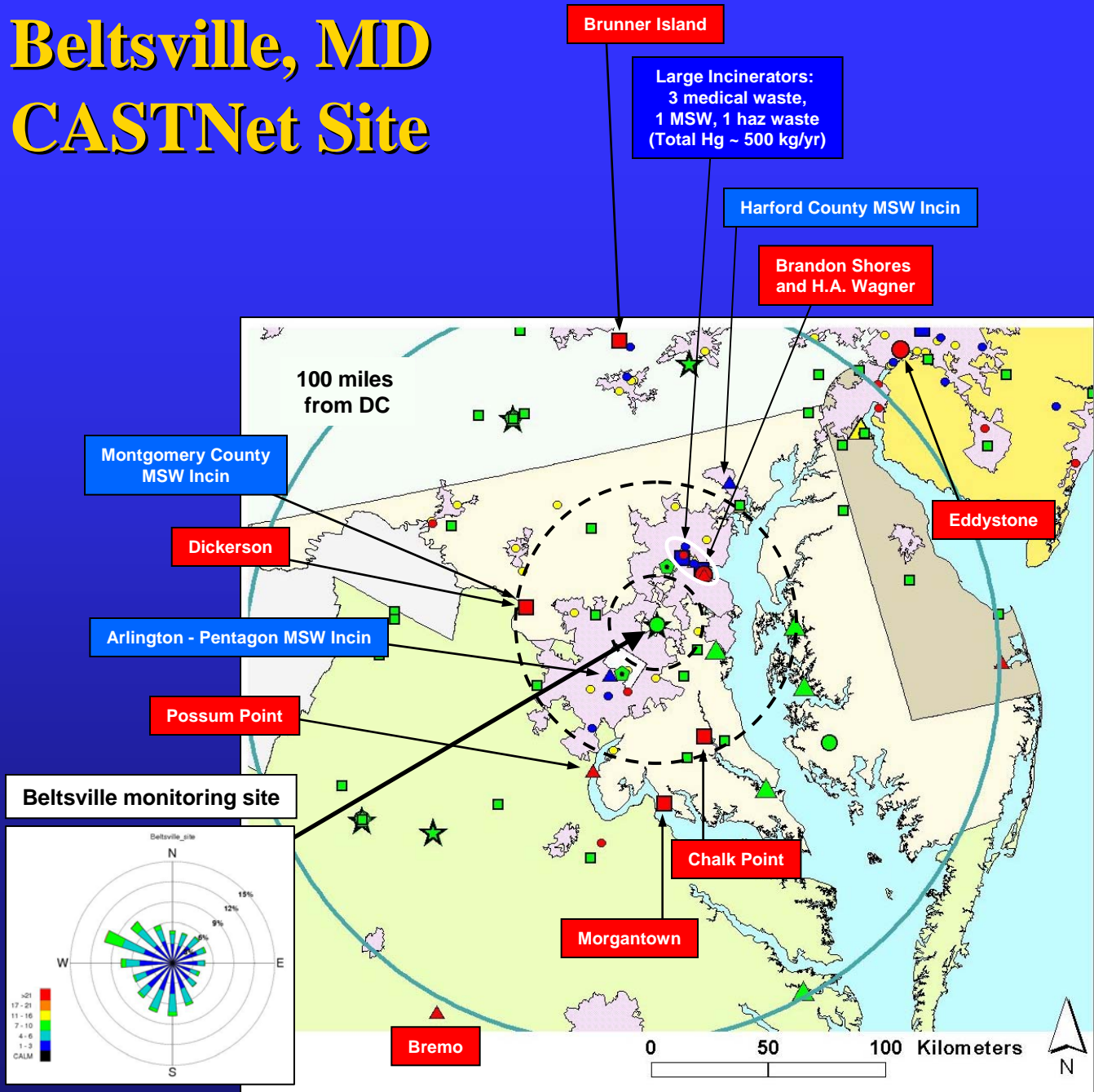


View looking east from the U.S. Fish and Wildlife Service Pavilion at Grand Bay NERR



View looking south and west from the U.S. Fish and Wildlife Service Pavilion at Grand Bay NERR

Beltsville, MD CASTNet Site



Monitoring sites

- rural AQS
- other AQS
- ★ NADP/MDN
- CASTNet
- ▲ Hg site
- ⬠ IMPROVE

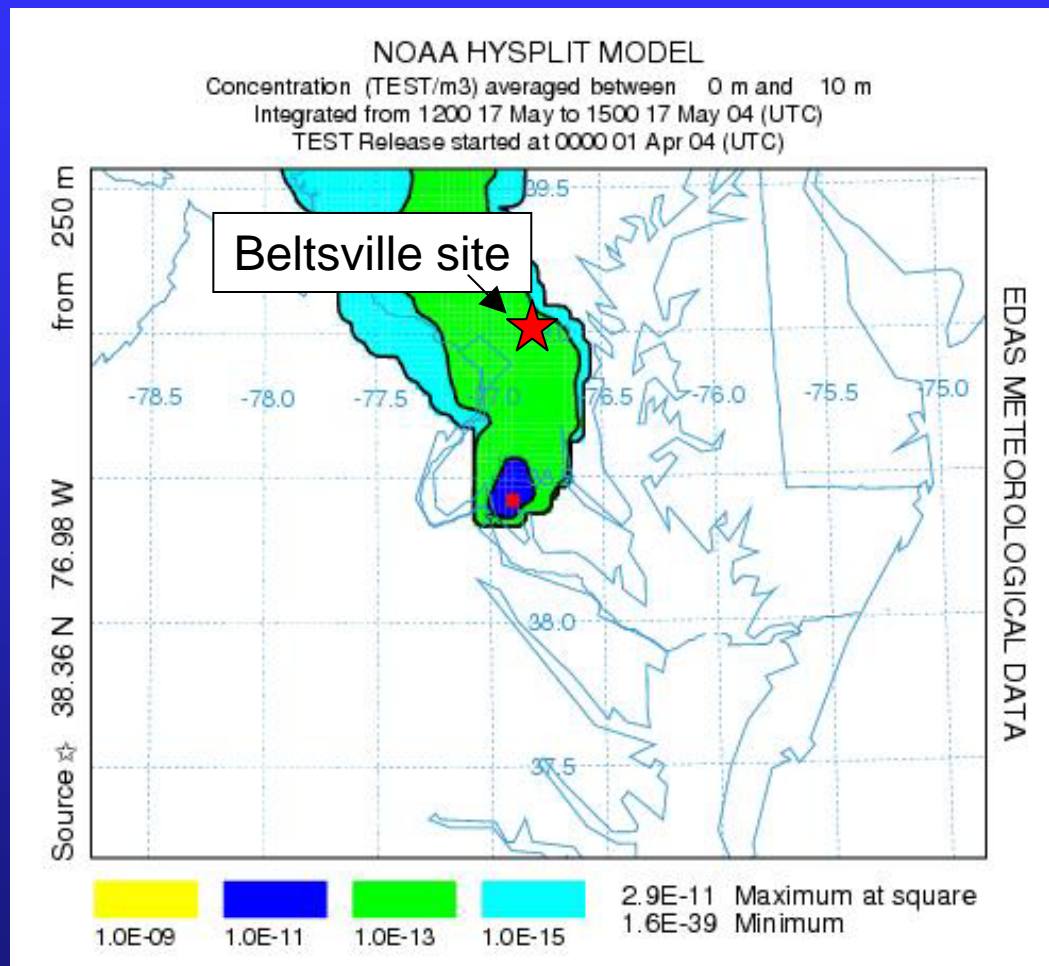
Symbol color indicates type of mercury source

- coal
- incinerator
- metals
- manuf/other

Symbol size and shape indicates 1999 mercury emissions, kg/yr

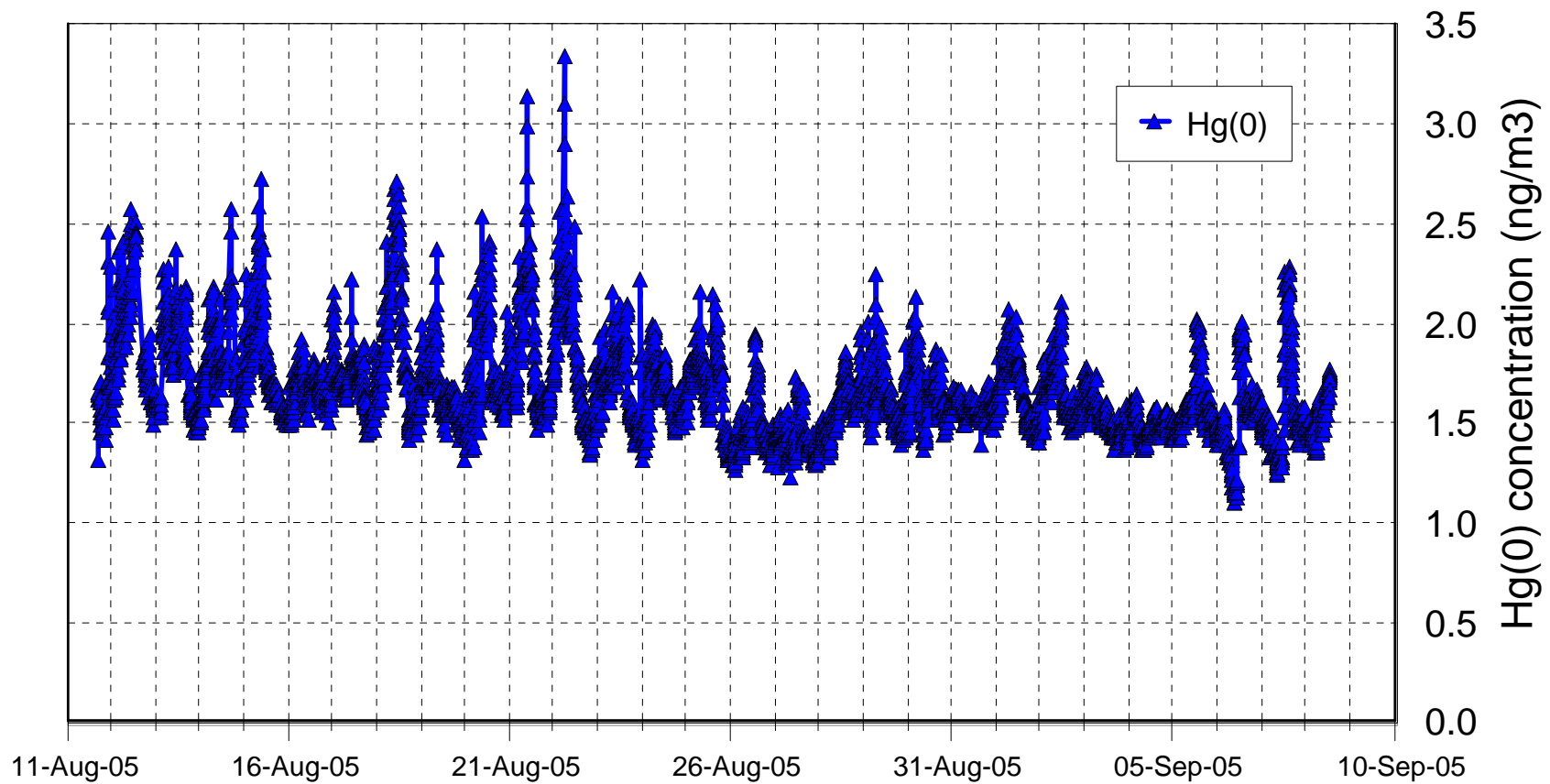
- 1 - 50
- ▲ 50 - 100
- 100 - 200
- 200 - 400
- ▲ 400 - 700
- ⬠ 700 - 1000
- > 1000

Simple dispersion example for emissions from Morgantown coal-fired power plant



- ❑ Simplified wet/dry deposition
- ❑ no plume chemistry
- ❑ EDAS-40 km met data (3-hr res)
- ❑ results displayed are the concentration averaged between 0-10 meters above the ground for a 1 gram/hr continuous emissions rate
- ❑ Morgantown RGM ~120 kg/yr or ~14 g/hr
- ❑ Example -- 10^{-11} g/m³ (dark blue) is in the range 10^{-11} to 10^{-9} ~ 140 – 14,000 pg/m³
- ❑ Example -- 10^{-13} g/m³ (green) is in the range 10^{-13} to 10^{-11} ~ 1.4 - 140 pg/m³

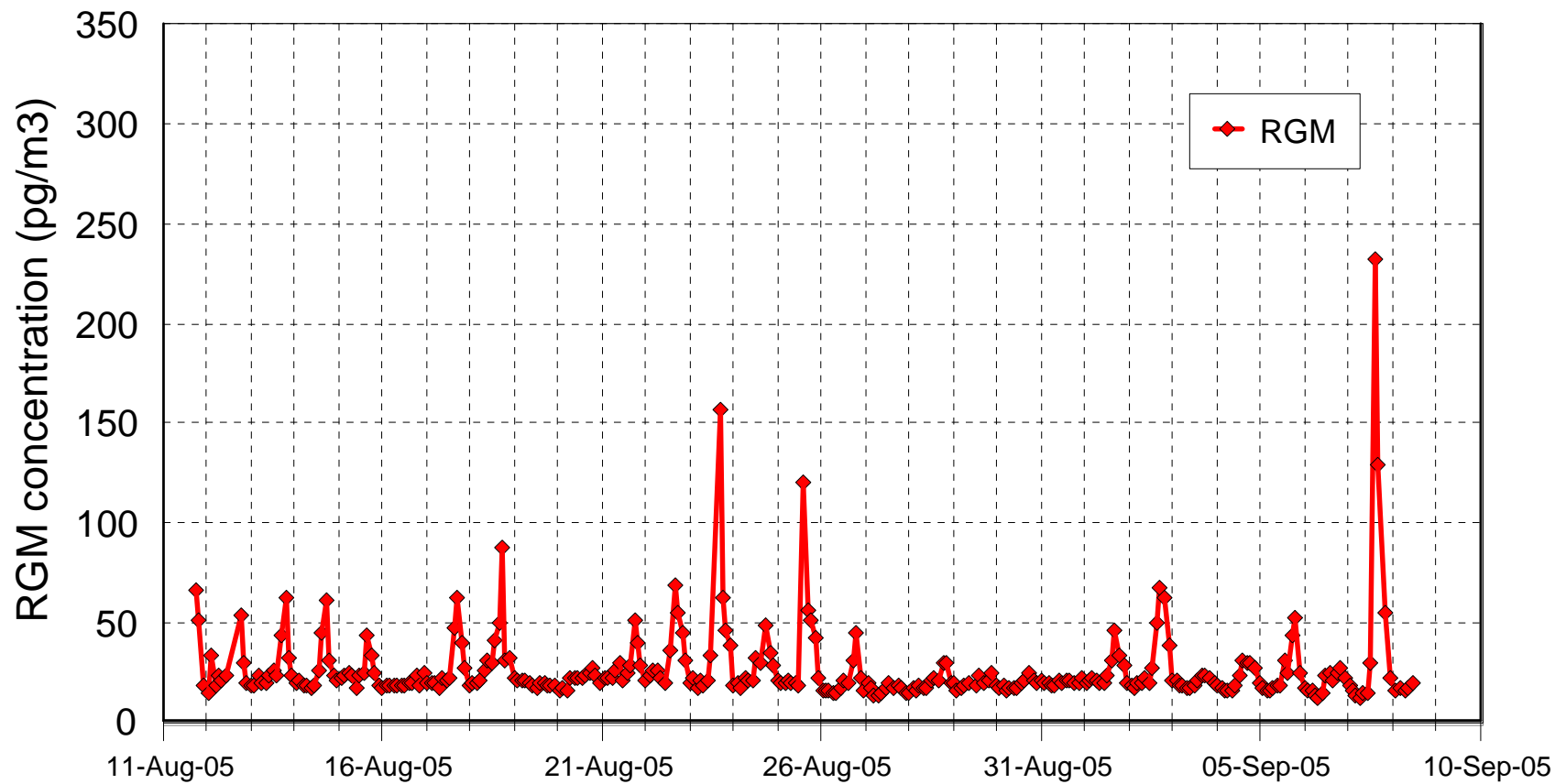
Hg Concentrations at Beltsville



data generously provided for discussion purposes by Fabien Laurier

Note – times shown are UTC, e.g., 7 PM UTC = 3 PM Eastern Daylight Savings Time

Hg Concentrations at Beltsville



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Status of Atmospheric Measurements at Beltsville, MD CASTNet Site



Measurement
Elemental mercury
Fine particulate mercury
Reactive gaseous mercury
Sulfur dioxide
Ozone
Carbon Monoxide
Nitrogen Oxides (NO, NO _y)
SO ₄ ²⁻ , NO ₃ ⁻ , NH ₃ , NH ₄ ⁺ , HNO ₃ , SO ₂ (Hourly)
Wind speed
Wind Direction
Relative Humidity
Temperature
Precipitation
SO ₄ ²⁻ , NO ₃ ⁻ , NH ₄ ⁺ , HNO ₃ , SO ₂ (Weekly)
Total mercury in precipitation (weekly)
Major ions in precipitation (weekly)