Potential data analyses for mercury network assessment

Regional Mercury Monitoring Network Evaluation Meeting

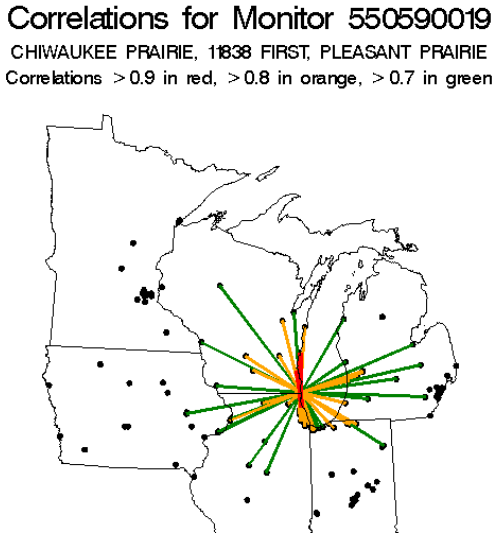
WDNR, Nov. 23, 2010

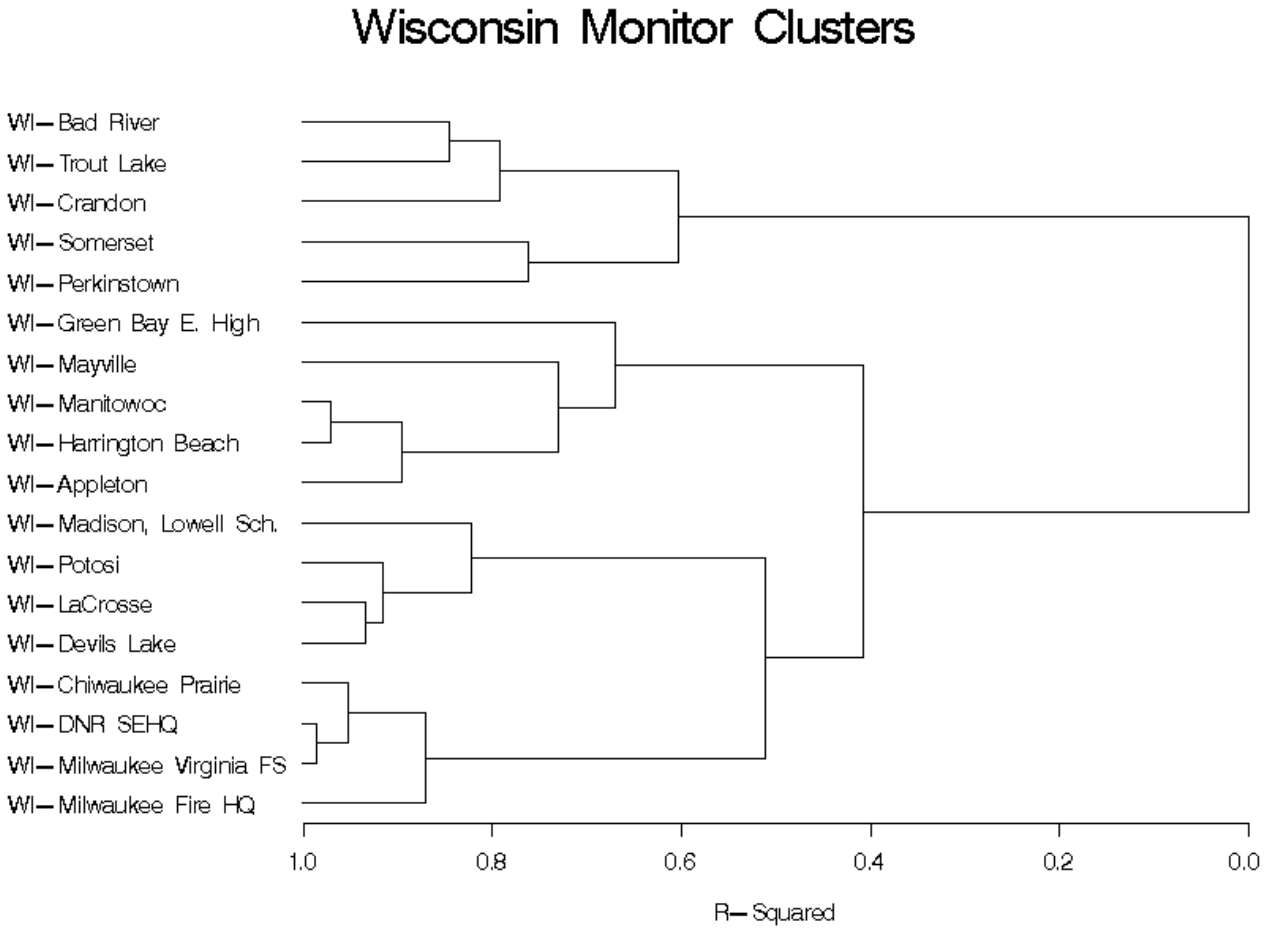
Proposed tasks

- Assess spatial coverage of existing network – are there obvious gaps or redundancies?
- Compare emission inventory to existing network – are monitors adequately covering areas of high emissions?
- Examine trends in mercury concentration and deposition – do they reflect trends in emissions?
- Use back trajectories to explore source regions and transport patterns

Possible methods: spatial coverage

Cluster analysis or correlation analysis





Possible methods: spatial coverage

- Unmonitored area analysis – use modeled data to identify gaps by visual inspection

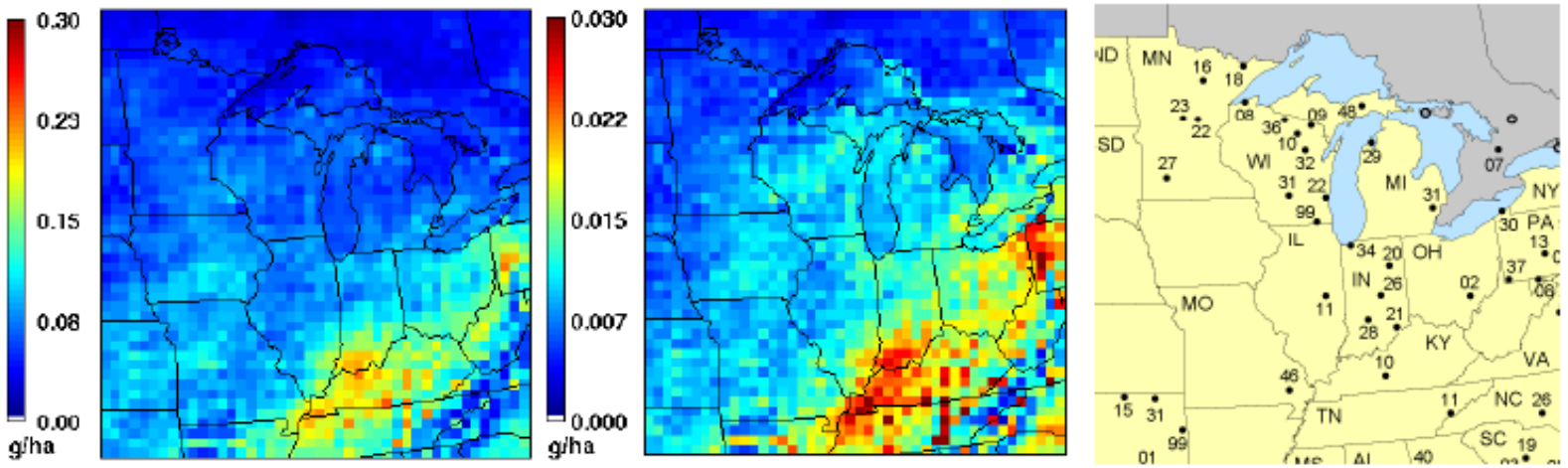
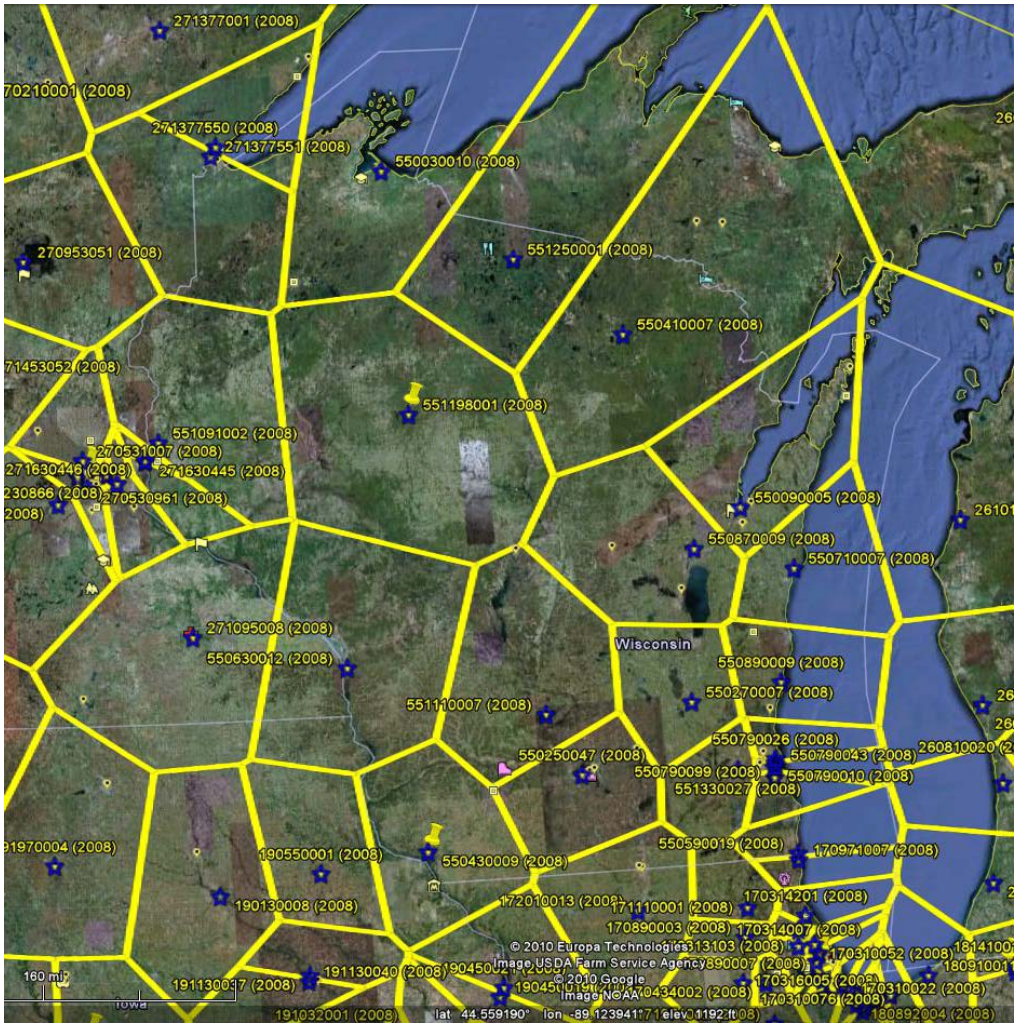


Figure 5. Maps of modeled mercury wet deposition for oxidized gaseous (left) and particulate (center) mercury v. existing mercury deposition monitoring network (right)

Possible methods: spatial coverage

- Area and population served analyses (EPA tool)



Possible methods: emissions inventory analysis

- Compare maps of emissions with current monitor locations to look for adequate coverage

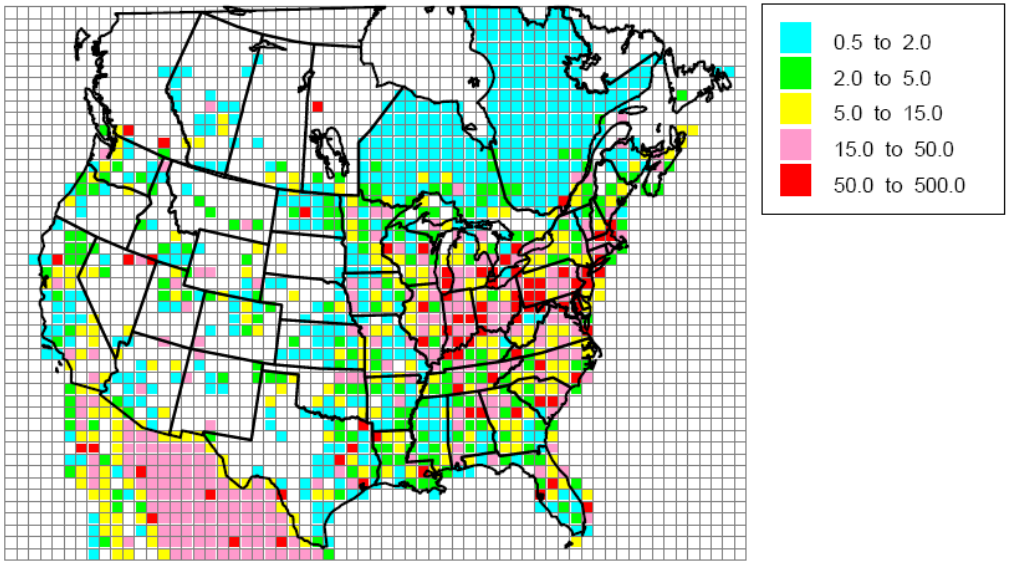
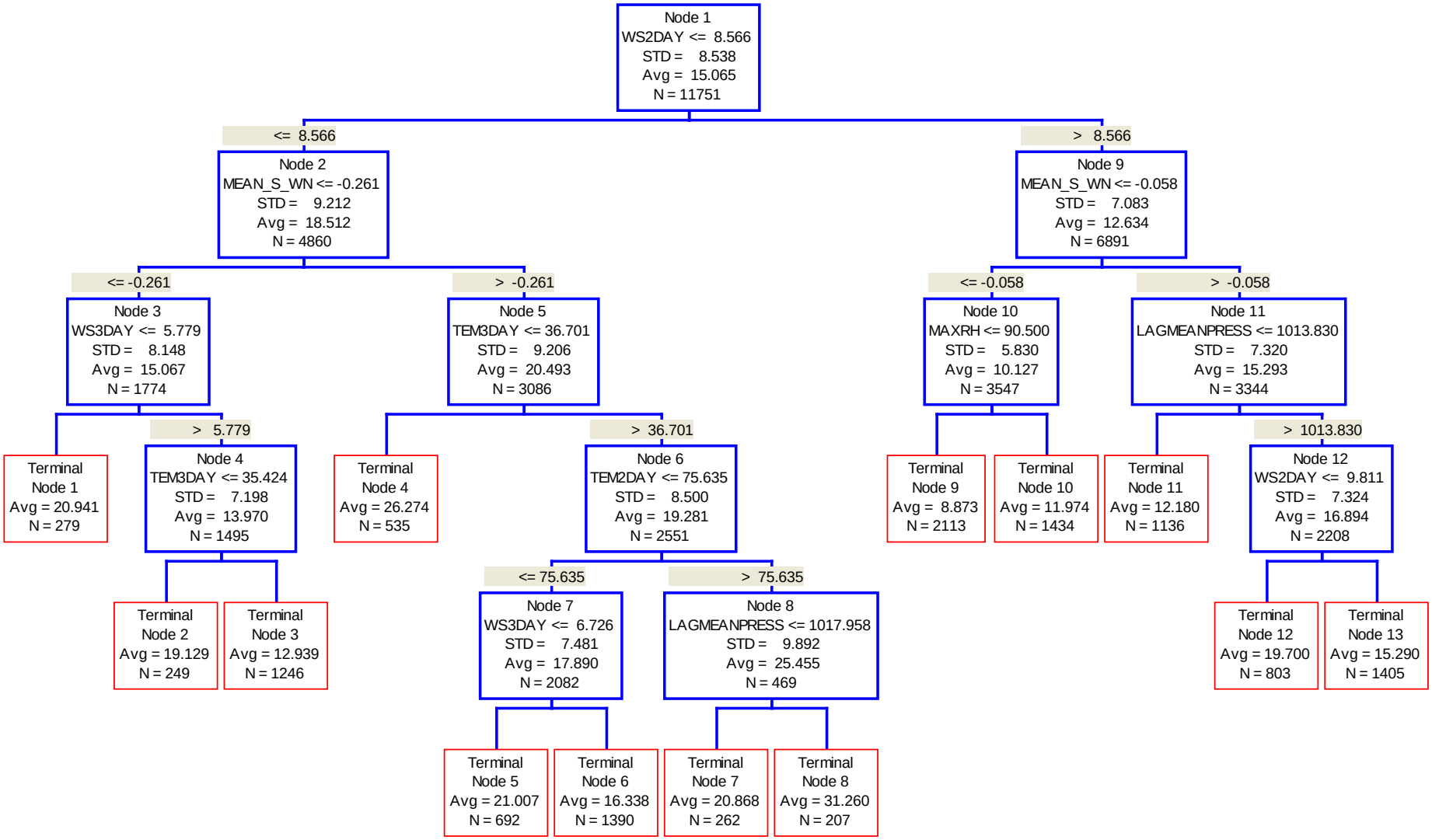


Figure 2-6. Example of an anthropogenic mercury emissions inventory for North America (μg m^{-2} y^{-1}) (based on Seigneur et al., 2003b).

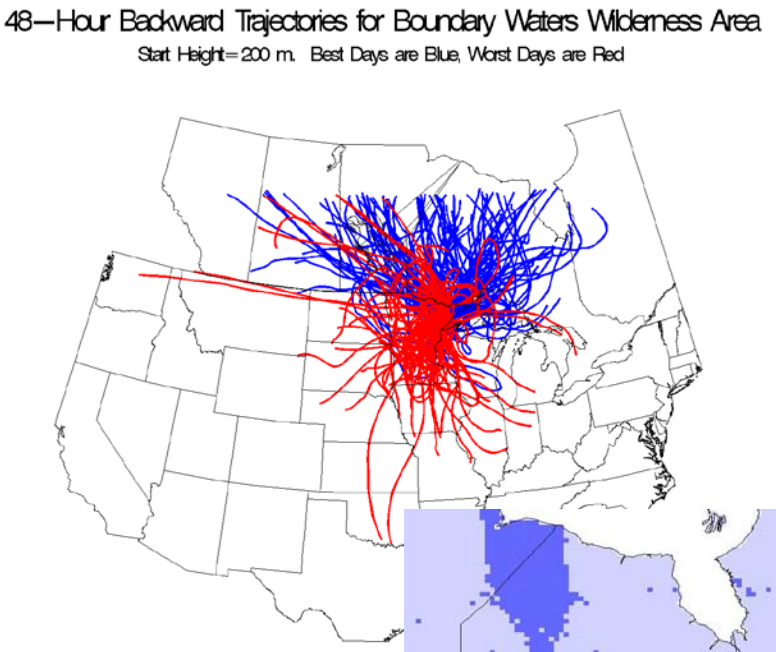
Possible methods: trends

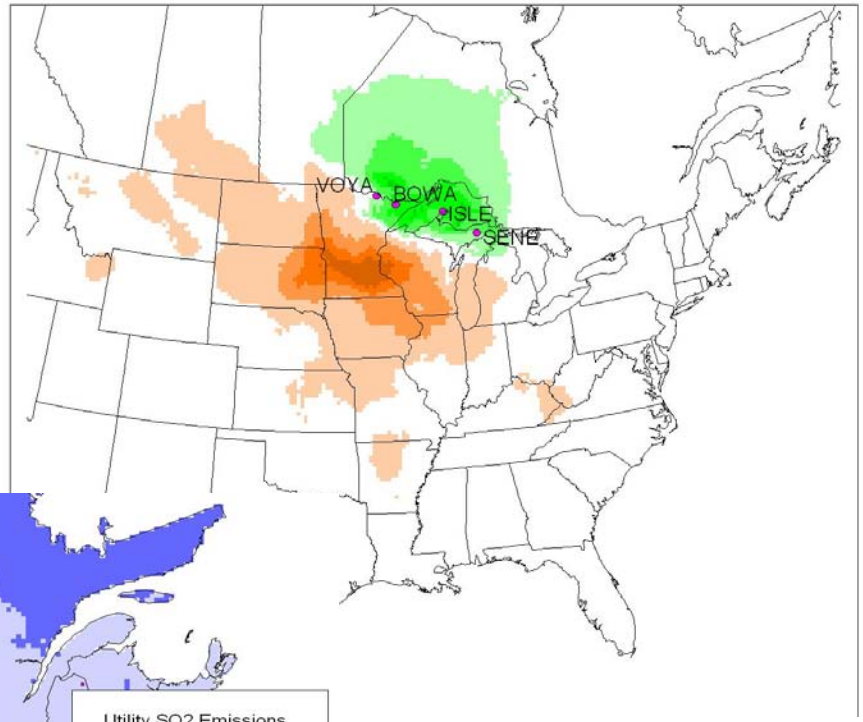
- Use CART analysis to adjust trends in mercury concentration and deposition for year-to-year meteorological variability
- Days (or weeks for Hg samples) are sorted by met conditions, and trends are examined only for days with similar conditions
- Caveats:
  - Requires many data points.
  - Week-long sample times may make it difficult to accurately characterize samples by met conditions

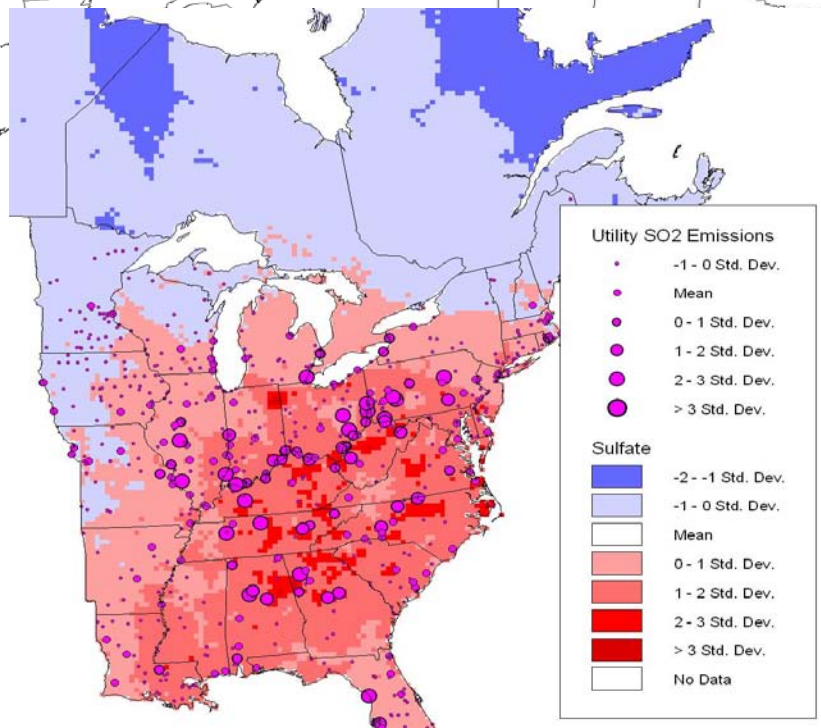
Chicago Tree

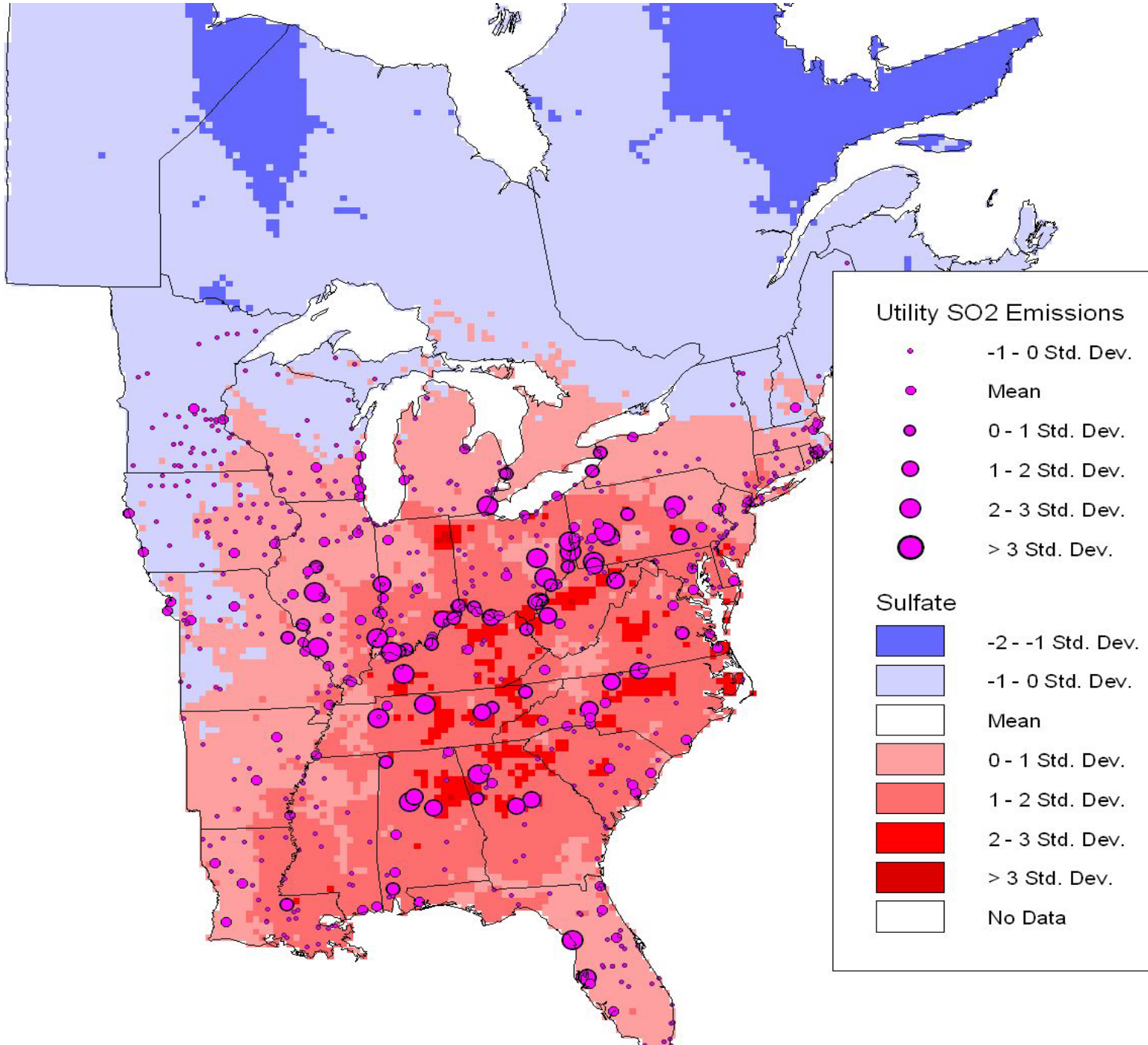


Back trajectory analyses








Utility SO2 Emissions
-1 - 0 Std. Dev.
Mean
0 - 1 Std. Dev.
1 - 2 Std. Dev.
2 - 3 Std. Dev.
> 3 Std. Dev.
Sulfate
-2 - -1 Std. Dev.
-1 - 0 Std. Dev.
Mean
0 - 1 Std. Dev.
1 - 2 Std. Dev.
2 - 3 Std. Dev.
> 3 Std. Dev.
No Data

Other suggested analyses or questions that could be addressed?