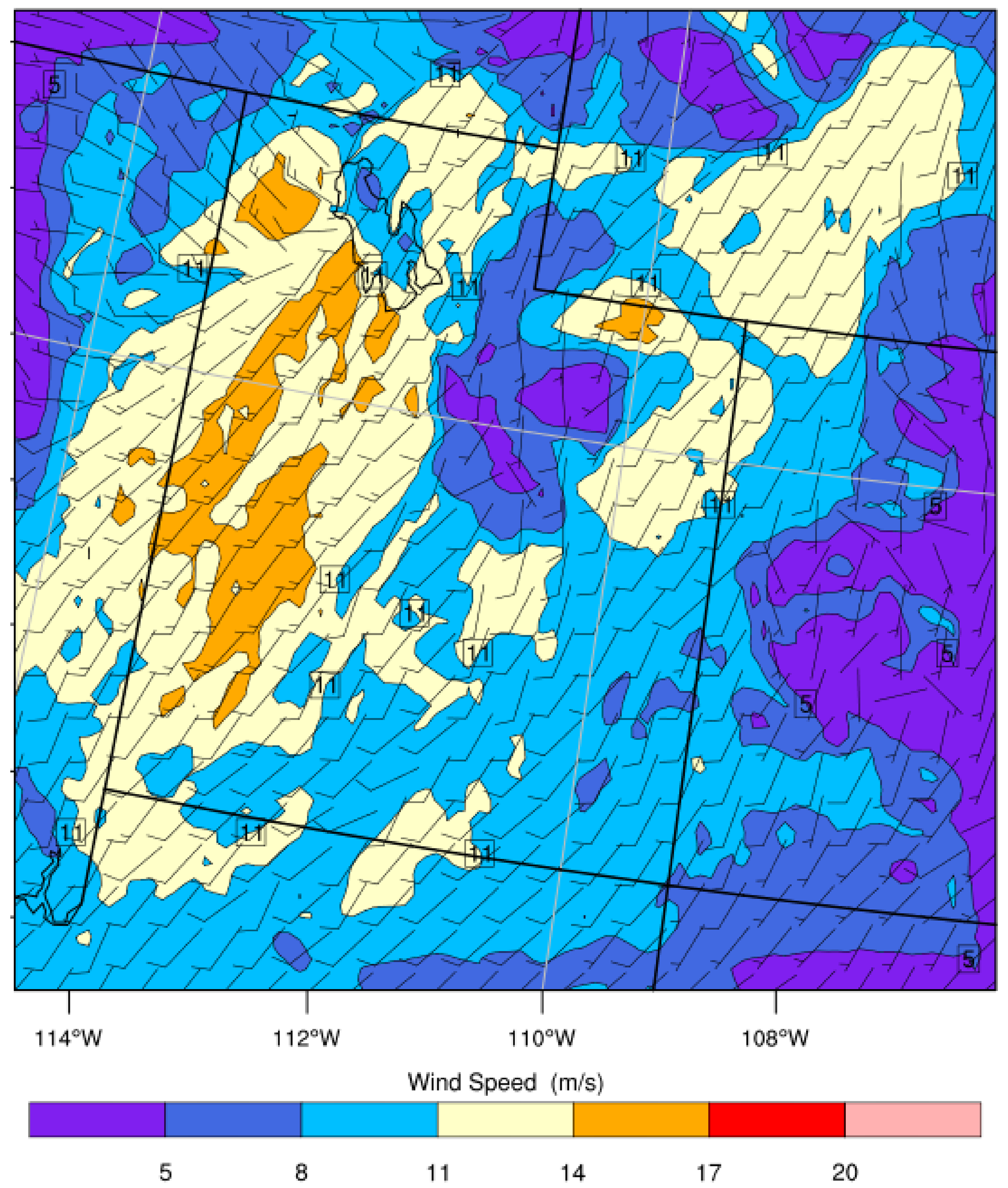
Modeling the Impact of Land Use Changes on Utah Dust Emissions

Objective:
Understand how changes in land use and meteorological conditions affect emitted dust concentrations in Salt Lake area

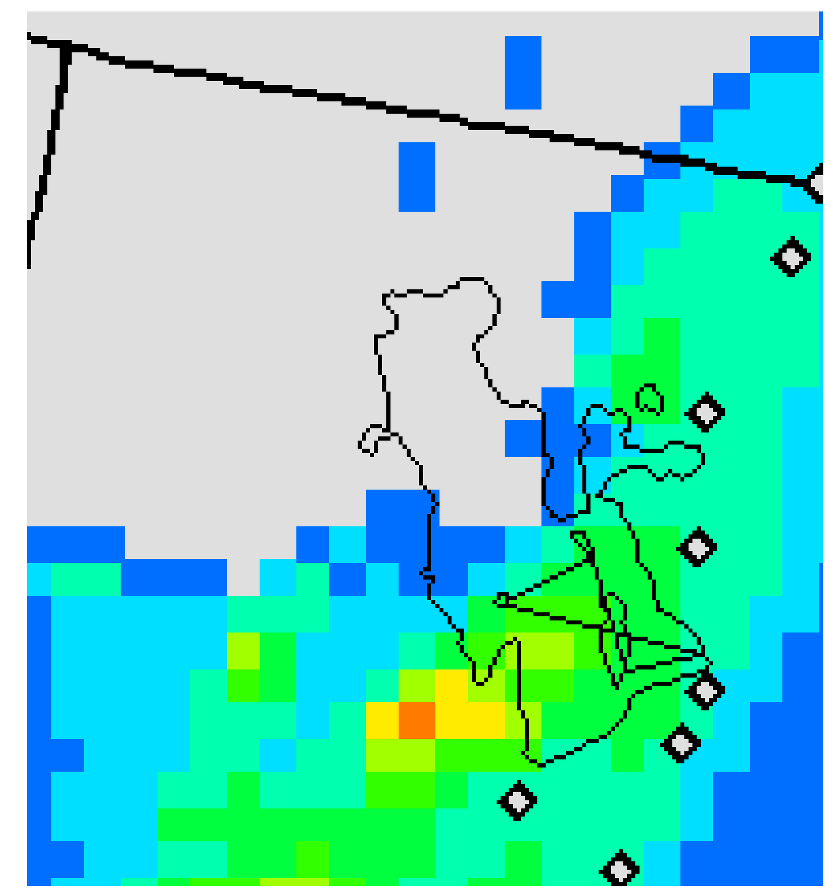
Why It Matters:
- Local topography is changing
- Weather patterns vary in magnitude and direction and so have varying impacts
- Increased dust concentrations can impact air quality and mountain snow melt
- Quantifying impact of land use changes on dust emissions can help inform land use policies

Approach:
Use computer simulations performed with WRF and CMAQ by manipulating land use through soil type, soil moisture, and land water mask settings to mimic 50% shrinking of the Great Salt Lake (GSL)

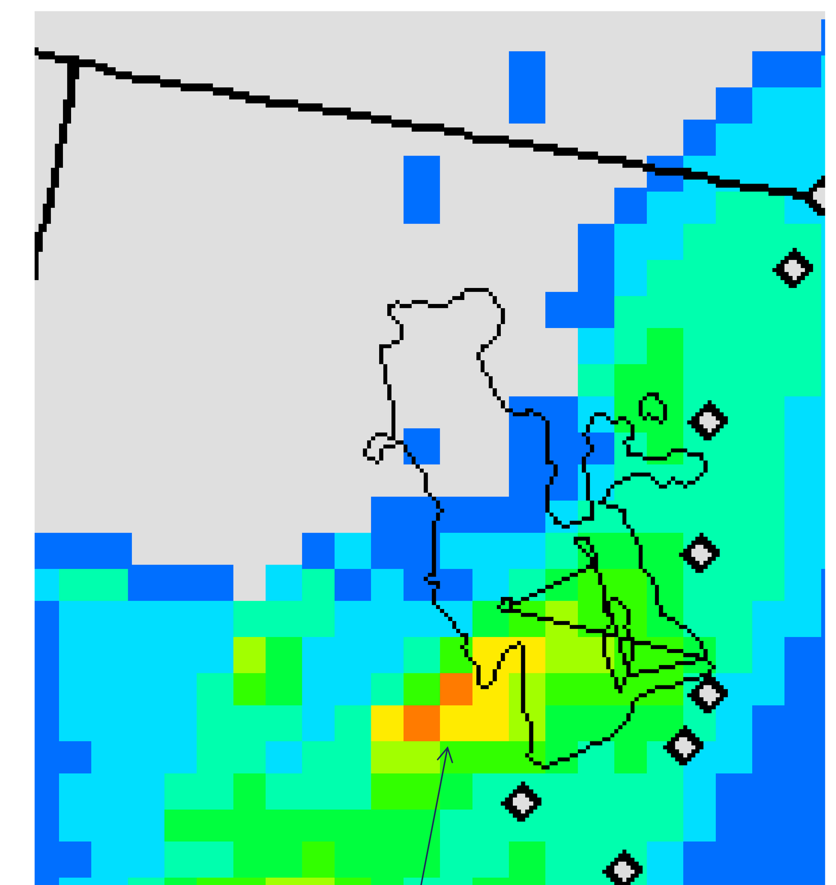
April 13th, 2017



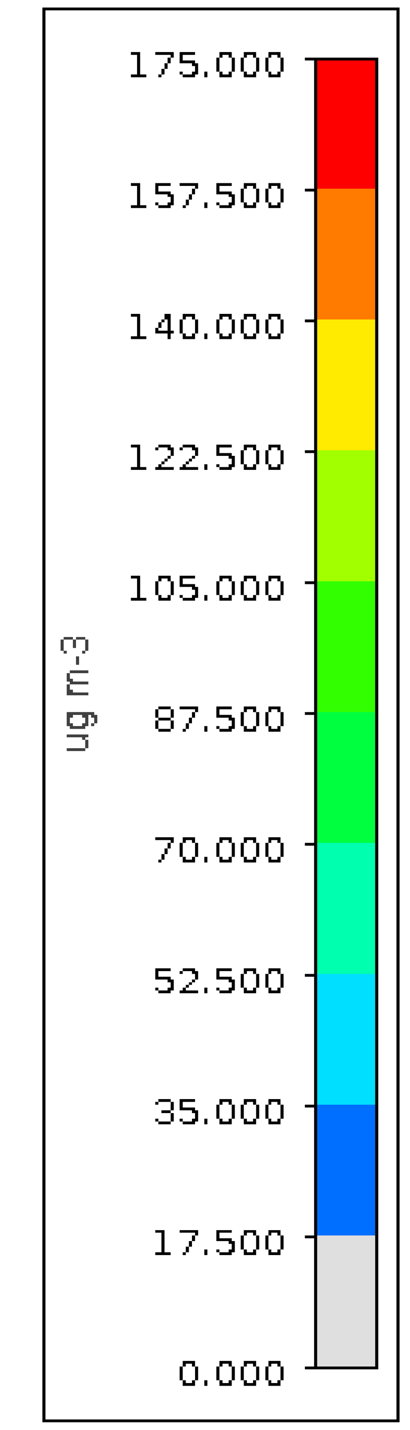
April Baseline



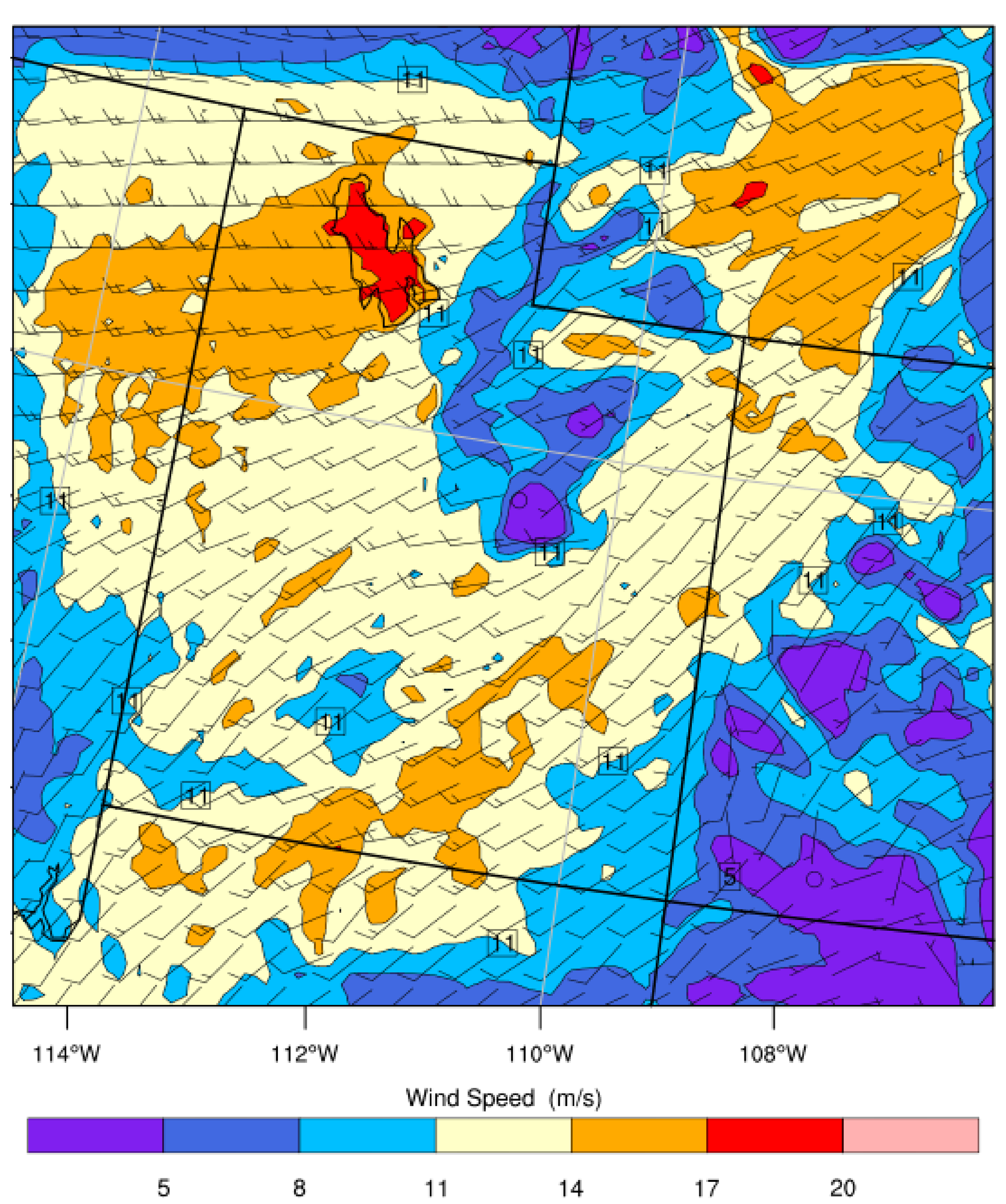
Shrinking GSL

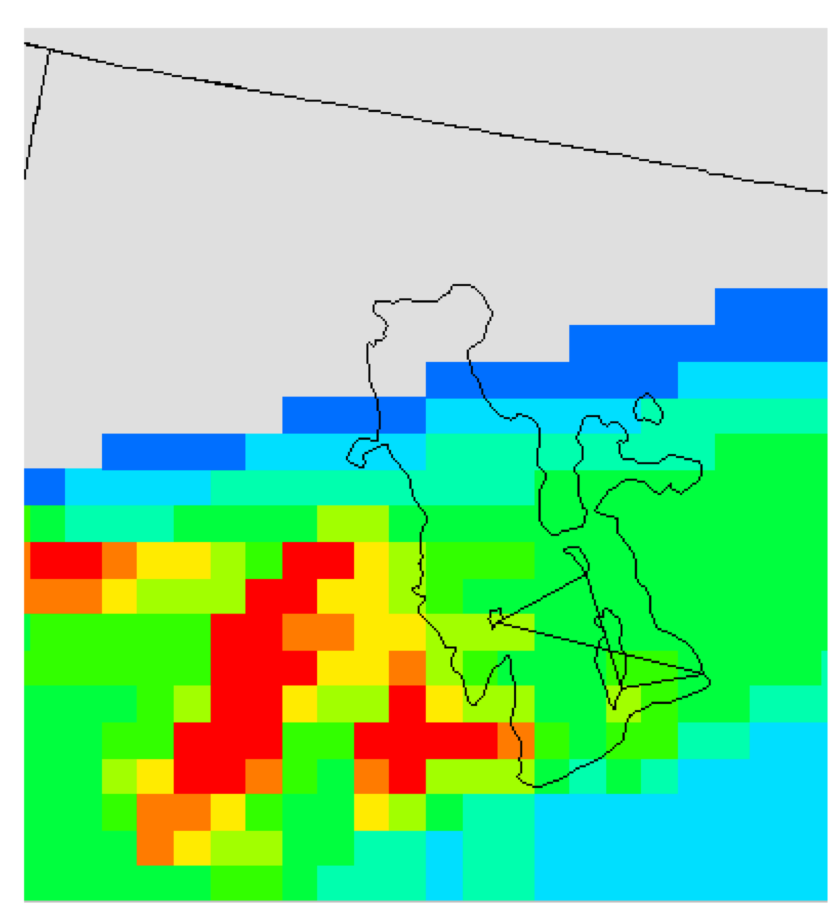


Maximum differences in dust emission

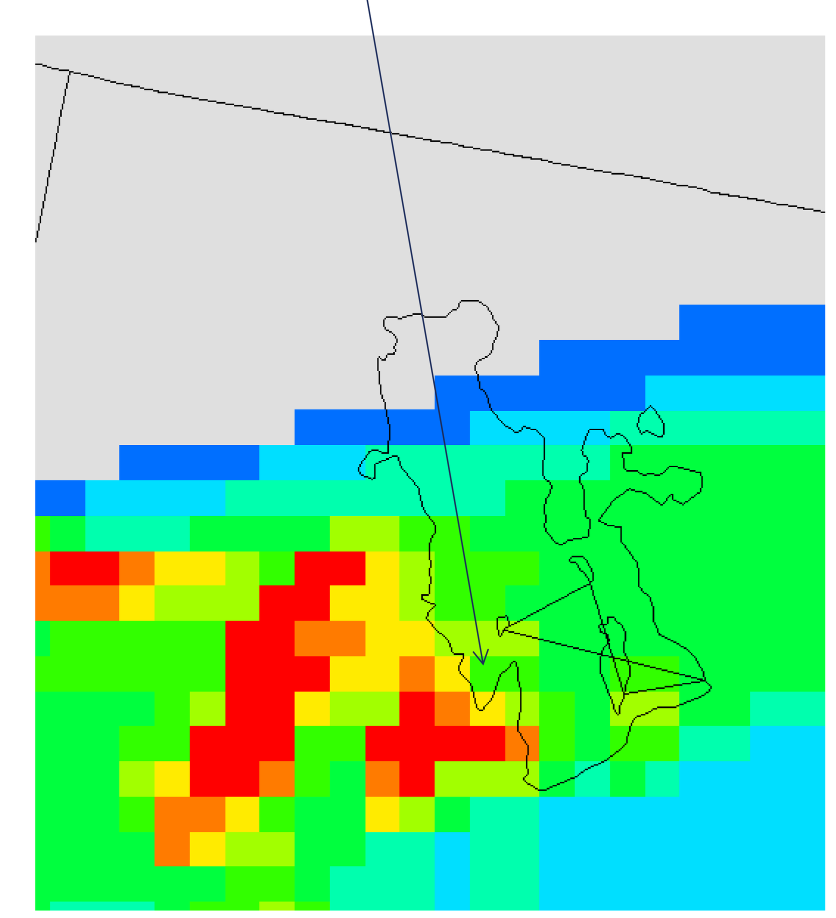


March 30th, 2010





March Baseline



Shrinking GSL

Relevant Details:
- April 2017- Winds mostly northernly up to 17 m/s
- March 2010- Winds mostly easterly up to 20 m/s
- Wind plots graphed 10 meters above surface

Results:
- A shrinking GSL produces additional dust source area that causes a localized increase
  - Difference in dust concentrations up to 10-25 ug/m^3
- Greater wind speed produces higher dust concentrations
  - Difference in dust concentrations up to 100 ug/m^3
  - Extends over Salt Lake City

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