Task 1.3: Surface and Upper-air Meteorological Representativeness in the San Joaquin Valley

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Introduction

- Many air quality monitoring sites in the San Joaquin Valley are not collocated with meteorological data
- Surface and upper-air measurements may not be representative of conditions at nearby air quality monitoring sites
- Goal: Develop a method for estimating the spatial "representativeness" of the surface and aloft meteorological measurements (Area of representativeness = spatial extent around an observation where that observation is considered to be valid)
Approach

- Use wind data from winter 2000-2001
  - Surface data from 2-m and 10-m towers
  - Upper-air data from wind profilers
- Calculate seasonal averages by time of day (morning, afternoon, night) and atmospheric layer (surface, ~100 to 800 m, 800 to 1600 m, and greater than 1600 m)
- Create Representativeness Index of all meteorological monitoring sites in domain for each time of day and atmospheric layer
Representativeness Index

- Defined an index that ranged from 1 to 3:
  - 1 = Most Representative
  - 2 = Representative
  - 3 = Not Representative

- Used a GIS weighting scheme based on several parameters:
  - Distance
  - Elevation
  - Slope of terrain
  - Average wind speed
  - Average wind direction
  - Atmospheric layer heights

- Created web site with tool to use Representativeness Index (Site Search, Maps)
Choose any site in the CCAQS database or search by site name or code.
Web Site - Maps

Layer 3 (>1600 m)
Winter Average
Web Site - Details

http://www.sonomatechdata.com/crpaqsmetrep/

Methodology

Data Selection/Data Acquisition
Surface Meteorology
Wind speed and direction data were queried and downloaded from the Central California Air Quality Studies (CCAQS) database and hourly averaged data from two meter and ten meter towers within the domain with valid QC flags (V2 - valid est. value, VH - valid hourly data, V0 - valid value) were selected and imported into a local database. For the few areas with b and 2 m data, only the 10 m data were used.