BenMAP

The Environmental Benefits Mapping and Analysis Program

Dr. Bryan J. Hubbell

U.S. EPA, Office of Air Quality Planning and Standards

Innovative Strategies and Economics Group

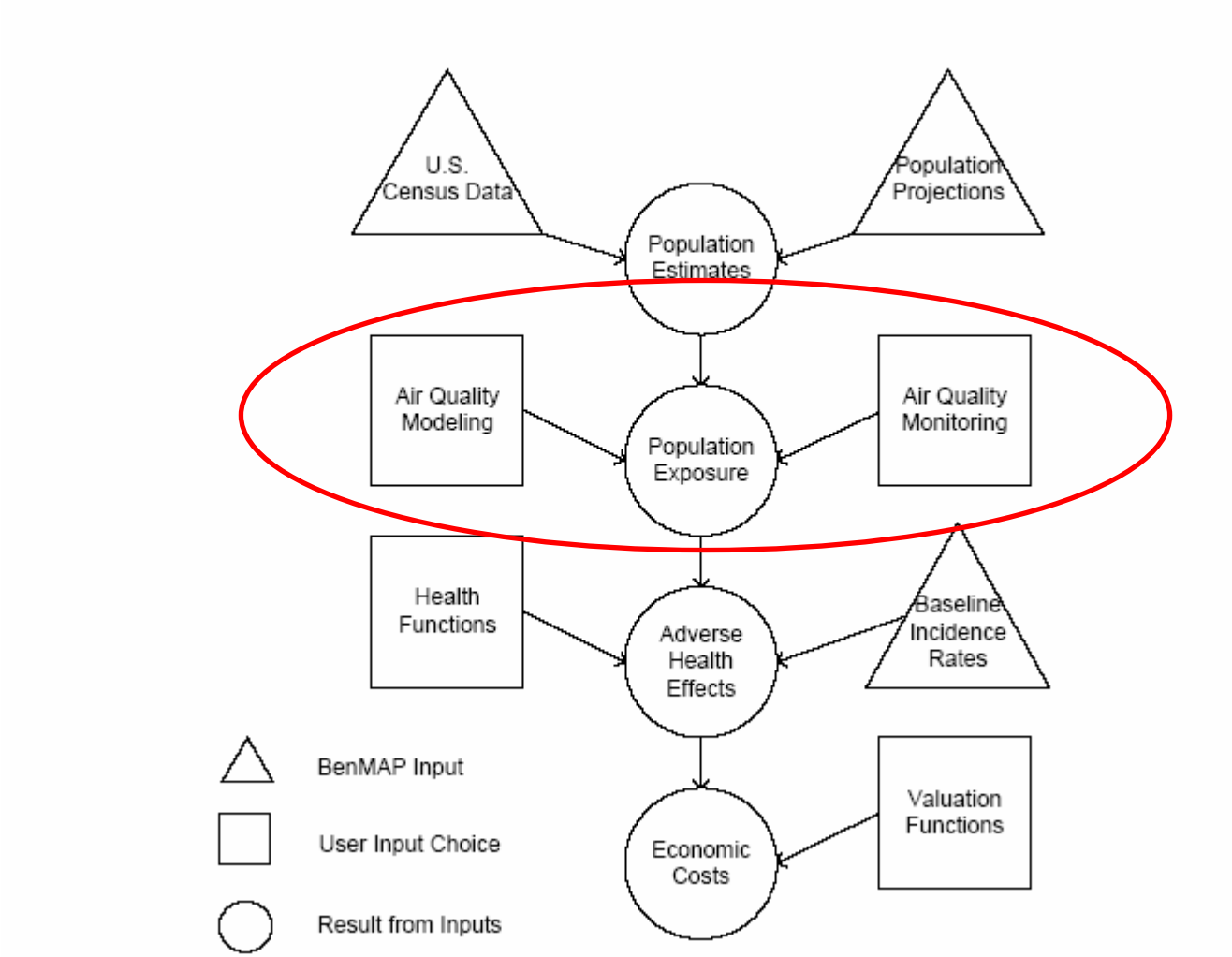
Overview

- What is BenMAP?
- Elements of a benefits analysis
- Key features of BenMAP
- Air Quality Modeling Inputs

What is BenMAP?

- EPA/OAR next generation environmental benefits analysis program
- GIS based system for
  - creating population level exposure surfaces
  - estimating changes in incidence of a wide variety of health outcomes associated with changes in ambient air pollution
  - valuing changes in incidence of health outcomes

Elements of a Benefits Analysis



Key Features of BenMAP

- Includes all of the key inputs to a benefits analysis
- The user only has to provide modeled data – or select monitor data for a “what if” style analysis
- BenMAP is an integrated GIS mapping, query, and statistics tool
- Outputs results (exposure, incidence, and valuation) in a variety of formats, including ASCII, .dbf, and shape files suitable for use with standard GIS packages such as ArcView

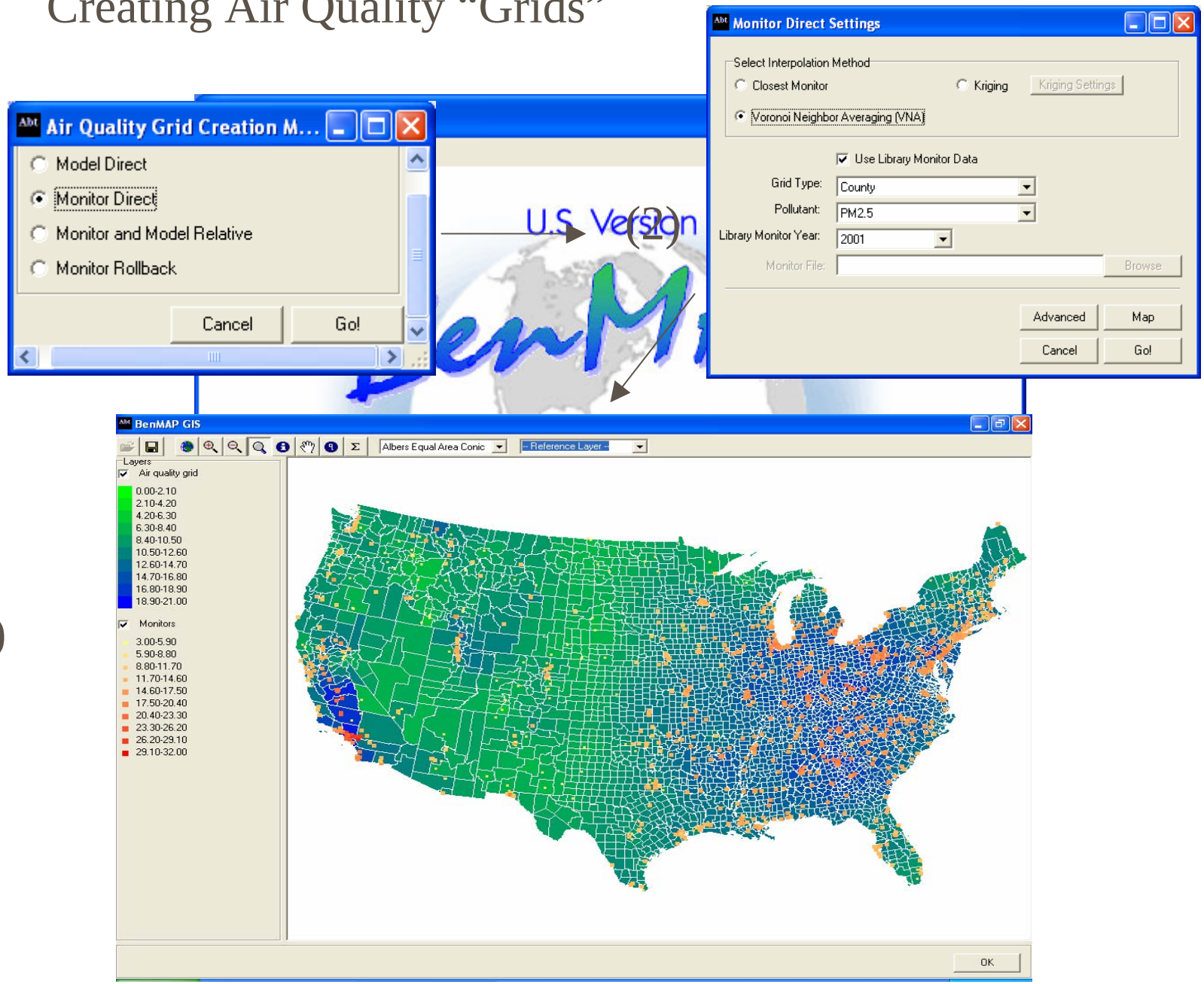
Air Quality Features

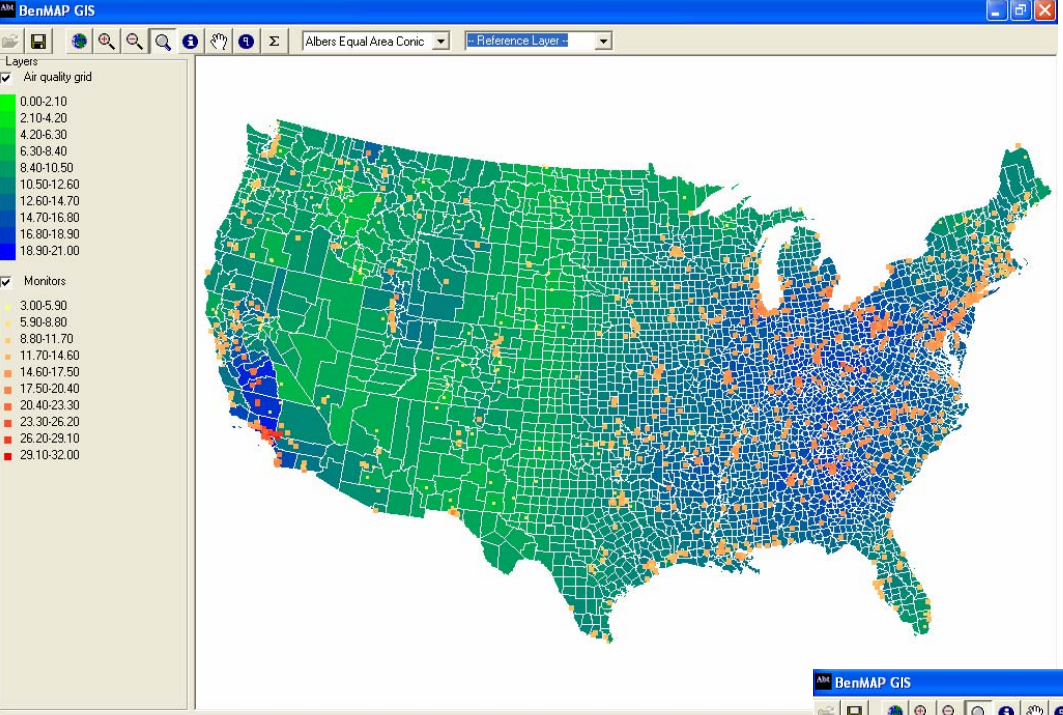
- Able to use a wide variety of air quality data, both monitored and modeled
- Preloaded with AIRS data for ozone, PM10, and PM2.5 for a number of recent years (1996-2004)
- Provides several options for creating population exposure maps, including direct use of monitor or model data, or use of model data with monitor data in a relative sense

Using BenMAP

- Users must create “baseline” and “control” gridded air quality exposure surfaces
- Air quality grids can be created using model data (supplied by the user), monitor data (using preloaded databases or user supplied data), or a combination of both
  - BenMAP currently supports REMSAD, CMAQ, and CAMx air quality models, as well as county data
  - Other models can be added relatively easily
- BenMAP can also create “what if?” scenarios by applying different reduction factors to available monitor data

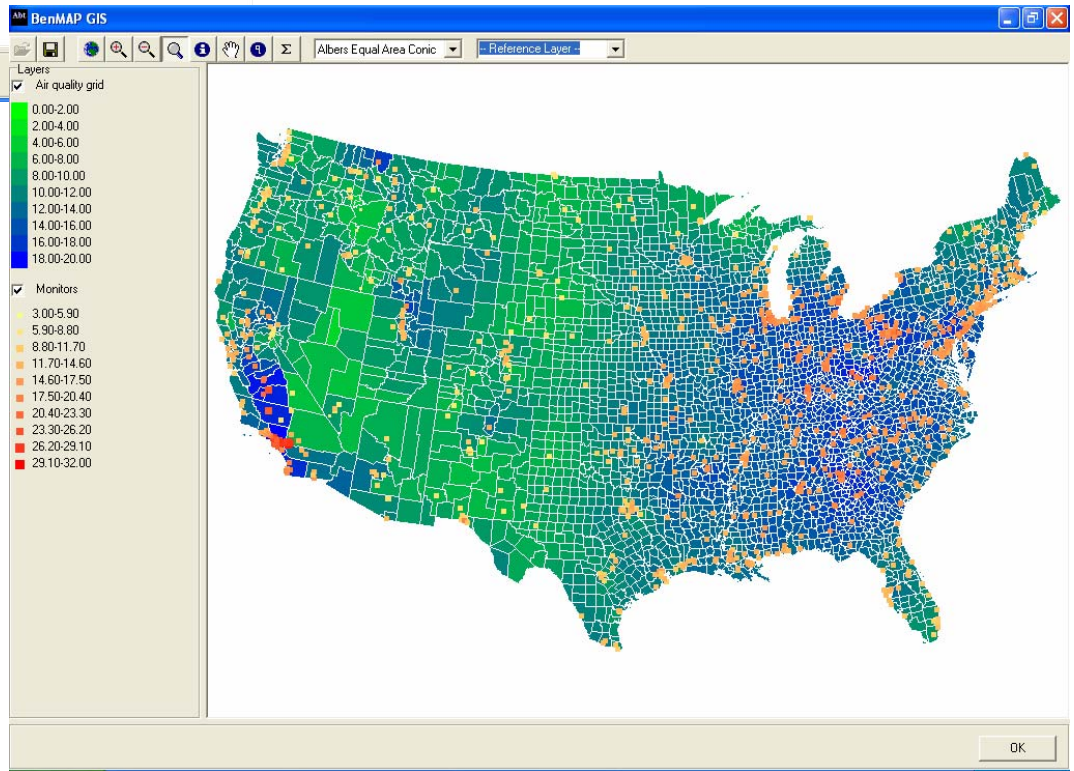
Creating Air Quality "Grids"



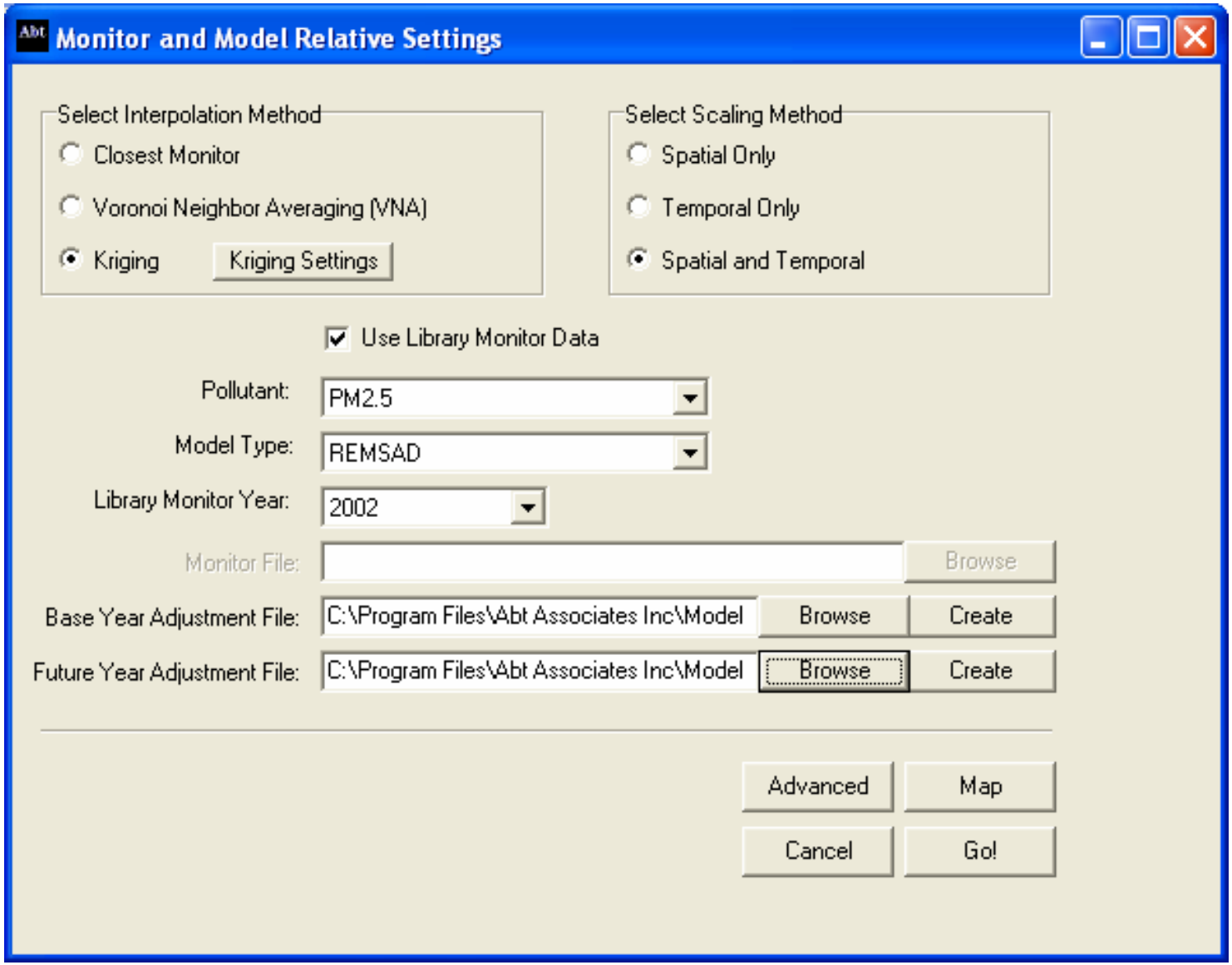


Interpolation using Voronoi Neighbor Averaging

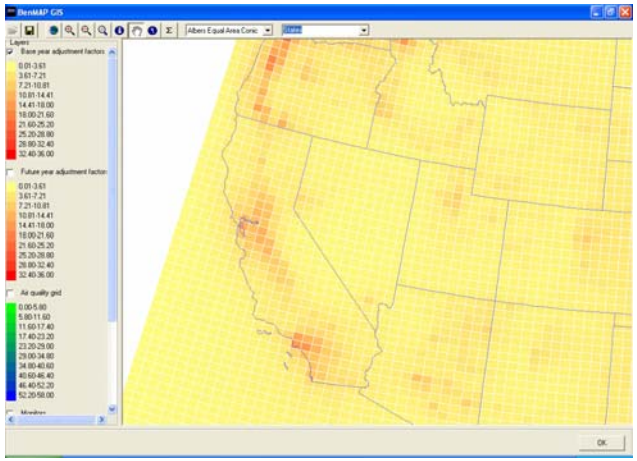
Interpolation using ordinary Kriging



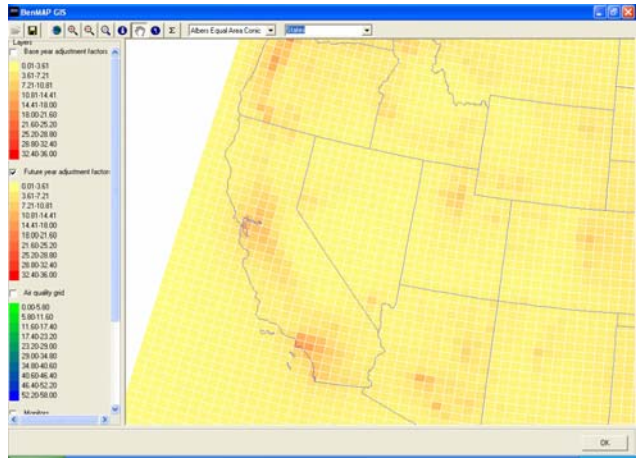
Combining Model and Monitor data



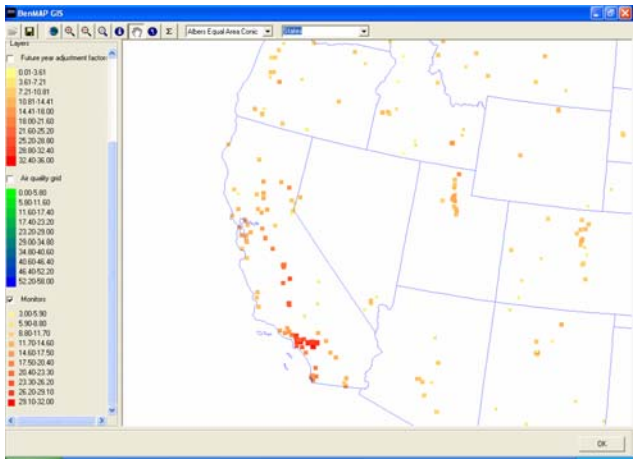
Combining Model and Monitor data



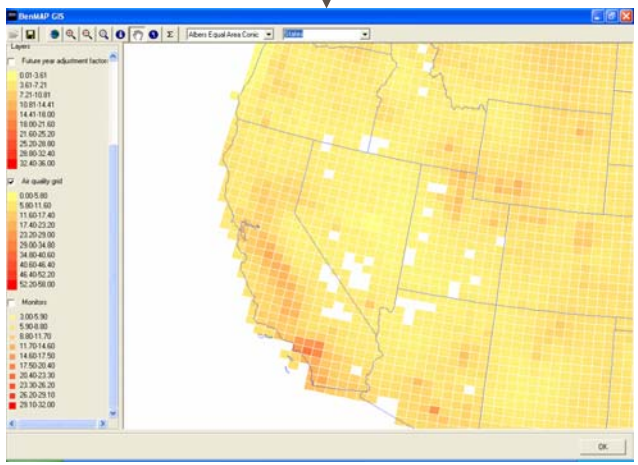
1996 Base Year Model Data



2020 Future Year Model Data



Base Year Monitor Data



Spatially and Temporally Scaled and Kriged Future Air Quality Surface

How does BenMAP fit into integrated modeling?

- BenMAP is a key element of the Air Strategy Assessment Program (ASAP), which combines cost, emissions, air quality, and benefits modeling in a single platform
- BenMAP is flexible enough to accept a wide variety of incoming air quality data inputs