

Update: background concentrations lookup tool

Ranil Dhammapala

ranil.dhammapala@ecy.wa.gov



Jill Schulte

jill.schulte@ecy.wa.gov



Sara Strachan

Sara.Strachan@deq.idaho.gov



Phil Allen

philip.allen@state.or.us

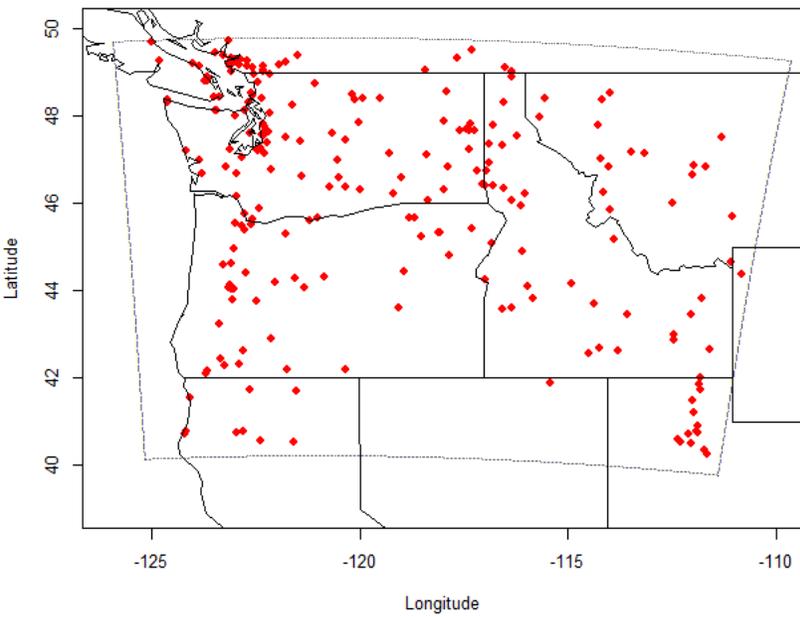
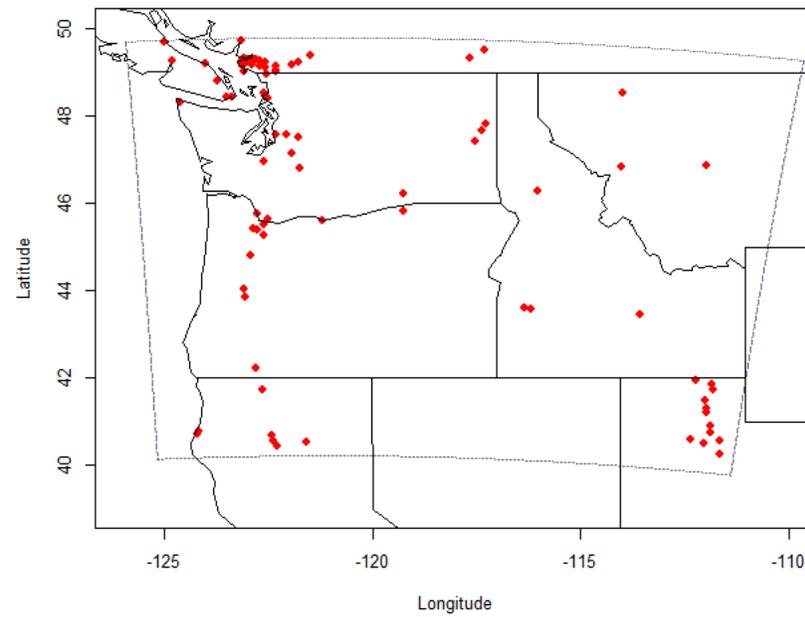
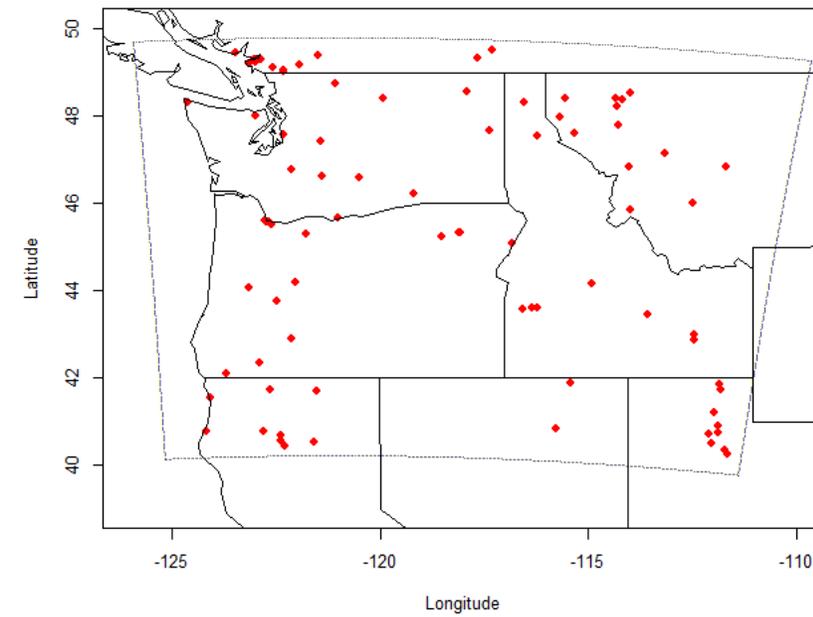
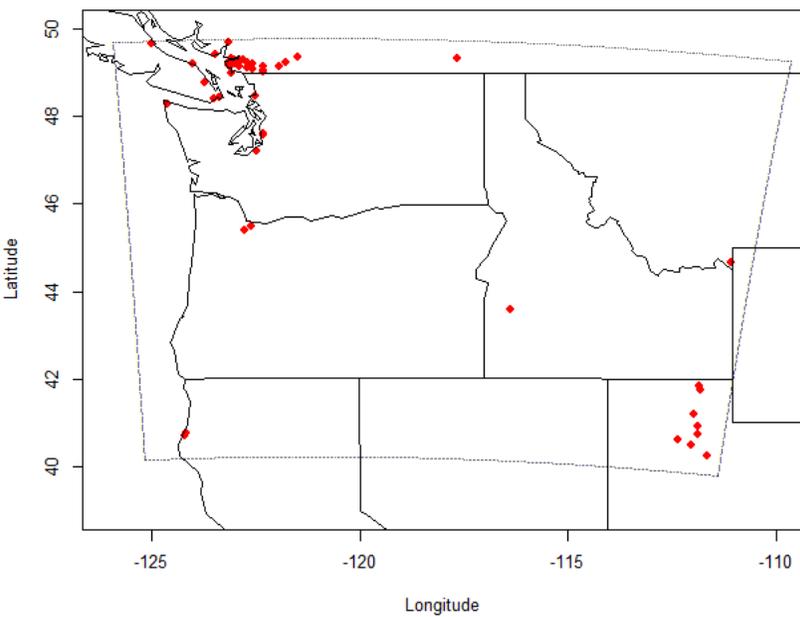
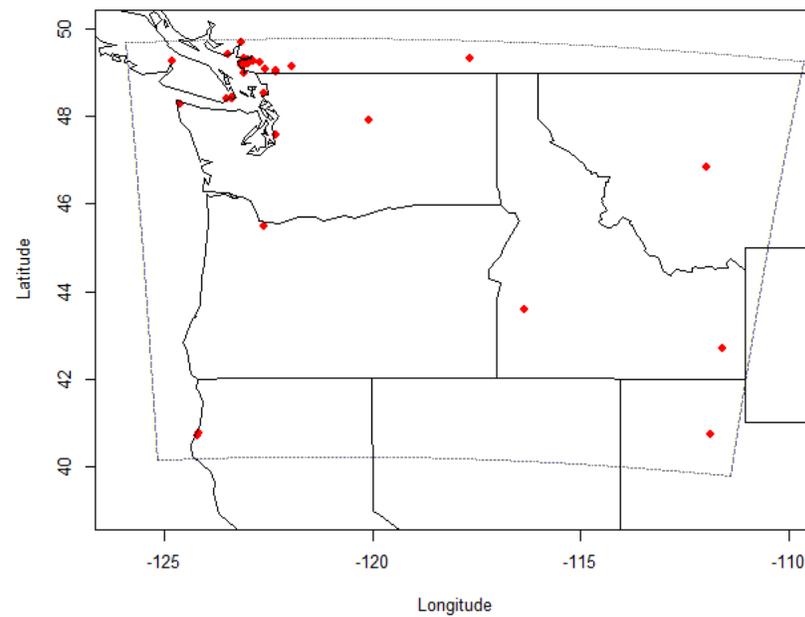
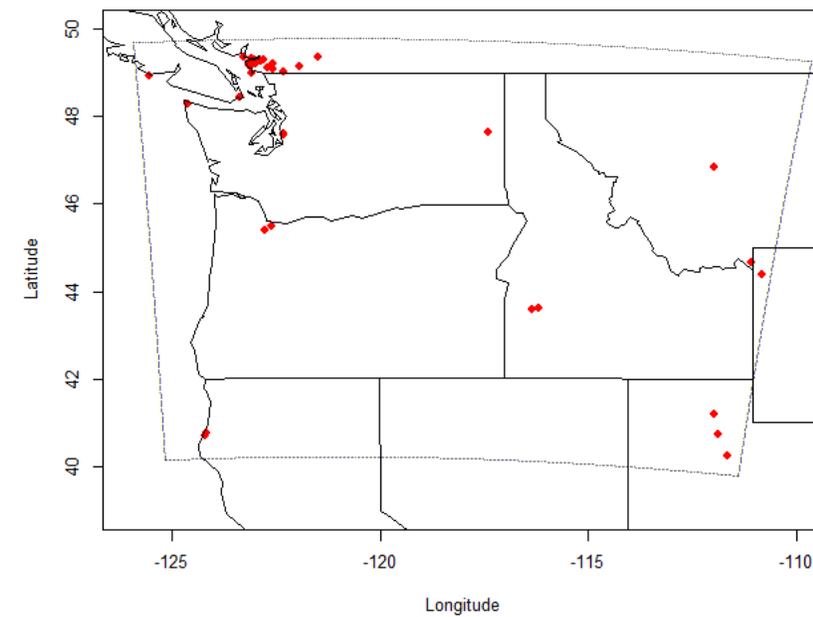


Updating the bkg lookup tool

- Decided to use Jul 2014- June 2017 data
- Got all criteria pollutant data (thanks Sara, Bruce & Jill)
- Included IMPROVE sites for PM_{2.5} and PM₁₀
- No temporary monitors
- Worked through data quirks
 - Omitted sites with < 1 yr of data
 - No seasonal sites that didn't run all 3 yrs
 - Removed SO₂ monitors very close to large point sources (Pocatello, ID, Ferndale, WA & Trail, BC)
 - Combined sites which moved short distances
 - Added coastguard operated cutting edge marine monitors which report 5µg/m³ of PM_{2.5} every hour (Jill calls them "ocean dummies")

The screenshot shows the NW AIRQUEST website interface. At the top, there is a navigation bar with links for "A-Z Index", "Statewide", "myWSU", "WSU Home", and a search box. The main header identifies the "Northwest International Air Quality Environmental Science and Technology Consortium" and the "NW AIRQUEST" tool. The page title is "Lookup 2009–2011 design values of criteria pollutants". A brief description states: "This tool facilitates the retrieval of design values at user-specified locations across Washington, Oregon and Idaho." A sidebar on the left lists navigation options: "NW-AIRQUEST Home", "LAR Home", "About NW-AIRQUEST", "Working Groups", "Projects", "Criteria pollutant design values", "Document Downloads", "Activities/Related Programs", "AIRPACT", "ClearSky", "BlueSky", "WRF Forecasting", "Global Change & Air Quality", "NASA ROSES", and "WSU Laboratory for Atmospheric Research". The main content area includes a "Submit coordinates" form with fields for "Latitude (decimal degrees) or UTM Northing (m)", "Longitude (negative decimal degrees) or UTM Easting (m)", "UTM Zone (10-12, leave blank if entering Lat/Longs)", "Download output in CSV file?" (set to "No"), and "Daily data?" (set to "No"). Below this is a "Submit file" section for multiple point queries, with a "Choose File" button, "No file chosen", "Download output in CSV file?" (set to "No"), and "Daily data?" (set to "No"). At the bottom, there is a map of the Pacific Northwest region, showing Washington, Oregon, and Idaho, with various locations and reservations marked.



PM2.5**O3****PM10****NO2****SO2****CO**

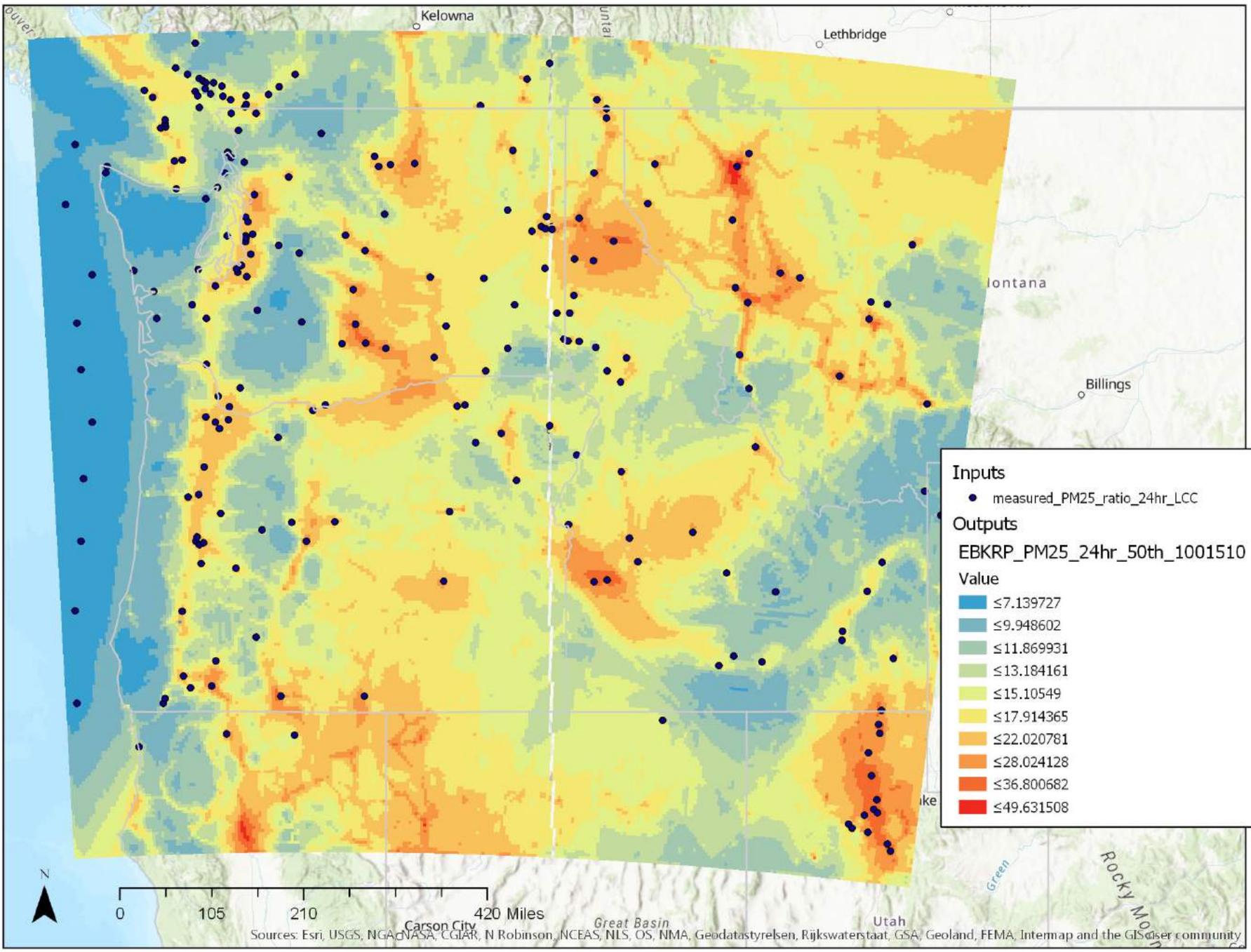
Work conducted since last update

- Improved performance by tweaking inputs
 - LOTS of back and forth
 - Picked interpolation that had best cross validation stats and fit conceptual understanding of each pollutant's geography
 - Went rogue for PM_{10}
- WSU is kicking us off the old R server on 2/15/2018
 - Website will contain a redirect (or a polite 404 error)
- Host results on ArcGIS Online web map
 - Users can select and analyze data
 - Users can subset area of interest



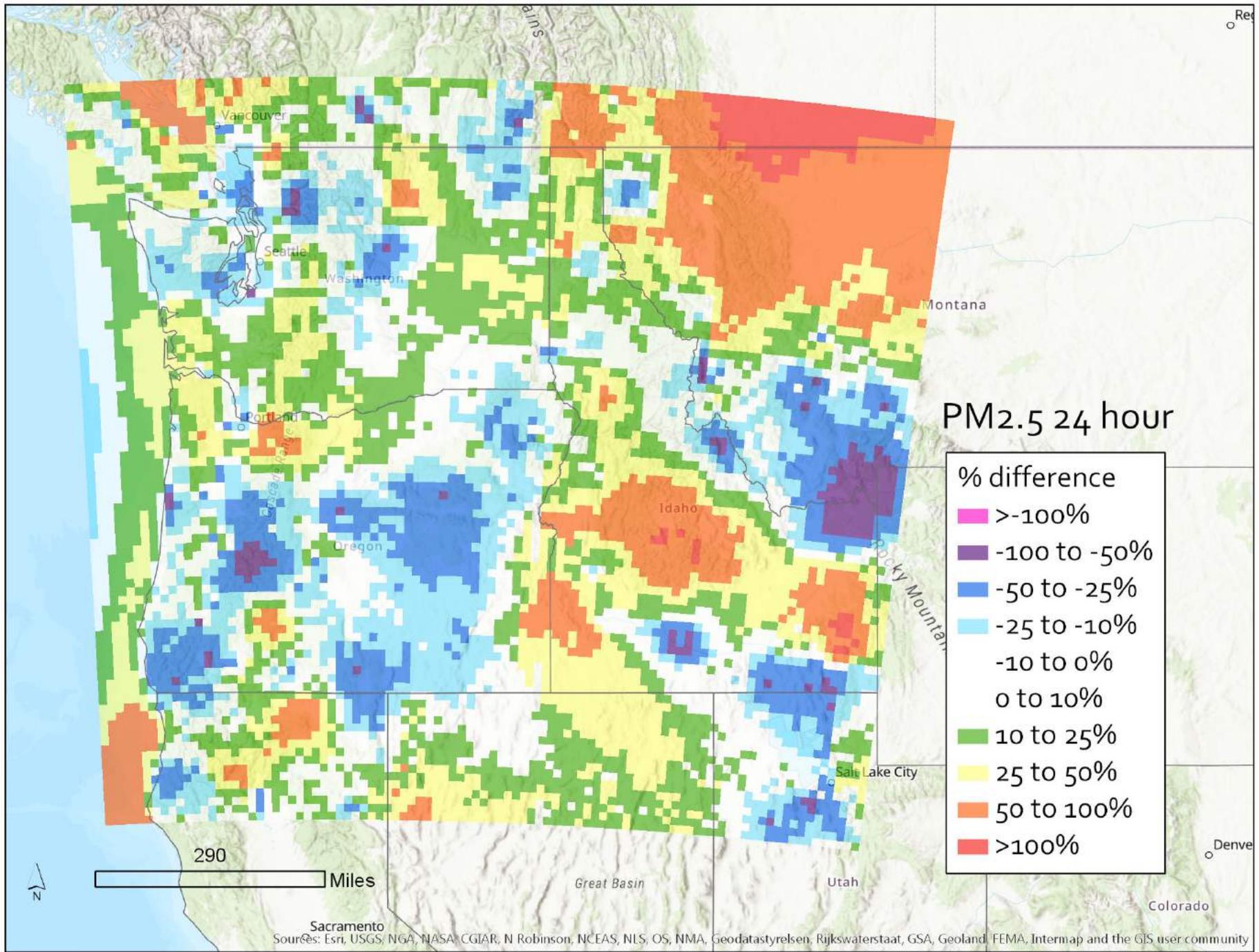


Our top picks for backgrounds



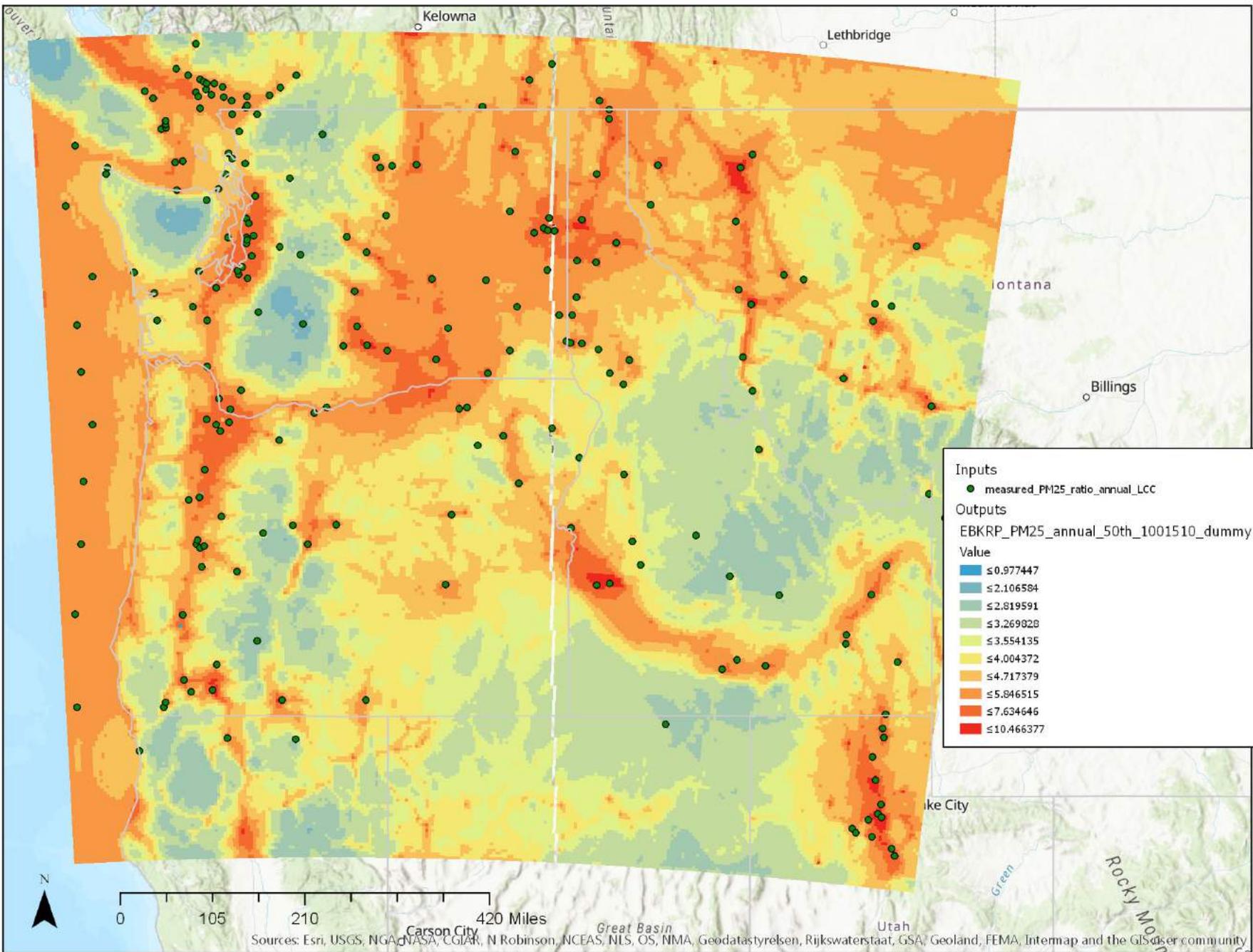
Interpolated
 $PM_{2.5}$ 24 hr DV
 (using ratios
 and modeled
 median)

Poor
 model/monitor
 correlation.
 Used EBK-RP
 on ratios to
 maintain fine-
 scale variation.



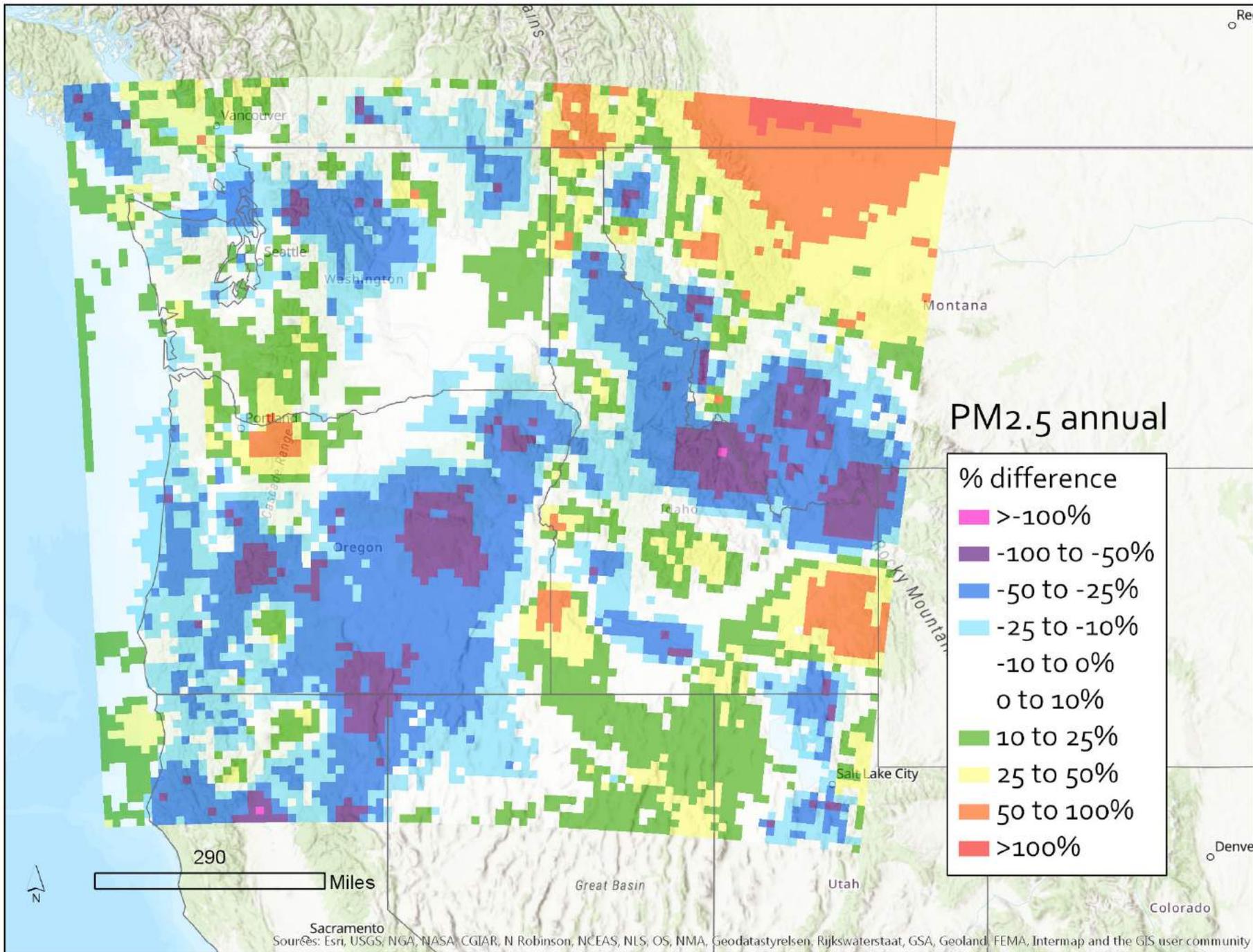
PM_{2.5} 24 hr DV
 % differences
 between new
 (proposed) –
 old
 background
 map



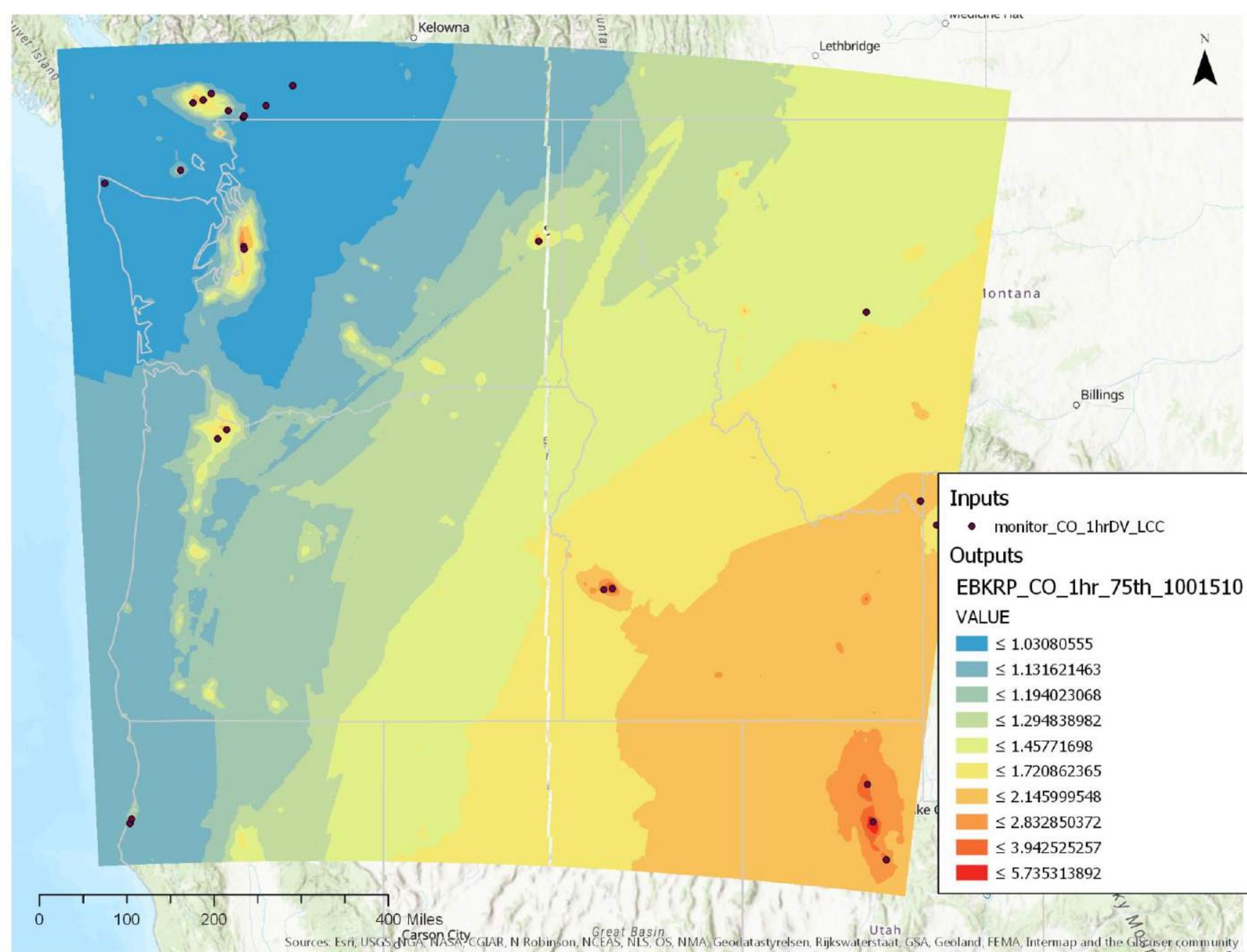


Interpolated
 $PM_{2.5}$ annual DV
 (using ratios and
 modeled
 median)

Poor
 model/monitor
 correlation. Used
 EBK-RP on ratios
 to maintain fine-
 scale variation.

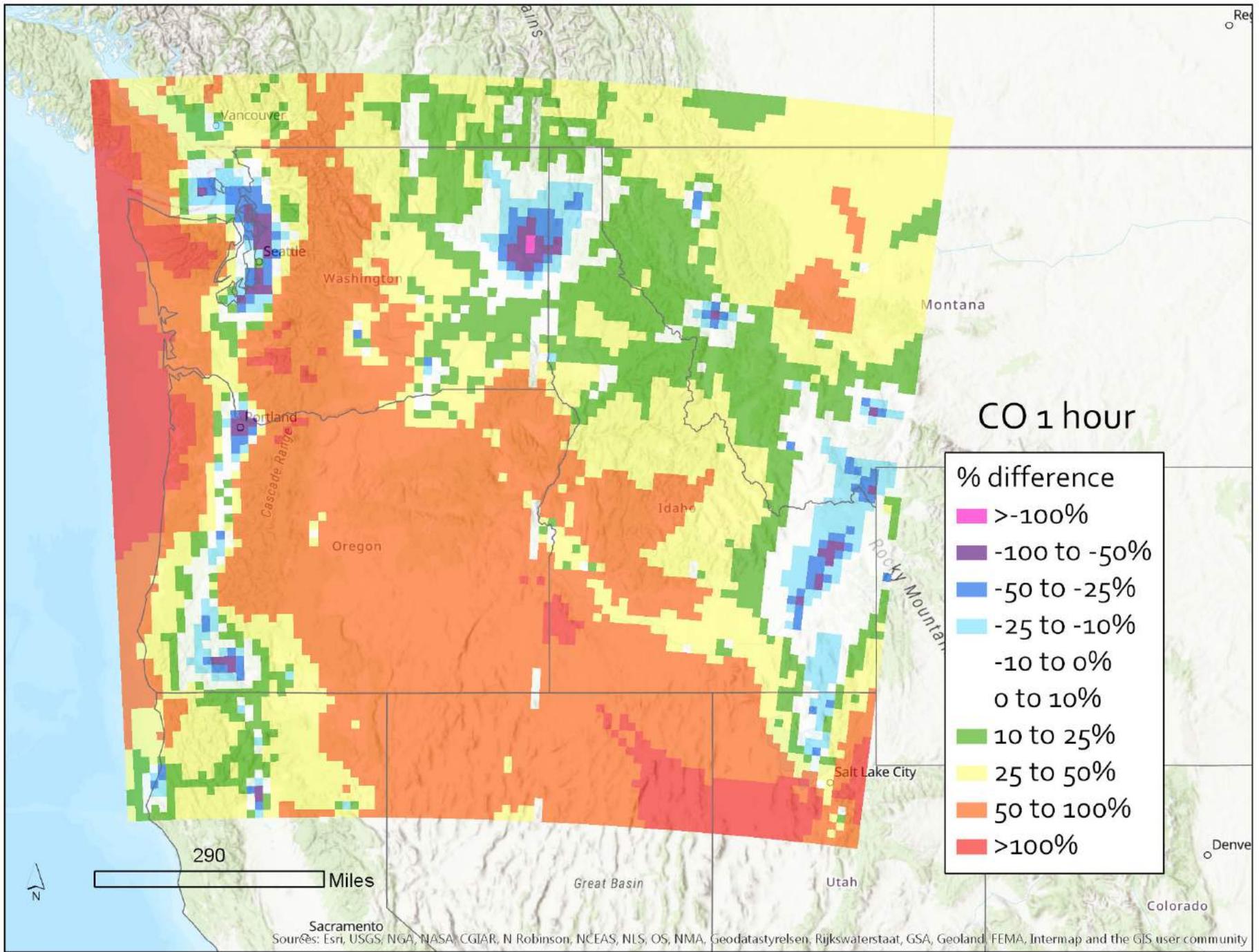


**PM_{2.5} annual DV
% differences
between new
(proposed) – old
background map**

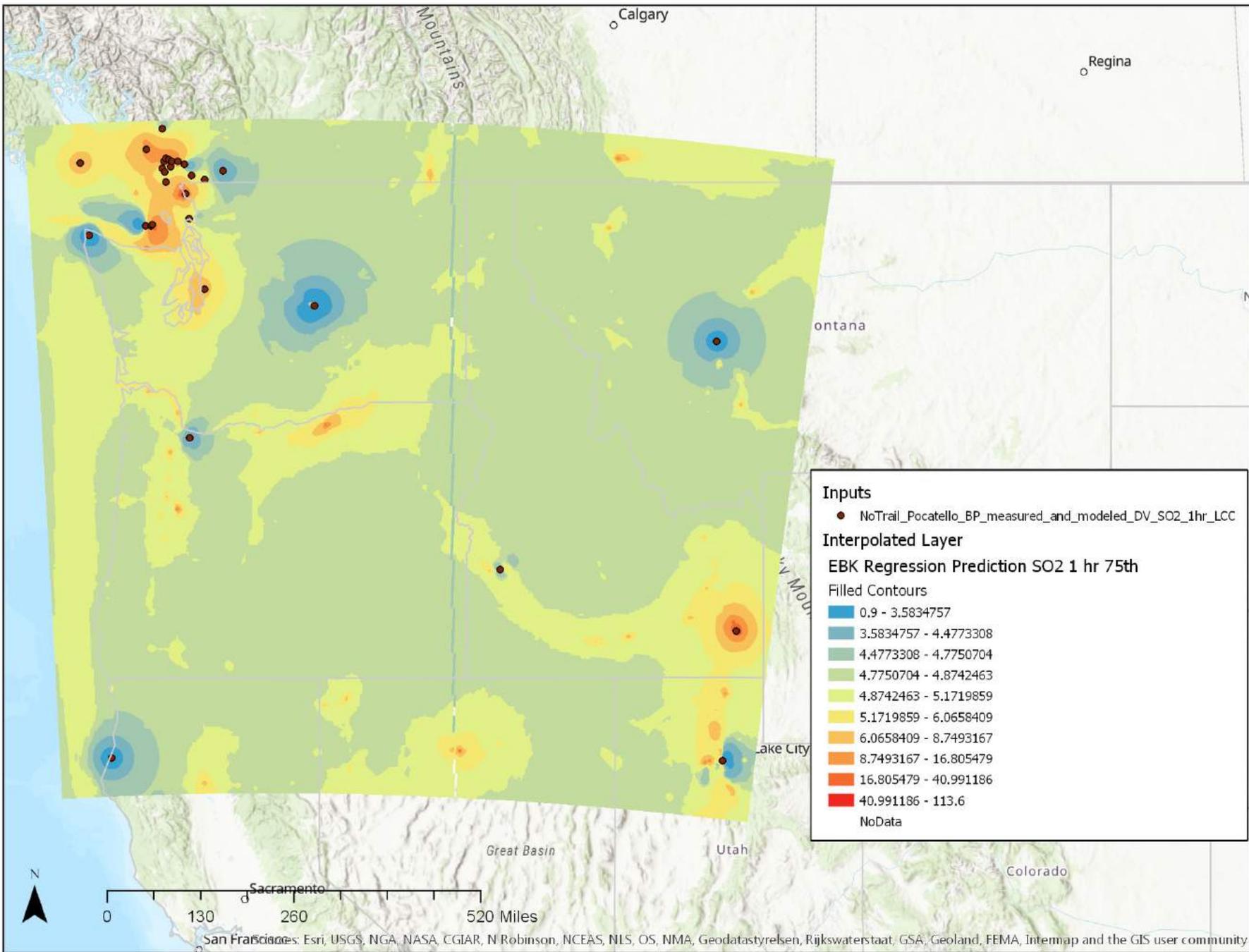


Interpolated
CO 1-hr DV

Interpolated
with model
75%ile (model
DVs had too
much wildfire
smoke)

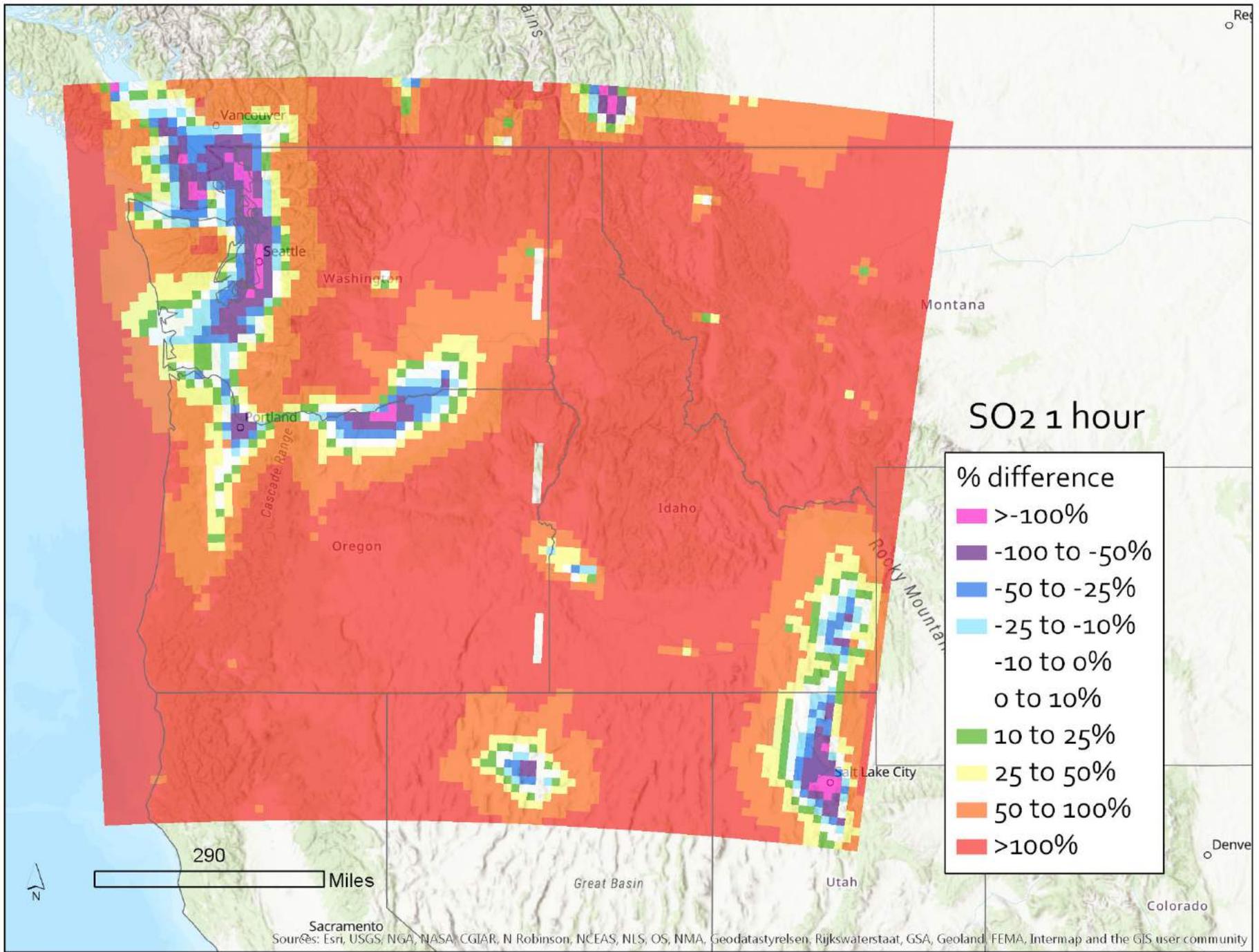


CO 1-hr DV %
differences
between new
(proposed) –
old background
map

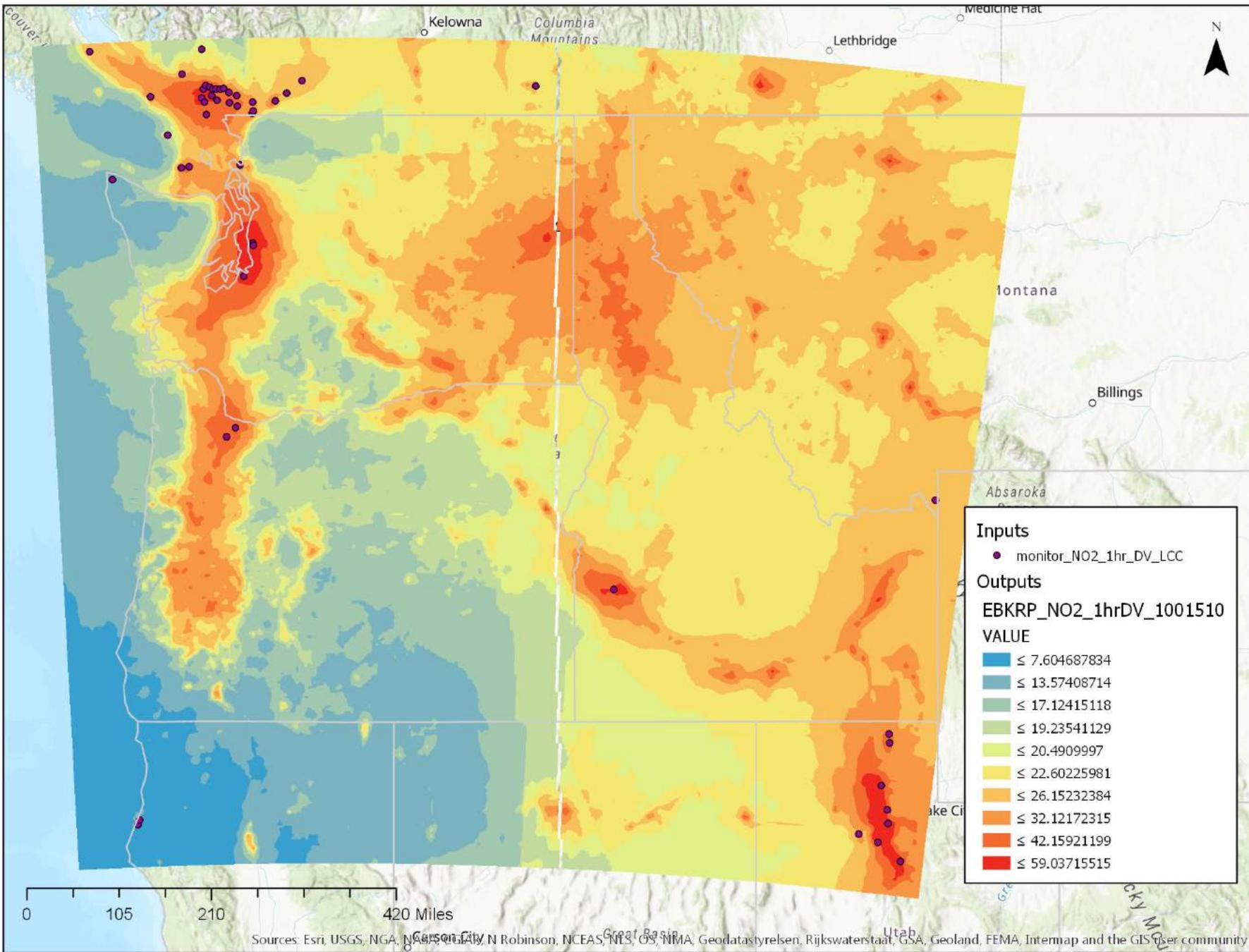


Interpolated
SO₂ 1-hr DV

Interpolated
with model 75th
percentile.
(Removed
BP@Ferndale
Pocatello, Trail
monitors)

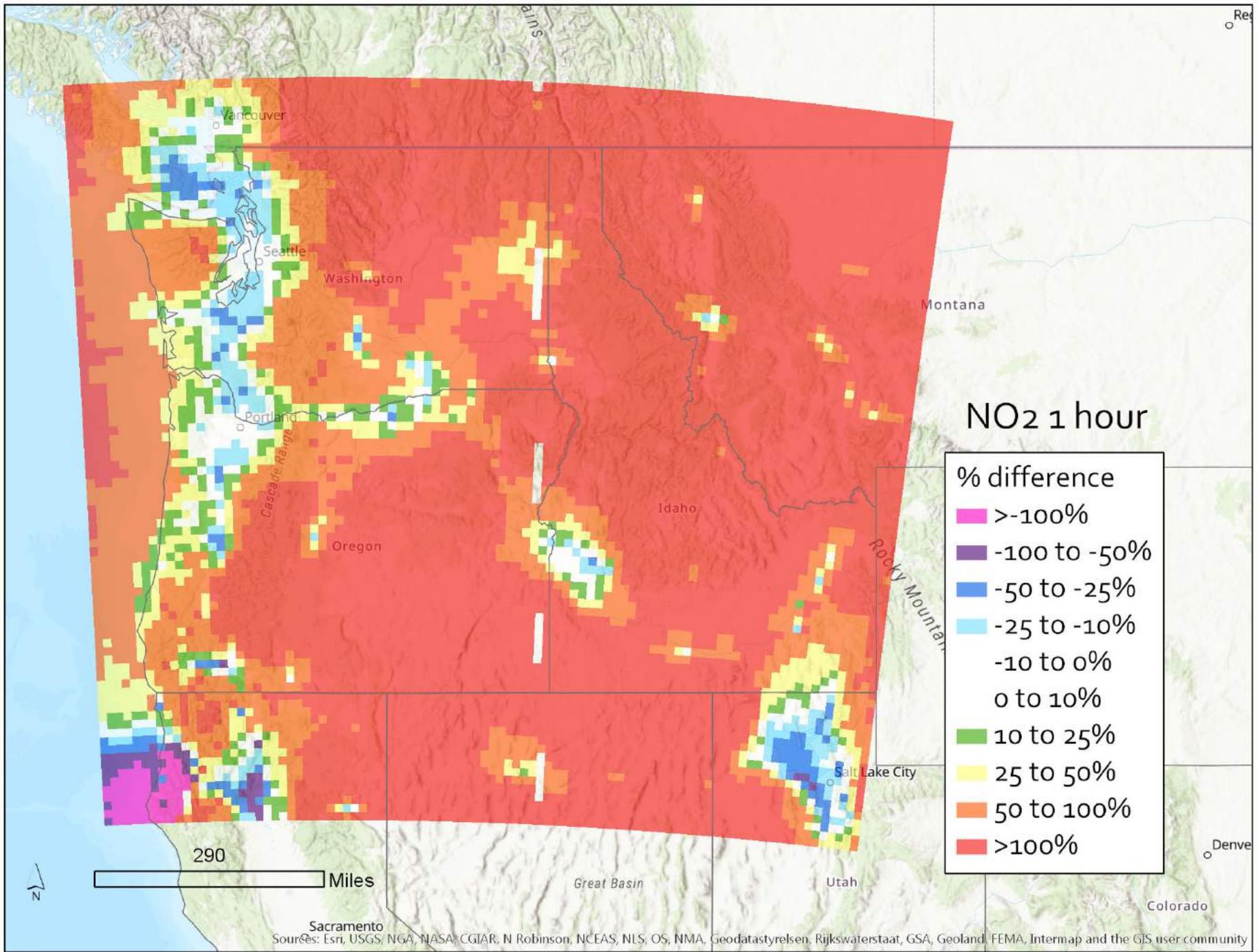


SO₂ 1 hr DV %
differences
between new
(proposed) –
old
background
map



Interpolated NO₂
1-hr DV

Interpolated with
model DV

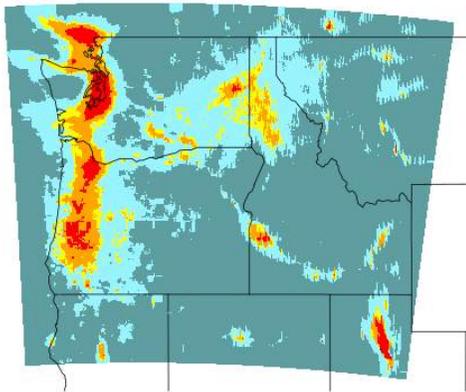
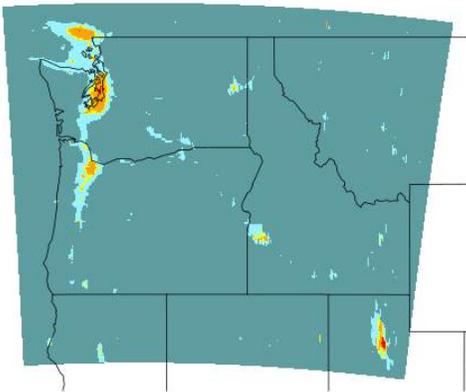
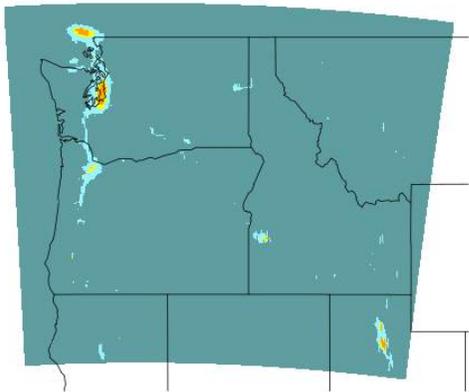


NO₂ 1-hr DV %
differences
between new
(proposed) – old
background map

Airpact NO2 median

Airpact NO2 75%ile

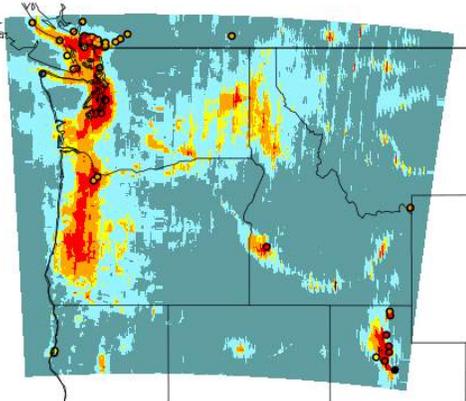
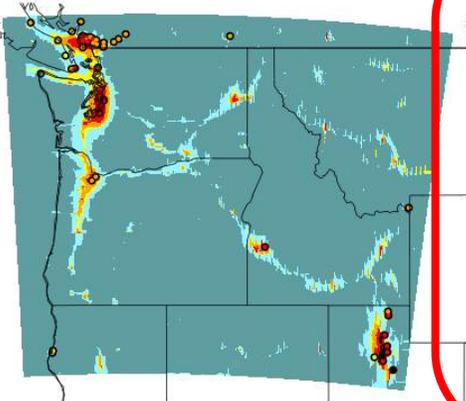
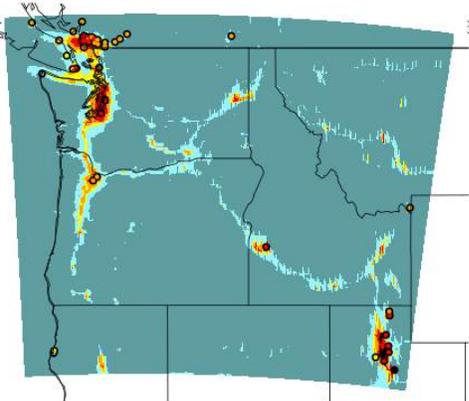
Airpact NO2 DV



IDW^1 w/Airpact median

IDW^1 w/Airpact 75%ile

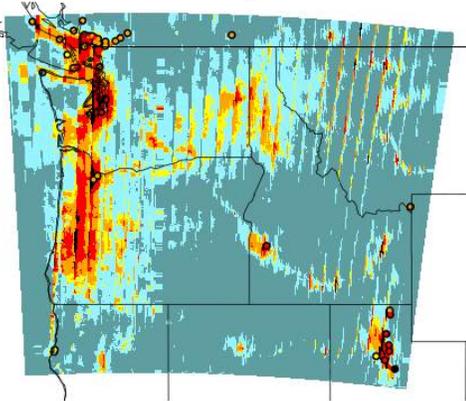
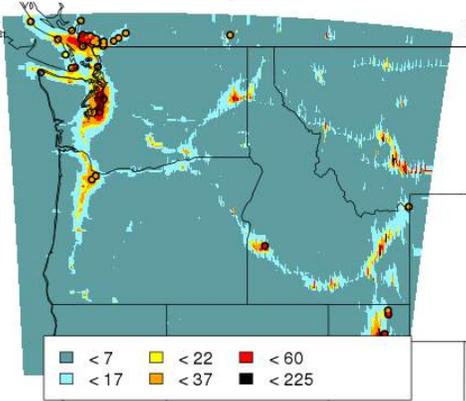
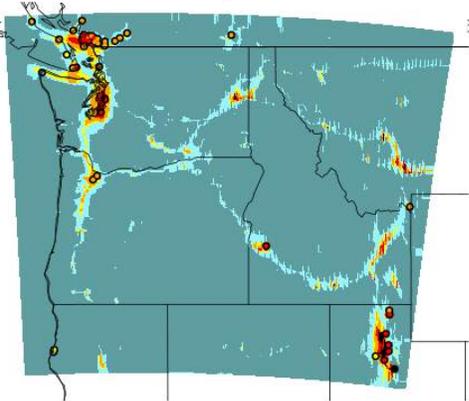
IDW^1 w/Airpact DV



IDW^2 w/Airpact median

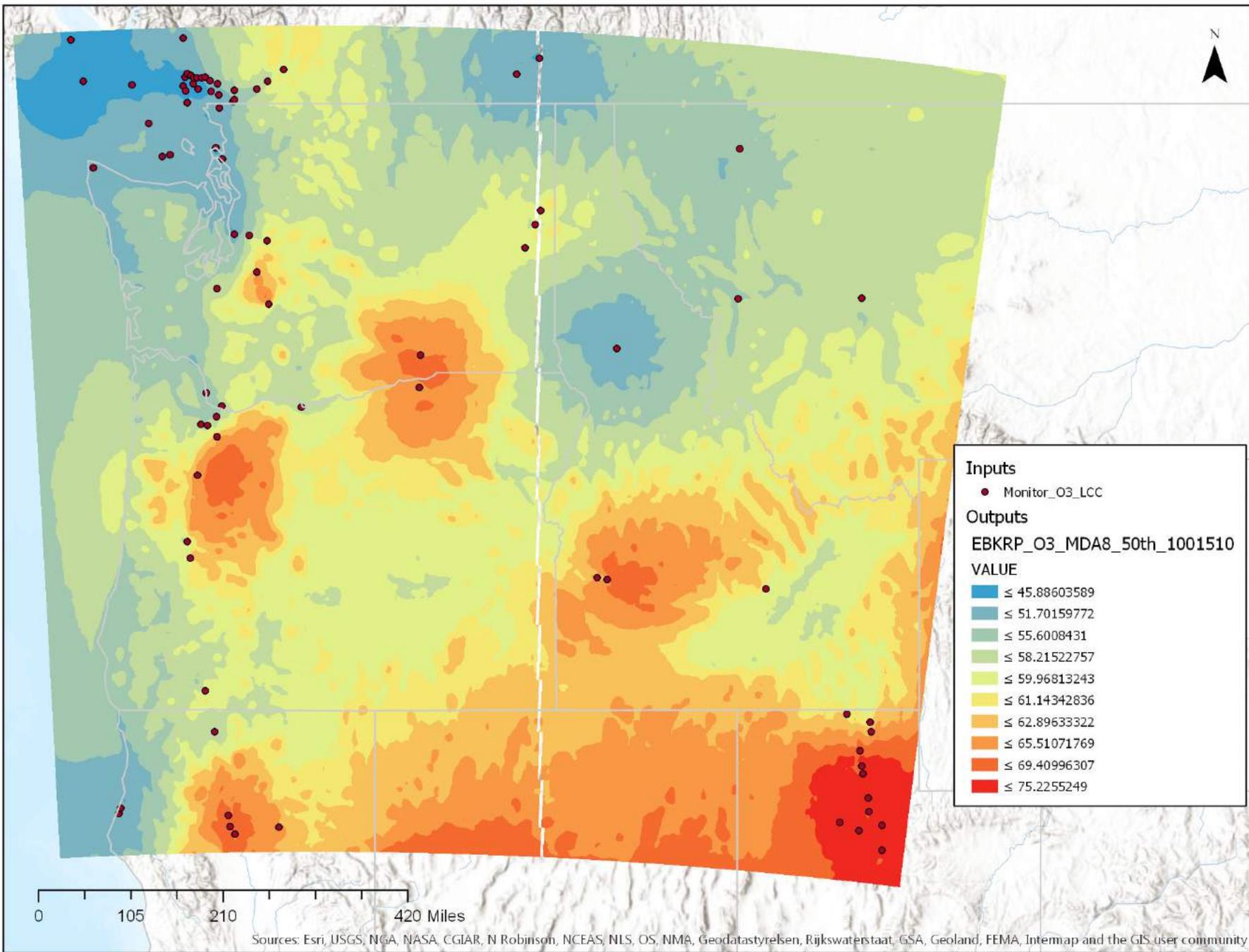
IDW^2 w/Airpact 75%ile

IDW^2 w/Airpact DV



Brady bunch
1-hr NO₂ DV
using the old
IDW
interpolation
method

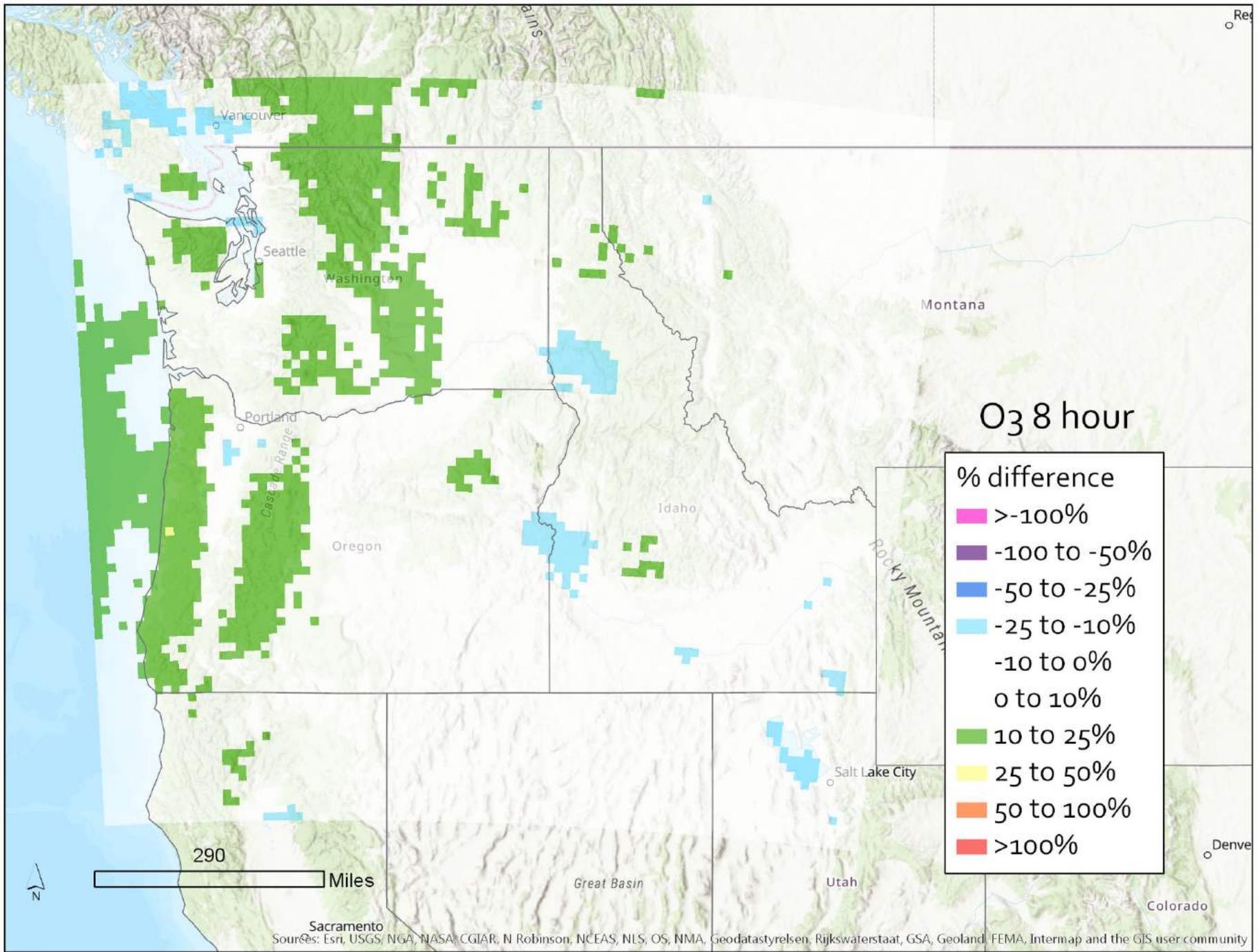
Options closest to Sara's
top pick and old method



Sources: Esri, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Interpolated O₃
8-hr DV

Interpolated with
model median

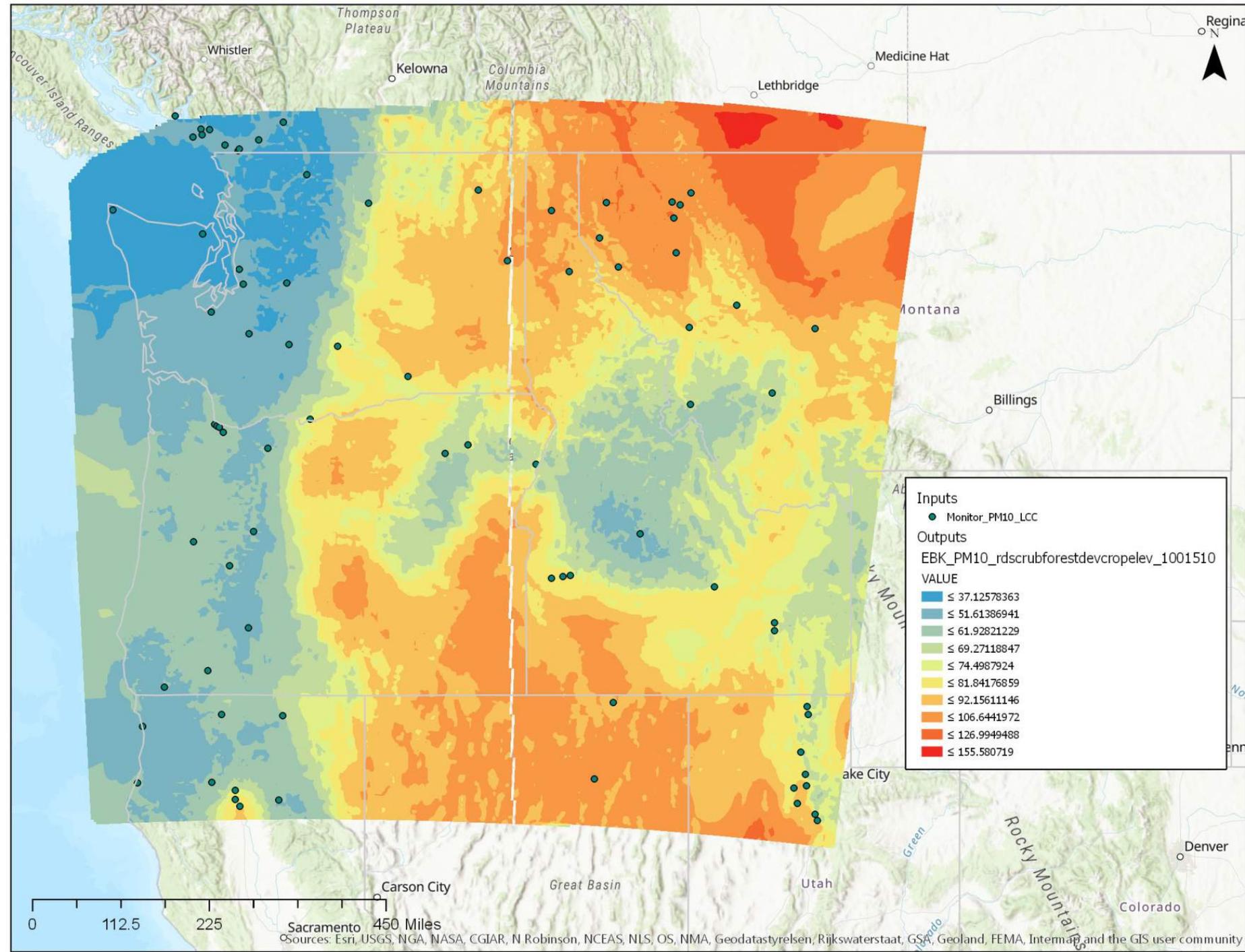


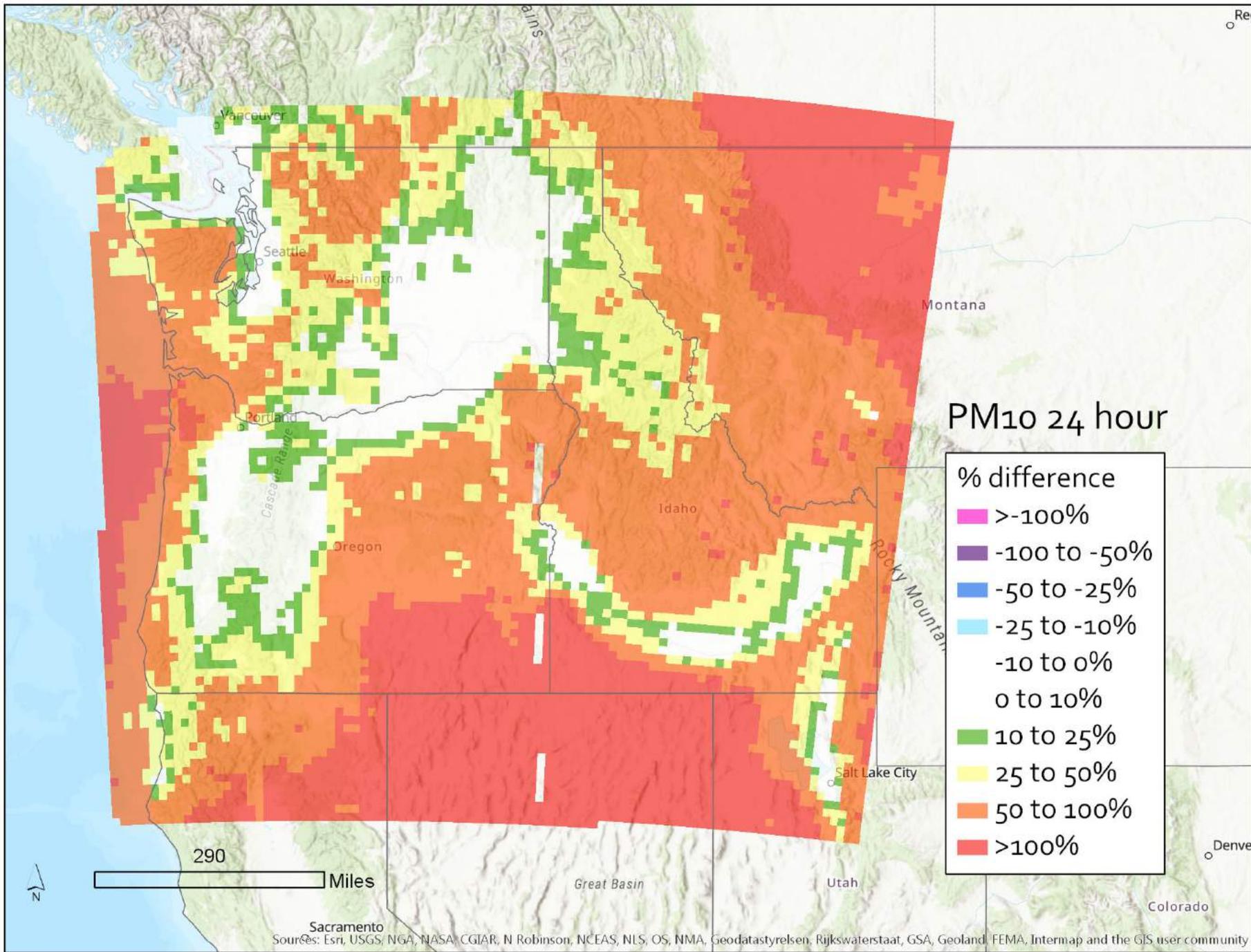
O₃ 8-hr DV %
differences
between new
(proposed) – old
background map

Interpolated PM₁₀ 24-hr DV

Model/monitor
anticorrelated,
land use model
better.

Explanatory
rasters: road,
scrub, forest,
developed, crop,
elevation





PM₁₀ 24-hr DV %
differences
between new
(proposed) – old
background map

Over to y'all

- Love 'em or not?
- Suggest improvements now
- Hope to roll out for use in permitting this month

