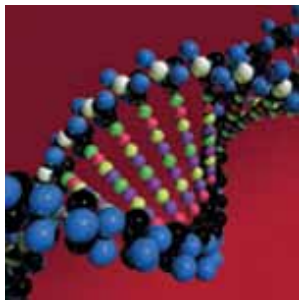
WRAP Regional Modeling Update


WRAP Implementation Working Group

13 August 2009

ENVIRON

Today's Topics

- Modeling Scenario Overview & Summary
- Emission inventories
- CMAQ Modeling Results
- Visibility Projections
- Next Steps

WRAP Visibility Modeling Scenarios

- 2002 Base Case - “2002 Base Case” or “Base02”
  - The Base02 inventory represents the actual conditions in calendar year 2002 with respect to ambient air quality and the associated sources of criteria and particulate matter air pollutants.
  - The Base02 inventories are used to validate the air quality model and associated databases and to demonstrate acceptable model performance with respect to replicating observed particulate matter air quality.
- 2000-04 Baseline Period Planning Case - “Plan02”
  - The Plan02 inventory represents baseline emission patterns based on average, or “typical”, conditions
  - The Plan02 inventory provides a basis for comparison with the future year 2018 projected emissions, as well as to gauge reasonable progress with respect to future year visibility.

WRAP Visibility Modeling Scenarios

- 2018 Future-year Base Case - “2018 Base Case” or “Base18”
  - These emissions are used to represent conditions in future year 2018 with respect to sources of criteria and particulate matter air pollutants, taking into consideration growth and controls.
  - Modeling results based on this emission inventory are used to define the future year ambient air quality and visibility metrics.
- 2018 Preliminary Reasonable Progress, version A - “PRP18a”
  - These emissions are used to evaluate the regional haze air quality for future year 2018 conditions with all known and expected controls as of March 2007.
  - Provide predicted 2018 future year air quality and visibility conditions in the Western Class I areas for December 2007 regional haze plans.
  - Modeling results based on this emission inventory are used to gauge reasonable progress with respect to future year visibility.
- 2018 Preliminary Reasonable Progress, version B - “PRP18b”
  - These emissions are used to evaluate the regional haze air quality for future year 2018 conditions with all known and expected controls as of March 2009.
  - Provide predicted 2018 future year air quality and visibility conditions in the Western Class I areas for regional haze plans.
  - Modeling results based on this emission inventory are used to gauge reasonable progress with respect to future year visibility.
- 2018 Preliminary Reasonable Progress, CMV Sensitivity - “PRP18cmv”
  - Same as PRP18b with updated Pacific Off-shore emissions.

Emissions Modeling

Emissions – emission data and QA found at:
http://newpah.cert.ucr.edu/aqm/308/qa_prp18b36.shtml

- The following 2009 updates for PRP18b include:
  - Update of California 2018 on-road and non-road emission inventories
  - Update of 2018 locomotive emissions
  - Update of WRAP 2018 stationary point source emissions
  - Update of WRAP 2018 area source emissions
  - Mexico 2018 projections

- Updates included in PRP18 CMV Sensitivity:
  - Updated Gridded Offshore Shipping
    - Eastern Pacific: Updated 2018 inventory

Emission Scenarios

Preliminary Reasonable Progress version B (prp18b)

- From Base02a
  - BEIS3 biogenic emissions (includes soil NO)
  - Windblown fugitive PM dust emissions – all components from WRAP WB Dust model
  - WRAP NH3 from WRAP NH3 model
  - Ontario, Canada point fires
- From Plan02a
  - WRAP baseline wildfires & wildland fire use
  - Offshore commercial shipping: no change (see Plan02a) From Base18a:
  - WRAP (except California) non-road mobile (annual and seasonal)
- From Base18b:
  - CENRAP on-road mobile
  - WRAP baseline prescribed fires (natural and anthropogenic), agricultural & non-federal rangeland fires
- From PRP18a:
  - Non-WRAP stationary point, area & mobile sources (on-road & off-road)
  - WRAP Oil & Gas
  - Fugitive dust
  - CENRAP & VISTAS point fires
  - Offshore Area, Gridded Offshore Shipping (Gulf of Mexico and Atlantic: Corbet/ENVIRON inventory)
  - Canada - 2020 inventory
  - Mexico – Road dust extracted from Phase II area inventory w/ TFs applied .

Emission Scenarios

Preliminary Reasonable Progress version B (prp18b) Updates include:

- Stationary Area
  - WRAP: Updated 2018 inventory
  - Mexico: Phase III inventory and updates to gridding data
- Non-road Mobile
  - WRAP: Updated 2018 inventory for California
  - Mexico: Phase III inventory and updates to gridding data (annual)
- On-road Mobile
  - WRAP: Updated 2018 inventory for California
  - Mexico: Phase III inventory and updates to gridding data
- Fugitive Dust
  - WRAP: Extracted from Updated 2018 stationary area source inventory
  - Mexico: Extracted from Phase III inventory
- Stationary Point
  - WRAP: Updated 2018 inventory
  - VISTAS: Updated 2018 Best & Final inventory
  - Mexico: Phase III inventory

Preliminary Reasonable Progress CMV Sensitivity:

- Same as PRP18b w/ Updated Gridded Offshore Shipping
  - Eastern Pacific: updated 2018 inventory

Emission Summaries

PRP18a:

Wrap region by source sector (tpy)

Sector	CO	NOX	VOC	NH3	SO2	PM10	PM2_5	PMC
Fires	8928013	202217	436714	45263	53856	726518	627618	119796
Area	1446307	320345	1860528	25430	110772	240738	211012	29765
Point	752028	895549	299700	14031	535055	190862	58607	132255
Non Road	4367813	594397	328247	1409	4074	43367	39320	4047
Onroad	5708505	519090	400626	71408	5933	36368	23618	12749
Biogenic	2624814	286996	18197340	0	0	0	0	0
WOG	68260	191728	749979	0	89	0	0	0
Road Dust	0	0	0	0	0	689599	72821	616779
Fugitive Dust	0	0	0	0	0	1123032	166125	956919
Wind-Blown Dust	0	0	0	0	0	1962165	431676	1530489
Offshore Platforms	0	0	0	0	0	0	0	0
Offshore Shipping	40868	524797	367468	149	280561	36352	35220	1132
Ag Ammonia	0	0	0	817256	0	0	0	0
Total	**23936606**	**3535119**	**22640603**	**974946**	**990341**	**5049001**	**1666017**	**3403931**

Emission Summaries

ENVIRON

Wrap region by source sector (tpy)

PRP18b:

Sector	CO	NOX	VOC	NH3	SO2	PM10	PM2_5	PMC
Fires	8,928,013	202,217	436,714	45,263	53,856	726,518	627,618	119,796
Area	1,386,853	290,874	1,830,236	25,387	108,274	233,469	205,202	28,306
Point	714,163	811,324	300,509	11,564	512,467	196,677	59,046	147,229
Non Road	4,520,104	557,423	332,659	922	3,186	35,095	31,673	3,442
Onroad	5,706,430	533,287	410,149	43,339	6,116	38,603	25,509	13,094
Biogenic	2,624,814	286,996	18,197,340	0	0	0	0	0
WOG	68,260	191,728	749,979	0	89	0	0	0
Road Dust	0	0	0	0	0	689,599	72,821	616,779
Fugitive Dust	0	0	0	0	0	1,099,367	166,474	932,901
Wind-Blown Dust	0	0	0	0	0	1,962,165	431,676	1,530,489
Offshore Platforms	0	0	0	0	0	0	0	0
Offshore Shipping	40,868	524,797	367,468	149	280,561	36,352	35,220	1,132
Ag Ammonia	0	0	0	817,256	0	0	0	0
Total	**23,989,504**	**3,398,646**	**22,625,055**	**943,880**	**964,550**	**5,017,846**	**1,655,240**	**3,393,168**

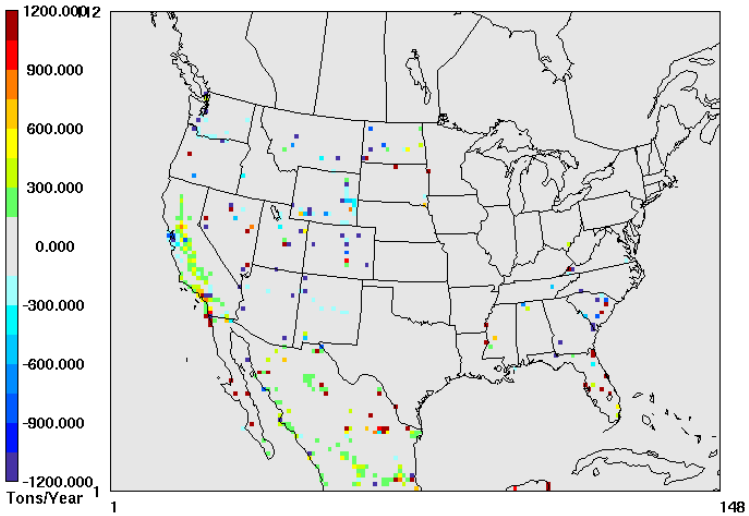
PRP18_cmv:

Sector	CO	NOX	VOC	NH3	SO2	PM10	PM2_5	PMC
Pacific Shipping	38657	380360	-330155	107	247607	99836	98354	1481

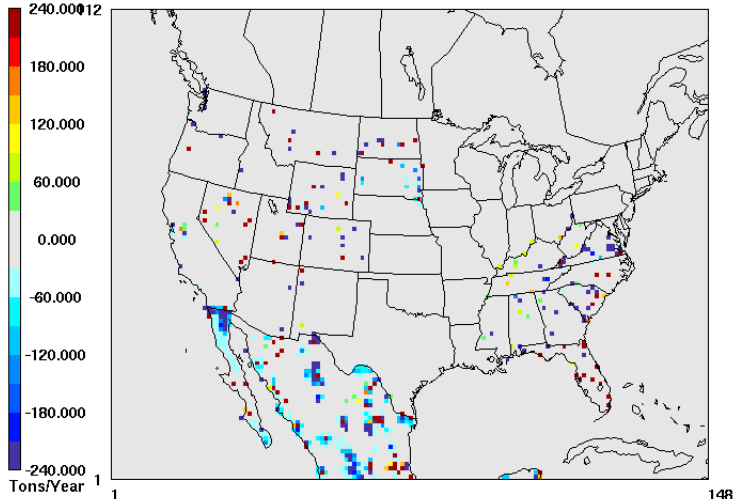
Emission Scenarios

Annual difference – All sources (prp18b-prp18a)

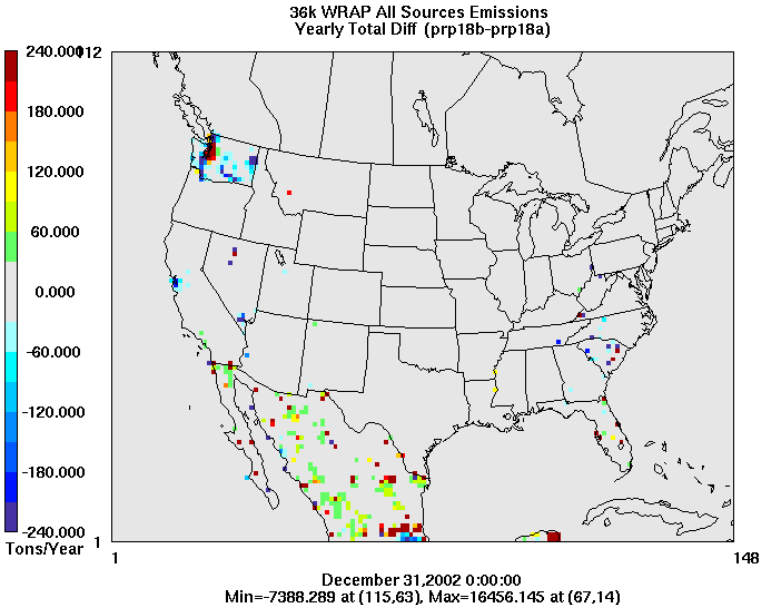
NO



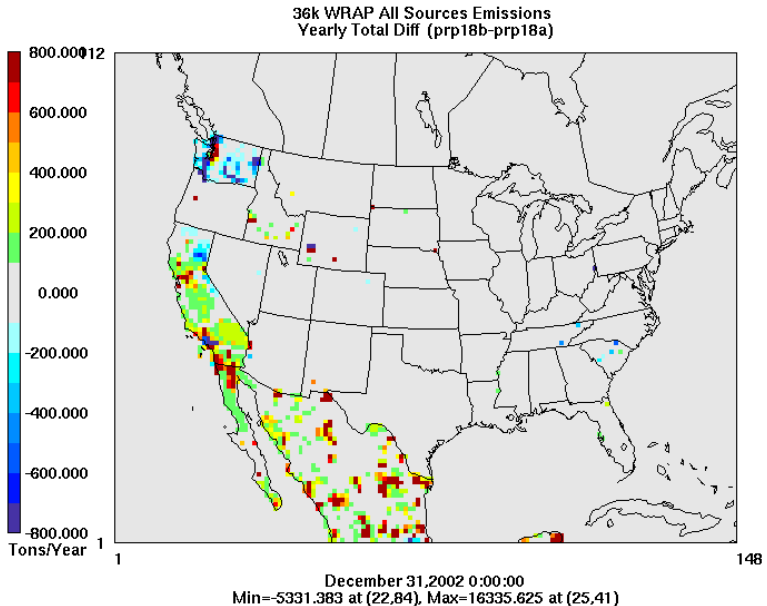
SO2



PM2_5



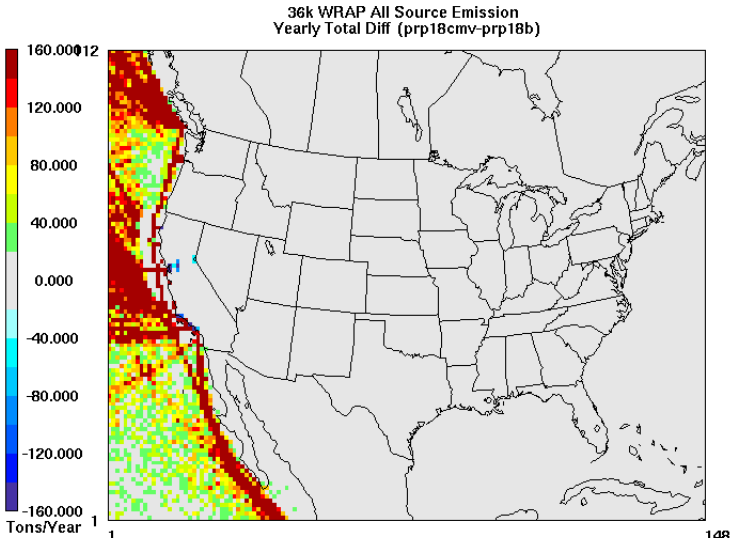
VOC



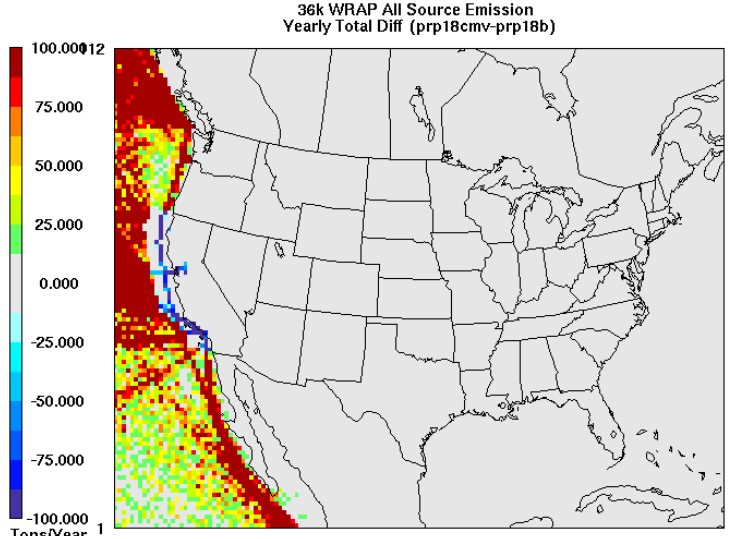
Emission Scenarios
Annual difference (prp18cmv-prp18b)

ENVIRON

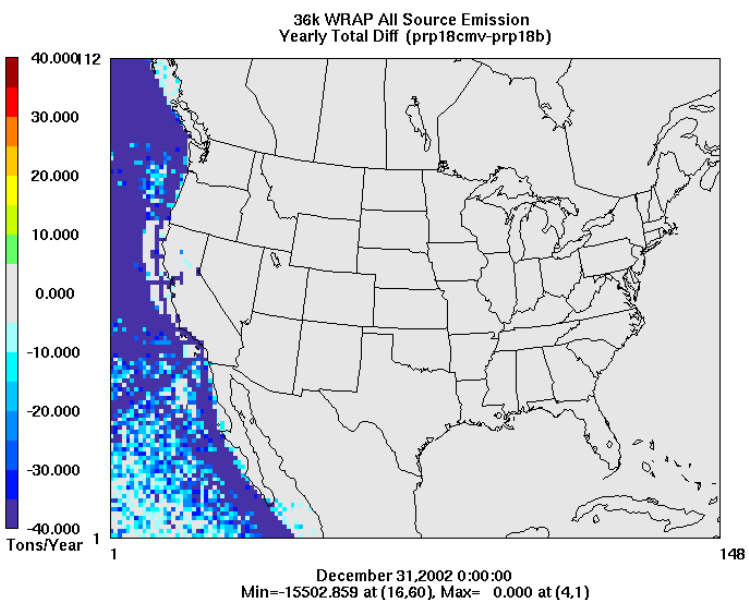
NO



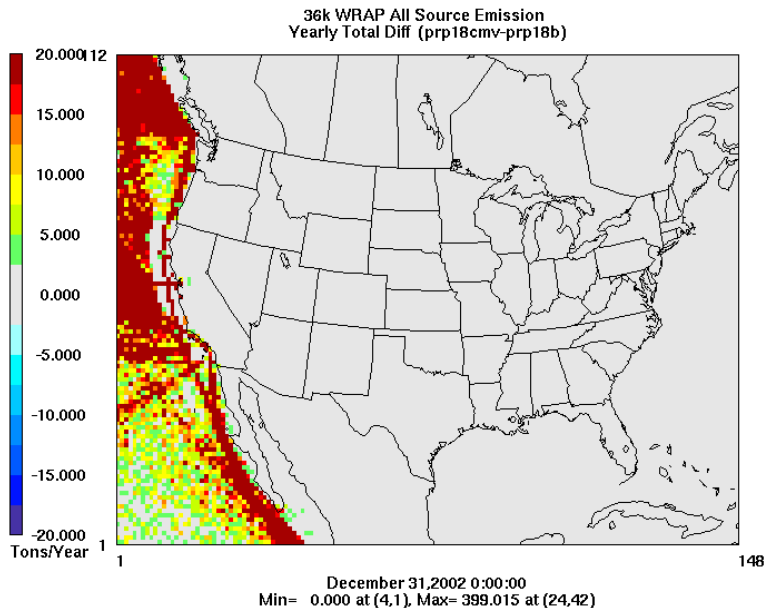
SO2



VOC

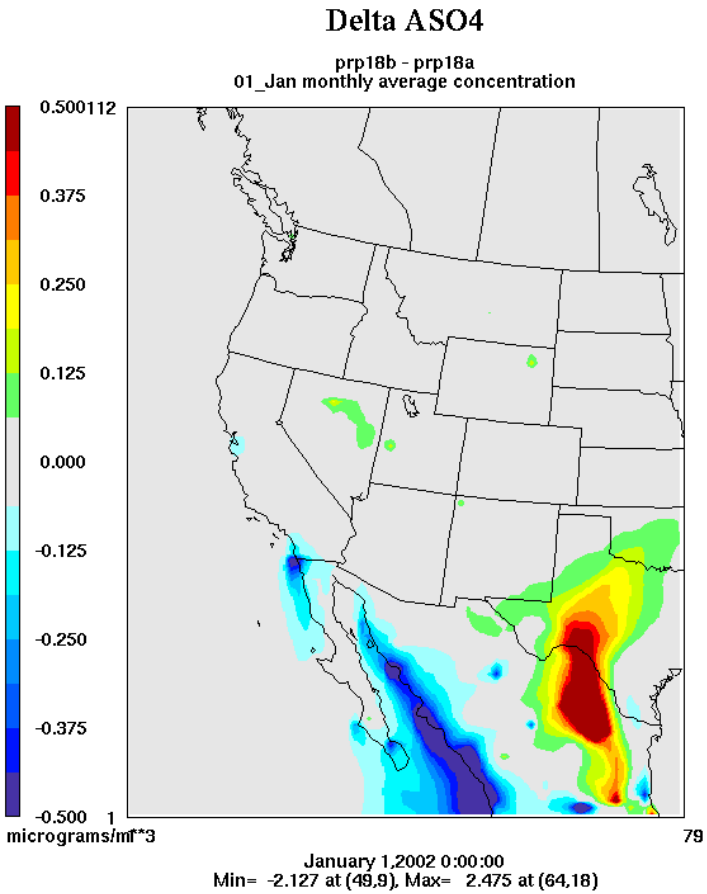


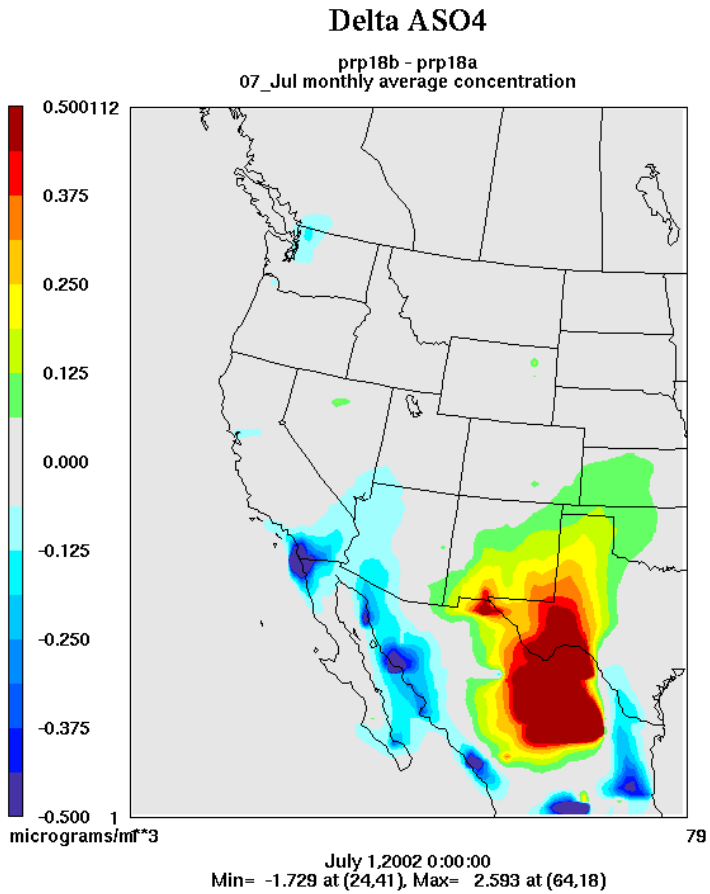
PMFINE



CMAQ Modeling Results

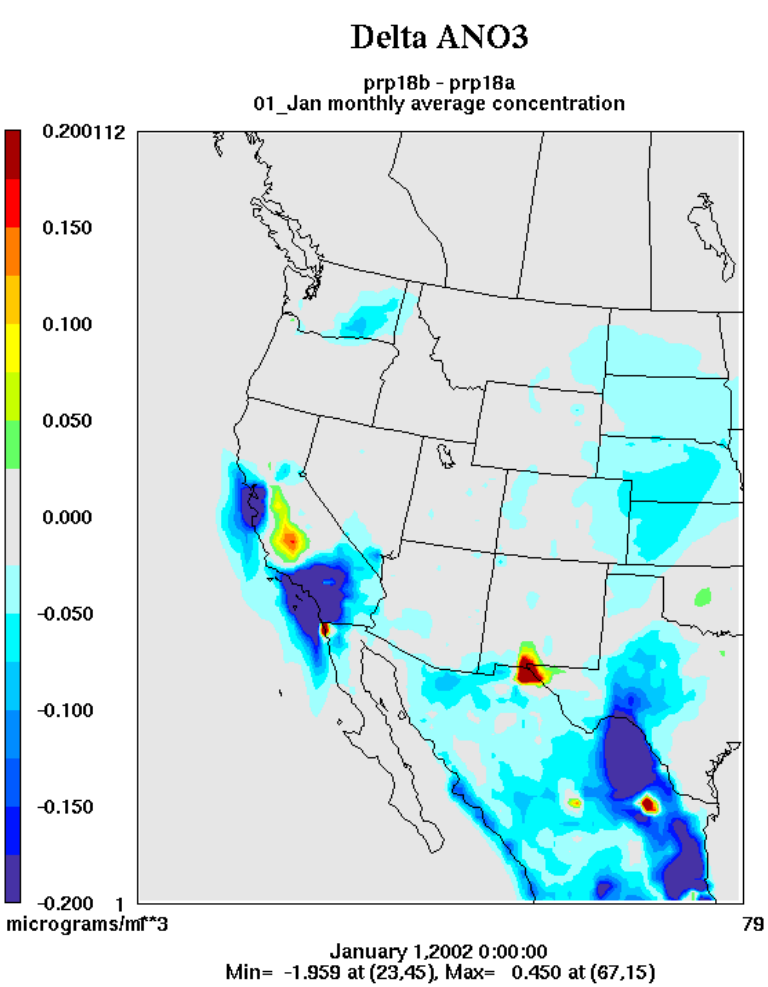
Difference in monthly average ASO4 (prp18b – prp18a)

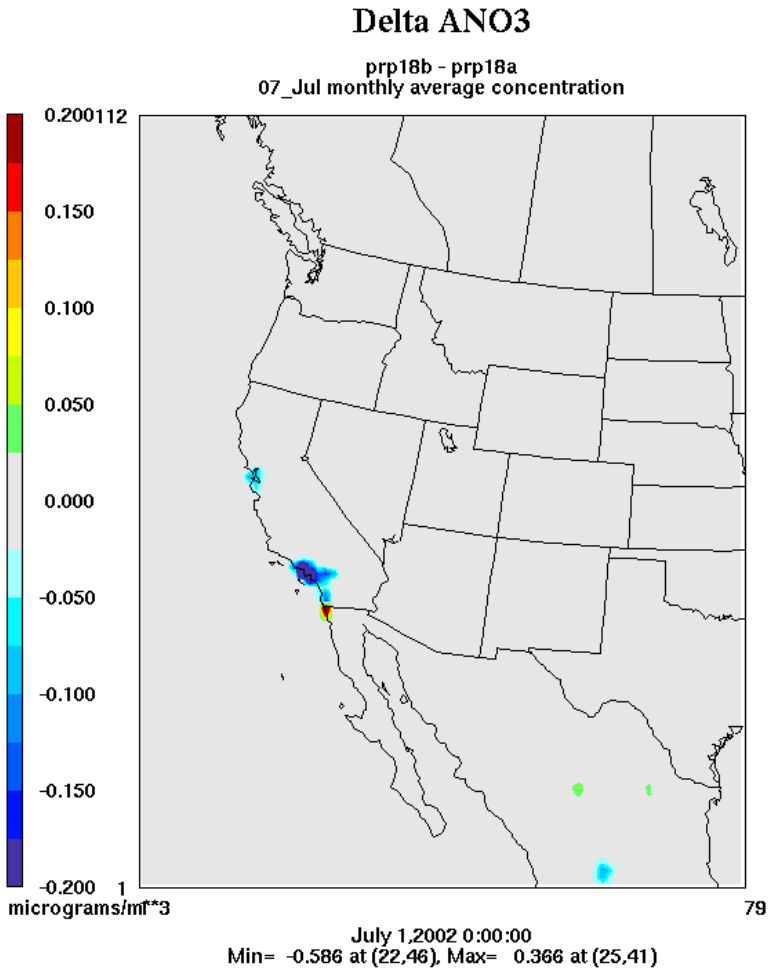




CMAQ Modeling Results

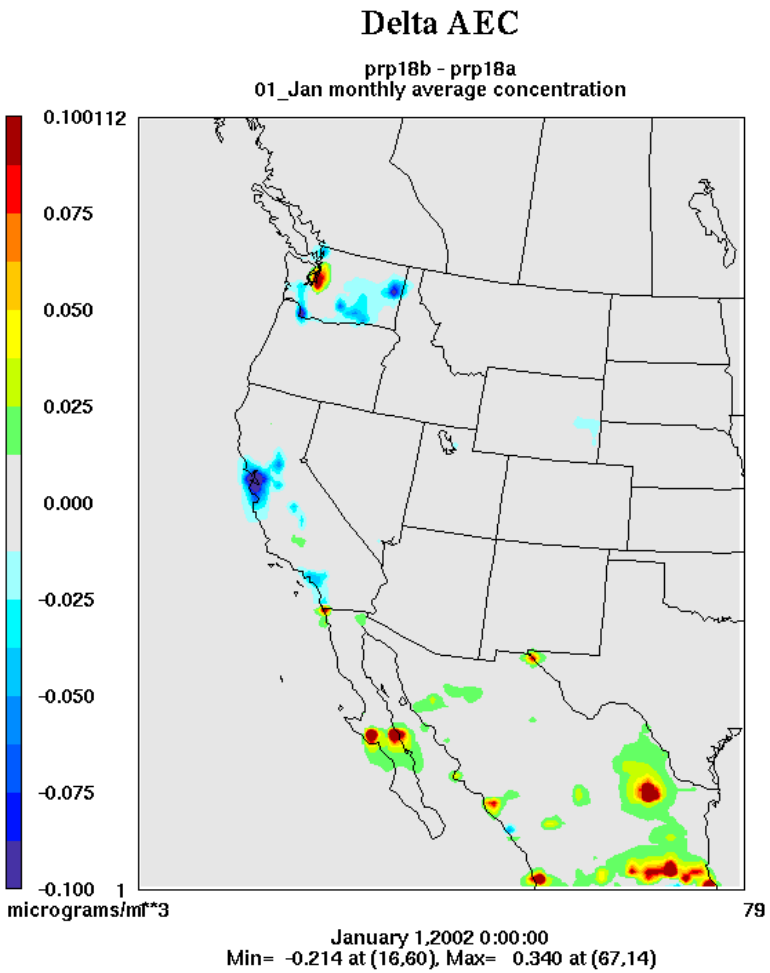
Difference in monthly average ANO3 (prp18b – prp18a)

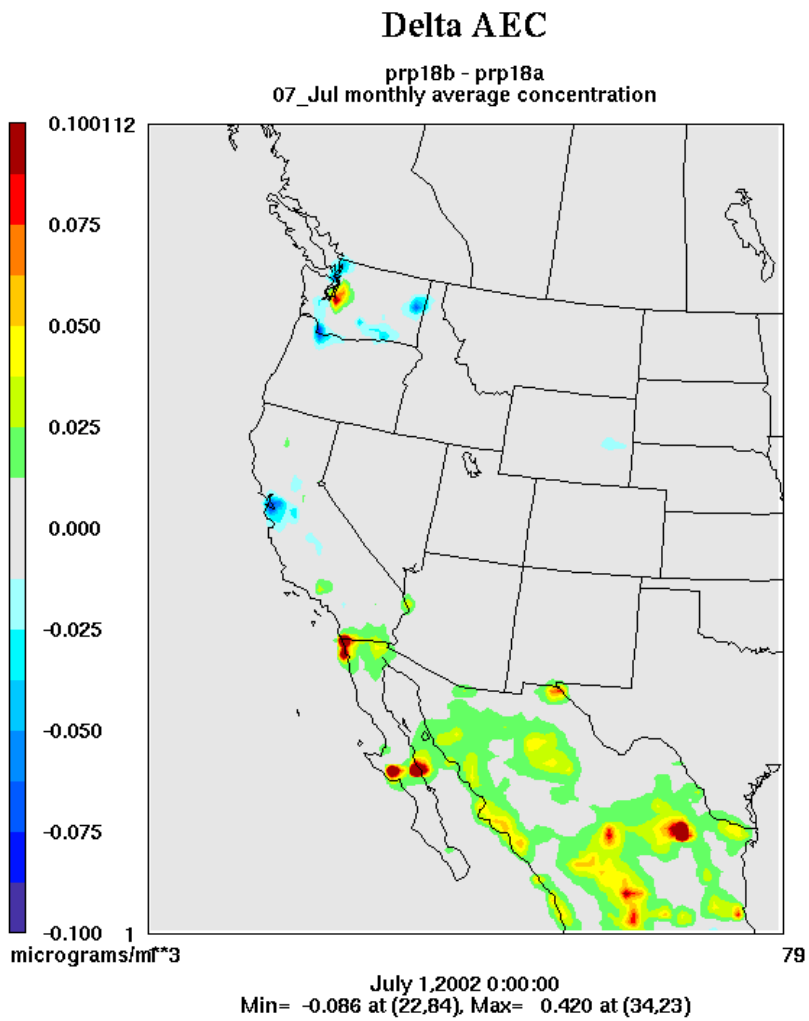




CMAQ Modeling Results

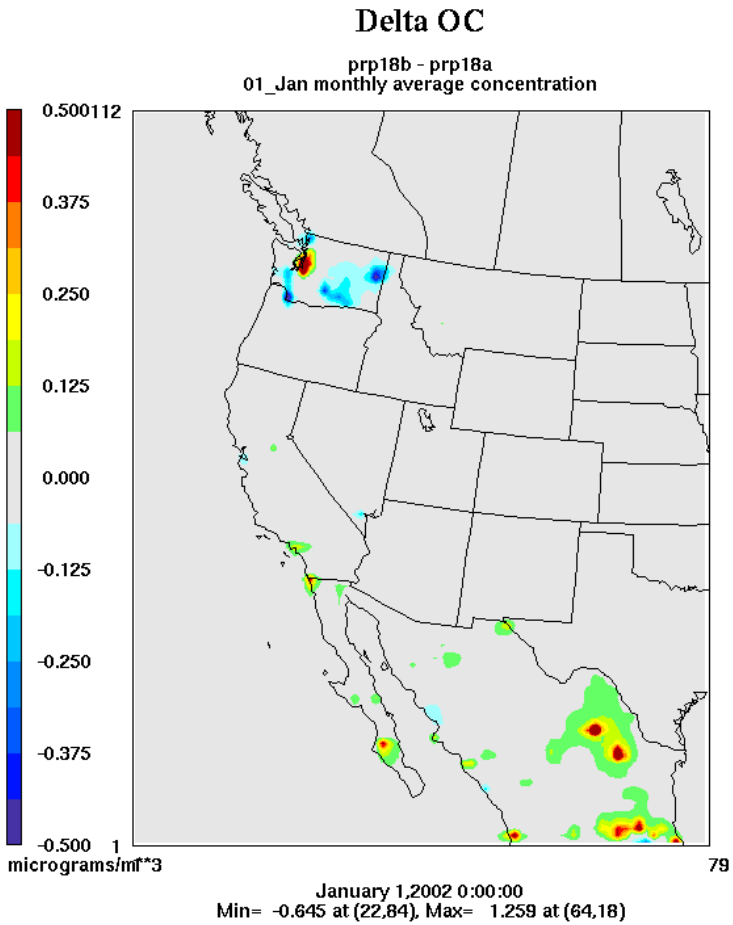
Difference in monthly average EC (prp18b – prp18a)

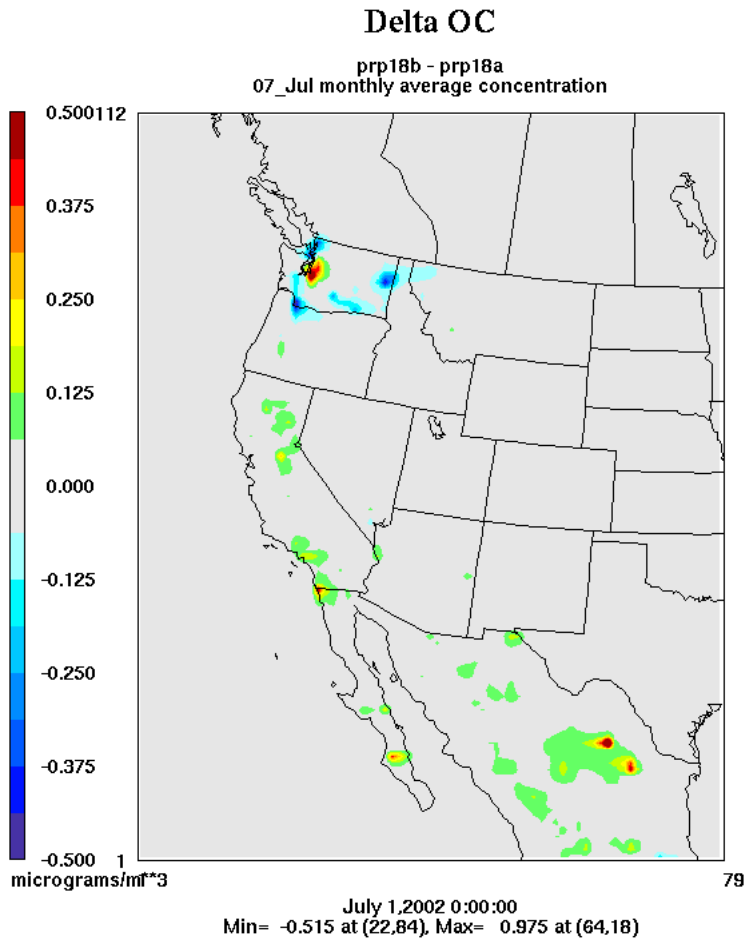




CMAQ Modeling Results

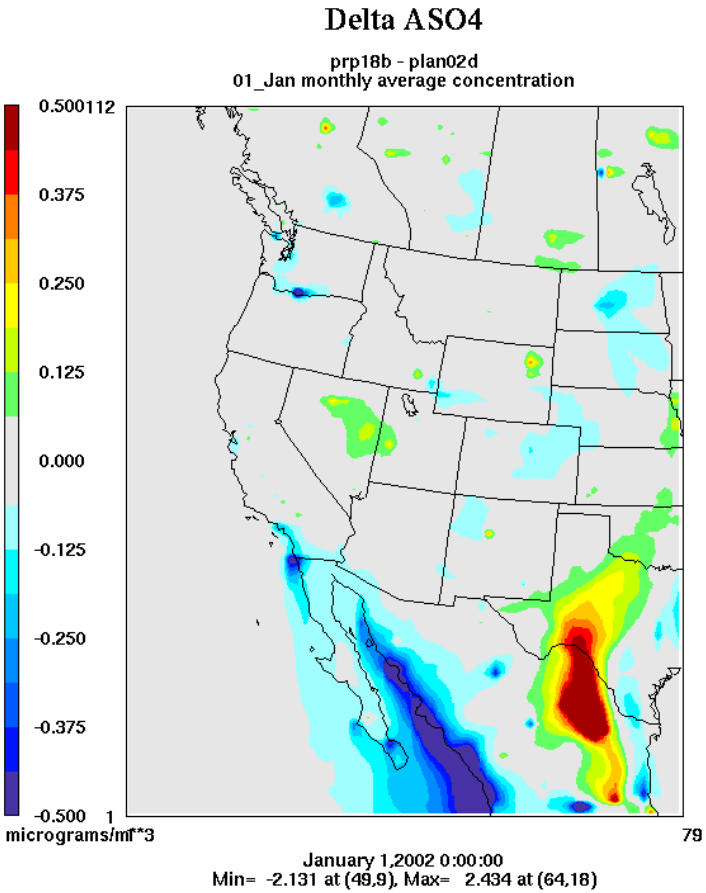
Difference in monthly average OC (prp18b – prp18a)

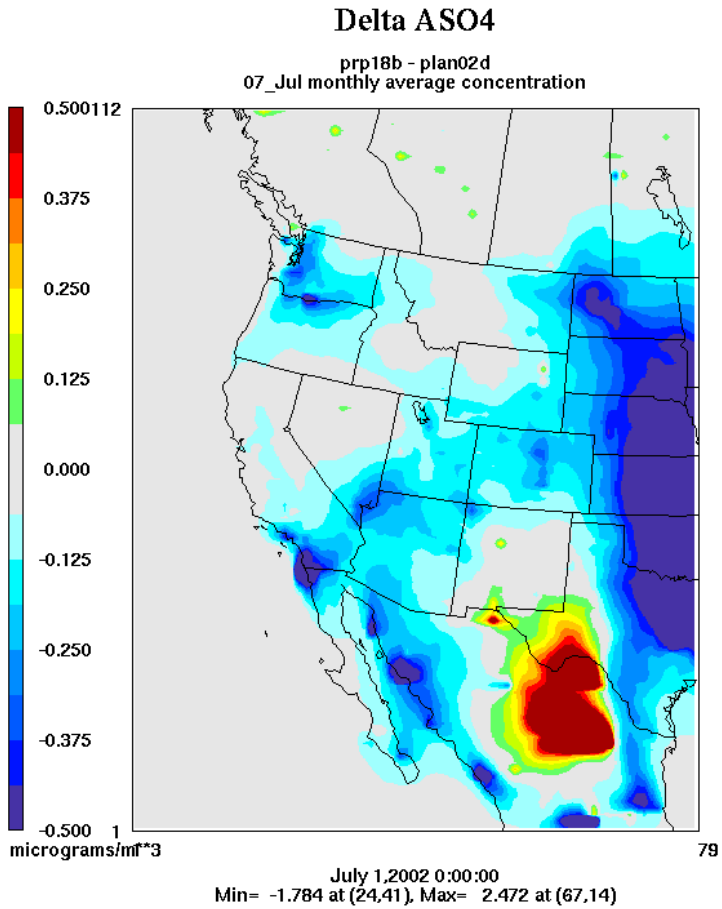




CMAQ Modeling Results

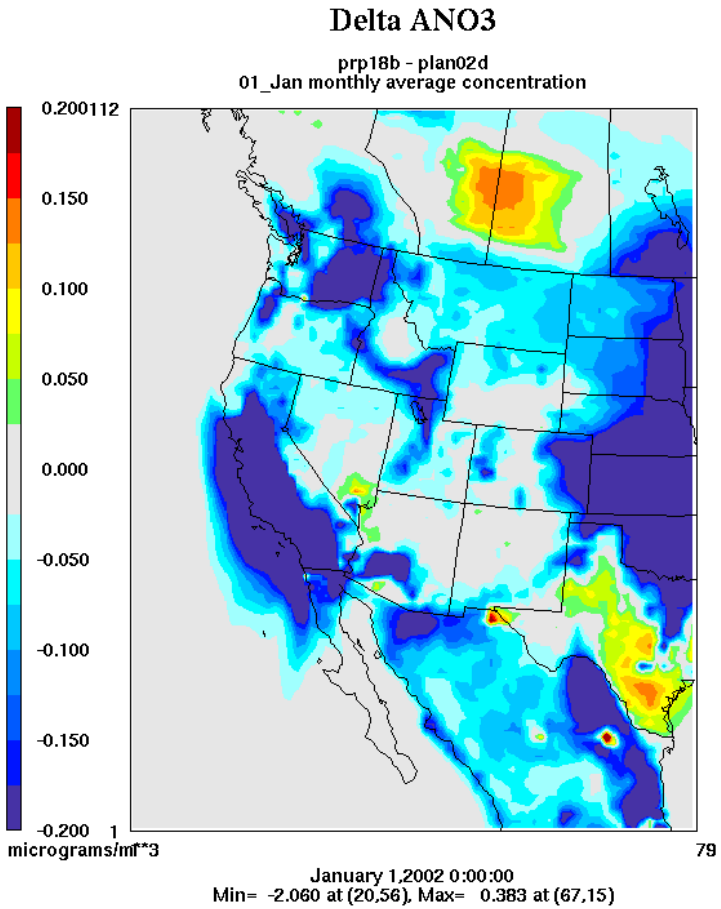
Difference in monthly average ASO4 (prp18b – p02d)

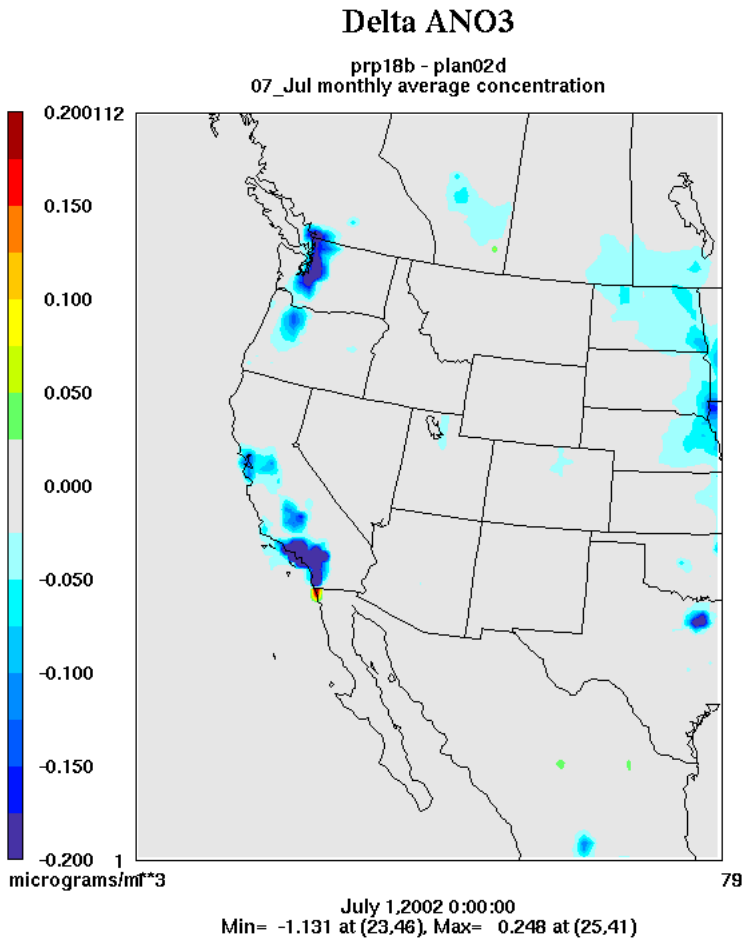




CMAQ Modeling Results

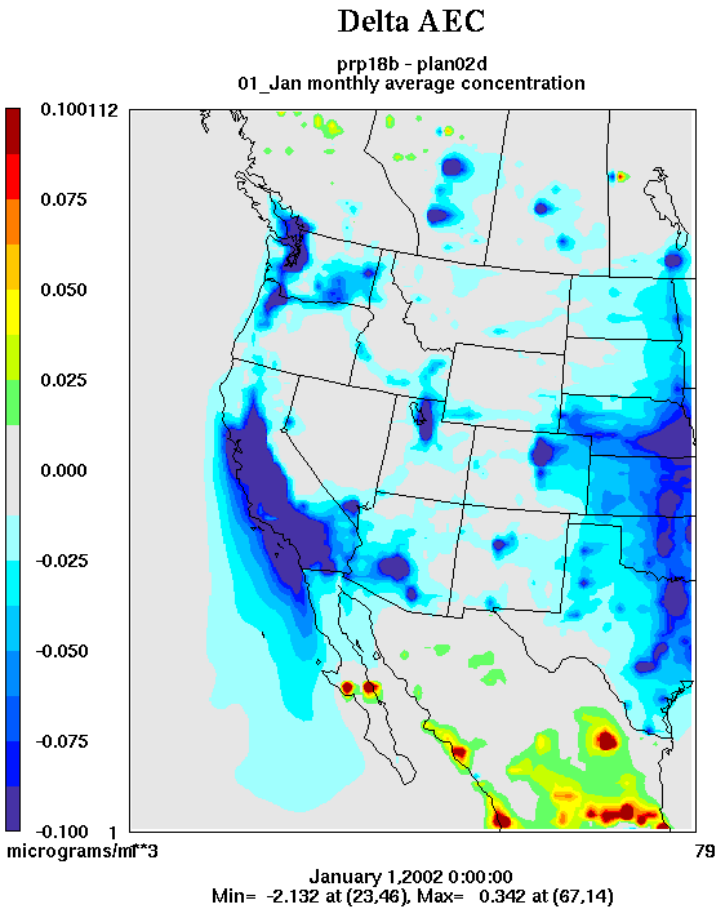
Difference in monthly average ANO3 (prp18b – p02d)

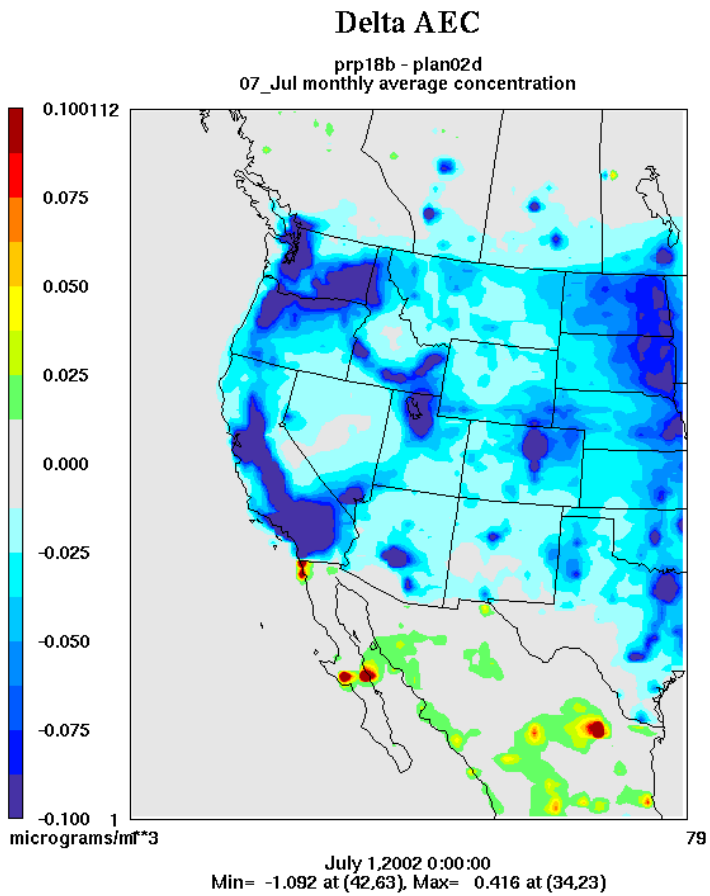




CMAQ Modeling Results

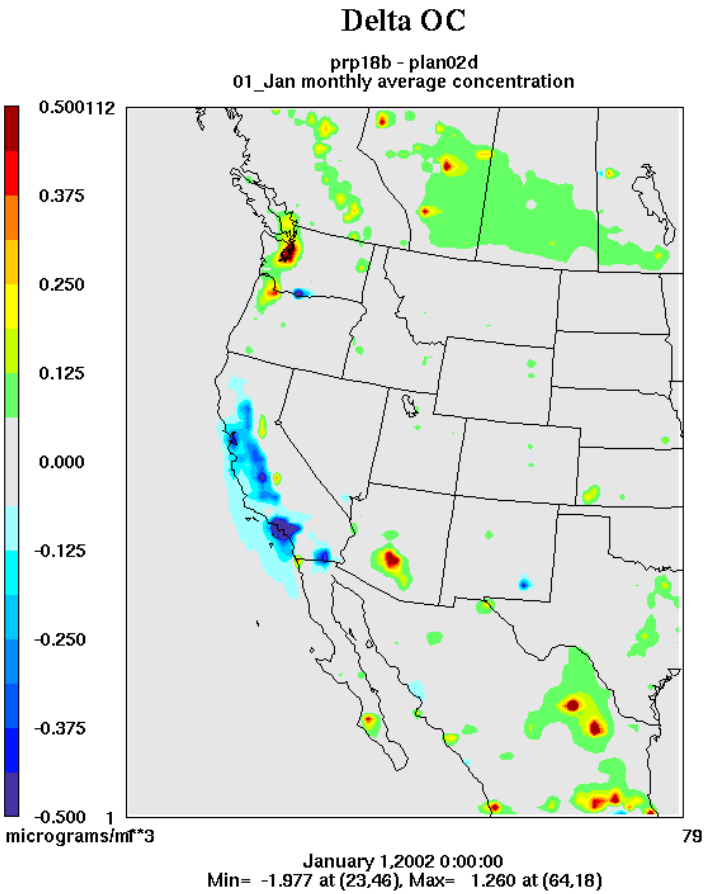
Difference in monthly average EC (prp18b – p02d)

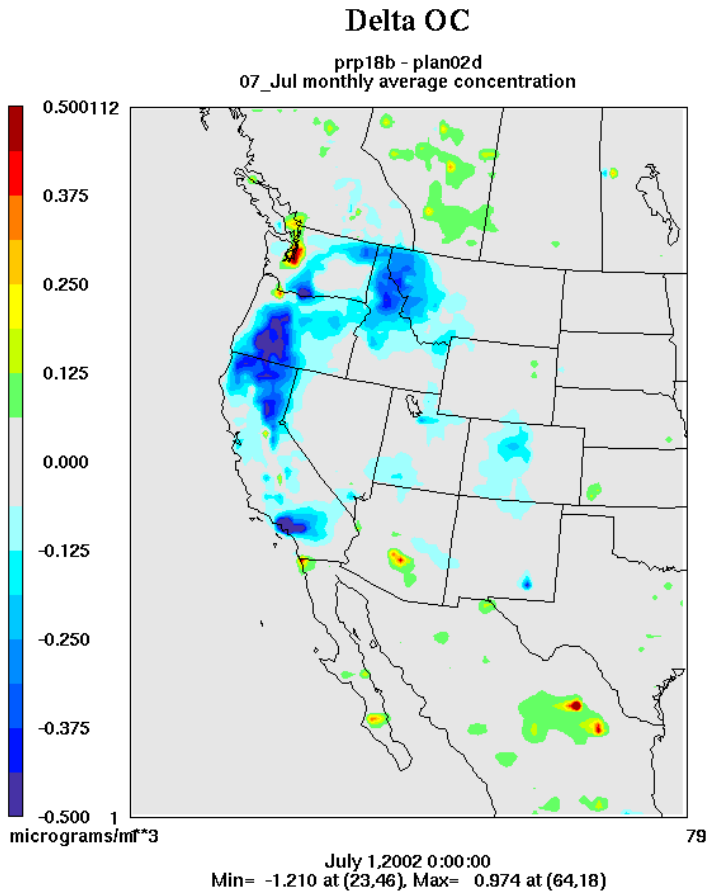




CMAQ Modeling Results

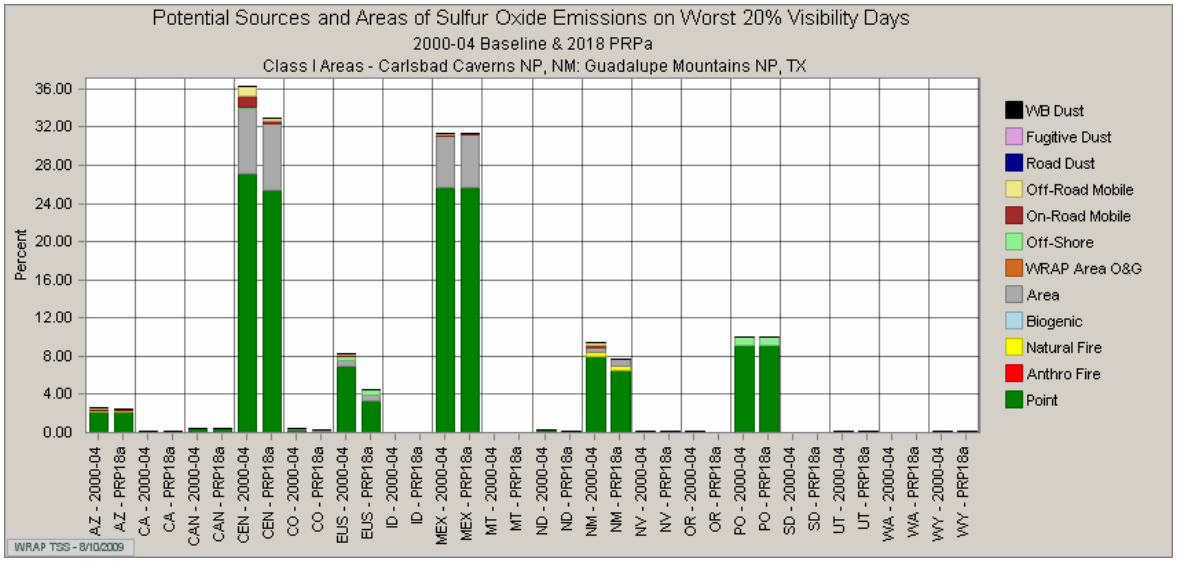
Difference in monthly average OC (prp18b – p02d)

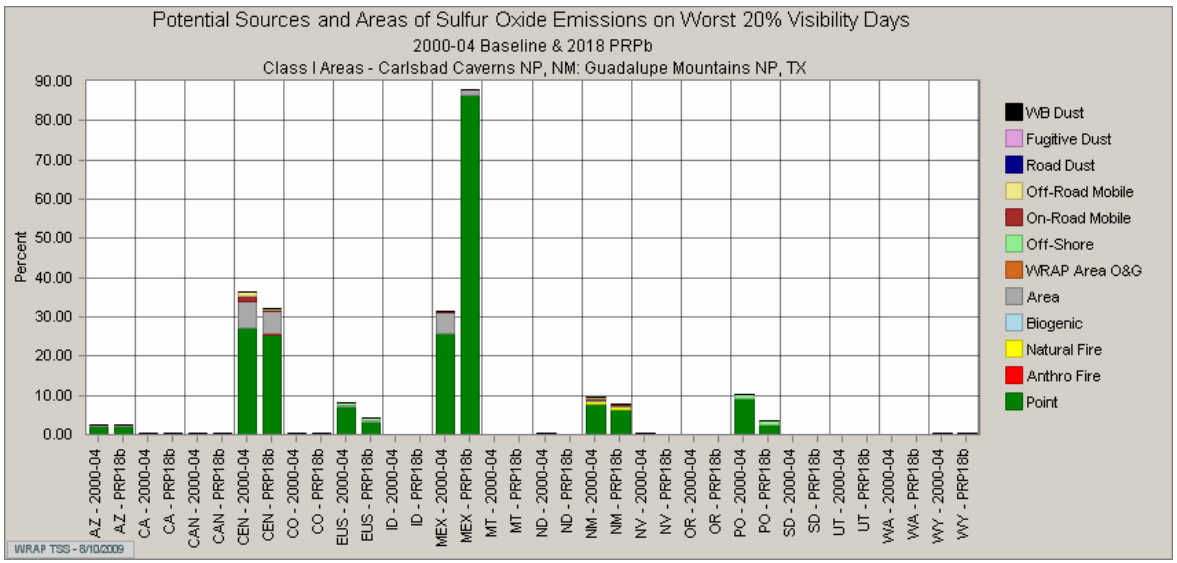




Impacts due to Mexico Emission Changes

WEP review for GUMO





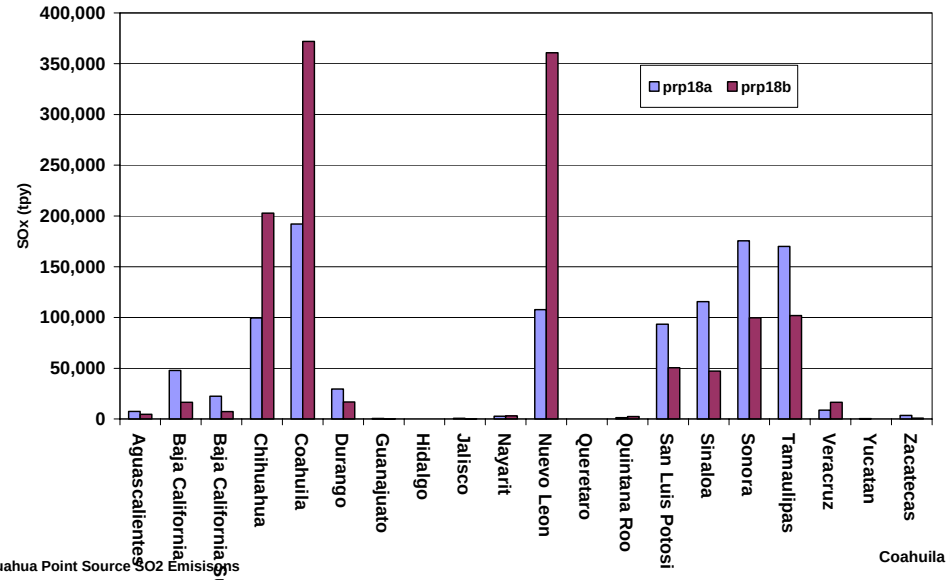
Potential PRP18b emission impacts from stationary point SO2

SO2 emissions ~3x PRP18a levels

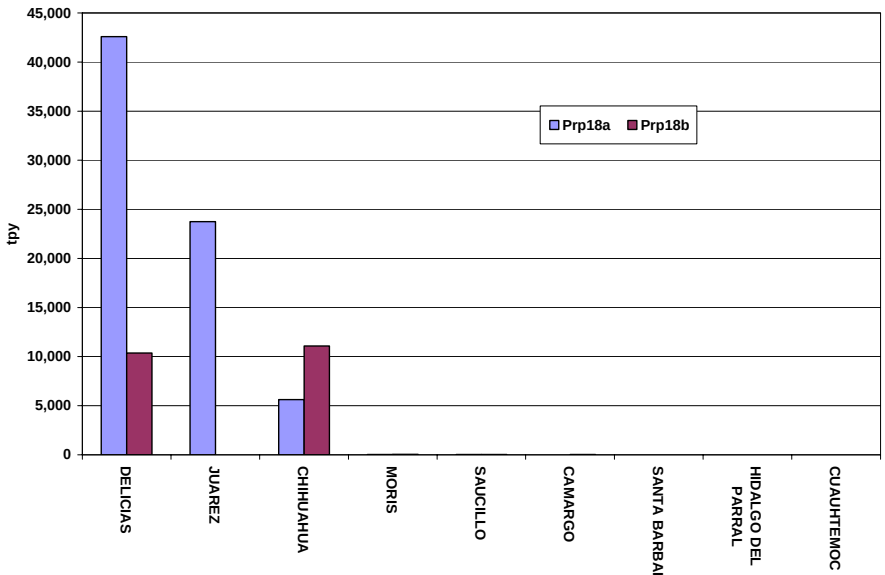
Review of Mexico Emission Changes

ENVIRON

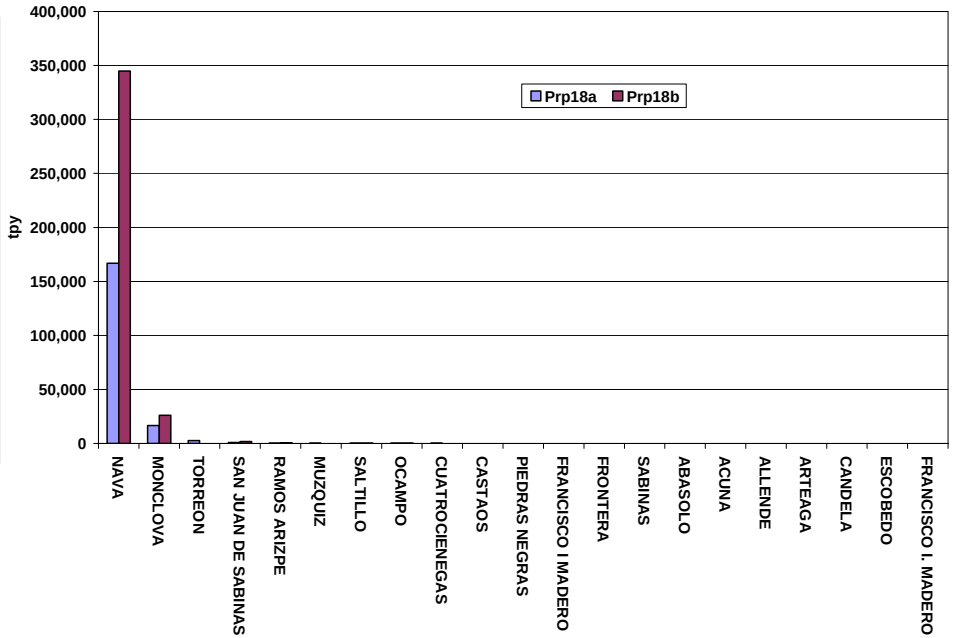
Mexico SOx Emissions (Point + Area Source)



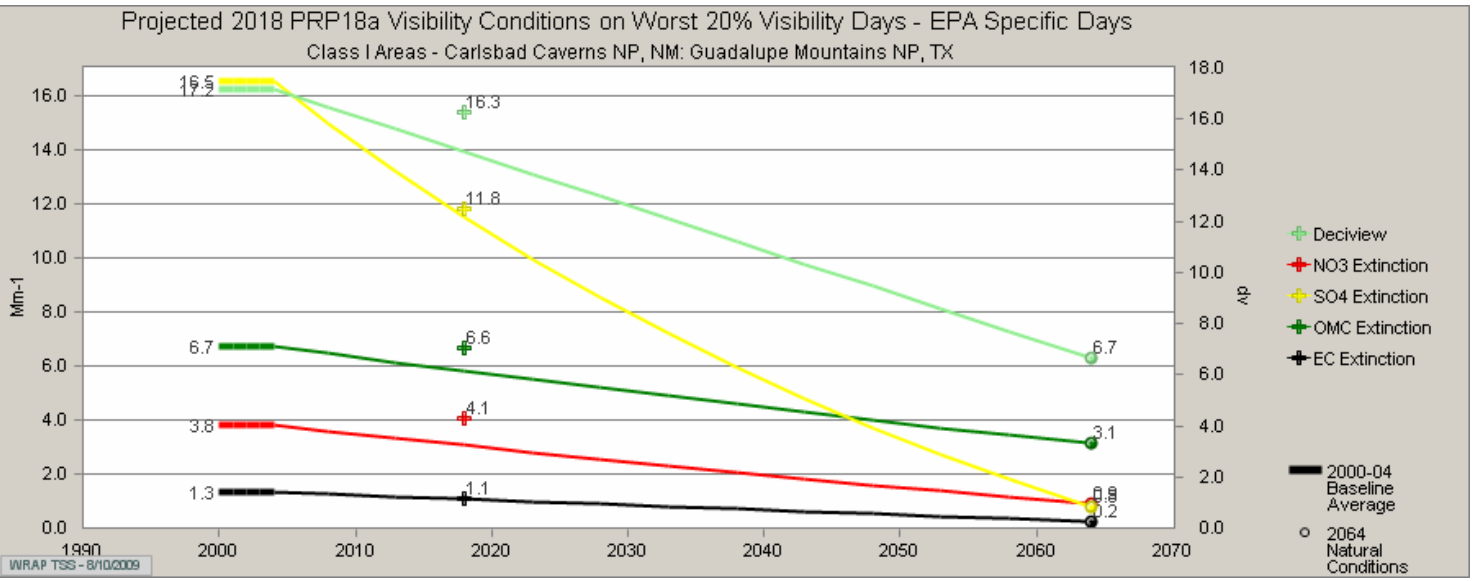
Chihuahua Point Source SO2 Emissions

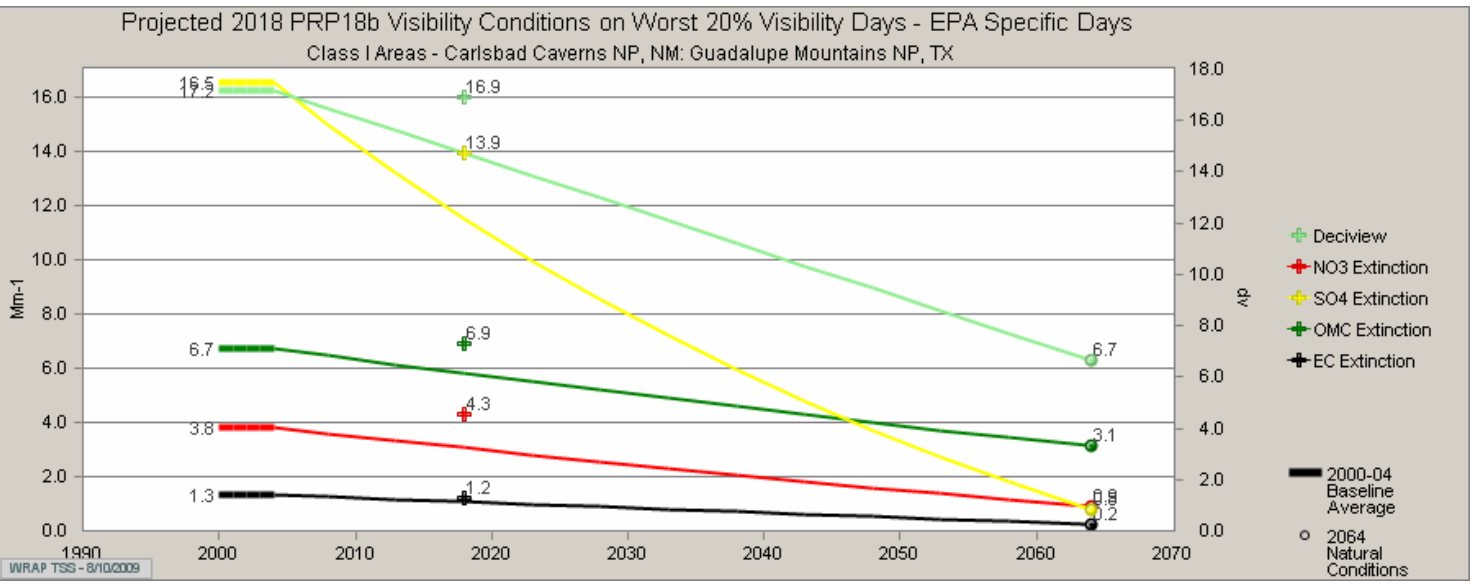


Coahuila Point Source SO2 Emissions



Impacts on 2018 Visibility Projections





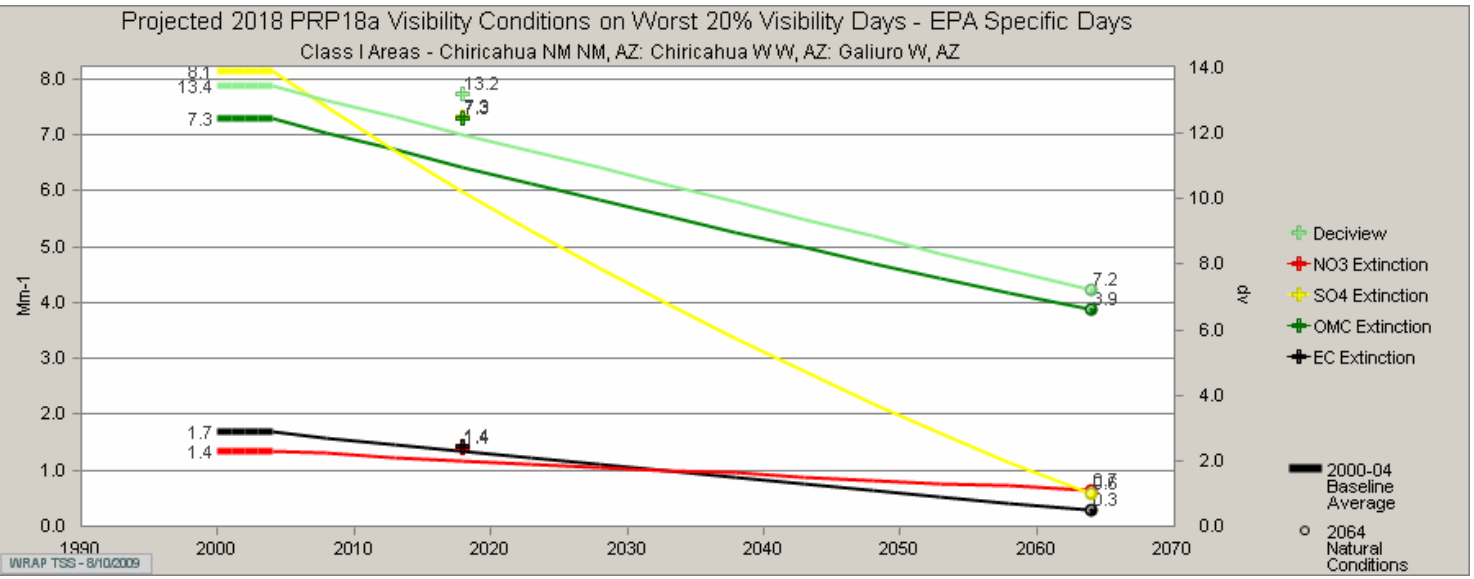
Carlsbad Caverns; Guadalupe Mountains (GUMO)

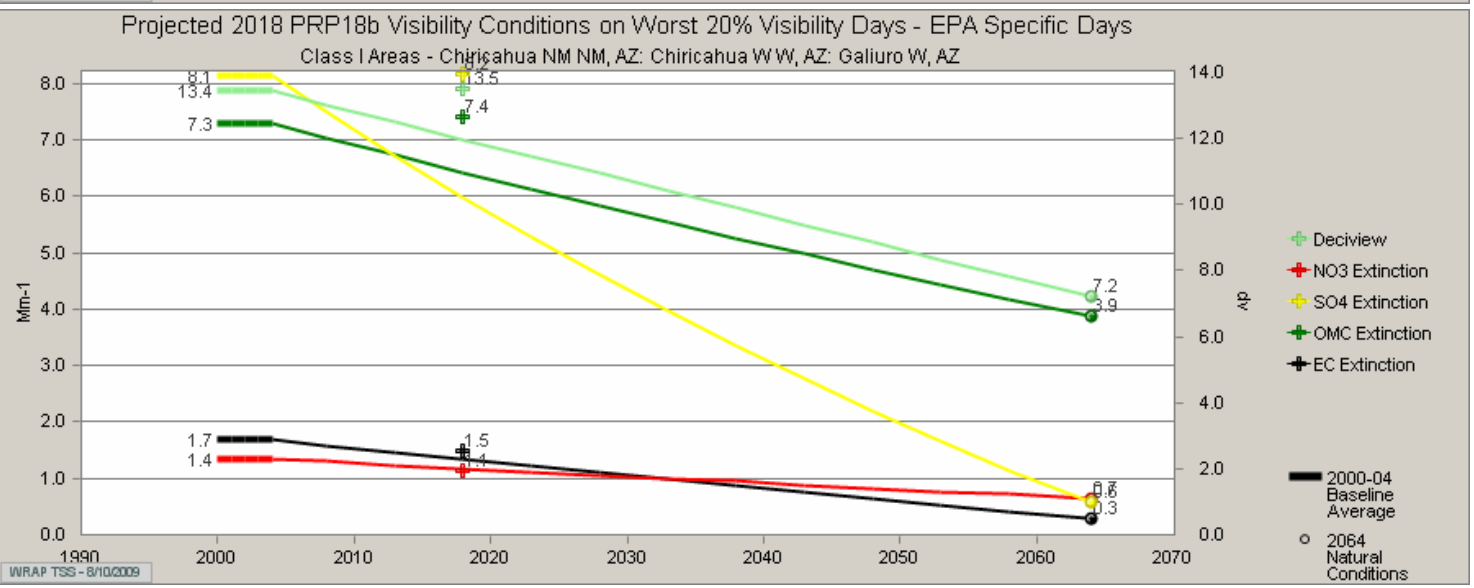
2018 dV increases ~0.6 from PRP18a to PRP18b

Driven by increased SO4 extinction

Smaller increases in NO3, OC & EC extinction

Impacts on 2018 Visibility Projections





Chiricahua (CHIR)

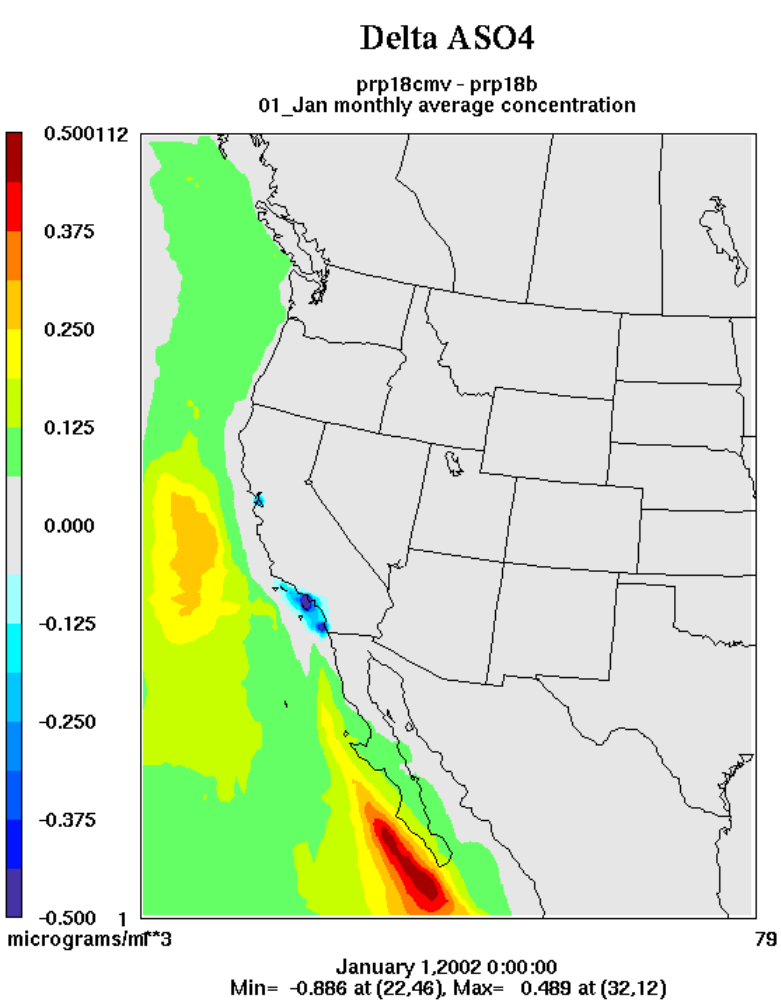
2018 dV increases ~0.3 from PRP18a to PRP18b

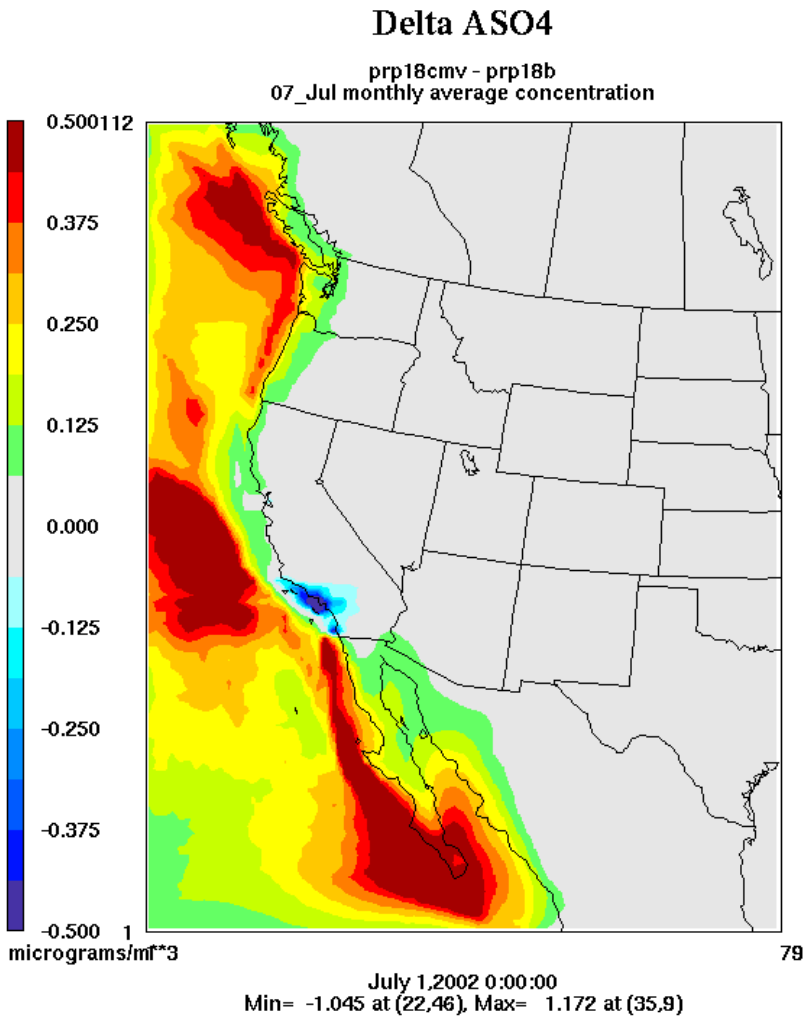
Driven by increased SO4 extinction

Small increases in OC & EC extinction

CMAQ Modeling Results

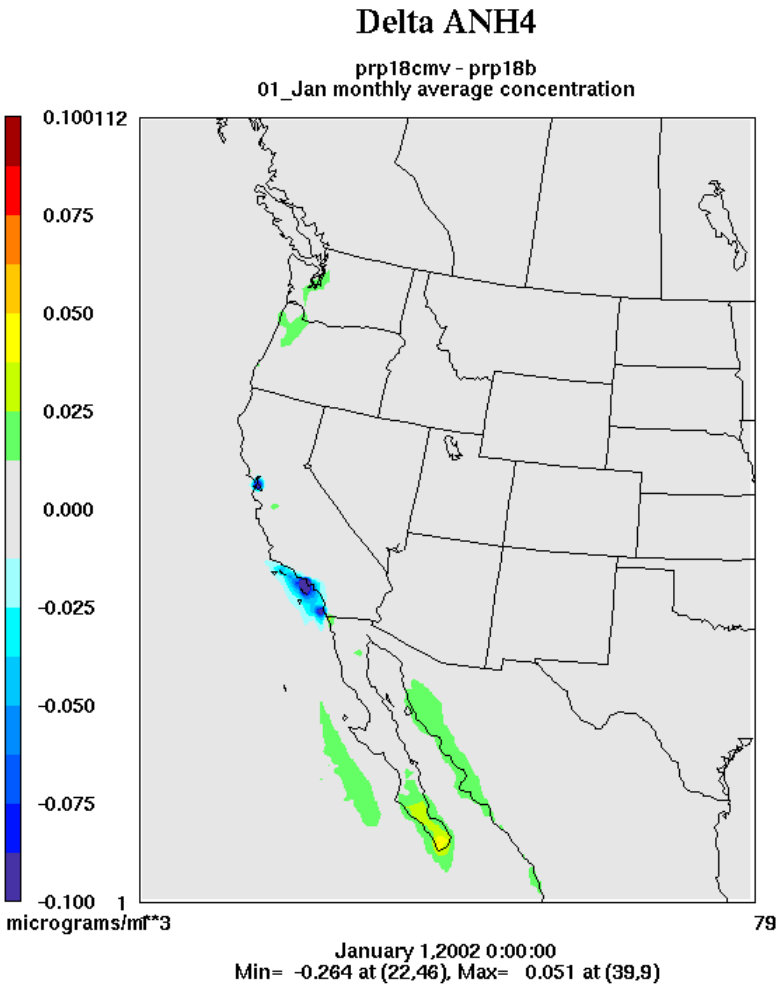
Difference in monthly average ASO4 (prp18cmv-prp18b)

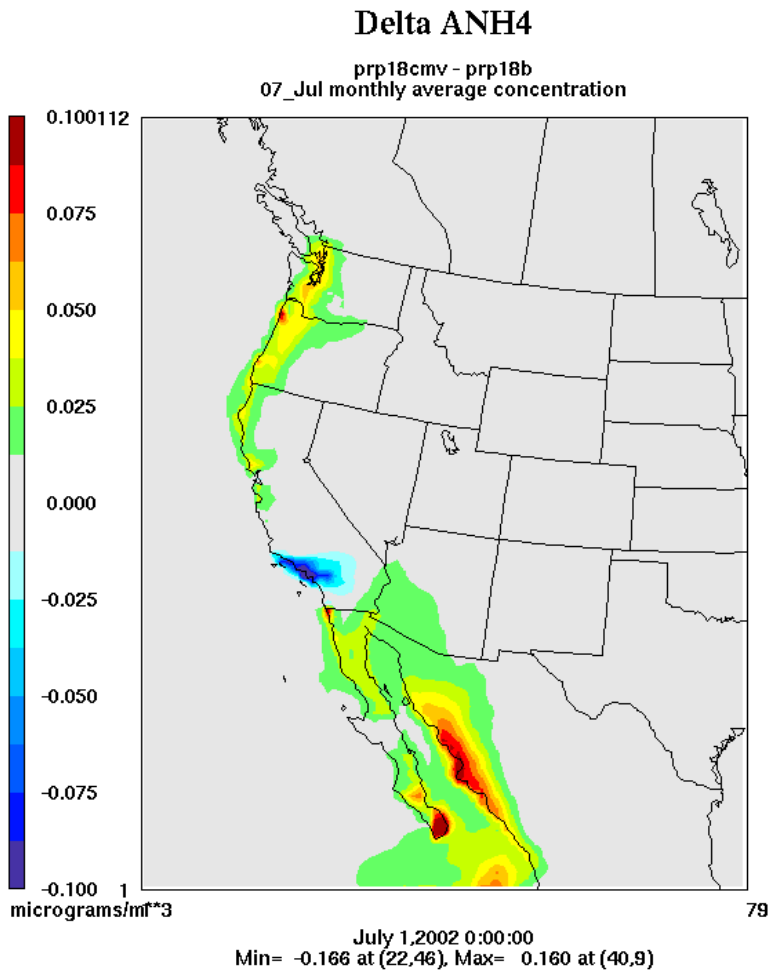




CMAQ Modeling Results

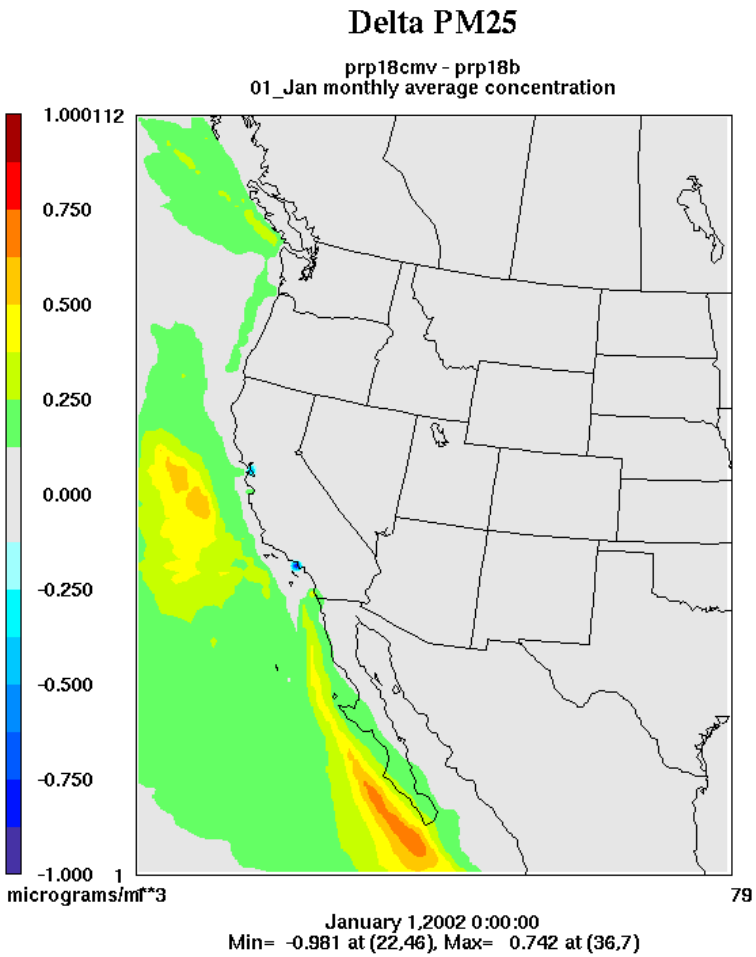
Difference in monthly average ANH4 (prp18cmv-prp18b)

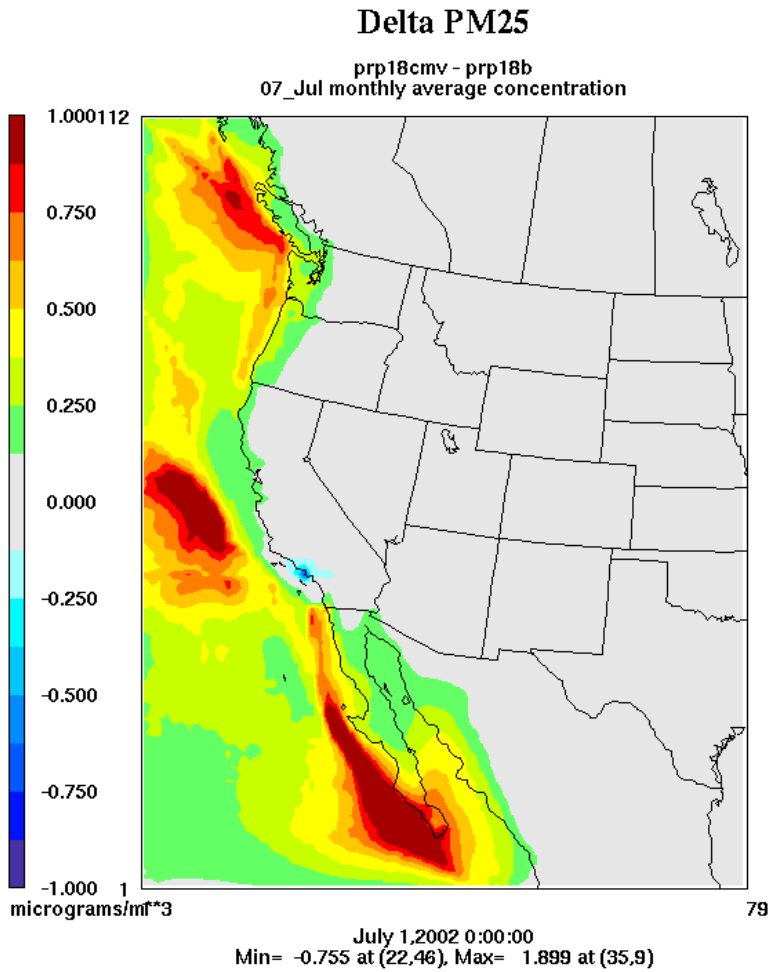




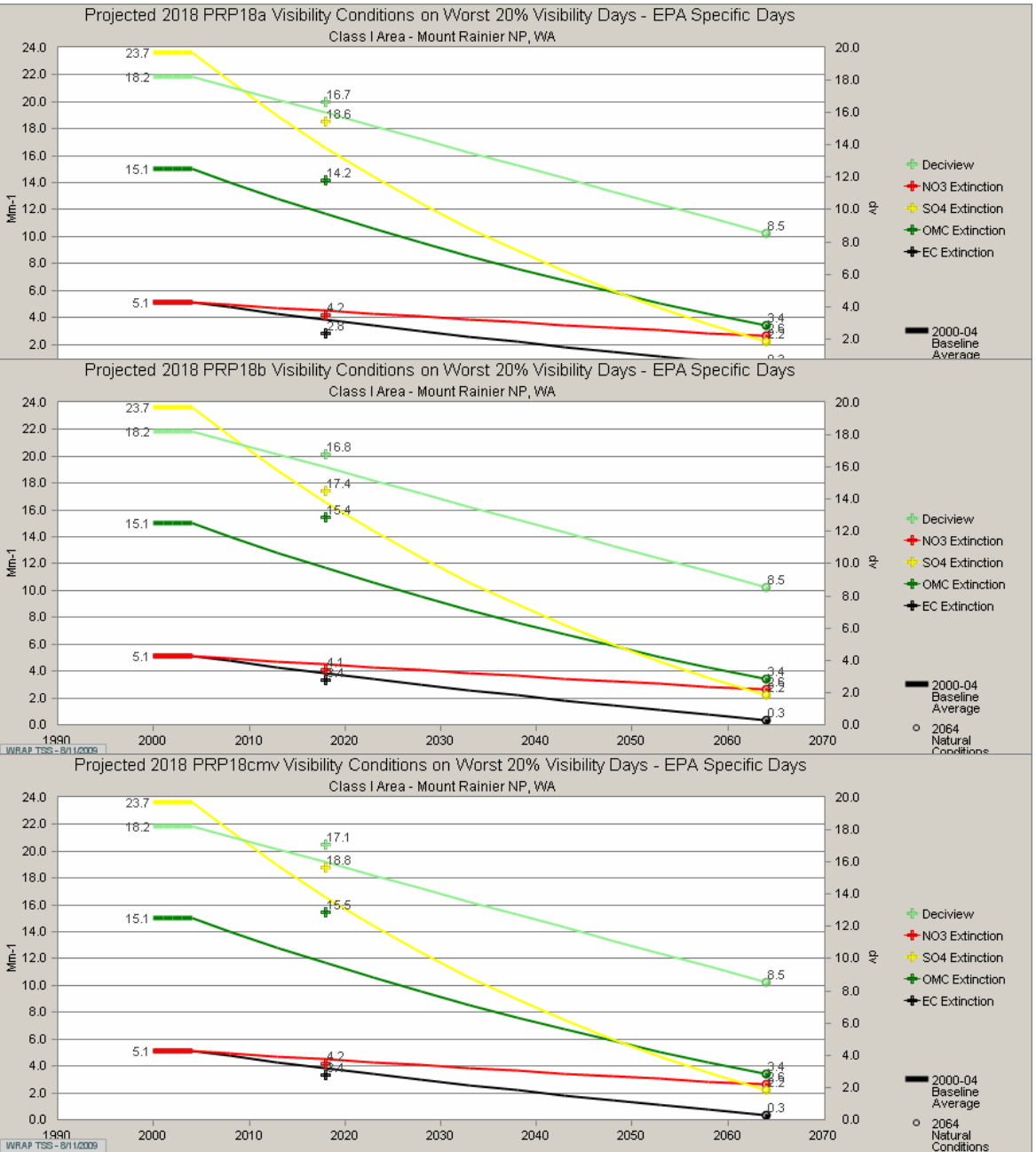
CMAQ Modeling Results

Difference in monthly average PM2.5 (prp18cmv-prp18b)





Impacts on 2018 Visibility Projections

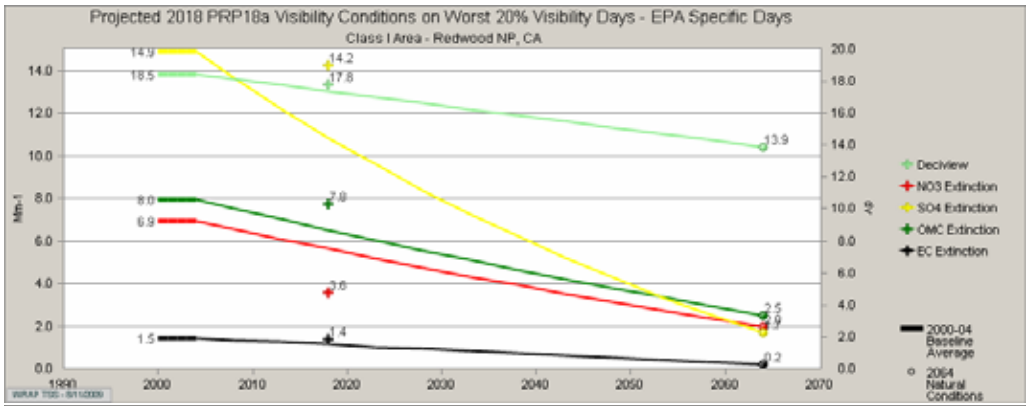


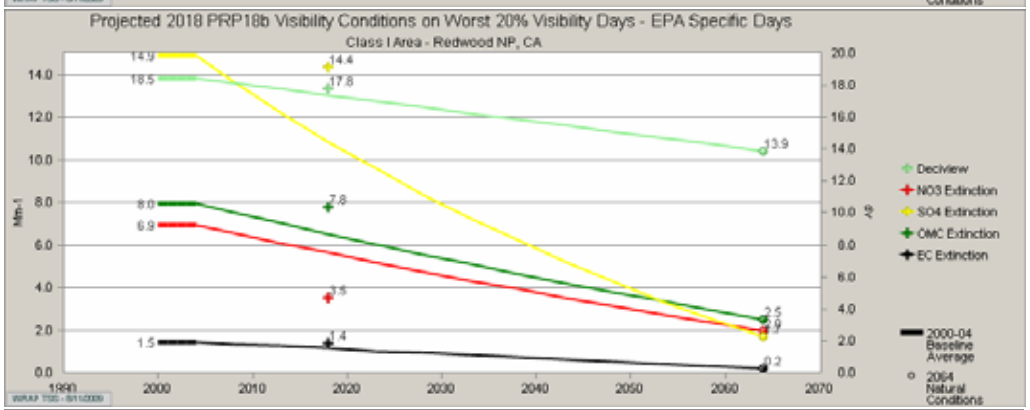
Mount Rainier (MORA)

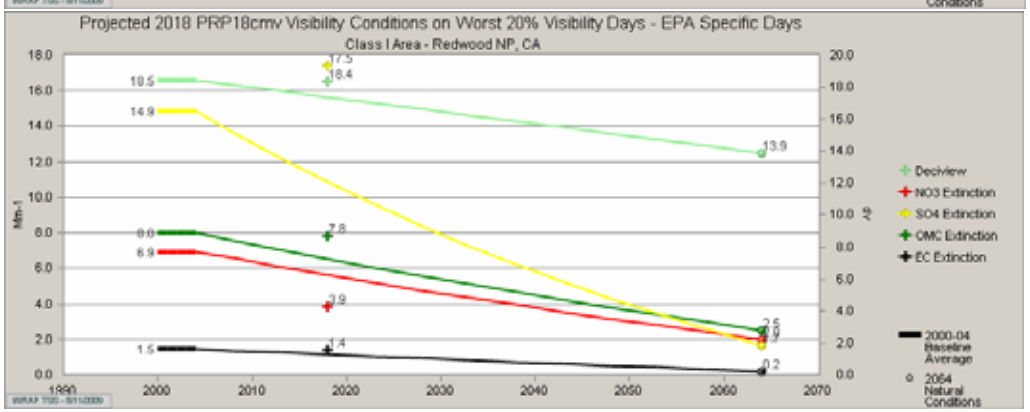
2018 dV increases ~0.1 from PRP18a to PRP18b due to increased SO4 & OC extinction

2018 dV increases ~0.3 from PRP18b to PRP18_cmv

Impacts on 2018 Visibility Projections





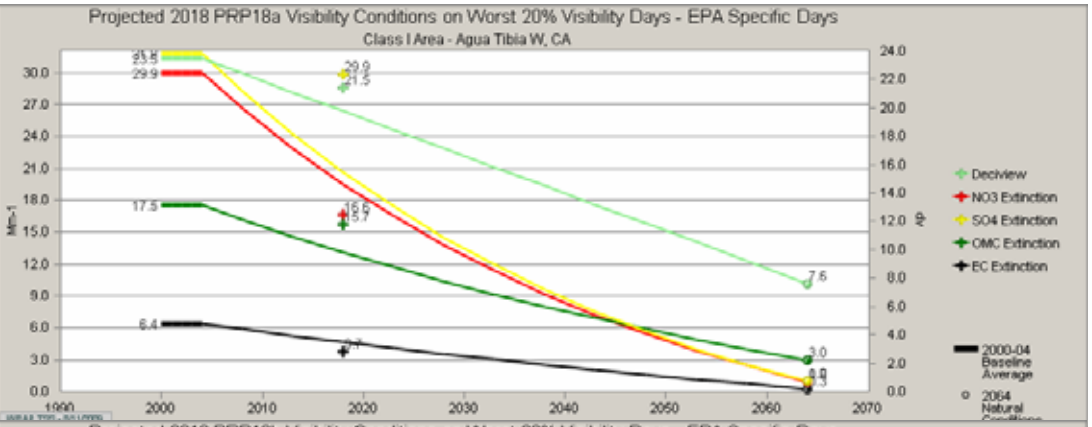


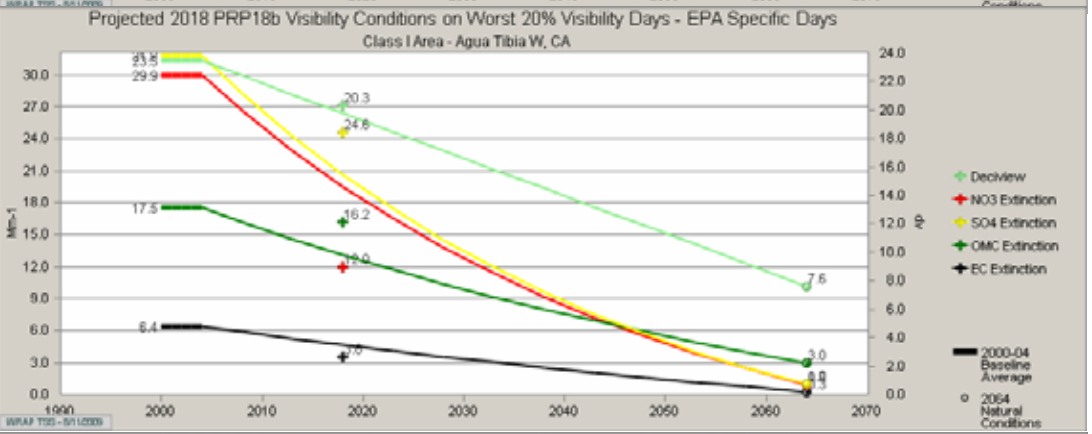
Redwoods NP (REDW)

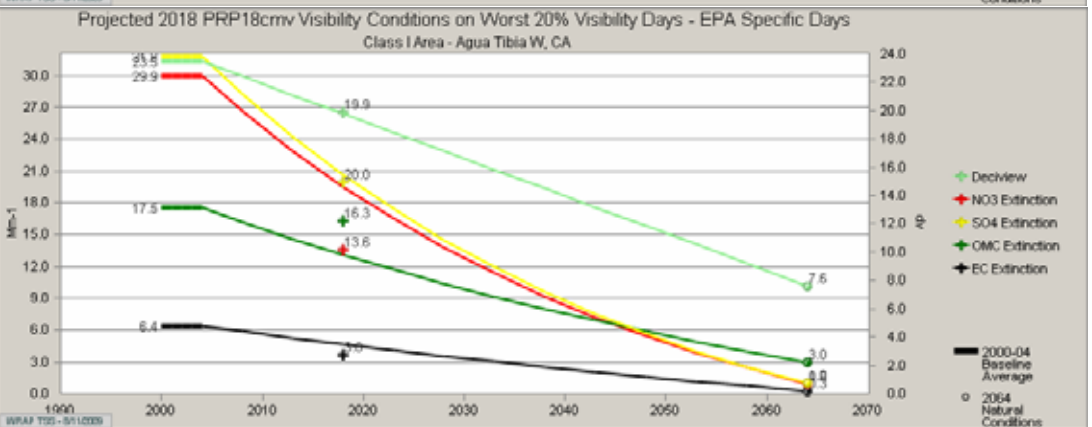
No change in 2018 dV from PRP18a to PRP18b -- increased SO4 extinction offset by decreases in NO3 extinction

2018 dV increases ~0.5 from PRP18b to PRP18_cmv due to large increase in SO4 extinction; small increase in NO3 extinction

Impacts on 2018 Visibility Projections







Agua Tibia (AGTI)

2018 dV decreases ~1.2 from PRP18a to PRP18b – large decreases in SO4 & NO3 extinction; small increase in OC extinction

2018 dV decreases and additional 0.4 from PRP18b to PRP18_cmv due to large decrease in SO4 extinction; small increases in NO3 extinction OC

Next Steps

- States need to review latest result on TSS
  - Most interior IMPROVE sites unaffected or only small changes from PRP18a to PRP18b – probably no impacts from PRP18_CMV
  - Southwest States potentially negatively impacted by 2018 Mexico emissions updates in PRP18b
  - Pacific NW and Coastal sites likely impacted by Pacific Offshore CMV inventory updates – impacts don't extend significantly inland
  - Mixed impacts throughout California from both PRP18b and PRP18_cmv
- Can provide some assistance to review, evaluation and interpretation of modeling and visibility results