

Questions Regarding PRP18b/cm_v Scenarios

IWG Conference Call

August 13, 2009

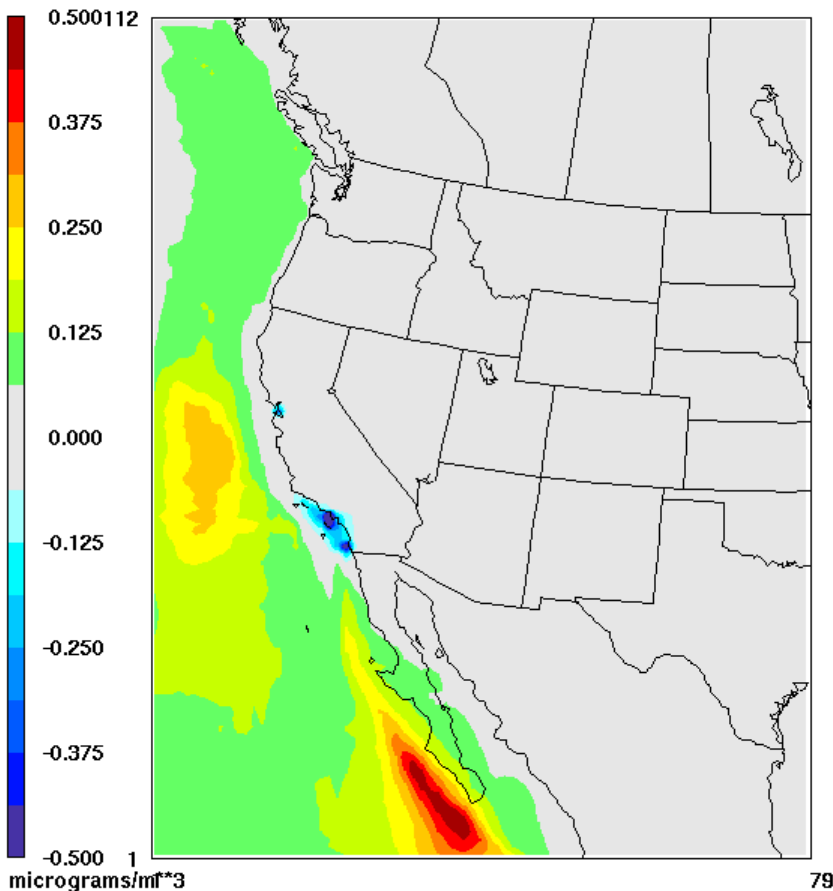
1. Visibility Projection Comparisons: PRP18b and PRP18cmv

- The PRP18cmv scenario included increased off shore emissions all along the coast coupled with significant reductions around Los Angeles (see emissions difference plots for January and July on next slide)
- Review of deciview visibility projections at IMPROVE sites from west to east across WRAP show highest impact of PRP18cmv close to the coast and in southern California
- The calculated impact of PRP18cmv on “inland” IMPROVE sites is less than 0.1 dv

Monthly Avg. Sulfate Model Results

Delta ASO4 Prp18cmv – Prp18b

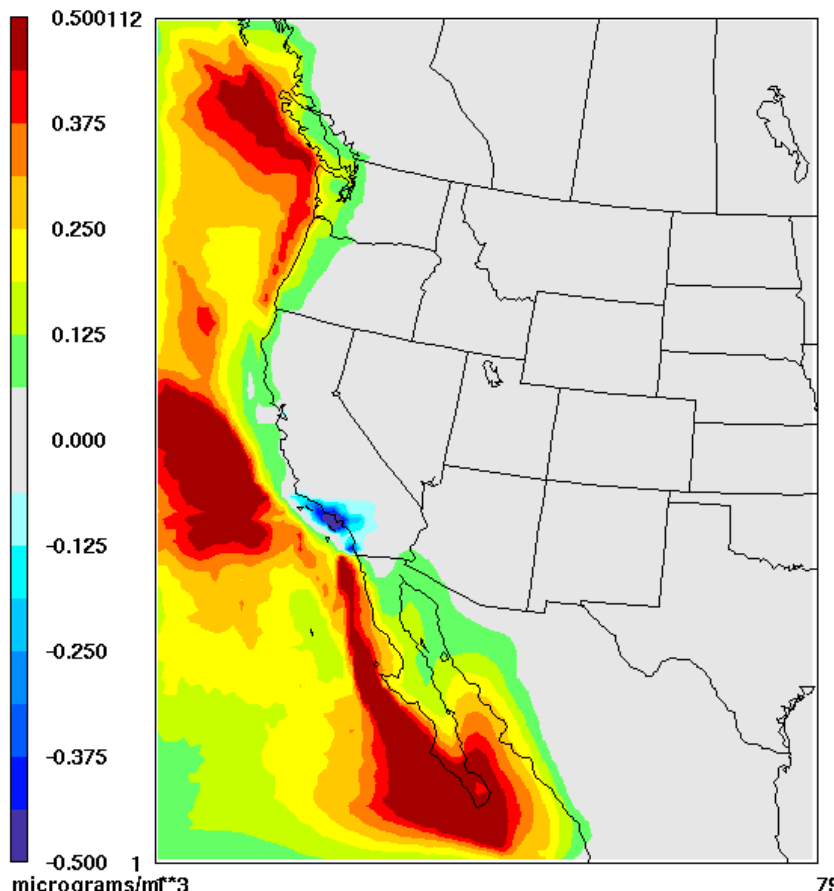
prp18cmv - prp18b
01_Jan monthly average concentration



January 1, 2002 0:00:00
Min= -0.886 at (22,46), Max= 0.489 at (32,12)

Delta ASO4

prp18cmv - prp18b
07_Jul monthly average concentration



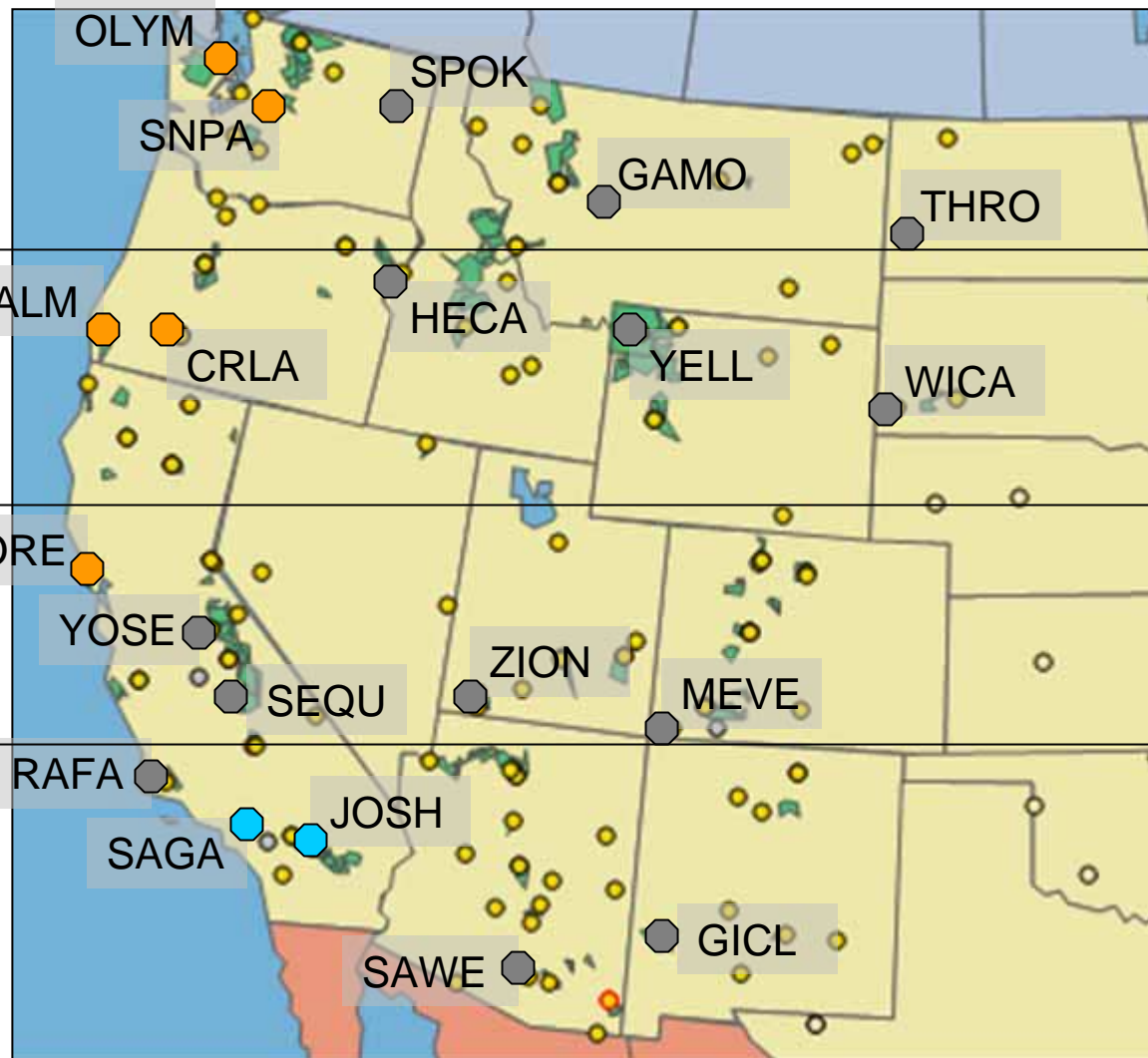
July 1, 2002 0:00:00
Min= -1.045 at (22,46), Max= 1.172 at (35,9)

Tier 1 >>>

Tier 2 >>>

Tier 3 >>>

Tier 4 >>>



Key to visibility projection change, PRP18cmv – PRP18b

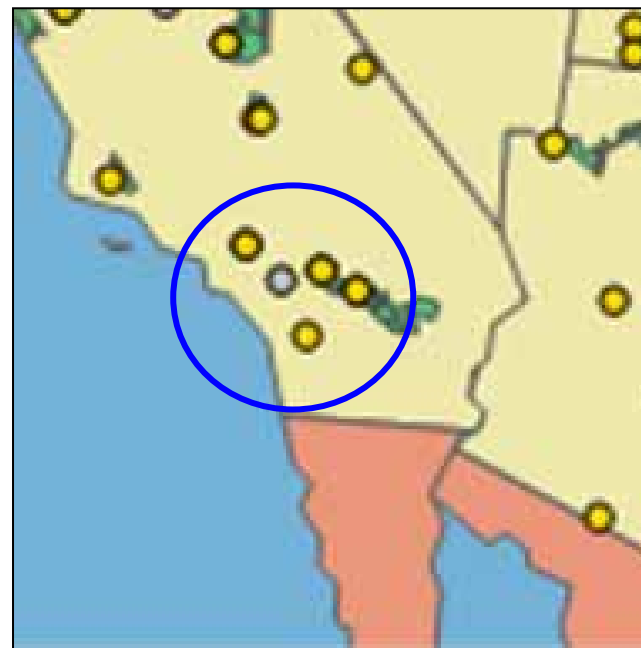
● > 0.1 dv
 ● < -0.1 dv
 ● < +/- 0.1 dv

Visibility Projections – West to East

		Visibility Projection by Scenario (DV)					
		Site	Base18b	Prp18a	Prp18b	Prp18cmv	Prp18cmv - Prp18b
Tier 1	OLYM		16.5	16.4	16.1	16.3	0.24
	SNPA		16.5	16.3	16.1	16.3	0.18
	SPOK		21.8	22.5	21.8	21.8	0.02
	GAMO		10.6	10.9	10.8	10.8	0.01
	THRO		17.3	17.2	17.1	17.1	0.00
Tier 2	KALM		15.1	15.1	15.1	15.3	0.27
	CRLA		13.0	13.4	13.4	13.6	0.13
	HACA		17.2	16.6	16.5	16.5	0.04
	YELL		11.3	11.2	11.2	11.3	0.02
	WICA		15.3	15.2	15.1	15.1	0.01
Tier 3	PORE		21.4	21.2	21.2	21.3	0.15
	YOSE		16.6	16.4	16.4	16.4	0.02
	SEQU		22.6	22.3	22.3	22.4	0.06
	ZION		12.8	12.8	12.6	12.6	0.03
	MEVE		12.7	12.6	12.5	12.5	0.02
Tier 4	RAFA		17.4	17.2	17.1	17.1	0.01
	SAGA		17.6	16.9	16.2	16.0	-0.24
	JOSH		18.0	17.5	16.5	16.3	-0.25
	SAWE		15.8	16.0	16.0	16.1	0.07
	GICL		12.7	14.9	15.1	15.2	0.03

Visibility Projections – Southern CA

- Due to PRP18cmv emission reductions around LA, nearby southern California sites show a reduction in visibility projections from PRP18b



Site	Visibility Projection by Scenario (DV)		
	Prp18b	Prp18cmv	Prp18cmv - Prp18b
AGTI	20.3	19.9	-0.37
JOSH	16.5	16.3	-0.25
SAGO	18.2	18.0	-0.18
SAGA	16.2	16.0	-0.24

2. Visibility Projections in Pacific NW

- The PRP18b Class I Area Summary Tables for North Cascades (NOCA) show sulfate extinction increasing by about 1 dv as the same time state emissions drop by 53% and weighted emissions drop by 25%
 - Question: can this be reconciled or is something wrong?
- Caution: the state/WEP emissions results by themselves can be deceptive:
 - The reported change in state emissions does not reflect influences from outside the state
 - Weighted emissions analysis does not take into account chemistry, so should be used as a guide to regions of potential concern only.

Review of NOCA Data on TSS

- The following series of slides reviews available data for NOCA on the TSS
- While Washington SO₂ emissions do drop significantly in the PRP18 scenarios, British Columbia SO₂ emissions in some regional districts increase significantly. It may be that the BC increases are driving the projected increase in sulfate extinction
- First, the observation that sulfate increases appear inconsistent with state-wide and weighted emissions changes is not confined to PRP18b (see following 3 slides)

NOCA Summary Table: PRP18a

Class I Area Visibility Summary: Glacier Peak W, WA: North Cascades NP, WA							
Visibility Conditions: Worst 20% Days							
RRF Calculation Method: Specific Days (EPA)							
Emissions Scenarios: 2000-04 Baseline (plan02d) & 2018 PRPa (prp18a)							
	Monitored	Estimated		Projected			
	2000-04 Baseline Conditions (Mm-1)	2064 Natural Conditions (Mm-1)	2018 Uniform Rate of Progress Target (Mm-1) ¹	2018 Projected Visibility Conditions (Mm-1)	Baseline to 2018 Change In Statewide Emissions (tons / %)	Baseline to 2018 Change In Upwind Weighted Emissions ² (%)	Baseline to 2018 Change In Anthropogenic Upwind Weighted Emissions ² (%)
Sulfate	14.87	2.03	10.99	18.19	53,850 -39%	-10%	-10%
Nitrate	2.69	2.11	2.56	2.43	174,838 -46%	-37%	-39%
Organic Carbon	33.02	6.48	24.39	39.74	2,178 4%	6%	12%
Elemental Carbon	3.81	0.51	2.95	3.22	-3,329 -25%	-20%	-30%
Fine Soil	0.48	0.5	0.48	0.89	8,216 23%	29%	31%
Coarse Material ³	1.75	1.89	1.78		40,184 38%	41%	50%
Sea Salt ³	0.01	0.2	0.05	Not Applicable			
Total Light Extinction	67.64	24.72	53.36	77.23			
Deciview	16.01	8.39	14.23	17.24			Not Applicable

NOCA Summary Table: PRP18b

Class I Area Visibility Summary: Glacier Peak W, WA: North Cascades NP, WA Visibility Conditions: Worst 20% Days RRF Calculation Method: Specific Days (EPA) Emissions Scenarios: 2000-04 Baseline (plan02d) & 2018 PRPb (prp18b)							
Monitored	Estimated		Projected				
2000-04 Baseline Conditions (Mm-1)	2064 Natural Conditions (Mm-1)	2018 Uniform Rate of Progress Target (Mm-1) ¹	2018 Projected Visibility Conditions (Mm-1)	Baseline to 2018 Change In Statewide Emissions (tons / %)	Baseline to 2018 Change In Upwind Weighted Emissions ² (%)	Baseline to 2018 Change In Anthropogenic Upwind Weighted Emissions ² (%)	
Sulfate	14.87	2.03	10.99	15.94	-45,998 -53%	-25%	-26%
Nitrate	2.69	2.11	2.56	2.46	-184,307 -49%	-38%	-40%
Organic Carbon	33.02	6.48	24.39	39.19	-1,018 -2%	5%	9%
Elemental Carbon	3.81	0.51	2.95	3.09	-4,069 -31%	-21%	-31%
Fine Soil	0.48	0.5	0.48	0.88	6,562 18%	29%	31%
Coarse Material ³	1.75	1.89	1.78		38,146 36%	39%	48%
Sea Salt ³	0.01	0.2	0.05	Not Applicable			
Total Light Extinction	67.64	24.72	53.36	74.32			
Deciview	16.01	8.39	14.23	16.74	Not Applicable		

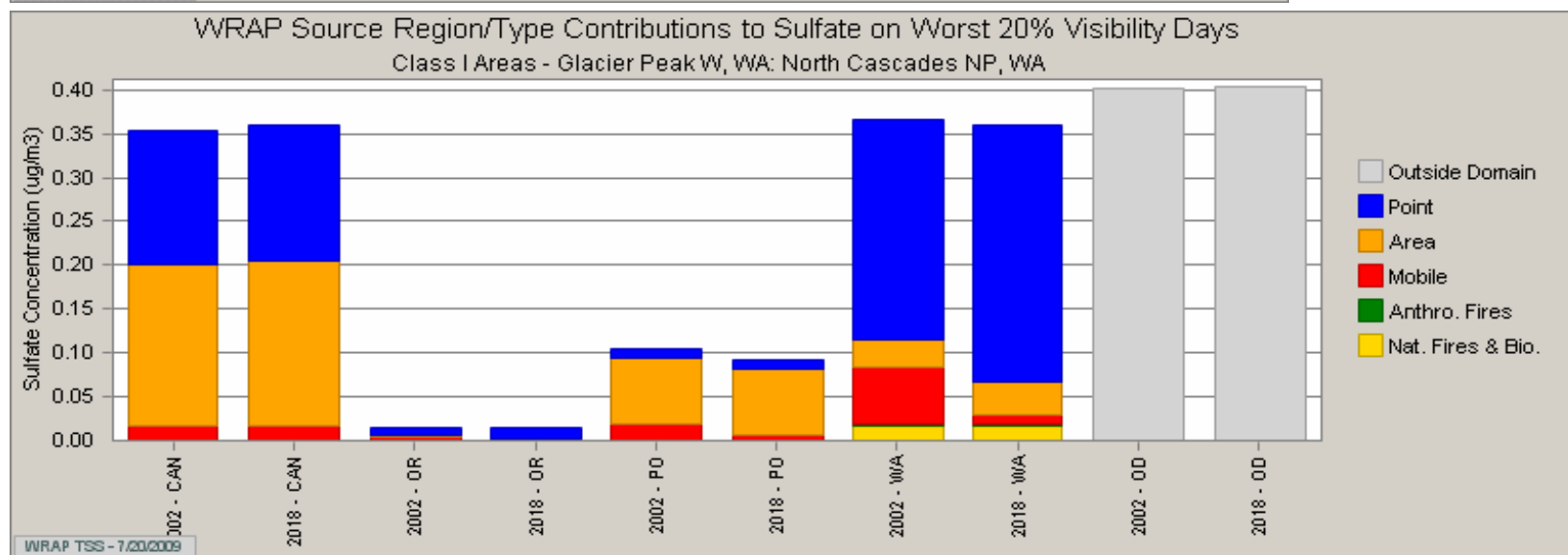
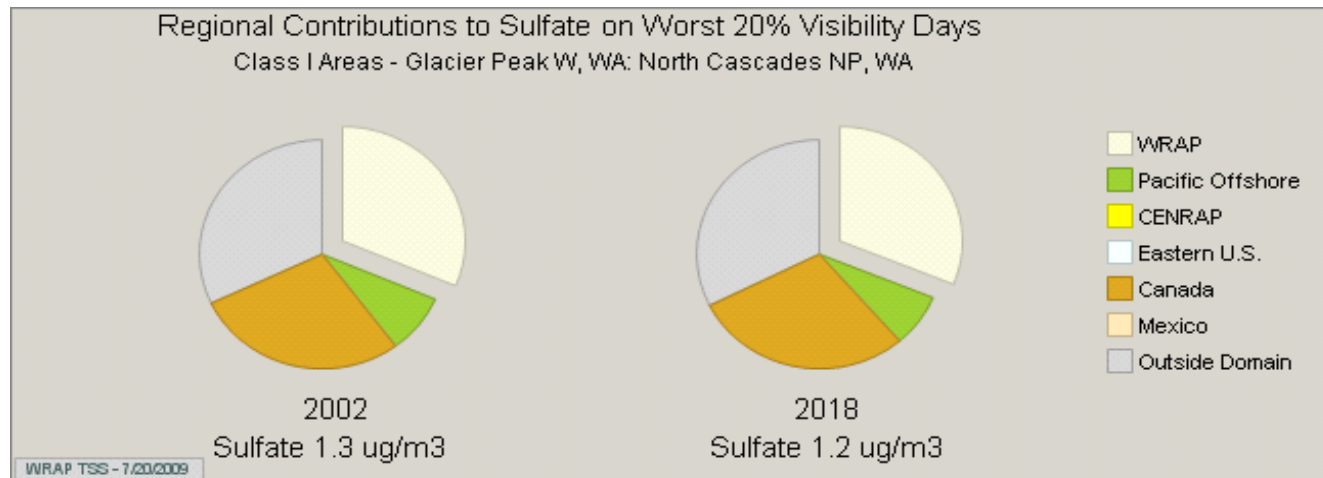
NOCA Summary Table: PRP18cmv

Class I Area Visibility Summary: Glacier Peak W, WA: North Cascades NP, WA							
Visibility Conditions: Worst 20% Days							
RRF Calculation Method: Specific Days (EPA)							
Emissions Scenarios: 2000-04 Baseline (plan02d) & 2018 PRPcmv (prp18cmv)							
Monitored	Estimated			Projected			
2000-04 Baseline Conditions (Mm-1)	2064 Natural Conditions (Mm-1)	2018 Uniform Rate of Progress Target (Mm-1) ¹	2018 Projected Visibility Conditions (Mm-1)	Baseline to 2018 Change In Statewide Emissions (tons / %)	Baseline to 2018 Change In Upwind Weighted Emissions ² (%)	Baseline to 2018 Change In Anthropogenic Upwind Weighted Emissions ² (%)	
Sulfate	14.87	2.03	10.99	16.45	45,998 -53%	-23%	-24%
Nitrate	2.69	2.11	2.56	2.49	184,307 -49%	-38%	-39%
Organic Carbon	33.02	6.48	24.39	39.26	-1,018 -2%	5%	9%
Elemental Carbon	3.81	0.51	2.95	3.1	-4,069 -31%	-21%	-31%
Fine Soil Coarse Material ³	0.48	0.5	0.48	0.89	6,562 18%	31%	33%
Sea Salt ³	1.75	1.89	1.78	Not Applicable	38,146 36%	39%	48%
Total Light Extinction	0.01	0.2	0.05		74.96	Not Applicable	Not Applicable
Deciview	67.64	24.72	53.36	16.86			
	16.01	8.39	14.23				

Regional Contributions to NOCA

- The PSAT results (better attribution tool than WEP) point to Canada, Washington, and Outside Domain as all about equal contributors, with a smaller amount from Pacific Offshore, and an almost negligible amount from Oregon.
- The WEP results show several things:
 - Largest difference on the gridded emissions map from Plan02d to PRP18b appears to be the shutdown of the Centralia Power Plant. Other changes are not large enough to change grid cell colors
 - Worst days' residence times show wind pattern confined to NW Washington and SW British Columbia
 - WEP maps show some likely significant increases in BC contribution right along the border

NOCA PSAT Results



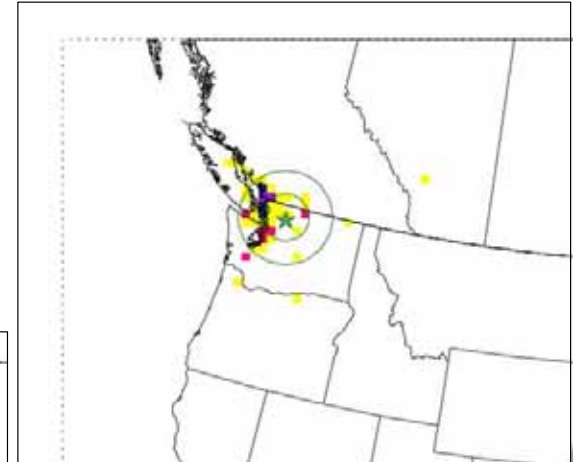
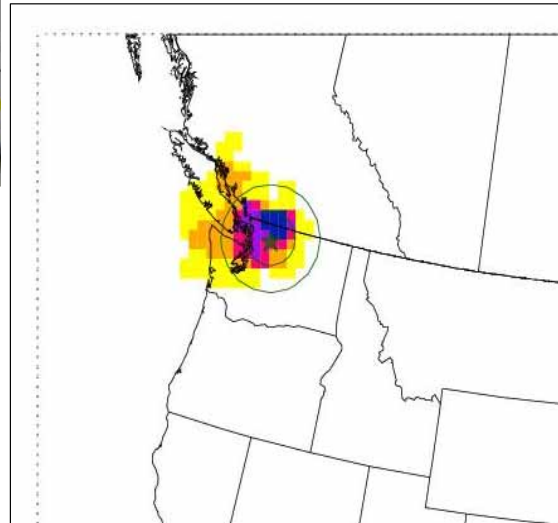
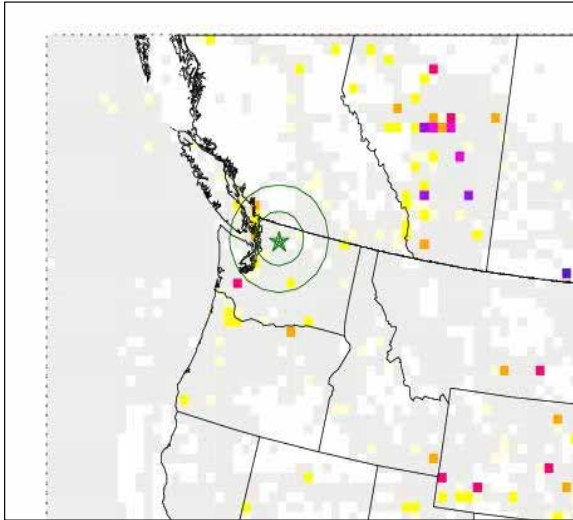
NOCA WEP Results

Emissions

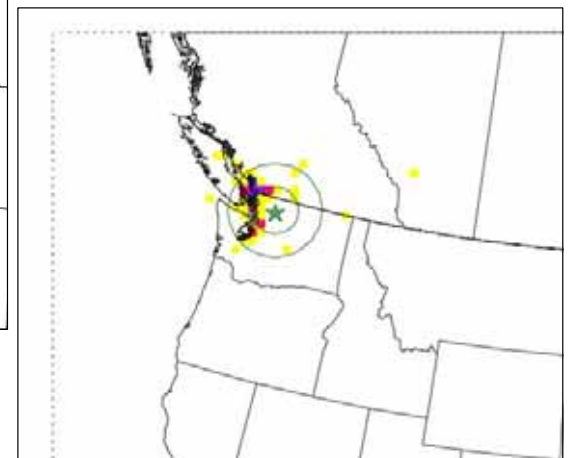
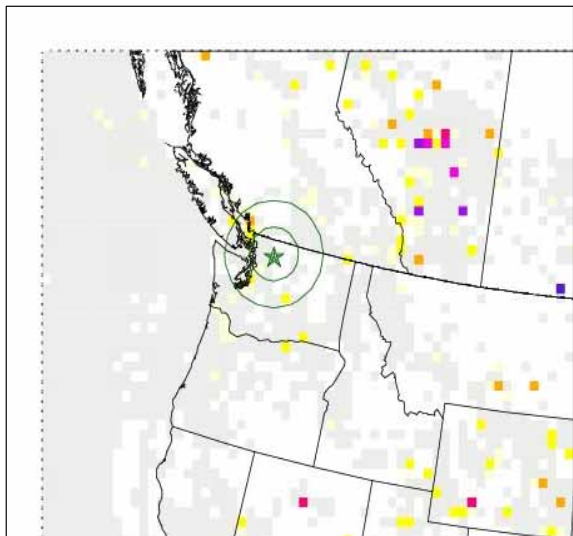
Residence Times

Weighted Emissions

Plan02d



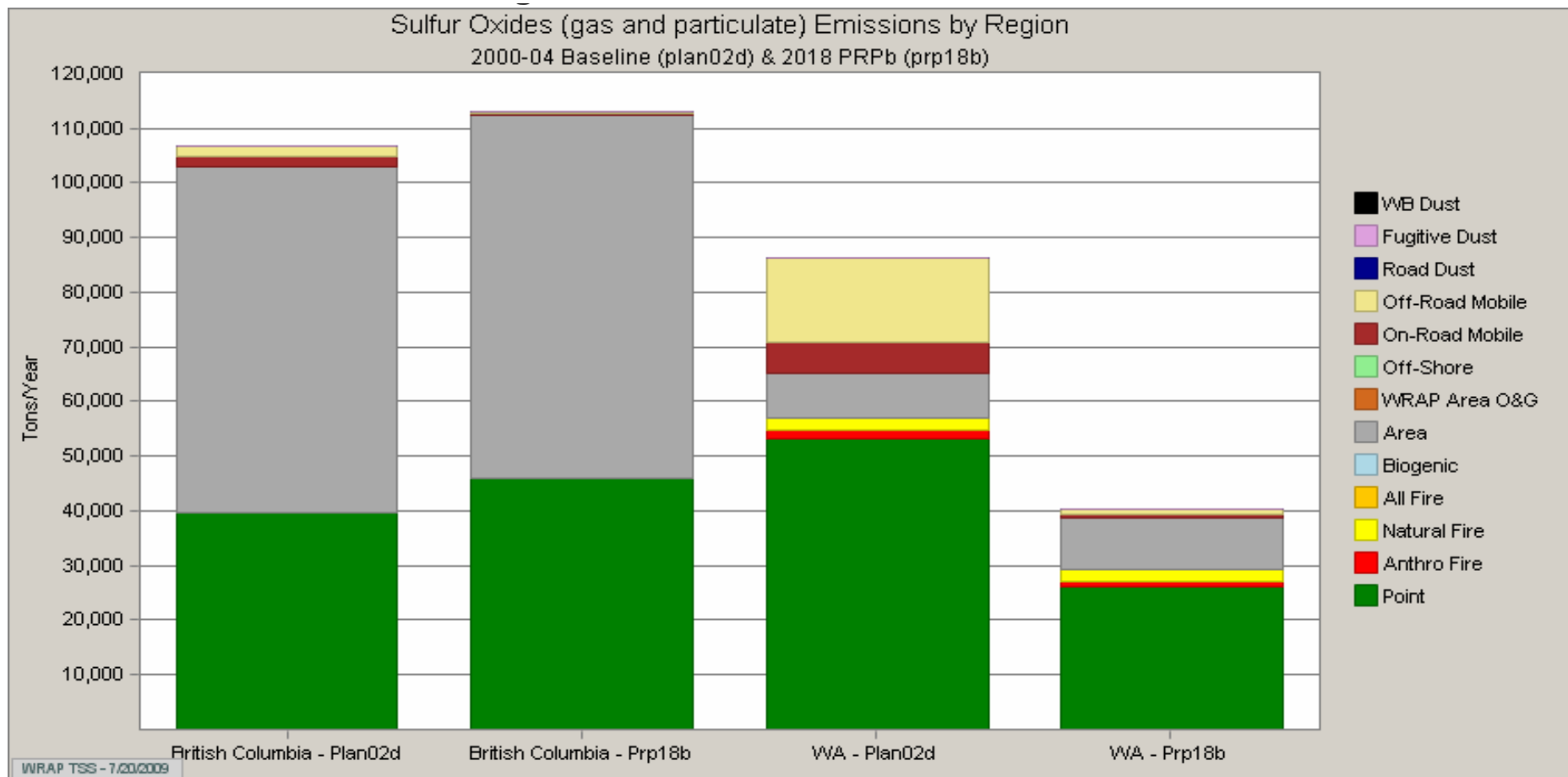
Prp18b



Regional Emissions (SMOKE)

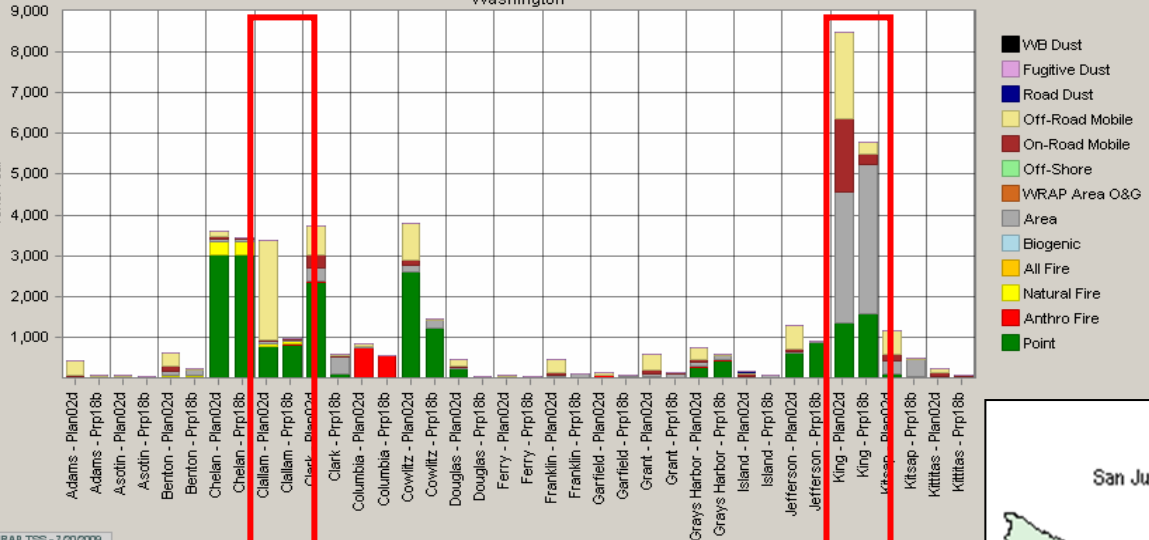
- The SMOKE-processed emissions available on the TSS show a significant decrease overall for Washington and a slight increase overall for British Columbia (note the Canadian inventories used were 2000 and 2020)
- Review of county/regional district level emissions:
 - Some WA counties closest to NOCA show significant reductions (Whatcom, Skagit, King, Clallam)
 - Some BC regional districts near the border show large increases (Capital, Central Kootenay, East Kootenay, Fraser-Fort George). Two central districts (Kitimat-Stikine and Bulkley-Nechako) also show significant increases

Emissions Changes for WA and BC

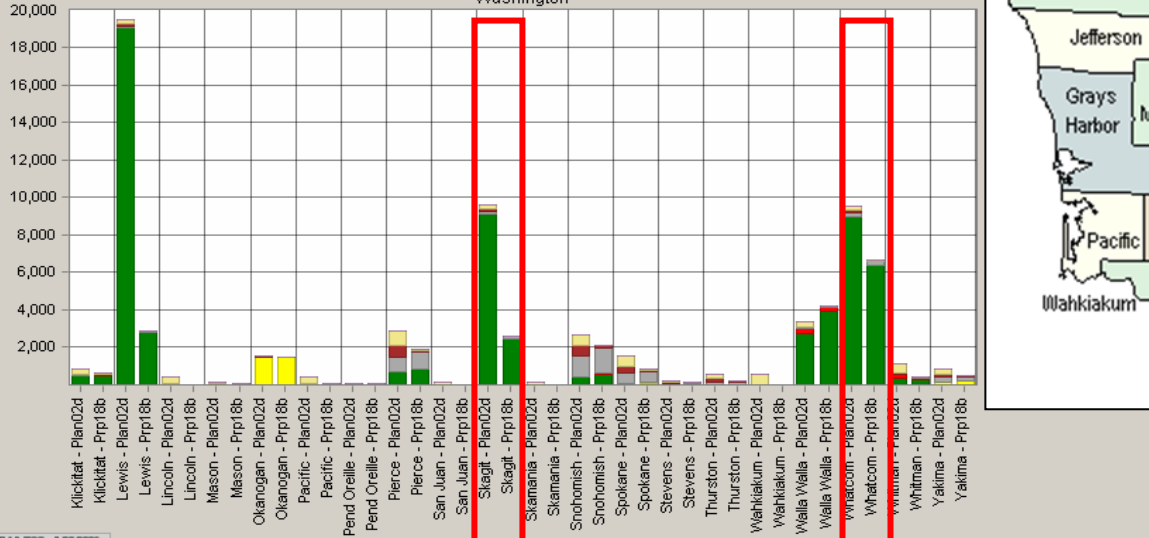


Emissions Changes for WA Counties

Sulfur Oxides (gas and particulate) Emissions by County Washington

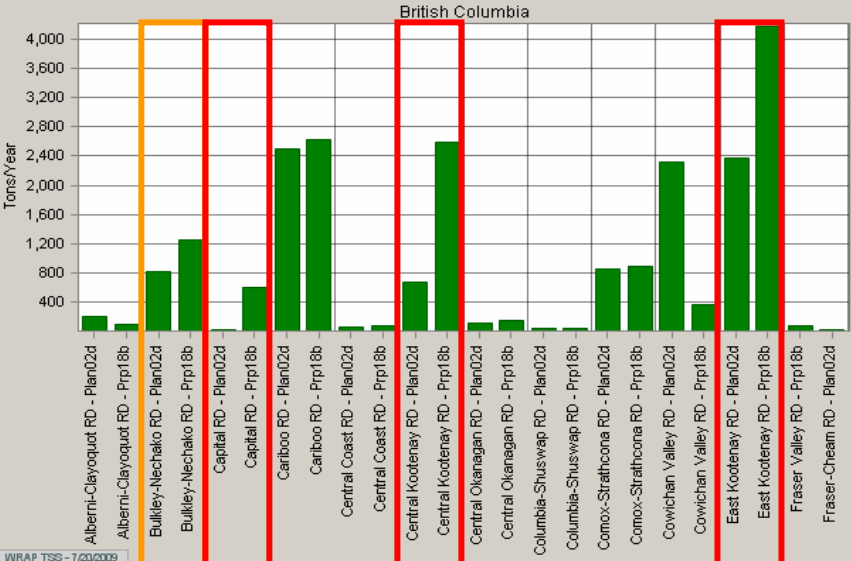


Sulfur Oxides (gas and particulate) Emissions by County Washington



Emissions Changes for BC Counties

Sulfur Oxides (gas and particulate) Emissions by County



Sulfur Oxides (gas and particulate) Emissions by County

