

What to do about SO₂?

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Initial EPA Guidance – Model !

- Data required
 - Stack parameters
 - Emission rates
 - Release point locations
 - Land surface characteristics
 - Topography
 - Meteorology
 - Buildings and structures

Initial EPA Guidance – Model !

- Applications used
 - Inventory retrieval system
 - Perl scripts
 - Expect program
 - AERSCREEN
 - Imagination

Partial Emissions Inventory File

- Modeling_ID PermittingAgencyCode
FacilitySiteName CityName FS_Latitude
FS_Longitude ReleasePointDescription
RP_Latitude RP_Longitude
EmissionsUnitDescription
- EmissionUnitProcessDescription max_SO2
max_SO2_yr year of stack data Ht_f Diam_f
Vel_fps Flow_acfs Deg_F hrs_yr notes
comments
- 033_10088_3_1 C King Co Ntrl Res
Wastewater Treatment 47.6613 -122.4313
47.6613 -122.4313 3.2265 2011 2011 30 4 3.7

Partial expect command file

- `#!/usr/bin/expect -f`
- `spawn /aeolus_data/projects/SO2_1-hr_analysis/2015/working/aerscreen`
- `expect "Enter Title:" ; send "PUGET SOUND REFINING COMPANY\n"`
- `expect "English or Metric Units? (E or M):" ; send "M\n"`
- `expect "(P, V, A, C, F, S, or H):" ; send "P\n"`
- `expect "Enter Emission Rate (g/s):" ; send "0.0368979722549451\n"`

Initial EPA Guidance – Model!

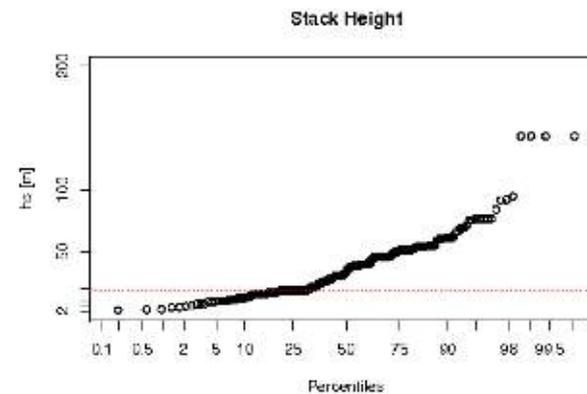
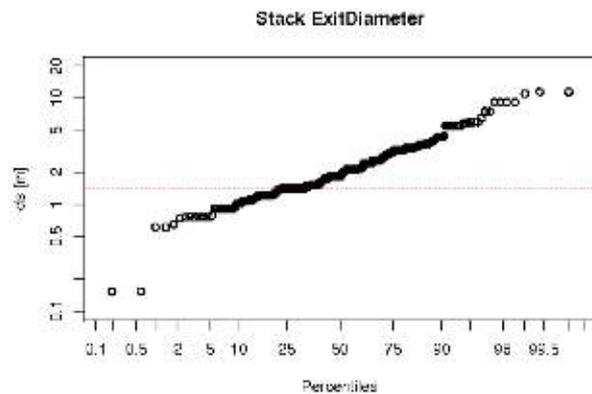
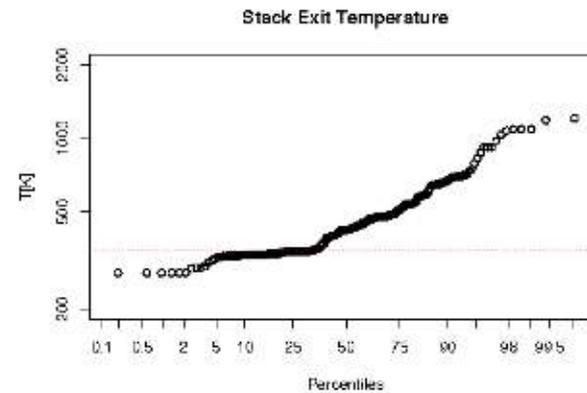
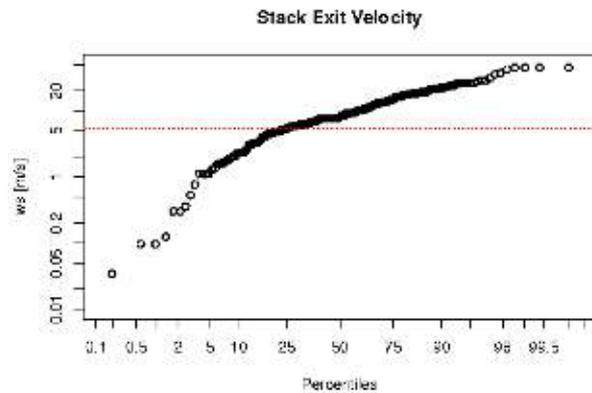
- Initial assumptions

- 25th percentile of distribution used to fill missing stack parameters
- Constant state-wide background concentration
- No terrain but pay attention to distance to NAAQS/2

- Results

- Executes at 100 points/hour w/o buildings
- Adding a building slows execution to 100 pts/day
- Adding terrain would likely also slow similarly

Finding Default Values for Missing Stack Parameters



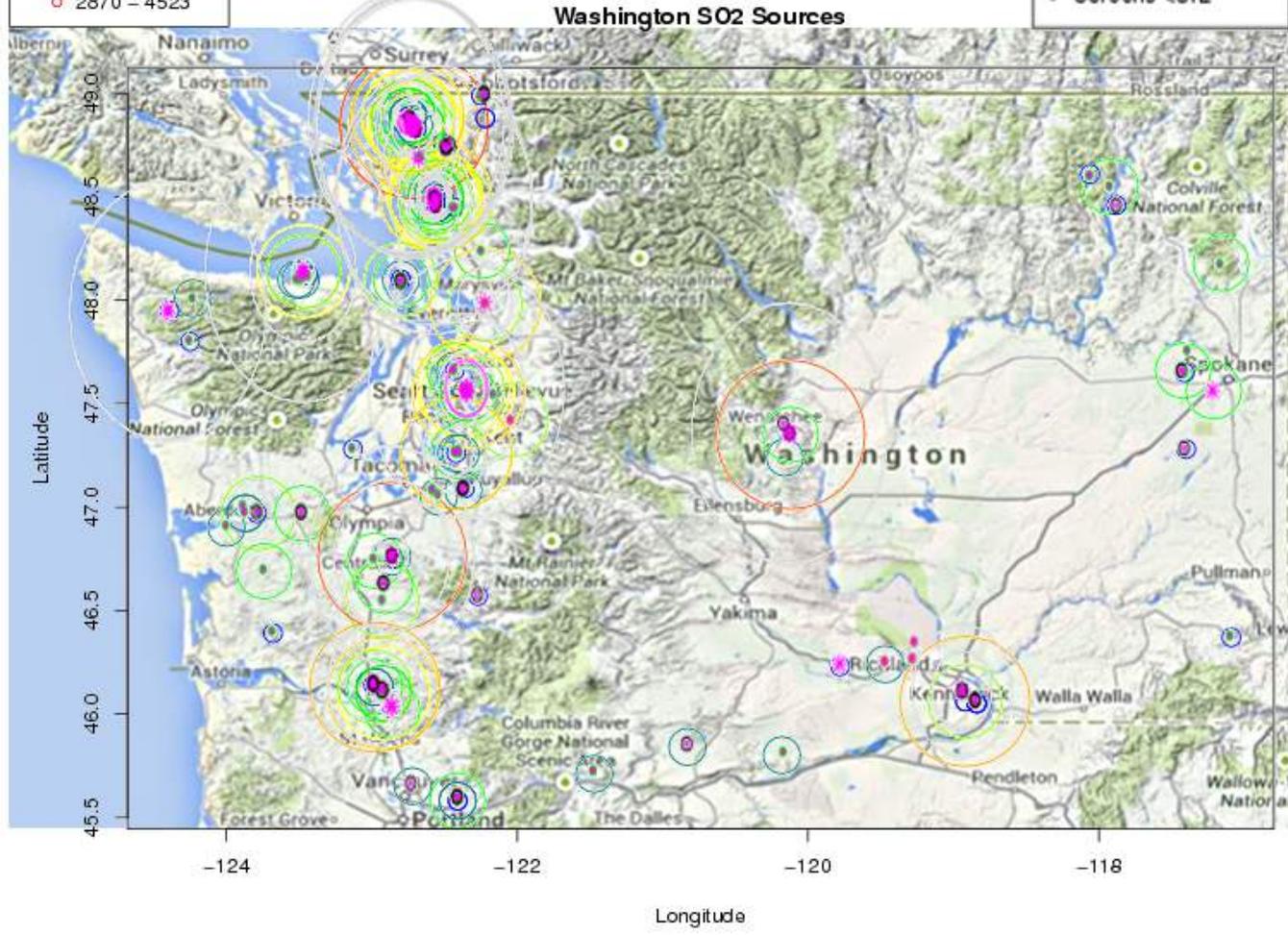
S02 Downwash Screening - NAAQS Impact Areas (Magenta Circles)

Includes Background of 6.22 ppb

S02 Screening - Significant Impact Areas (Grey Circles)

Annual Emissions [t/yr]	
○	1 - 2.7
○	2.7 - 7.4
○	7.4 - 20
○	20 - 55
○	55 - 150
○	150 - 400
○	400 - 1100
○	1100 - 2870
○	2870 - 4523

★	Screens > NAAQS
●	Screens > NAAQS/2
●	Screens > SIL
○	Screens < SIL



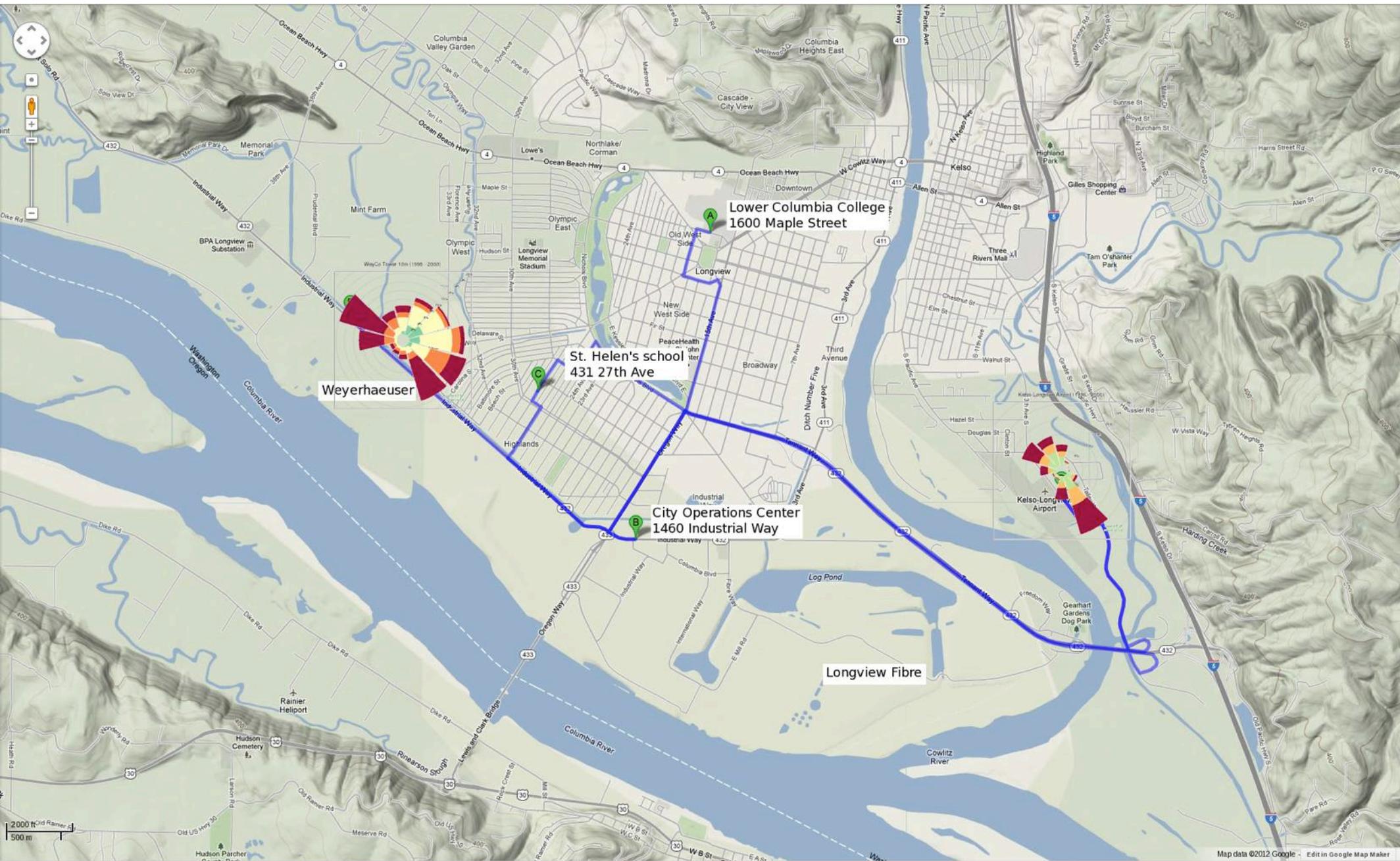
Respond to Request for Analysis of Existing Monitoring Data

- Three areas
 - Longview
 - Pulp & paper mills
 - Cherry Point
 - Oil refineries & aluminum smelter
 - March Point
 - Oil refineries & chemical plant

Methods

- Longview
 - Relatively old data—ambient monitoring and meteorology
- Cherry Point
 - One monitor located north of each of the three facilities
- March Point
 - One monitor located north of each of the three facilities

Results Kelso-Londview

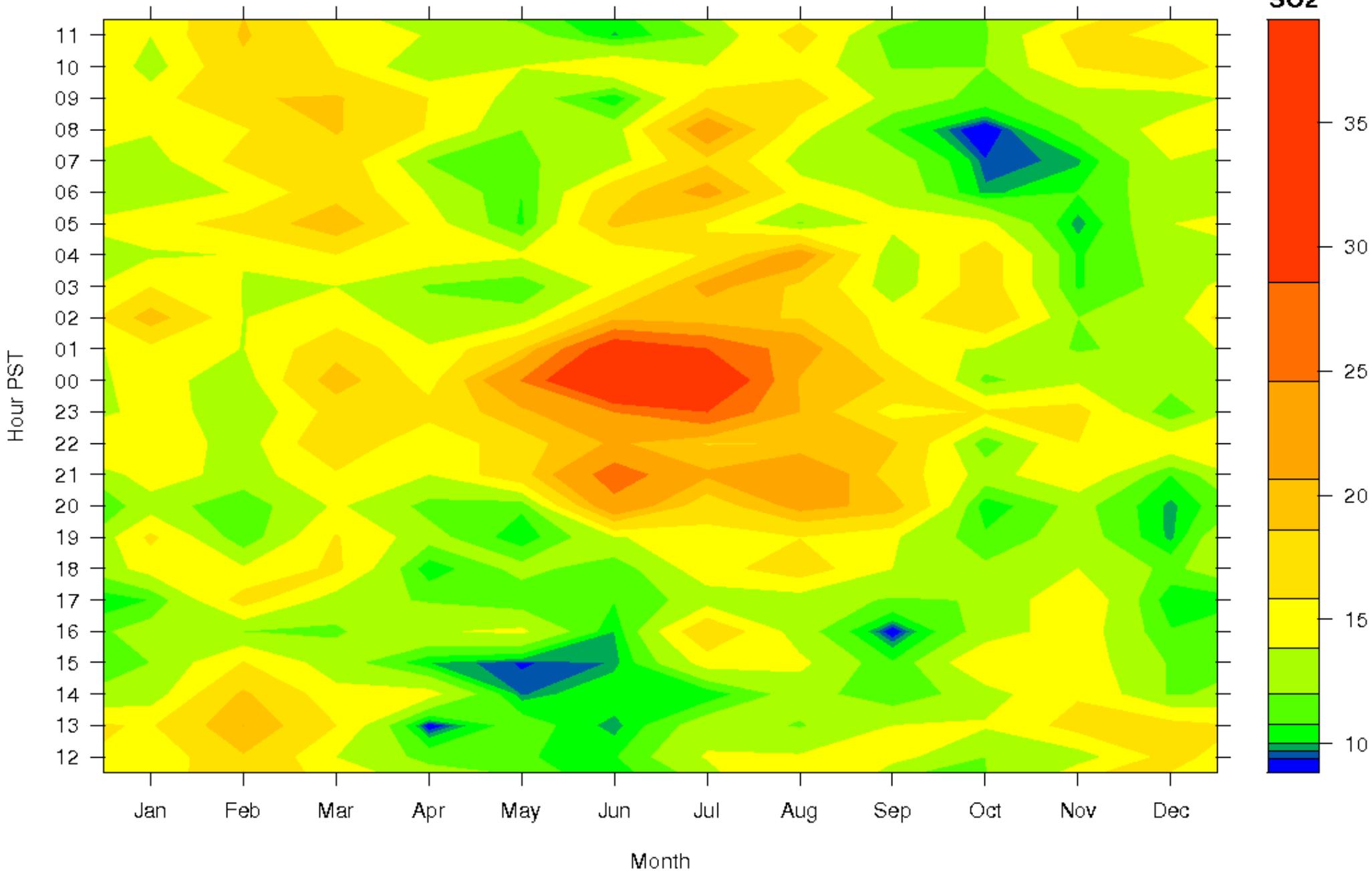


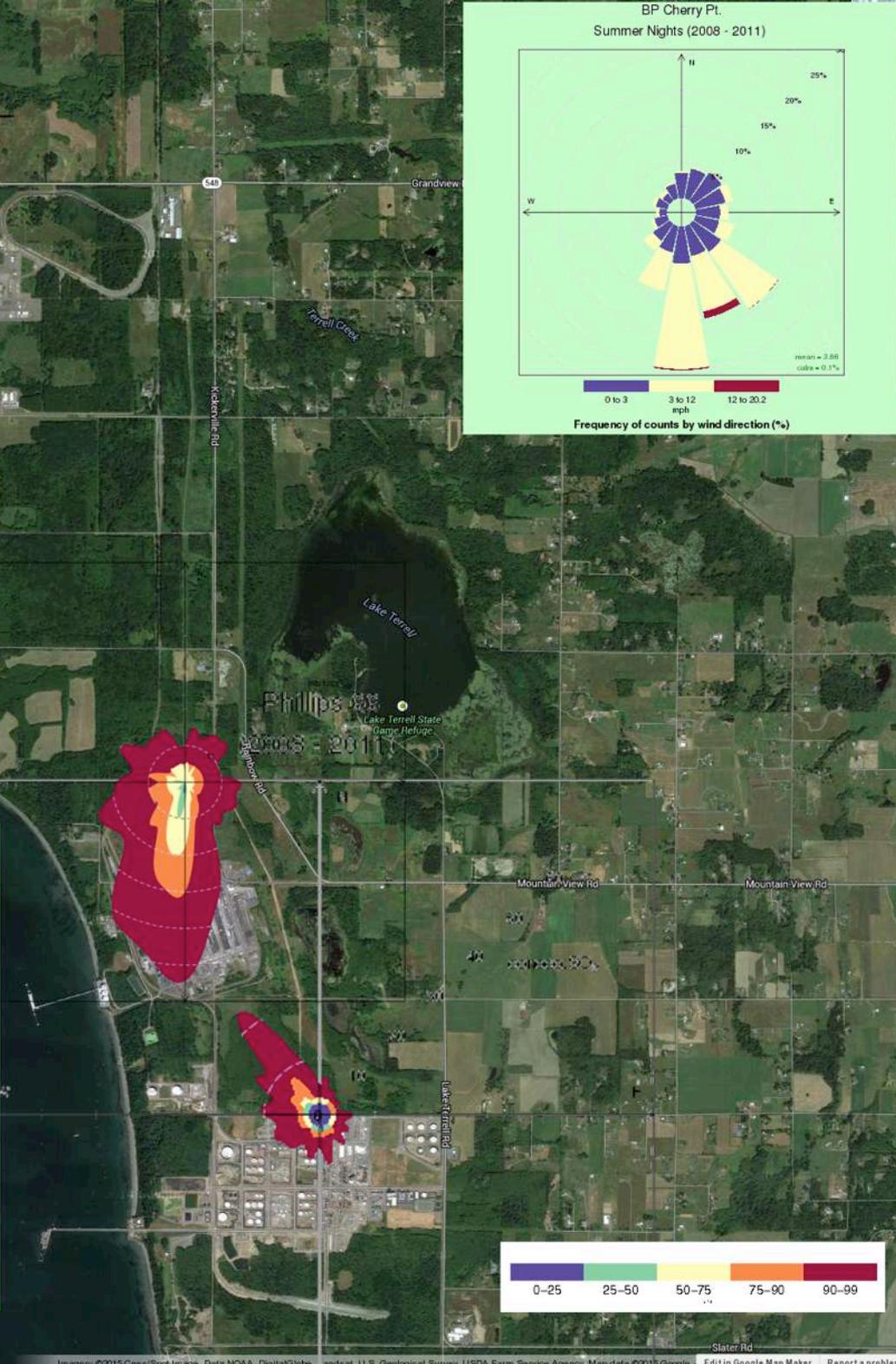
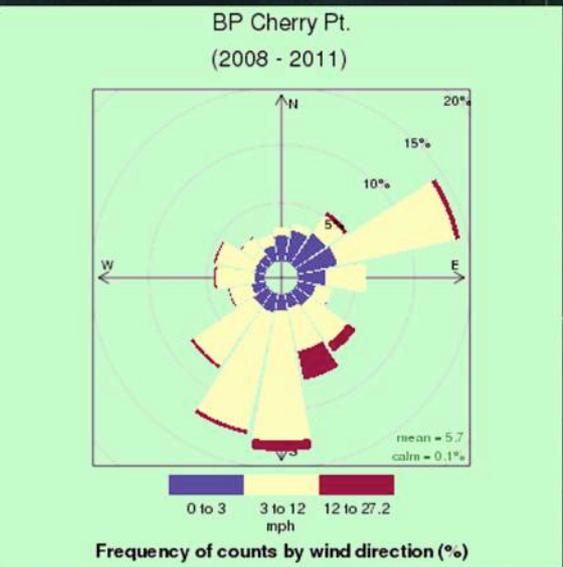
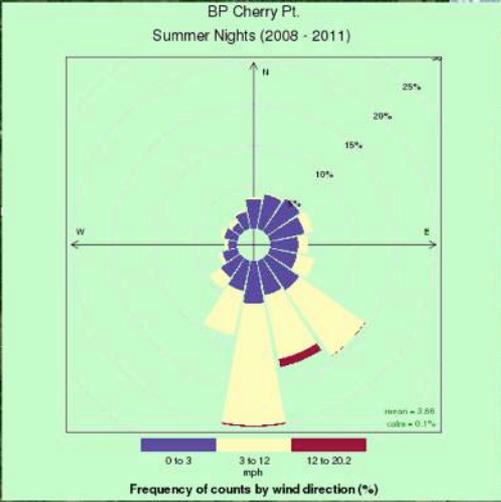
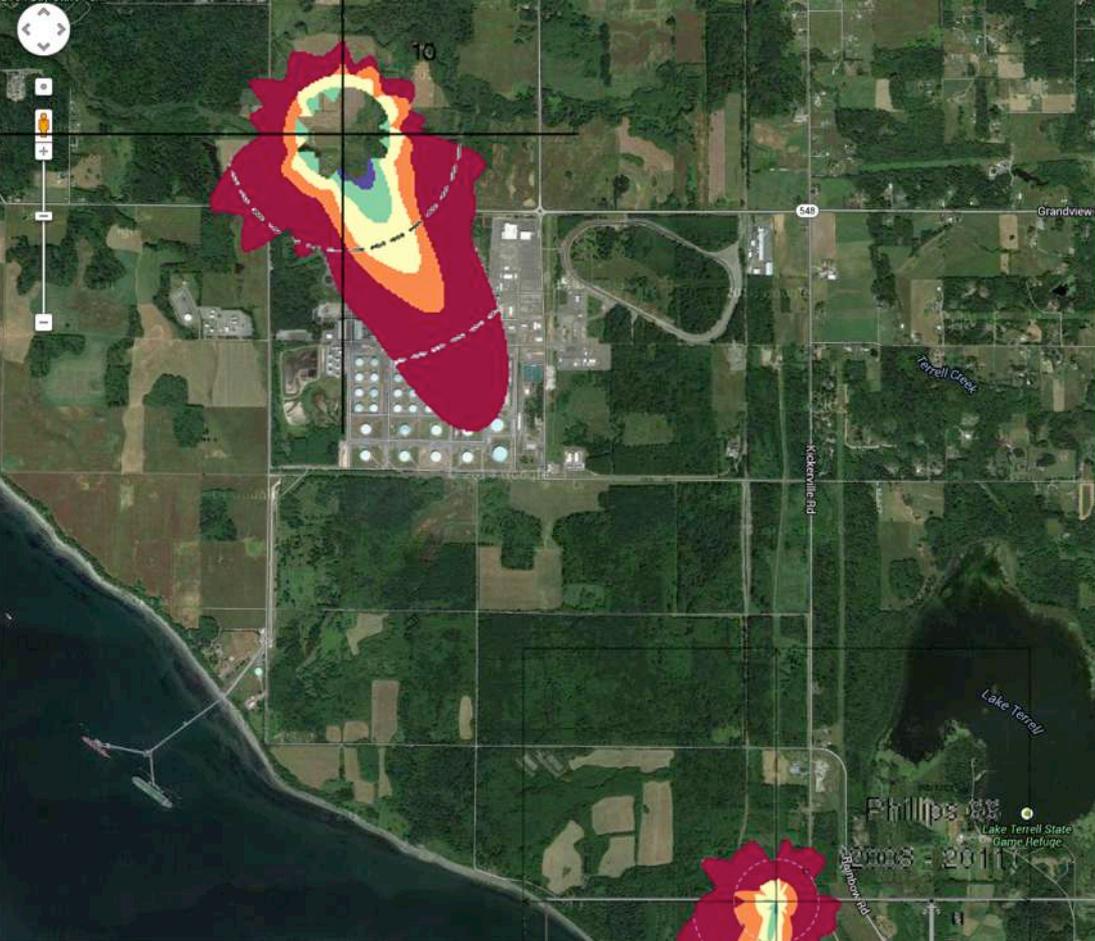
NW-Airquest, Portland, OR, 24 – 26 June 2015

Results

- Cherry Point

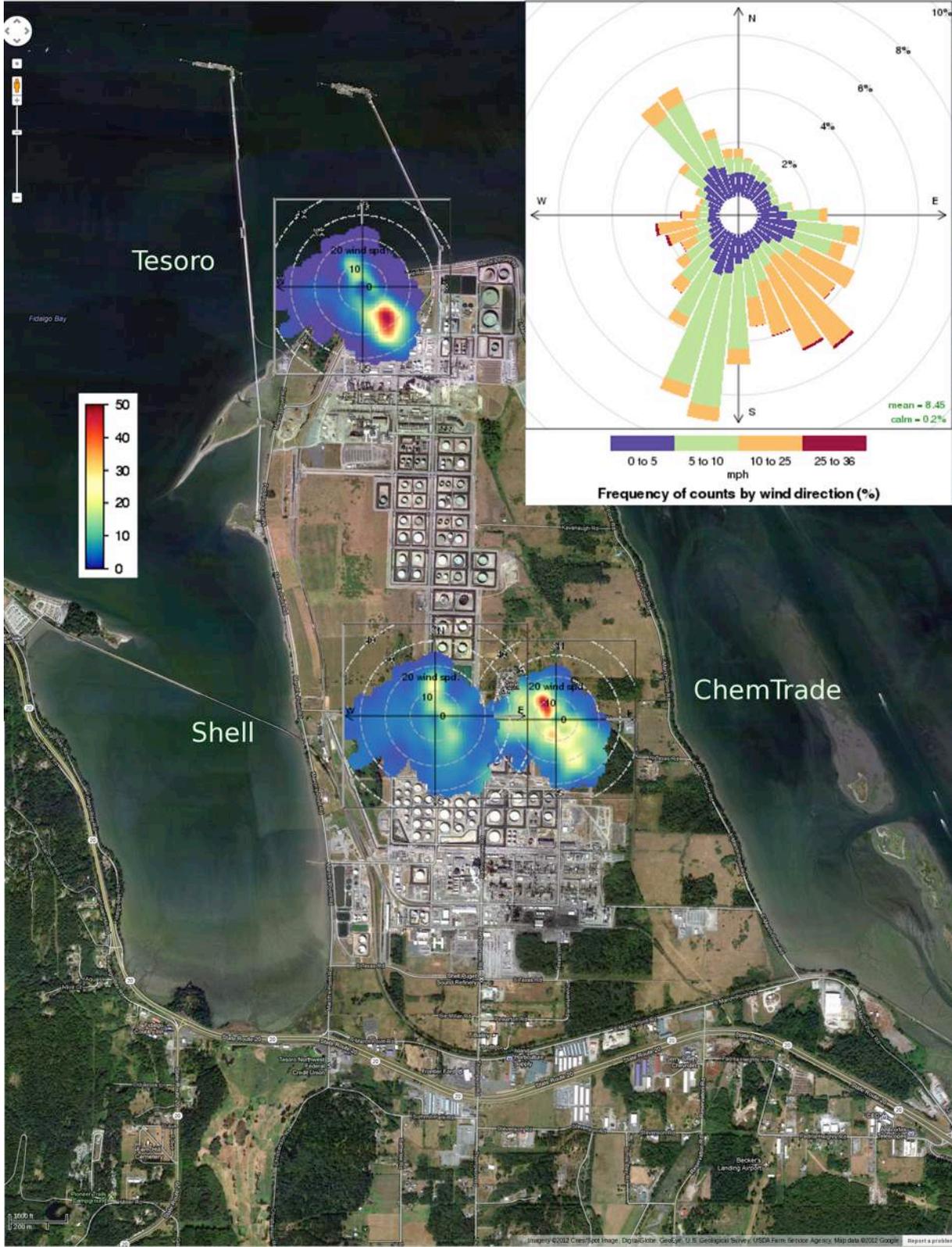
**BP Cherry Point
(2008-01-01 - 2011-12-31)**





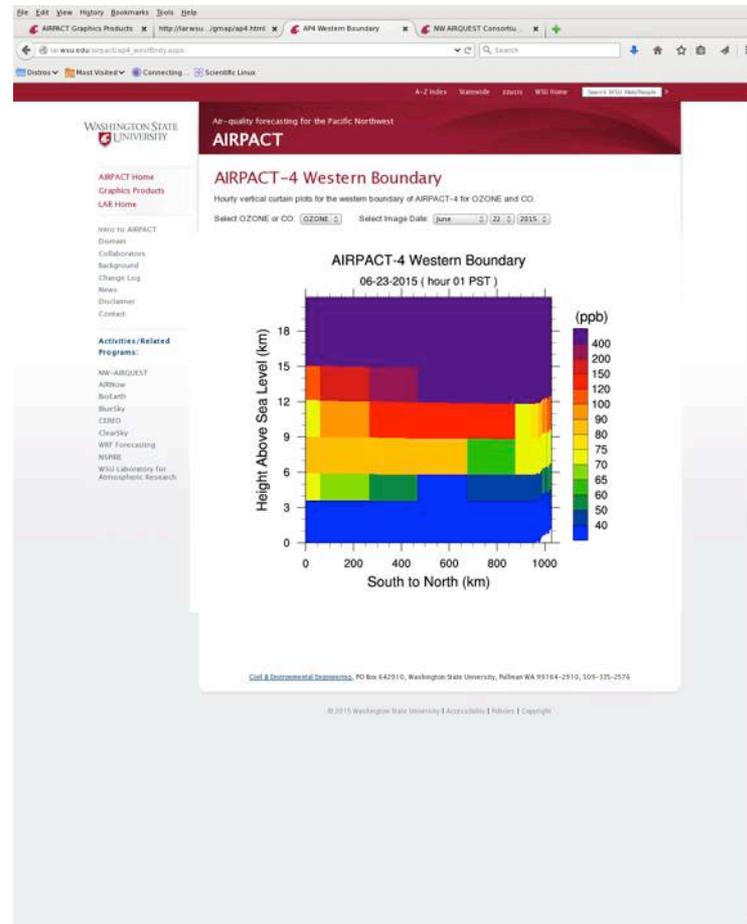
Results

- March Point



NW-Airquest, Portland, OR, 24 – 26 June 2015

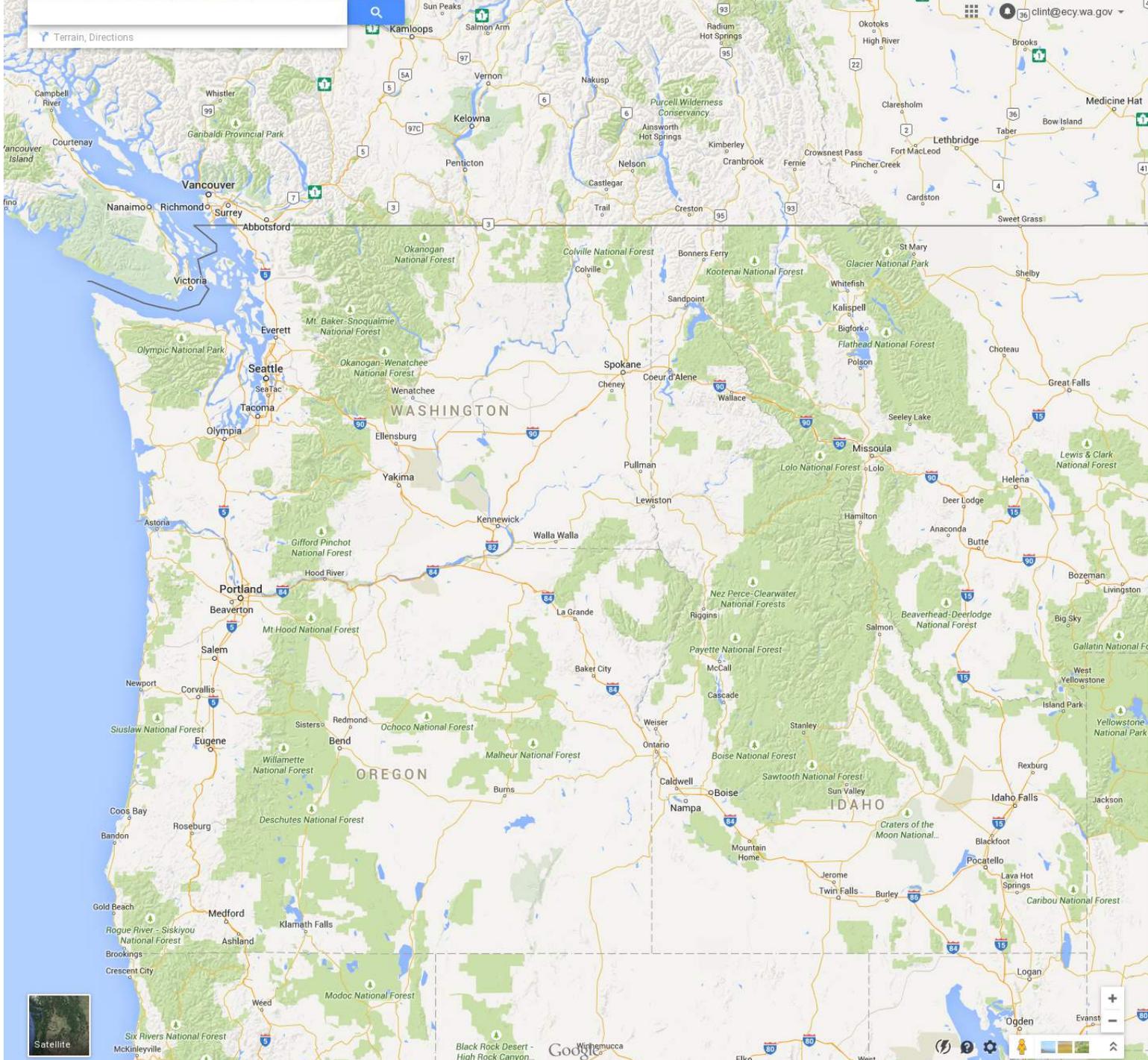
Flux Curtains for AIRPACT



NW-Airquest, Portland, OR, 24 – 26 June 2015

Estimating Interstate Transport

- Western boundary figure suggested a way
 - Identify pairs of cells along boundary of domain of interest
 - Approximately 1300 pairs of cells to surround ID, OR, and WA
 - For each layer (up to 3000 m?)
 - Sum flux ($\text{kg}/\text{m}^2/\text{hr}$ of selected species across boundary
 - Greater than 0 in one accumulator
 - Less than 0 in another accumulator
 - Keep table of monthly sums



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