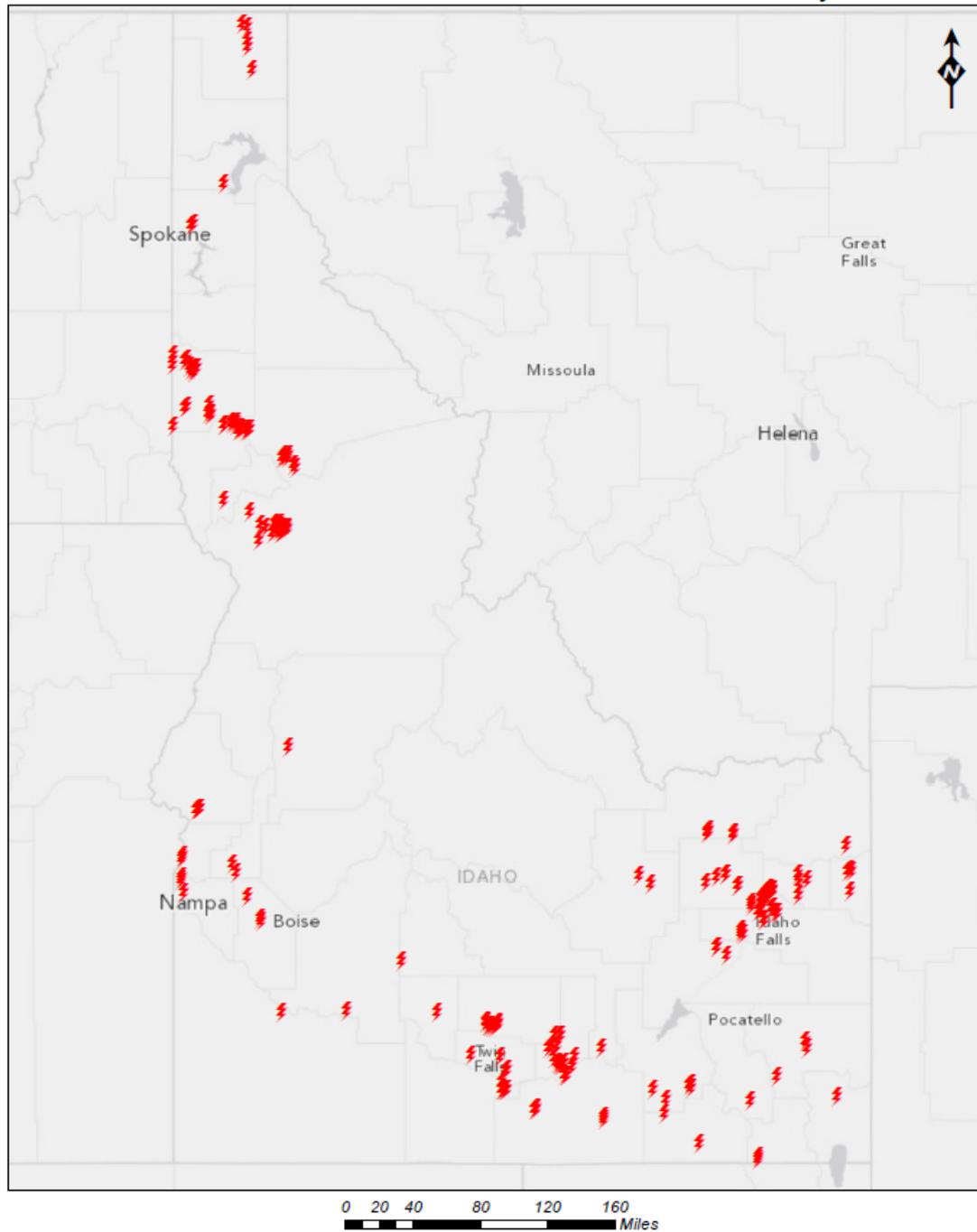


Do agricultural fires affect
Ozone?

Airpact3 Reanalysis

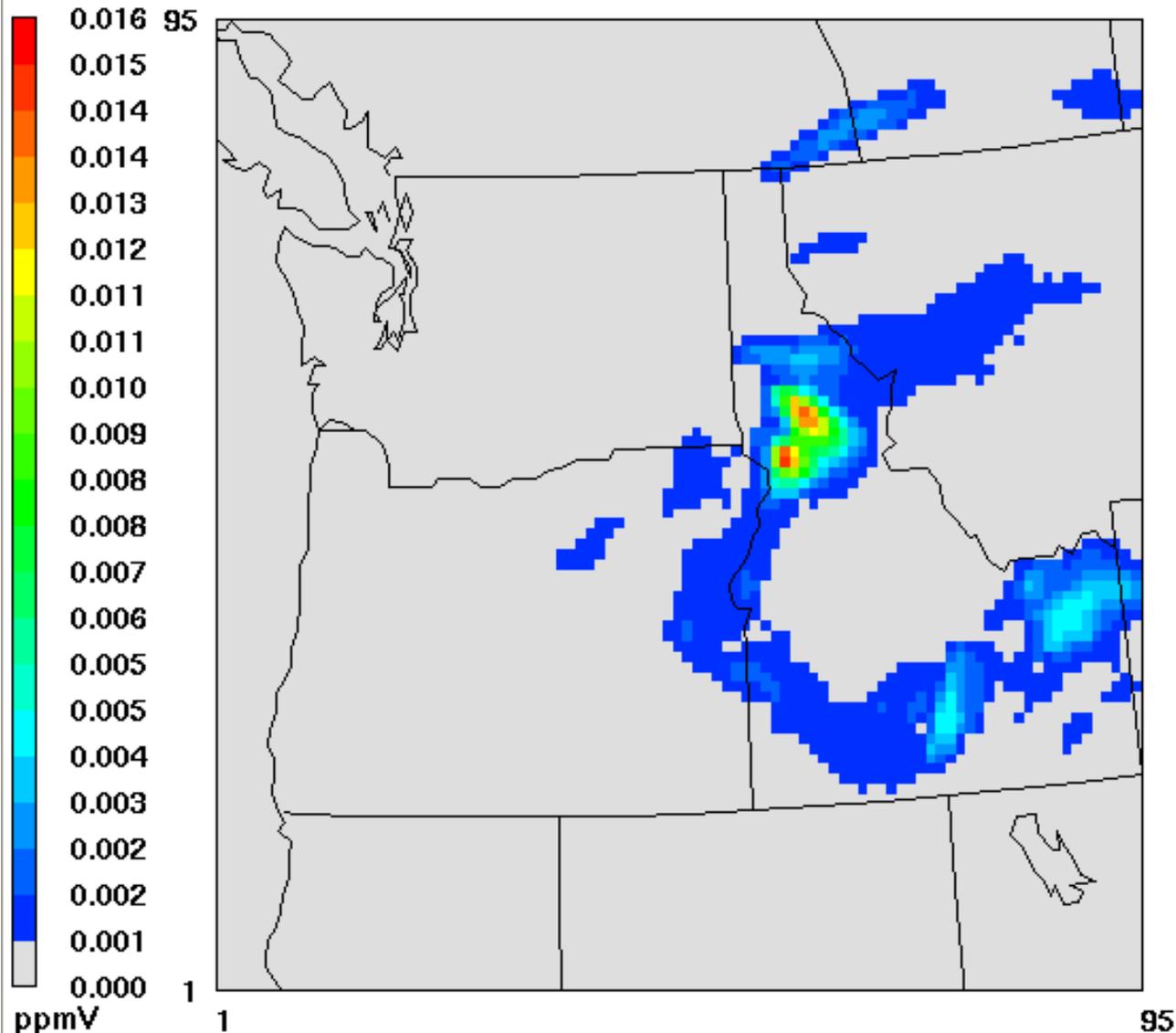
- Select a high ozone week in August.
- Simulate the maximum 1-day Crop Residue acreage for each county in Idaho.
- WRAP-based emission factors
- Two plume rise approaches
 - FEPs Briggs Plume rise calculation
 - Air Sciences Plume Class 2
- Same start hour vs staggered start hours
- Check to make sure daily carryover is minor.

Distribution of fields on maximum burn day



Layer 1 RollingA_8_O3e-RollingA_8_O3g

e=CCTM_airpact.8hrO3.airpact.2011239.1lay, g=CCTM_airpact.8hrO3.airpact.2011239

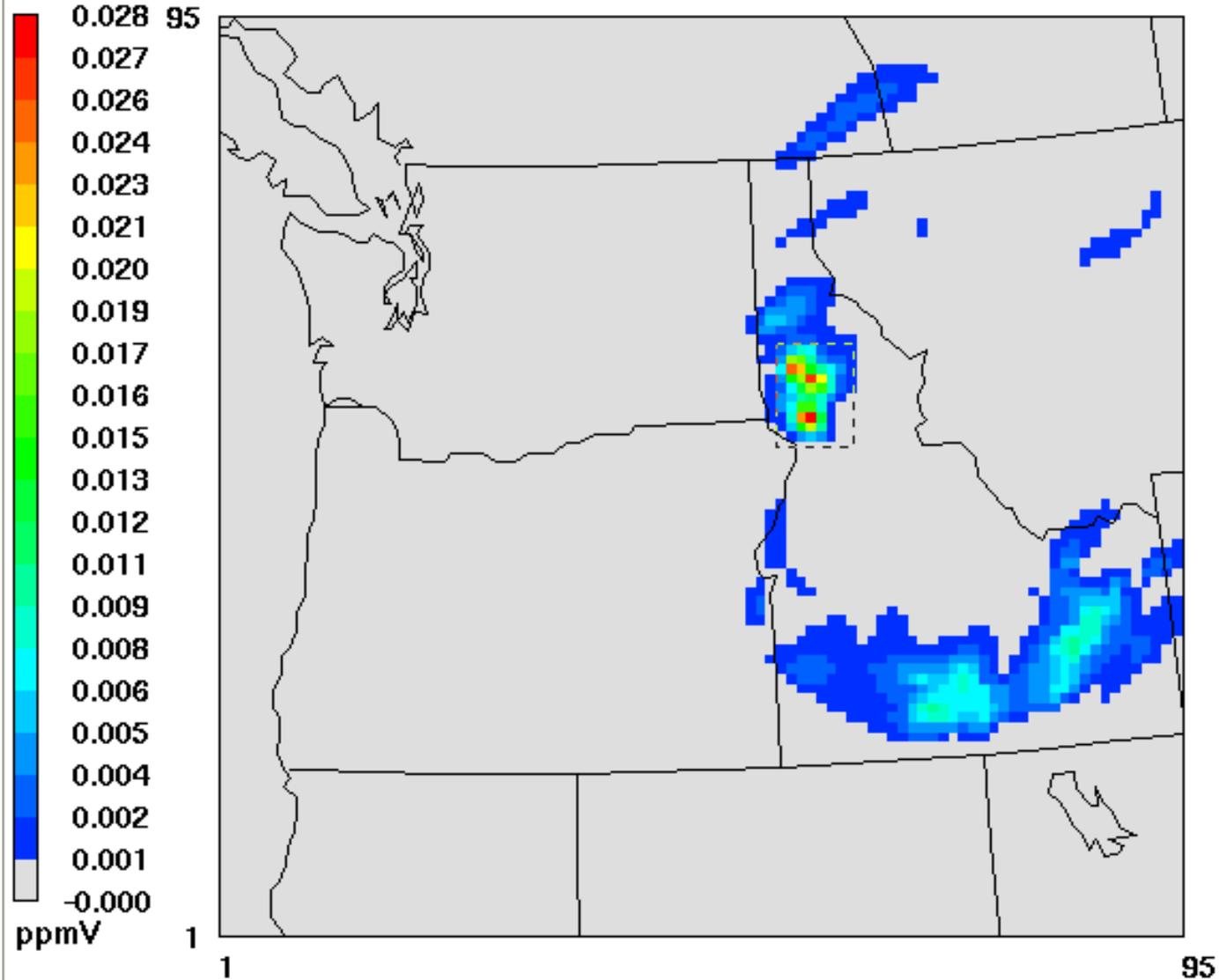


August 28, 2011 3:00:00

Min= -0.000 at (83,24), Max= 0.015 at (59,52)

Layer 1 RollingA_8_O3b-RollingA_8_O3a

a=CCTM_airpact.8hrO3.airpact.2011236.1lay, b=CCTM_airpact.8hrO3.airpact.2011236.



August 25, 2011 3:00:00

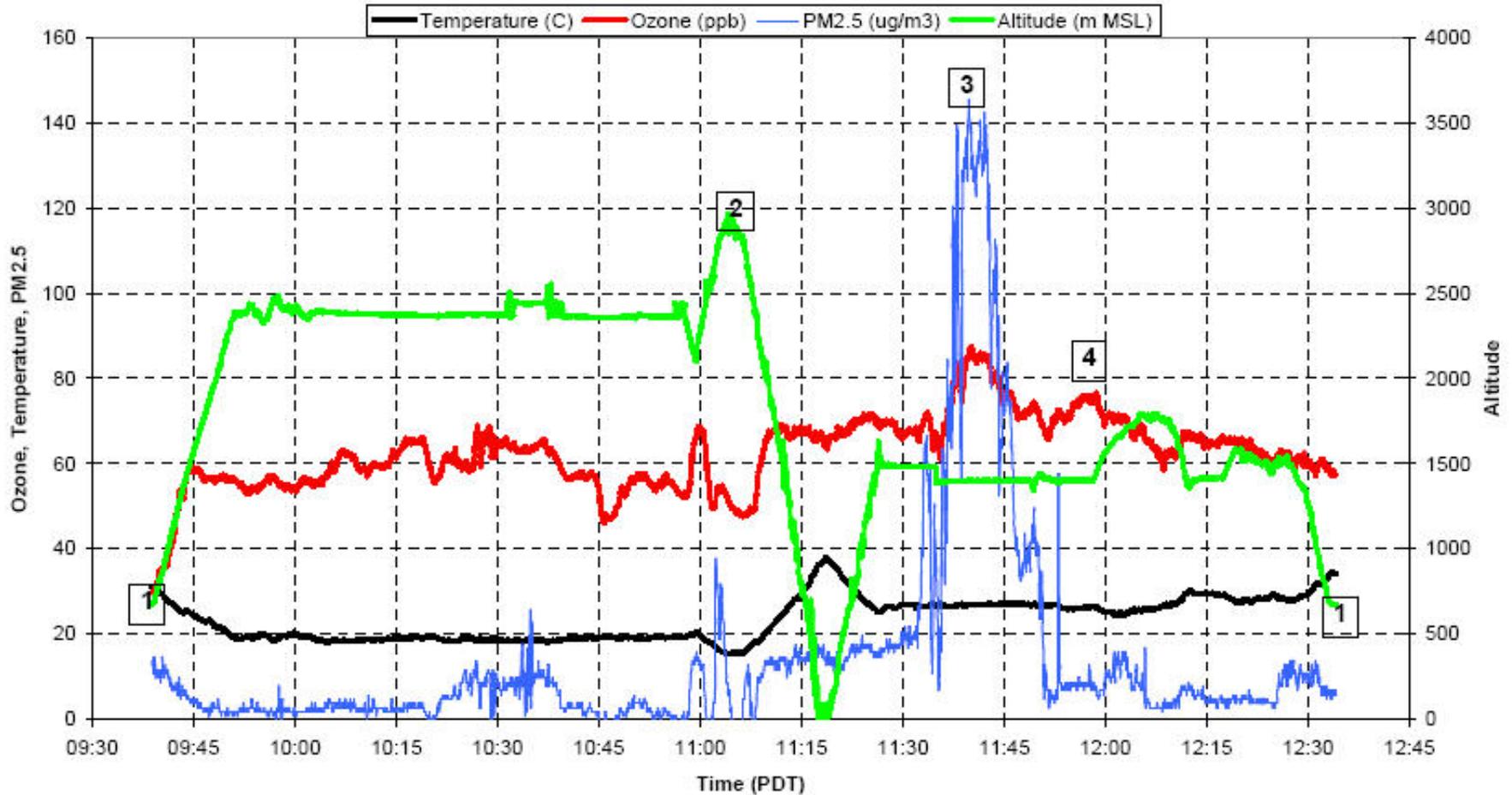
Min= -0.000 at (53,61), Max= 0.027 at (59,54)

Comparison of Results

- Compare emissions
- Compare to Aircraft transect of wildfire plume.
- Compare to prescribed fire impacts at Boise.
- Search for Crop Burn impacts in monitoring data.

Aircraft transect through Wildfire Plume, Southern California

Morning Flight on 8/8

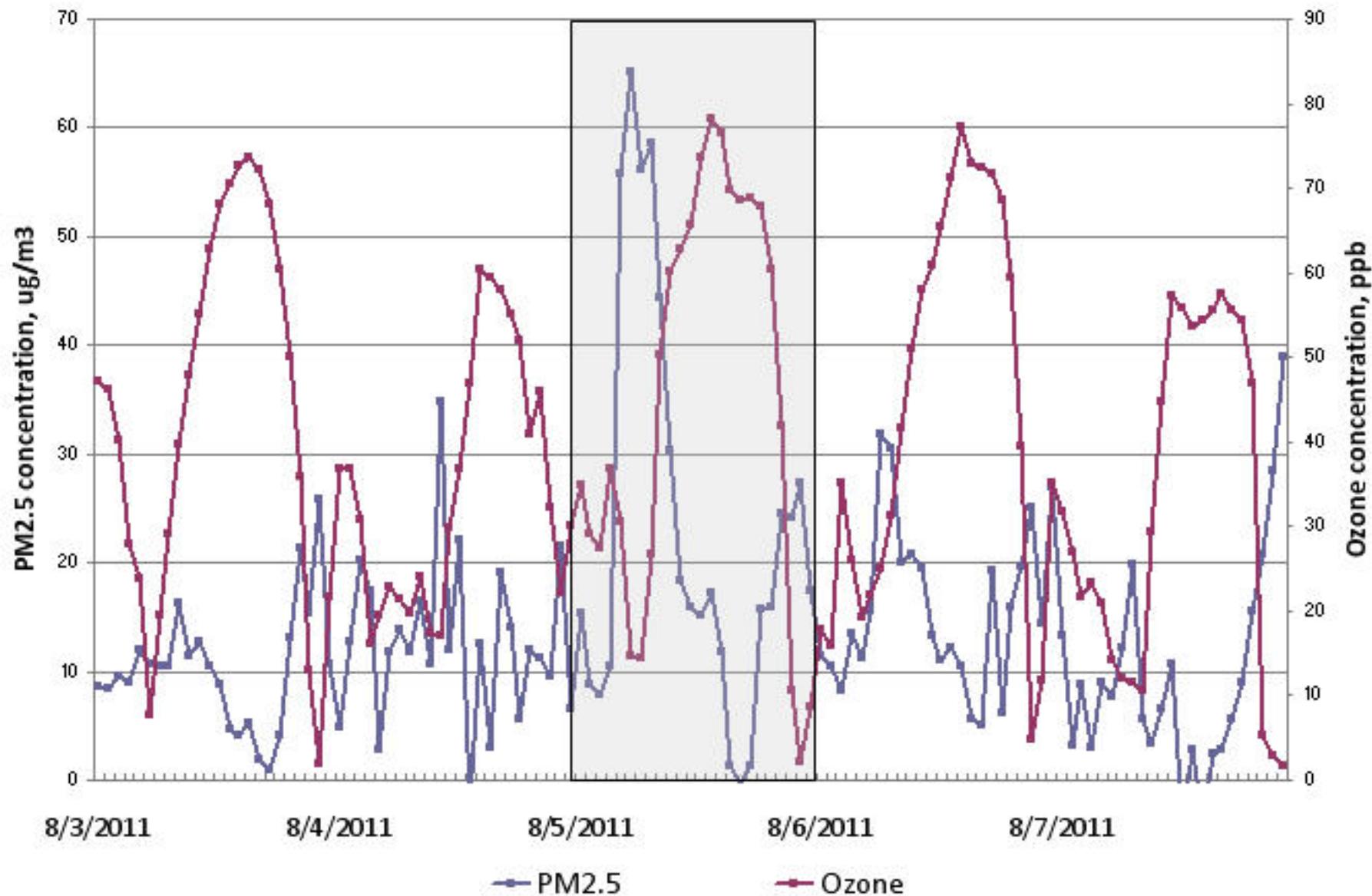


Local observations of
prescribed/wildland fire impacts
on ozone and PM

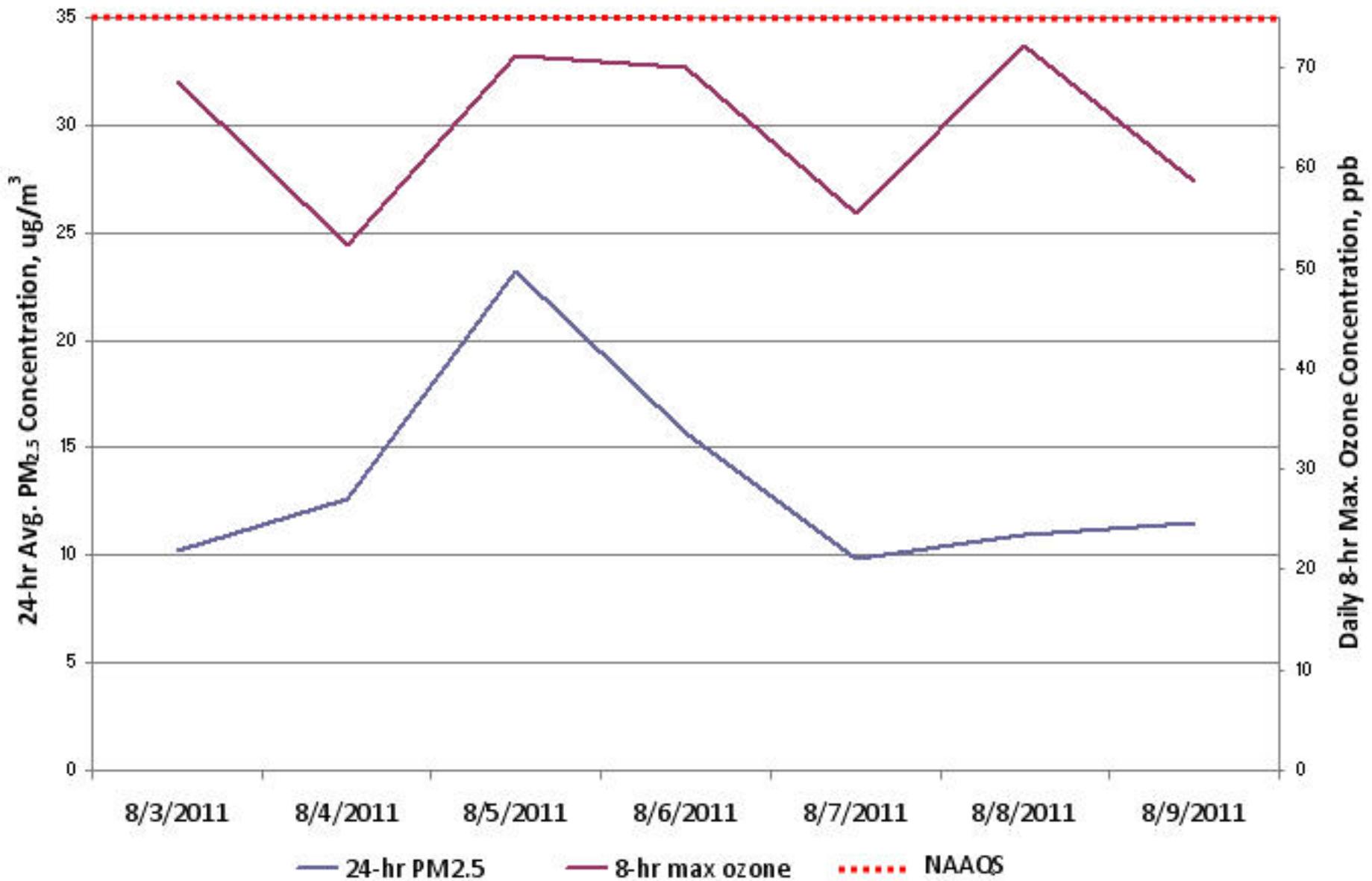
Aug 5, 2011 Treasure Valley



Ozone & PM_{2.5} Hourly Impacts in Boise from Wildfire: Aug 5, 2011



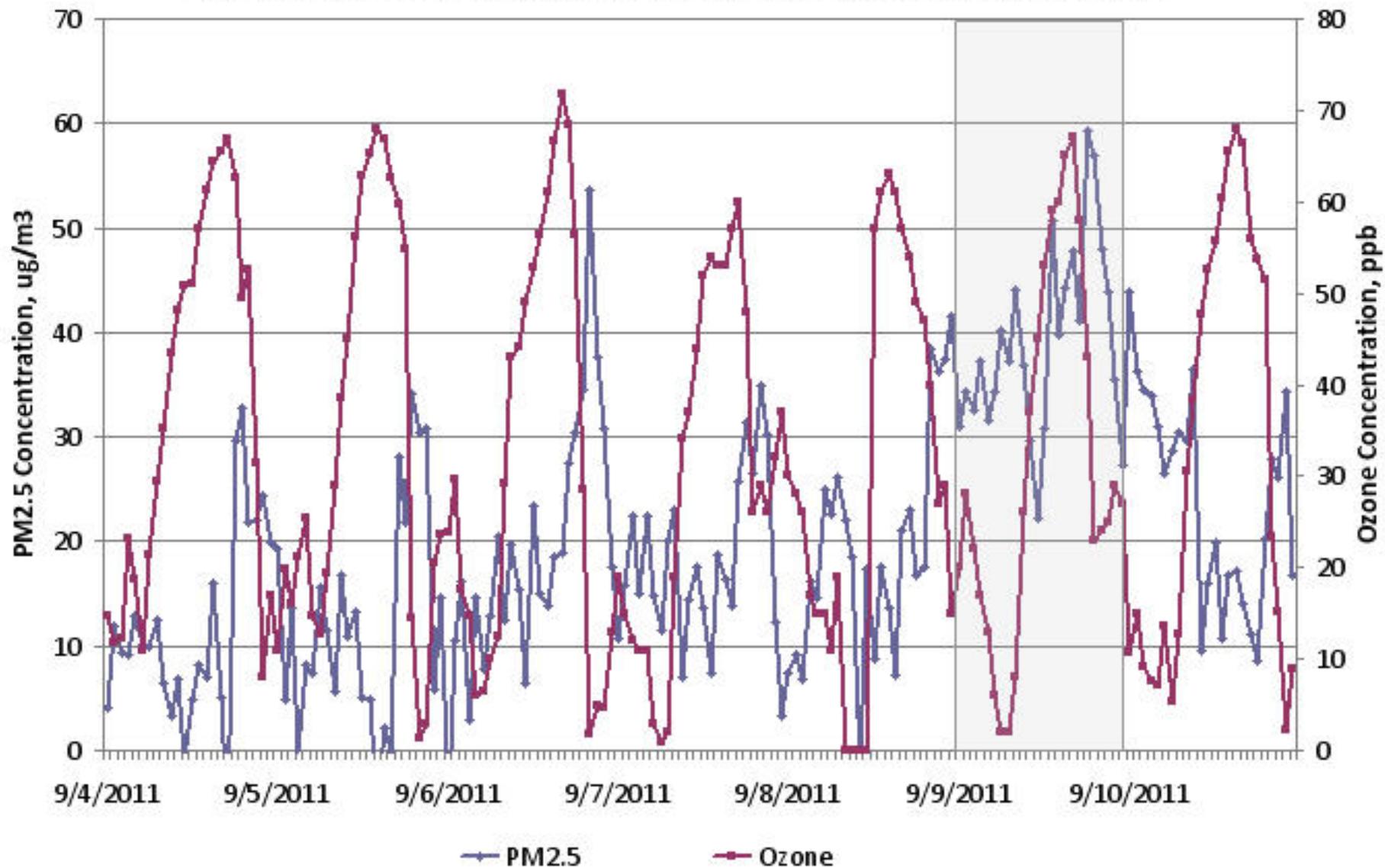
Ozone & PM2.5 Impacts vs NAAQS in Boise from Wildfire: Aug 5, 2011



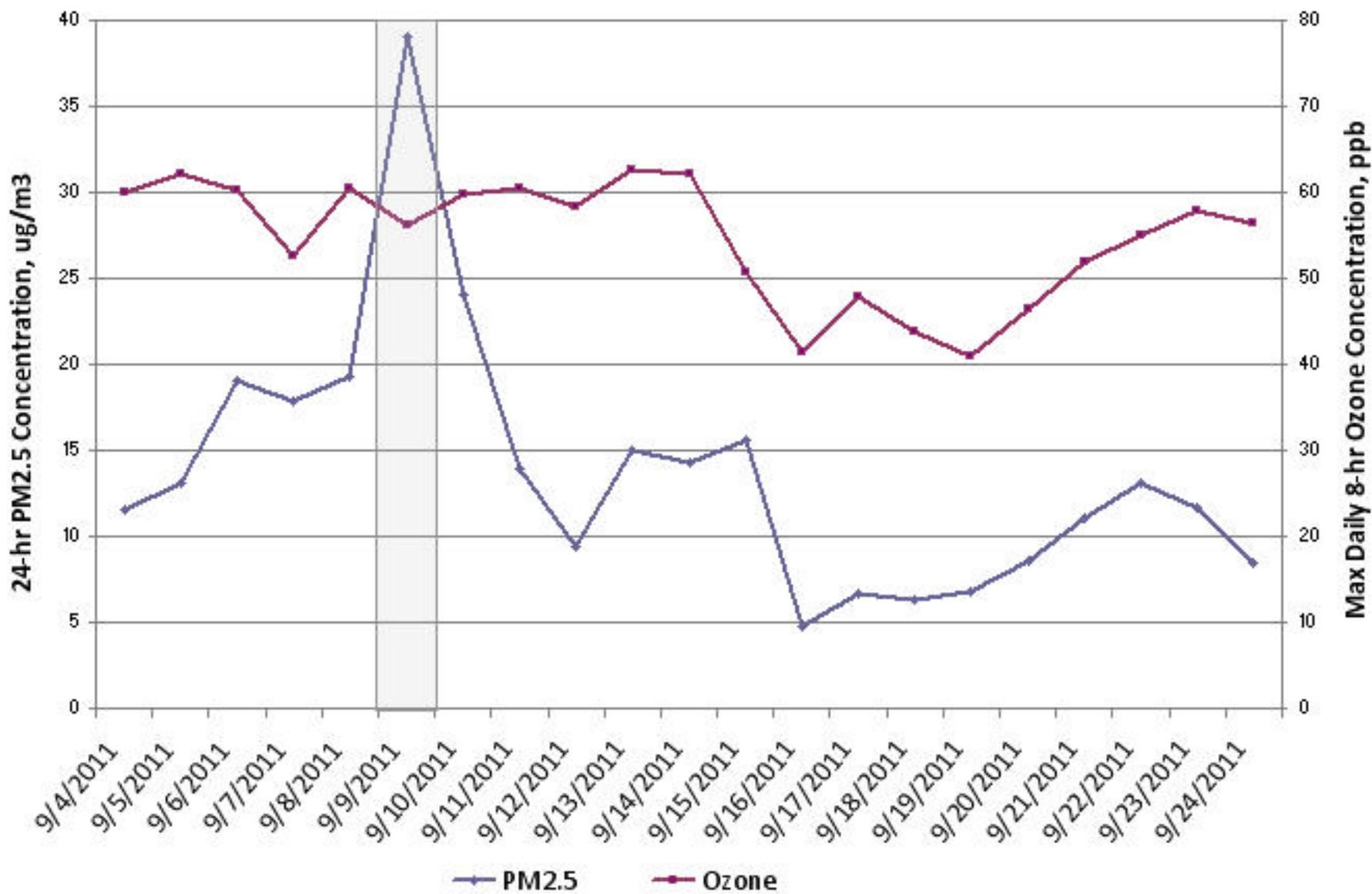
Sept 9, 2011 Boise Area



Ozone and PM2.5 Impacts in Boise due to Wildfire: Sept 9, 2011



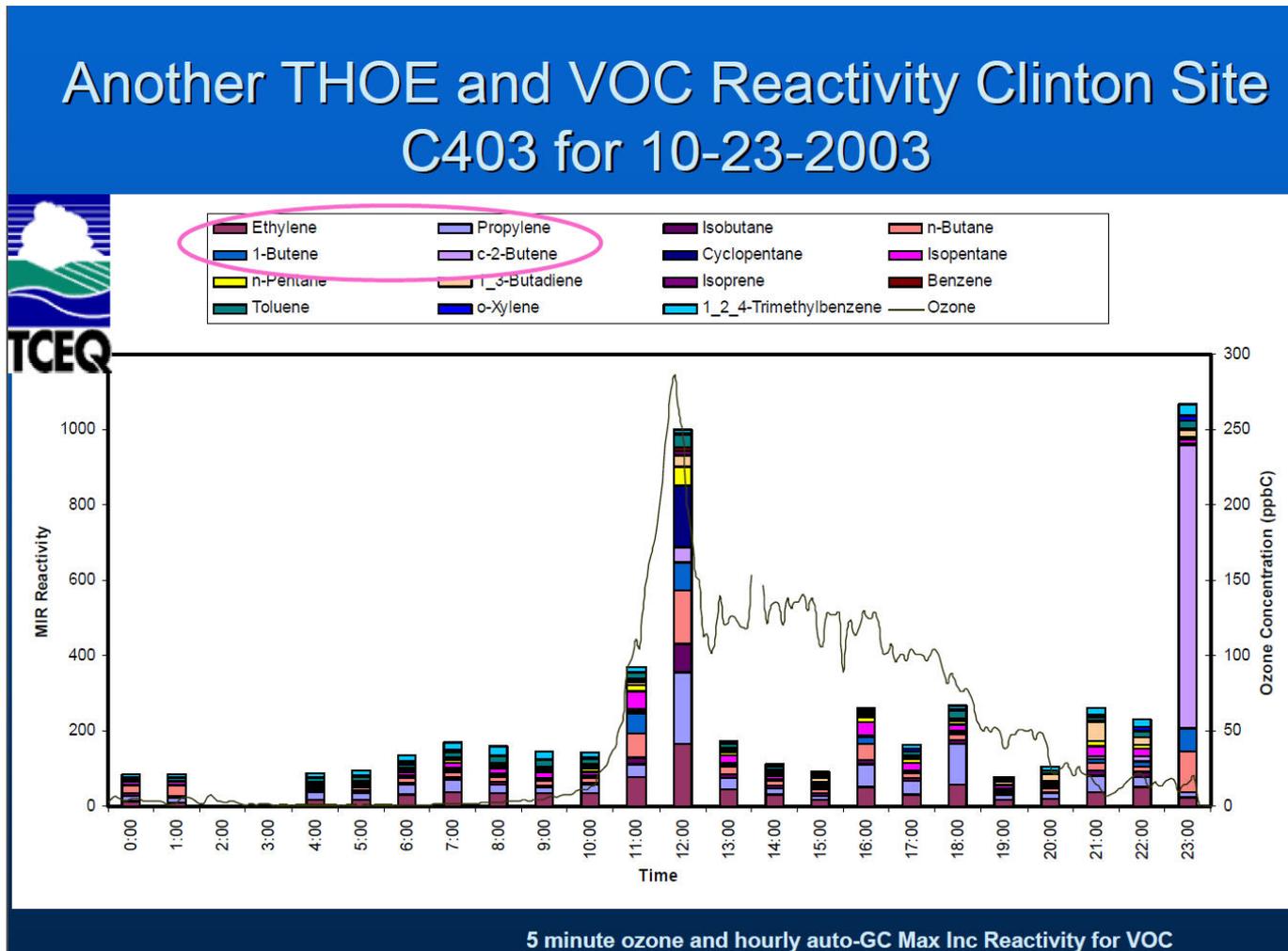
Ozone and PM2.5 Daily Impacts due to Castro Fire: Sept 9, 2011



Search all Ozone Monitoring
Statewide for CRB impacts

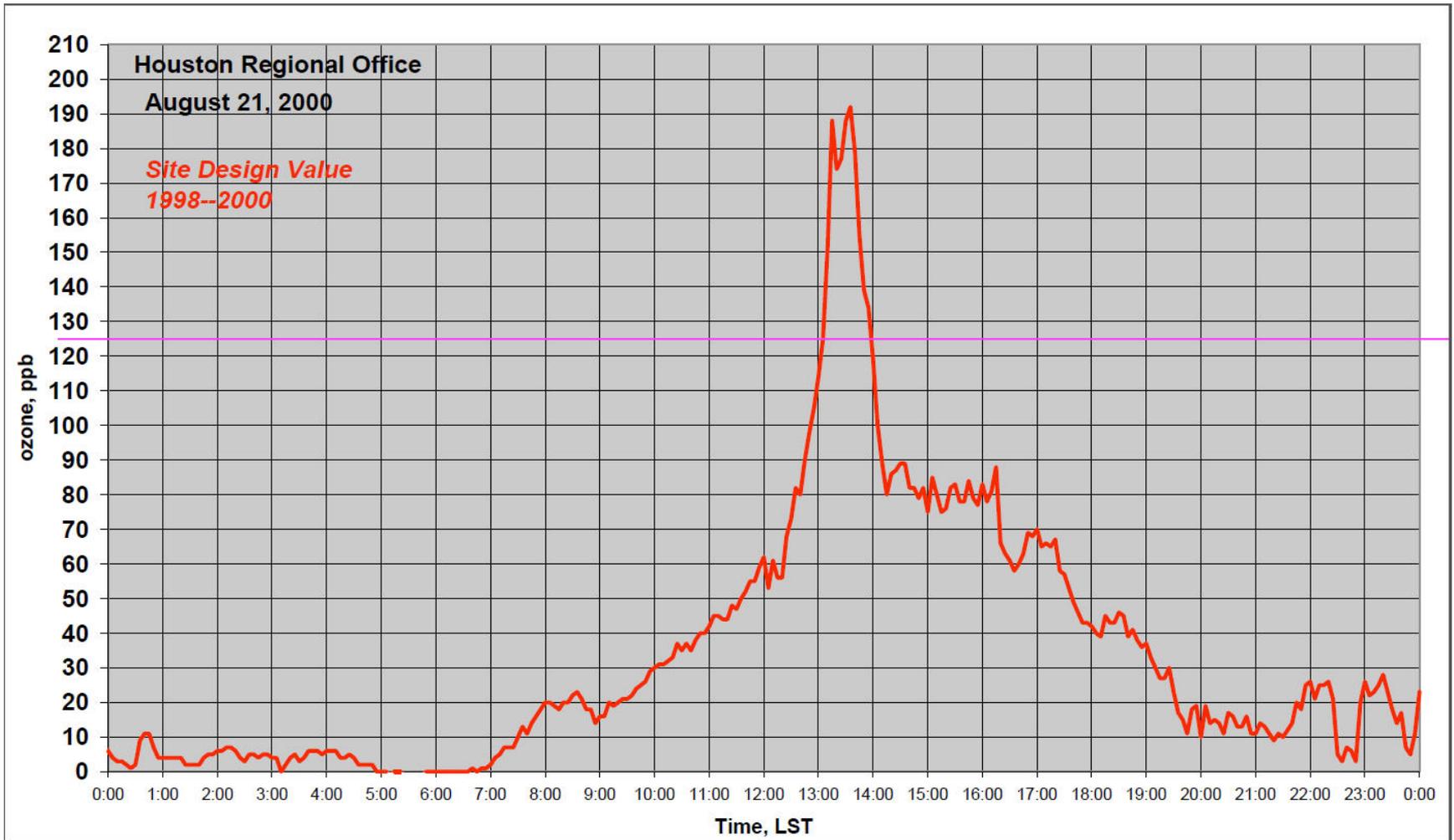
TCEQ Houston Study

In some areas with chemical plants, very large brief releases of highly ozone-producing VOCs cause “Transient High Ozone Events” or “spikes”. The ozone “spike” below represents about a 30 ppb contribution to the 8-hour ozone concentration.



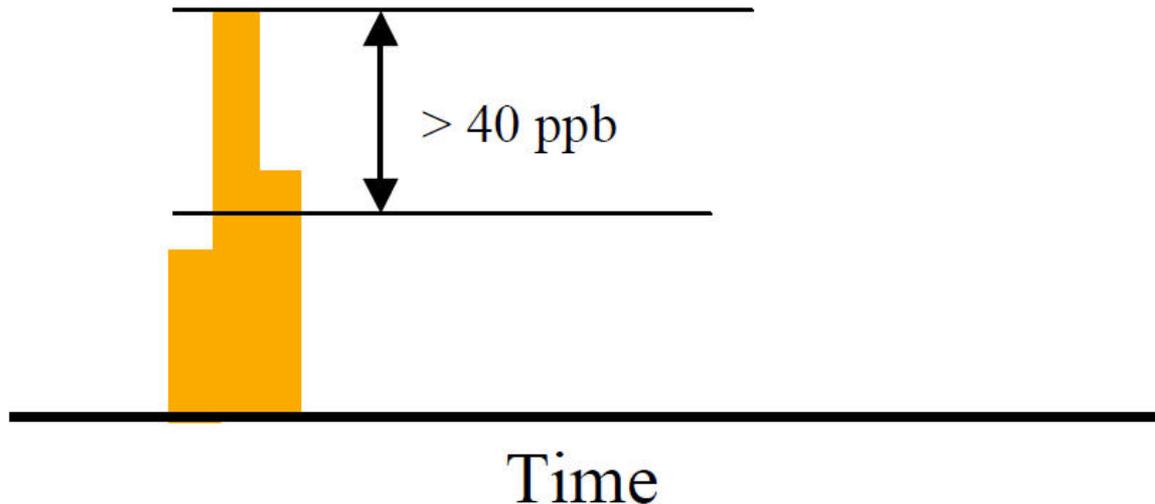
Here is another example. This spike contributes about 15 ppb to the 8-hr ozone value.

Note, these “spikes” result from releases of highly reactive organic compounds of approximately the same duration (1 -2 hr) as a crop burn, but with 10 – 100 more ozone producing potential than a crop burn.

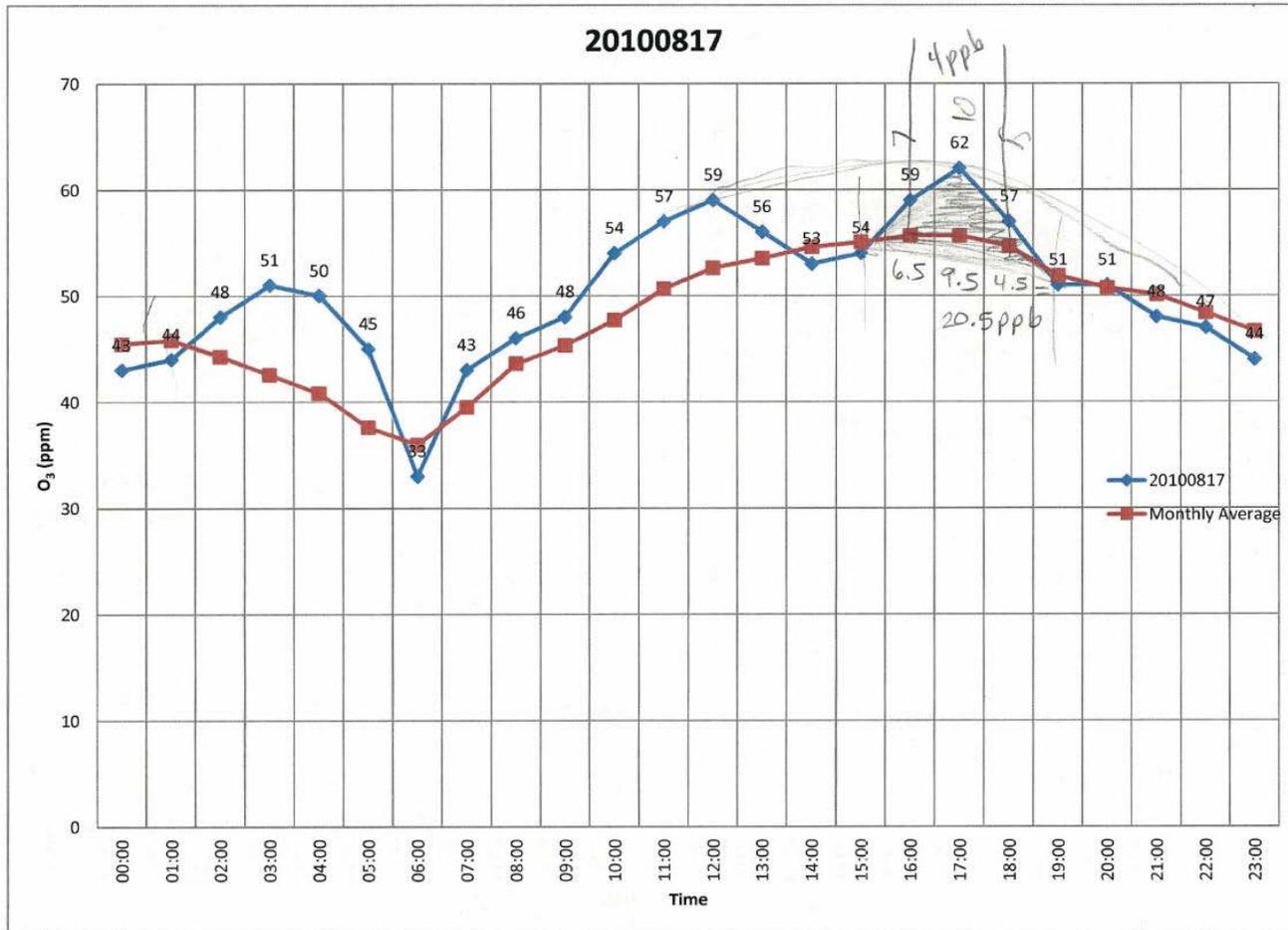


AIRS Dataset Analysis

Our first scan through the AIRS dataset was an automatic scan using a definition of a “spike” as a 1-h ozone value that was 40 ppb higher than the hour before averaged with the hour after.



This graph shows typical ozone variations, that we are assuming could be caused by CRB.



DEQ has searched the ozone data for spikes:

- Filter all burns by 1) >10 acres; 2) within 50 miles; 3) Wind Dir toward monitor
- Integrate ozone “peaks” over ~4 ppb, (1-hour) then compute maximum 8-hr average.

Searching all Burns greater than 10 acres from 2008 to 2011 for Ozone Impacts

Ozone Monitor	# Burns within 50 miles	# wind observations blowing toward Monitor during burn window (5min-1hr)	# days to examine	# potential Ozone "spikes" found	Maximum 8-hr Impact, if assumed to be from CRB*
Craters of the Moon	117	79	24	13	2.5 ppb
St. Lukes, Meridian	441	141	29	13	1.25 ppb
Coeur d'Alene	473	94	9	5	0.5 ppb
City of Rocks	26	59	Concurrent data not obtained yet		
Totals	1057	373	62	31	
* Additional analysis is in progress for any variations over 1 ppb to determine if they could result from the CRB burn.					

Conclusion: Maximum peak contribution, if assumed to be from CRB: ~ 2.5 ppb

Reasons modeled ozone in CRB near-field smoke plumes may be over predicted.

- Smoke aerosol occlusion of solar UV light in near-field is not accounted for.
- Possible ozone-smoke particle interaction or “sink” is not accounted for.
- Smoke plume instantaneous dilution and ozone titration into a 12 km grid cell is not realistic.

When sun is shaded, Ozone responds rapidly.



Time lag from maximum eclipse to Ozone minimum was 150 seconds – Eastman & Stedman, *VARIATIONS IN THE AMBIENT OZONE CONCENTRATION DURING THE 26 FEBRUARY 1979 SOLAR ECLIPSE**, Atmospheric Environment Vol. 14, pp. 731-732. Pergamon Press Ltd. 1960

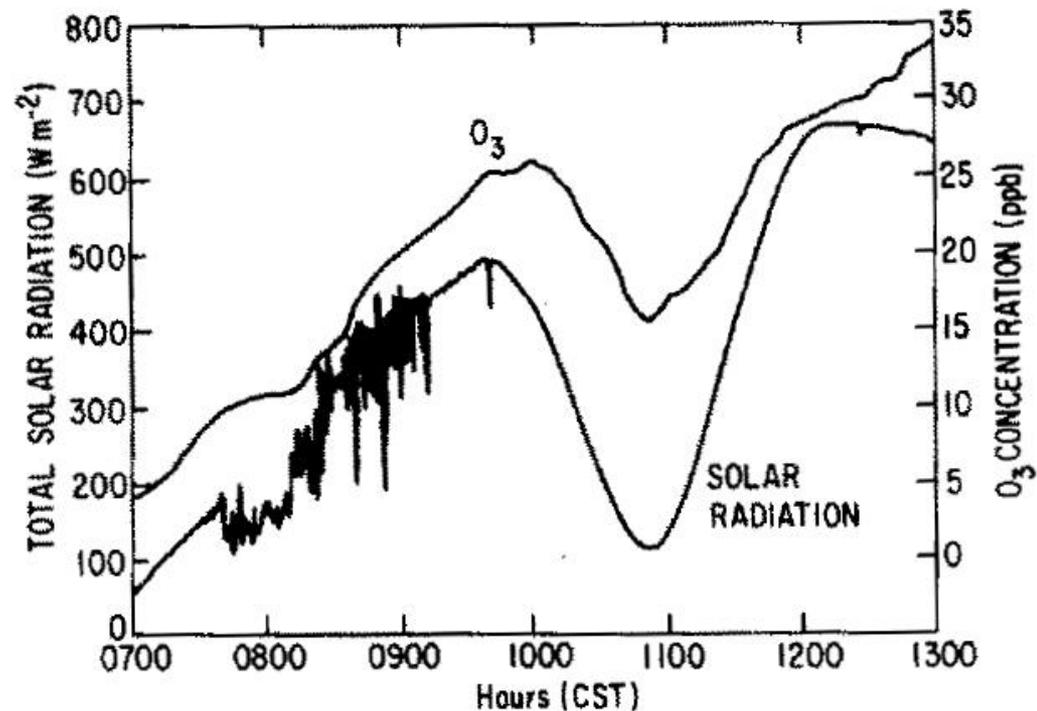


Fig. 1. Ozone concentration in ppb and total solar radiation in $W m^{-2}$ on 26 February 1979.

Reasons modeled ozone in CRB near-field smoke plumes may be over predicted.

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- Smoke plume instantaneous dilution and ozone titration into a 12 km grid cell is not realistic.

Summary/Conclusions

- CMAQ-modeled near-field CRB impacts appear unreasonably high.
- Significant uncertainties / unknown effects.
- This is a work in progress.
- We are open to suggestions.

Discussion / Suggestions?

