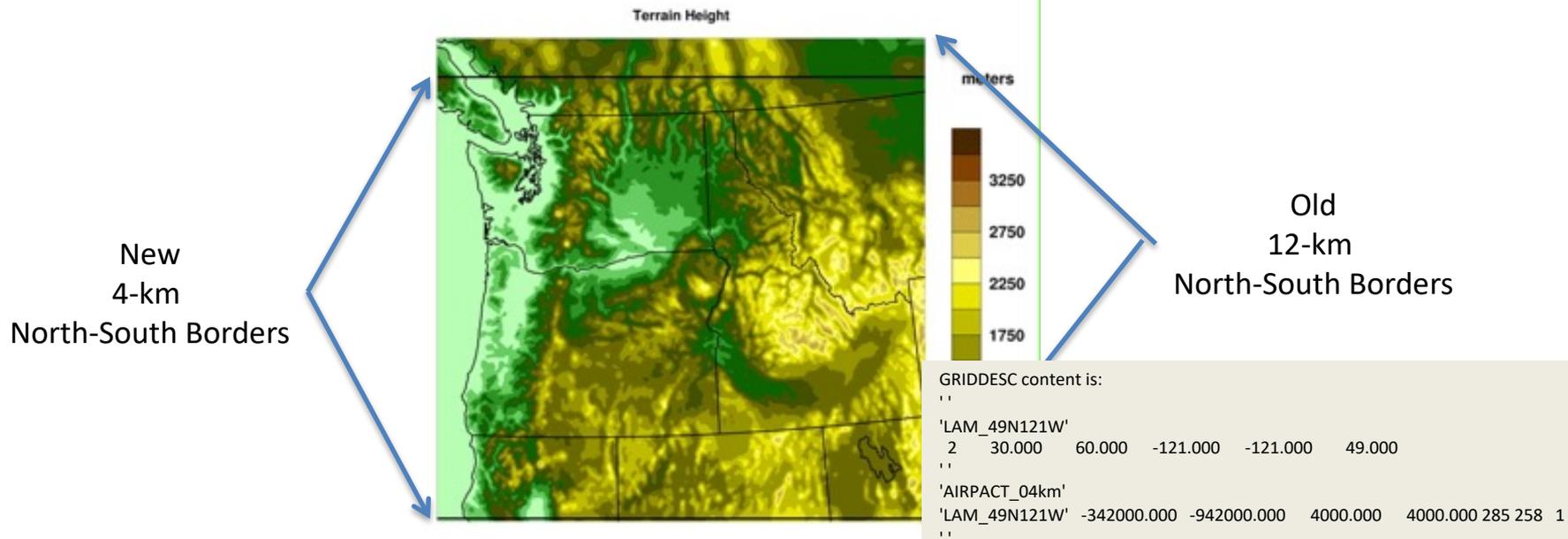
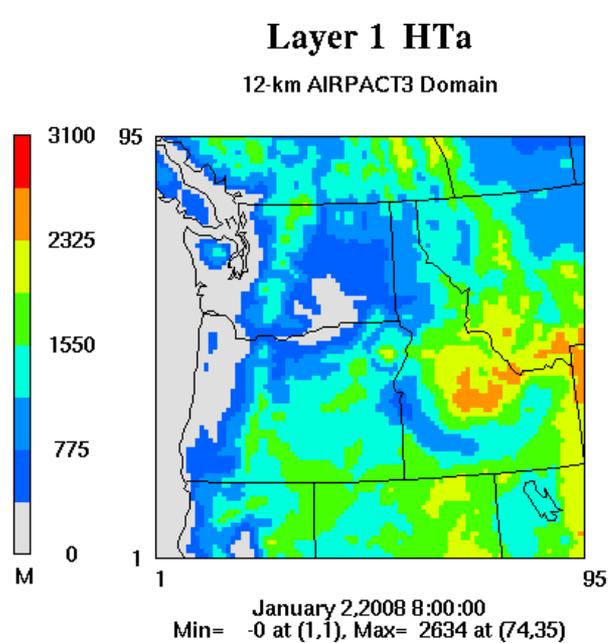
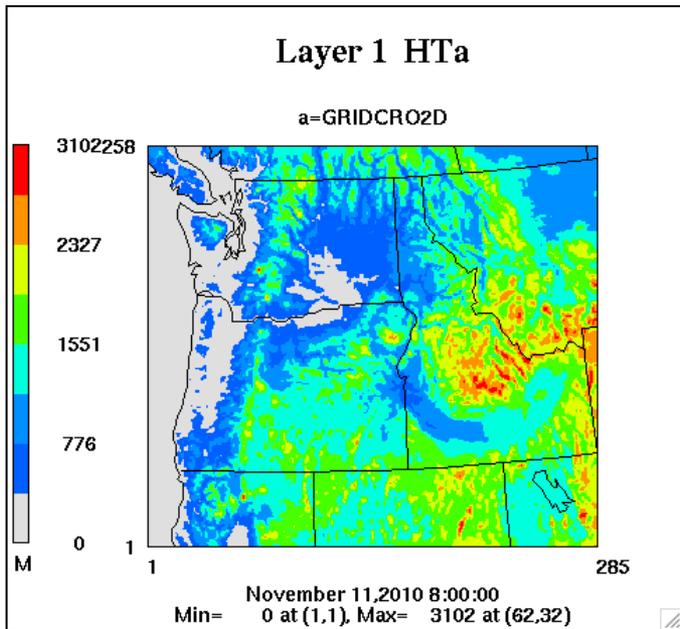


4-km AIRPACT VS 12-km AIRPACT

Both with dynamic boundary conditions from MOZART-4
Figures created on 5/29/2011 (corrected corrupted JPROC input file)

New 4-km Domain

Old 12-km Domain



AIRPACT-4 vs AIRPACT-3

	AIRPACT-3	AIRPACT-4
Grid cells	95x95 12-km grid cells	285x258 4-km grid cells
Vertical Layers	21 layers	21 layers
MCIP	v3.3	v3.6
SMOKE	v2.1 (LAYPOINT v2.4)	v2.7
CMAQ	v4.6	v4.7.1 updated according to Carlton et al, ES&T 2010.
Mass adjustment (CMAQ)	denrate	yamo
Anthropogenic Emissions	2005 from Ecology, IDEQ, ODEQ	2007 from Ecology, IDEQ, ODEQ
Fire Emissions	None	None
Biogenic Emissions	BEIS-3	MEGAN v2.1
CMAQ run time	8 processors on breezy 3.5 hours for 64-hour run	96 processor on aeolus 2.5 hours for 24-hour run
System Wall Clock Time	8 hours	TBD
Storage Requirement for 24-hour Run		
Emission	1.1 GB	891 MB
MCIP	428 MB	3.6 GB
CMAQ	2 GB	27 GB

CMAQ 4.7

Foley, K. M.; Roselle, S. J.; Appel, K. W.; Bhave, P. V.; Pleim, J. E.; Otte, T. L.; Mathur, R.; Sarwar, G.; Young, J. O.; Gilliam, R. C.; et al. Incremental testing of the Community Multiscale Air Quality (CMAQ) modeling system version 4.7. *Geosci. Model Dev.* **2010**, *3*, 205–226.

Incremental test simulations over the eastern United States during January and August 2006

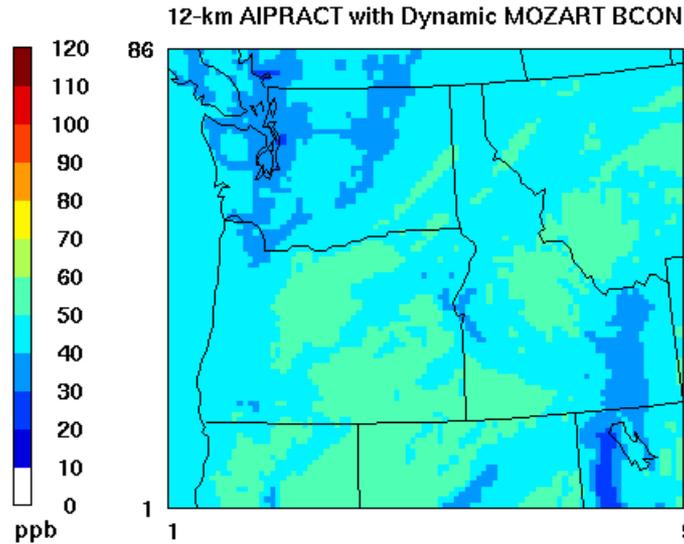
Particulate sulfate predictions are improved across all monitoring networks during both seasons due to cloud module updates.

Numerous updates to the SOA module improve the simulation of seasonal variability and decrease the bias in organic carbon predictions at urban sites in the winter. Bias in the total mass of fine particulate matter (PM_{2.5}) is dominated by overpredictions of unspciated PM_{2.5} (PM_{mother}) in the winter and by underpredictions of carbon in the summer.

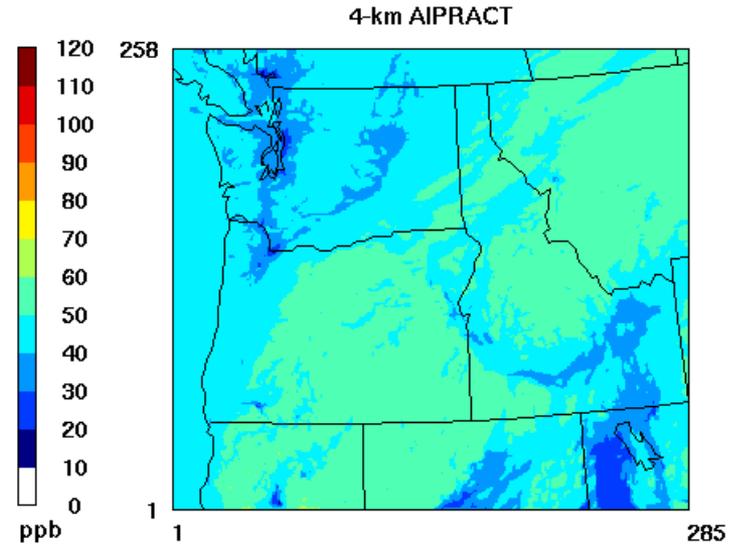
The CMAQv4.7 model results show slightly worse performance for ozone predictions. However, changes to the meteorological inputs are found to have a much greater impact on ozone predictions compared to changes to the CMAQ modules described here.

Model updates had little effect on existing biases in wet deposition predictions.

Surface-
Layer
 O_3

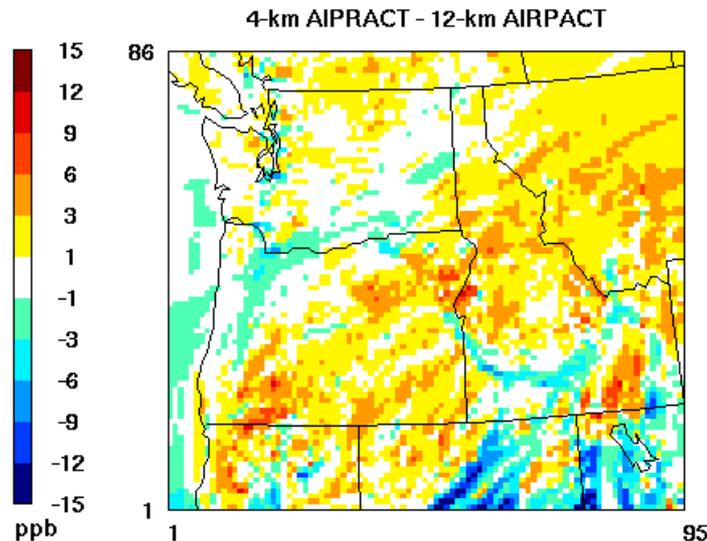


February 13, 2011 0:00:00 (PST)
Min= 23 at (17,82), Max= 60 at (26,4)



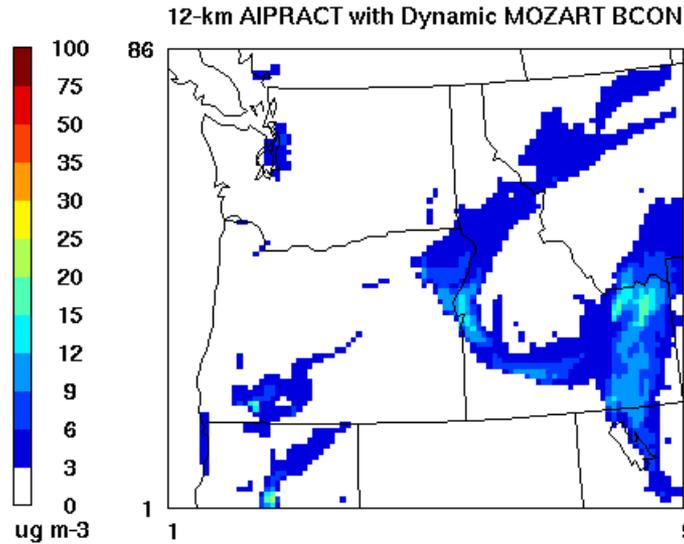
February 13, 2011 0:00:00 (PST)
Min= 7 at (58,222), Max= 61 at (73,1)

Surface-Layer
 ΔO_3
(@ 12-km)

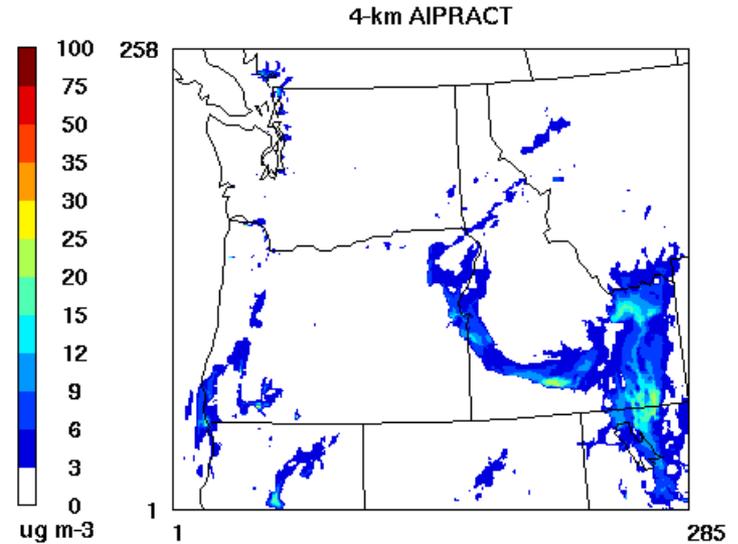


February 13, 2011 0:00:00 (PST)
Min= -18 at (50,1), Max= 12 at (80,18)

Surface-
Layer
PM_{2.5}

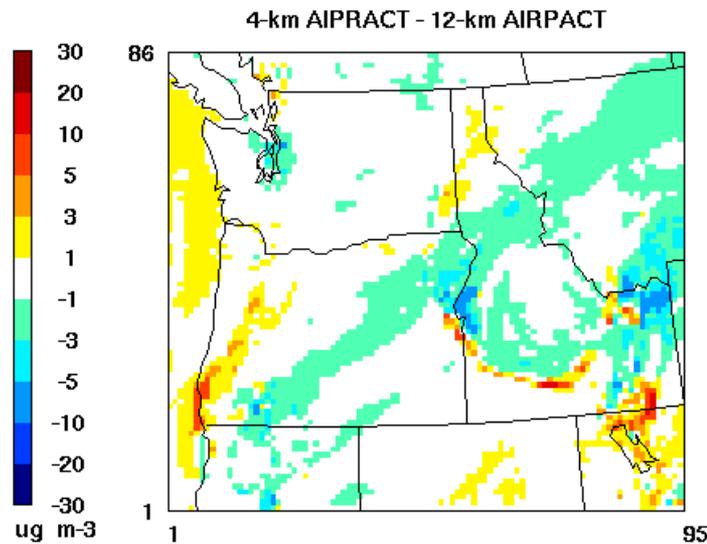


February 13, 2011 0:00:00 (PST)
Min= 0 at (13,42), Max= 23 at (20,2)



February 13, 2011 0:00:00 (PST)
Min= 0 at (68,158), Max= 27 at (48,58)

Surface-Layer
 Δ PM_{2.5}
(@ 12-km)

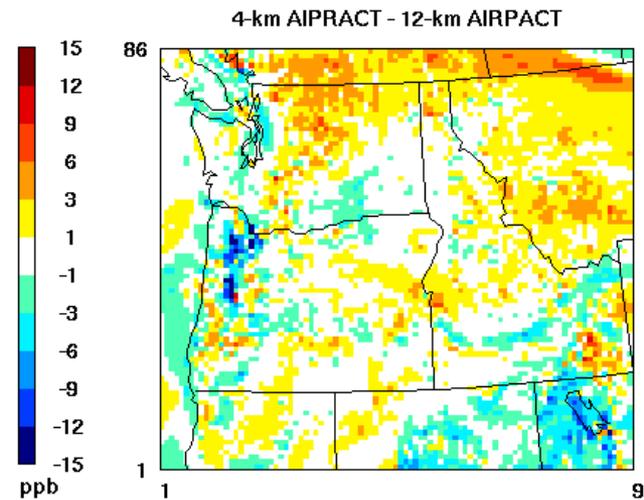
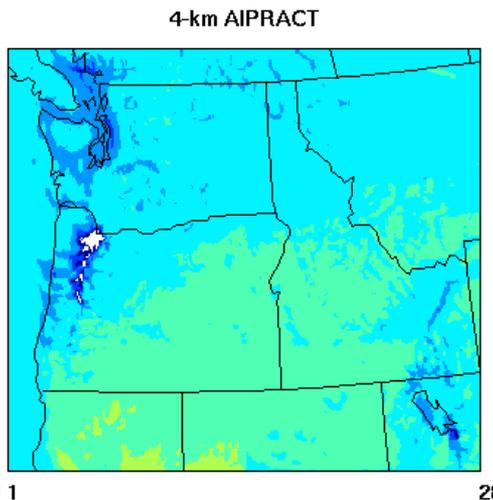
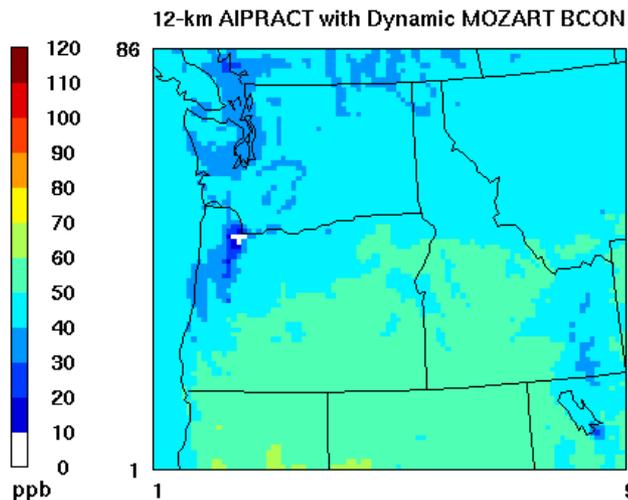


February 13, 2011 0:00:00 (PST)
Min= -9 at (20,2), Max= 14 at (71,24)

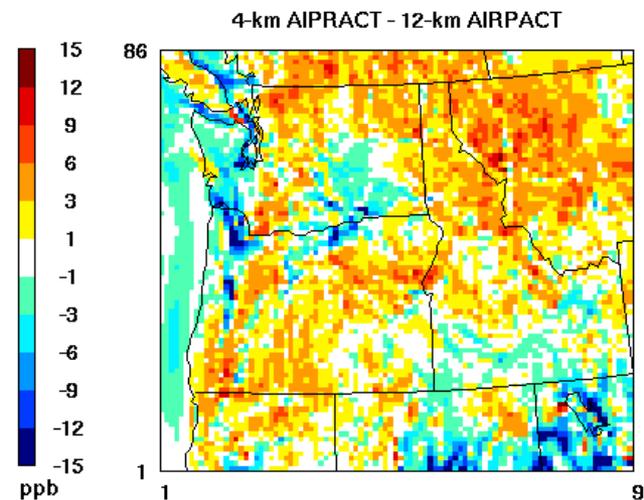
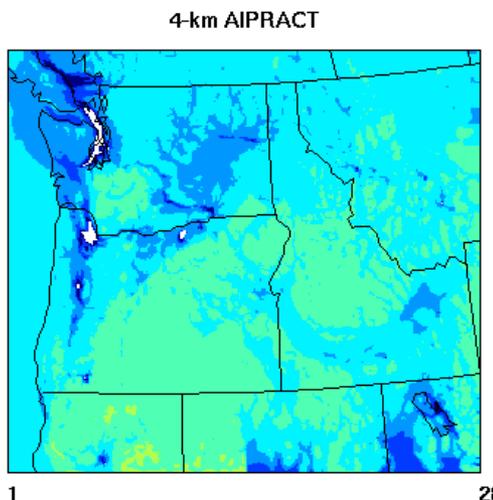
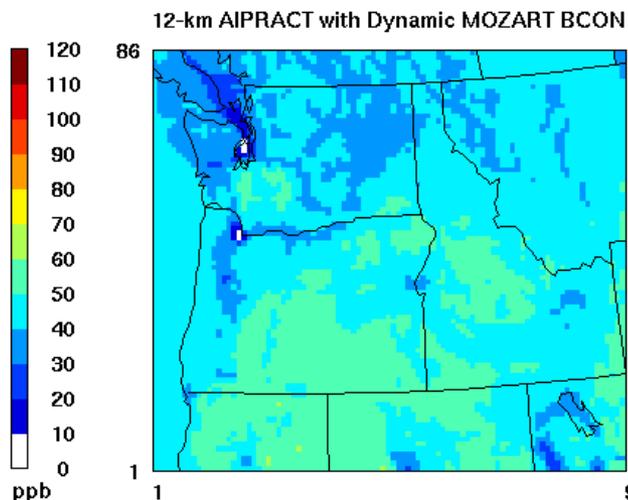
Surface-Layer O₃

Surface-Layer ΔO₃ (@ 12-km)

Feb 13, 2011 @ noon



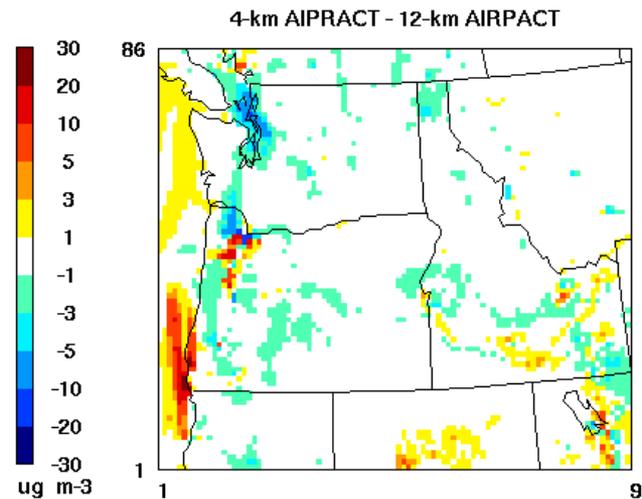
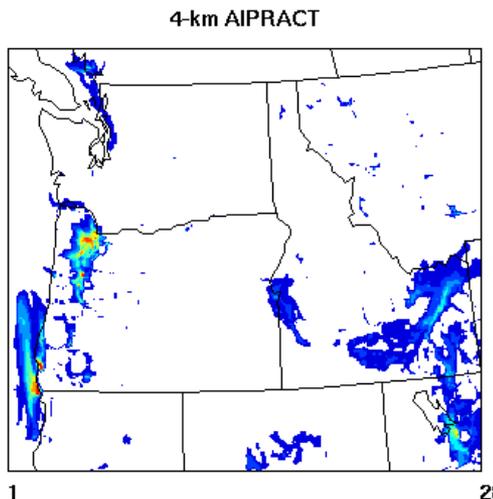
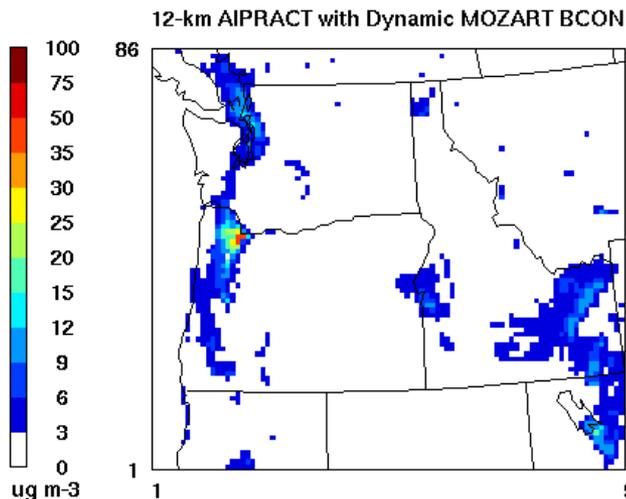
Feb 13, 2011 @ 11 pm



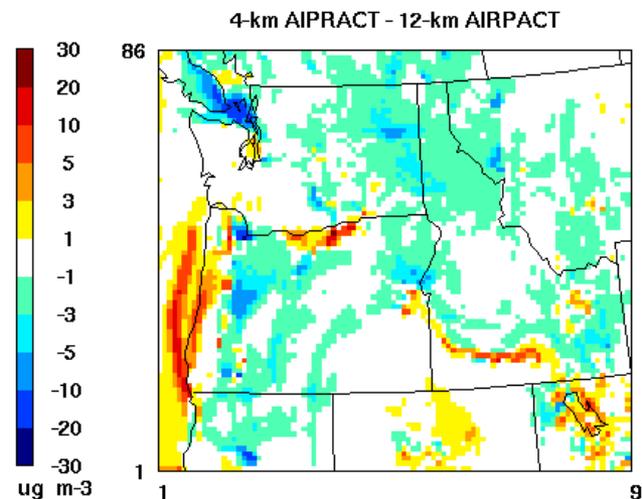
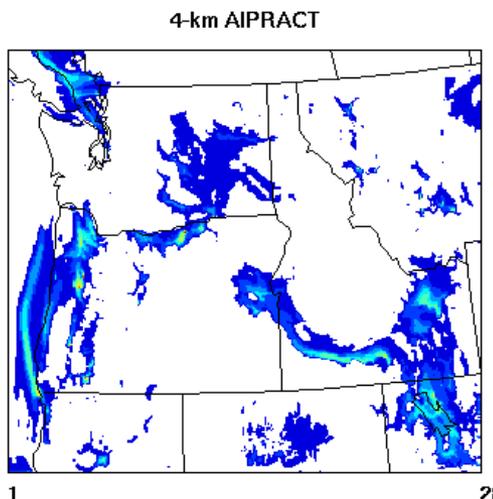
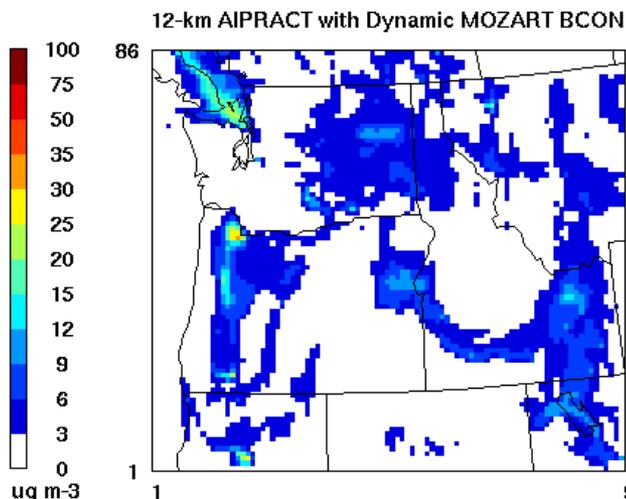
Surface-Layer PM_{2.5}

Surface-Layer Δ PM_{2.5} (@ 12-km)

Feb 13, 2011 @ noon

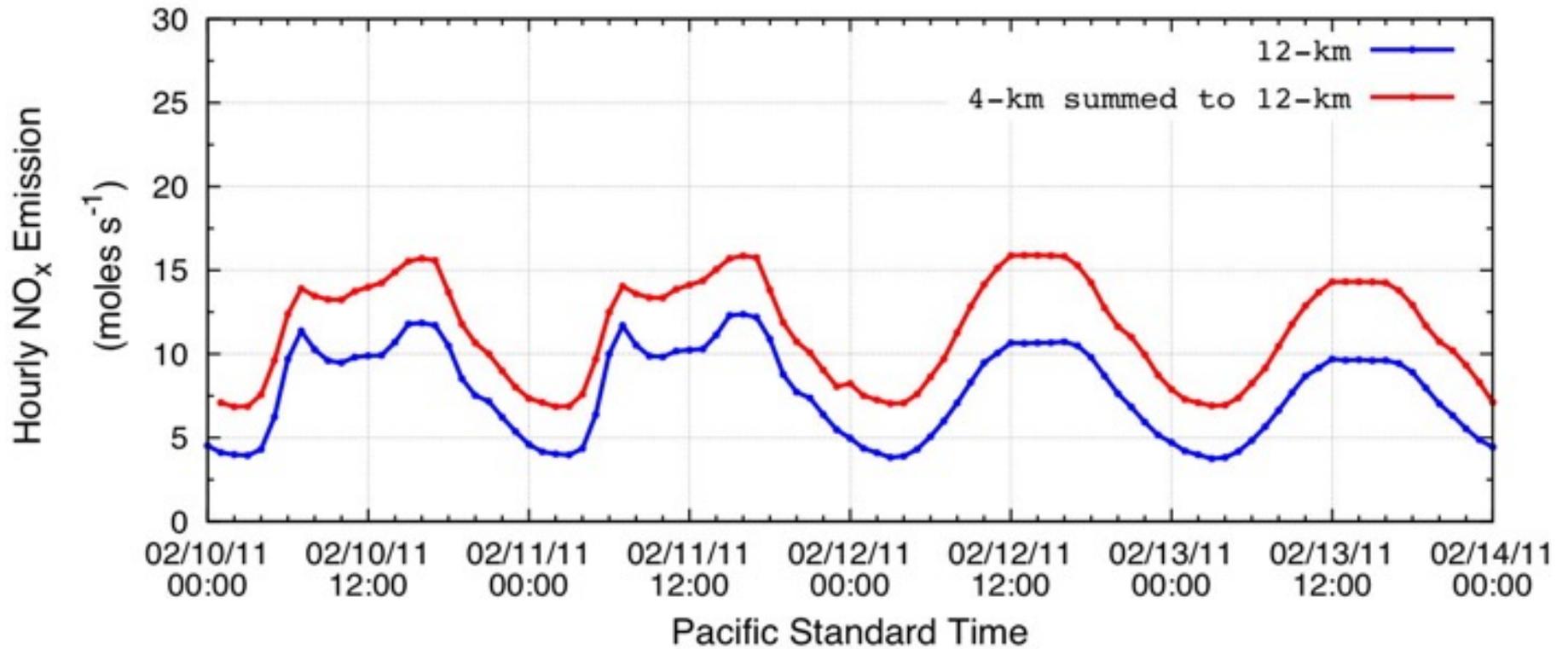


Feb 13, 2011 @ 11 pm

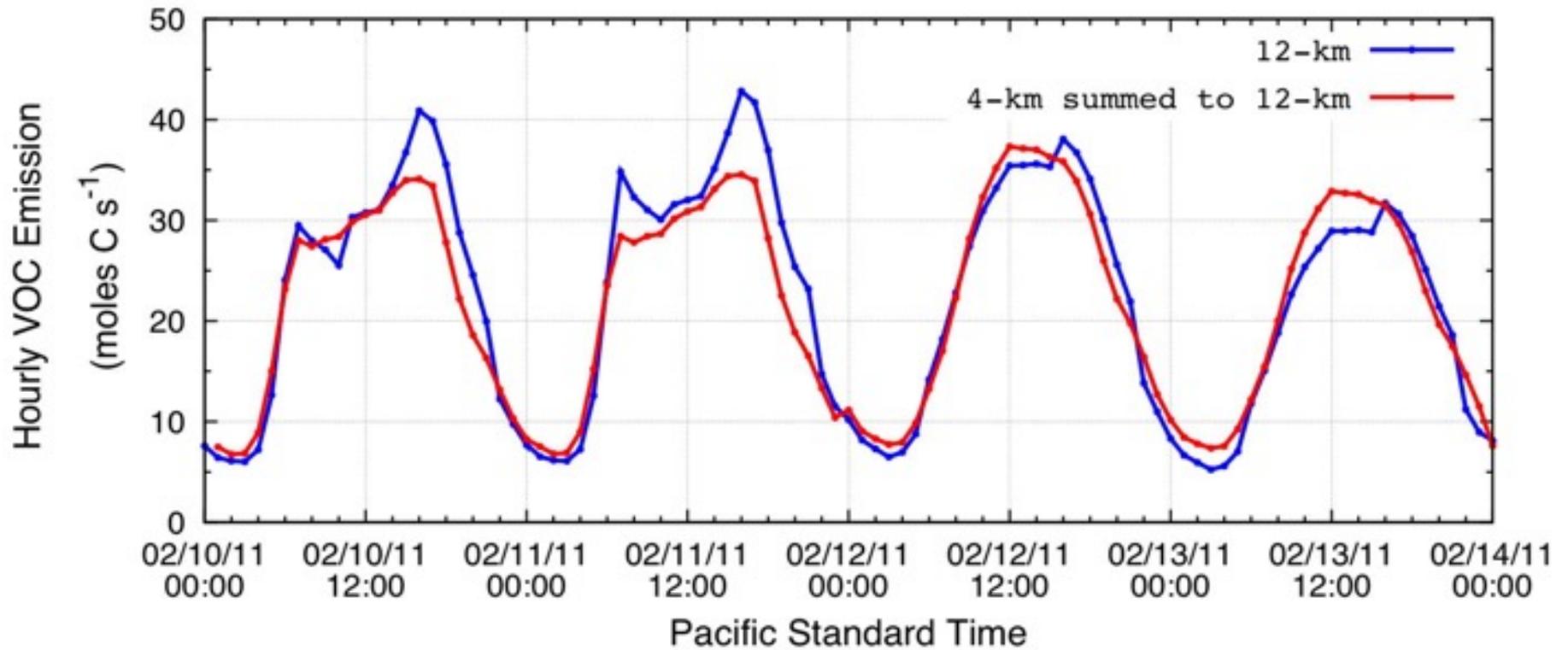


VOC/NO_x Emissions

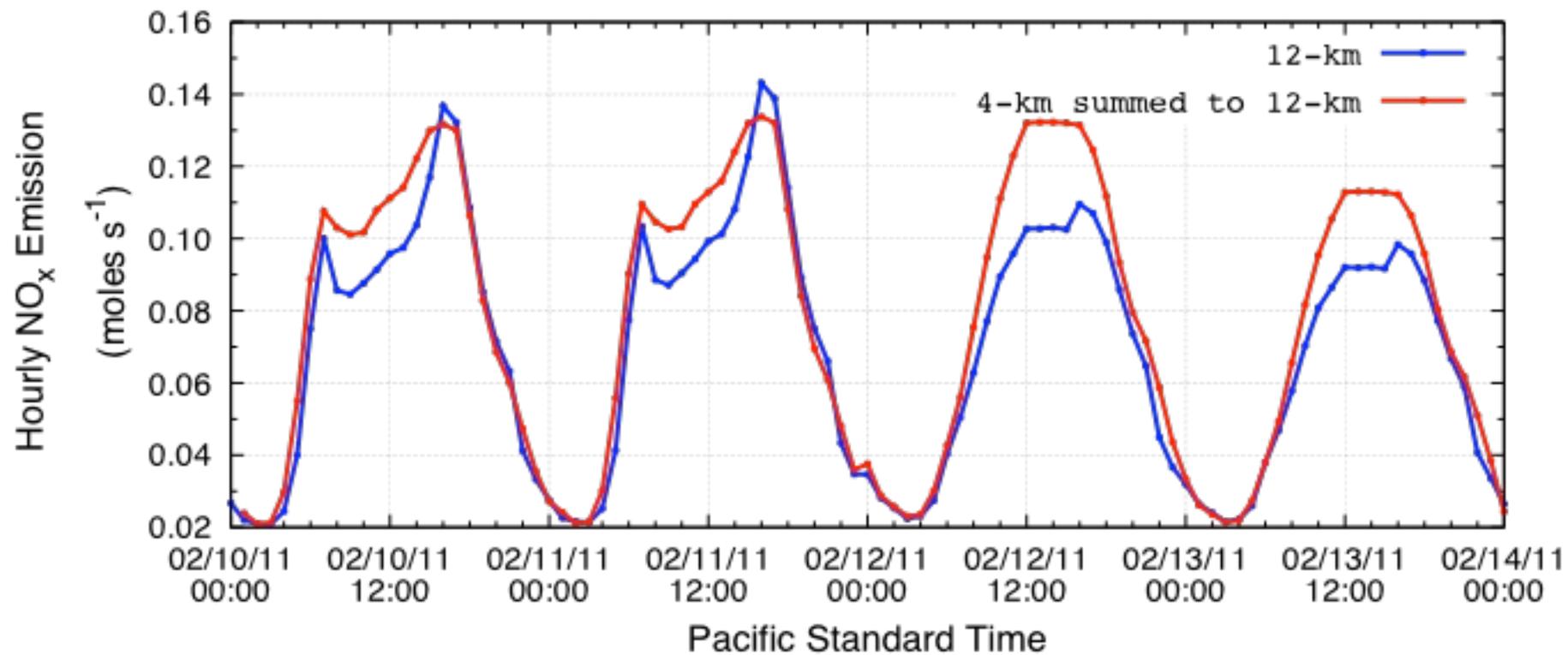
Seattle - Beacon Hill



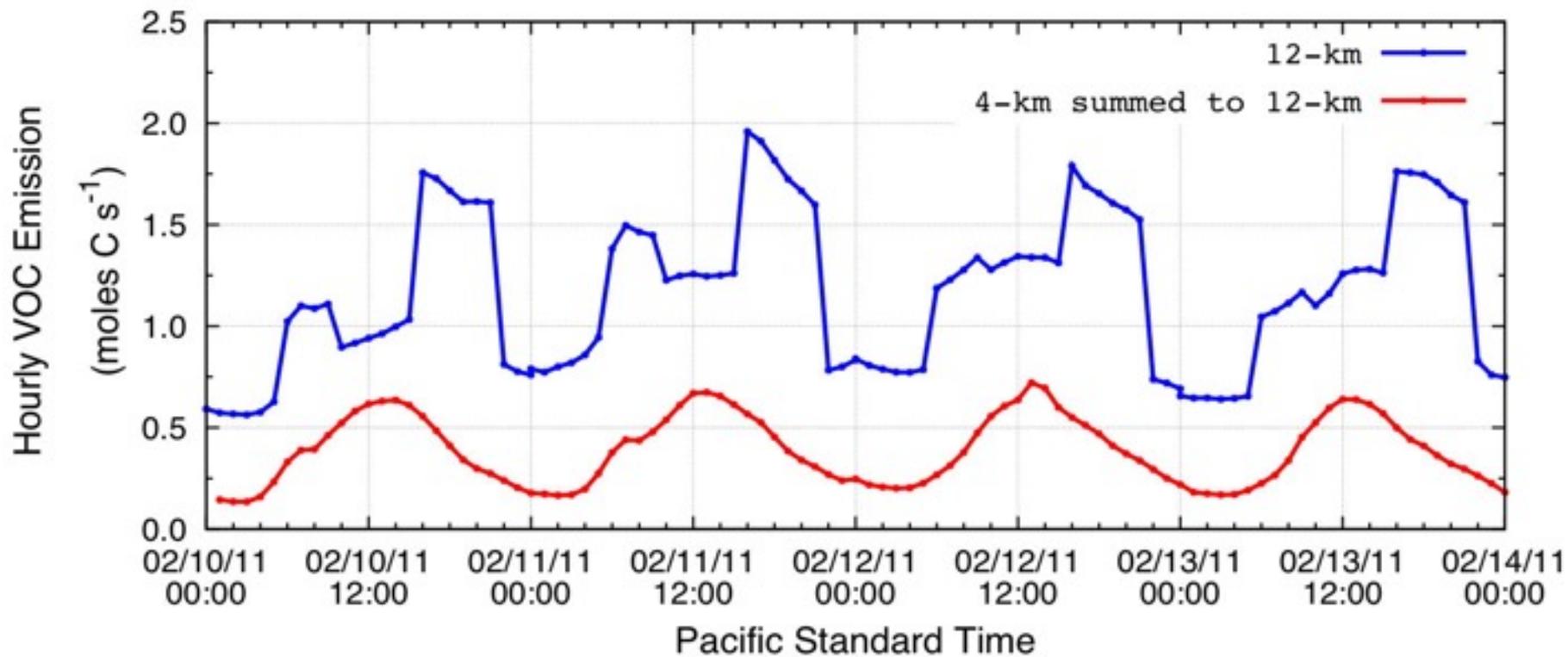
Seattle - Beacon Hill



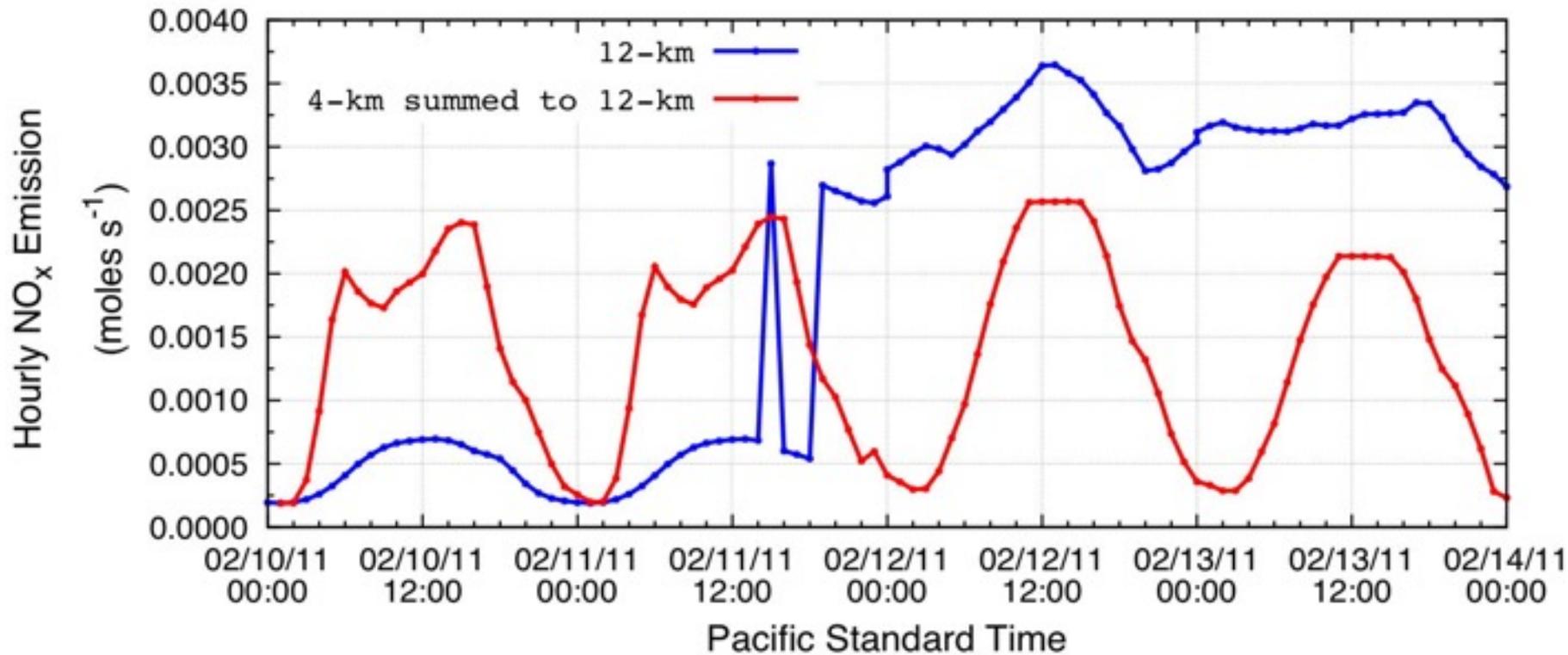
Enumclaw Mud Mt



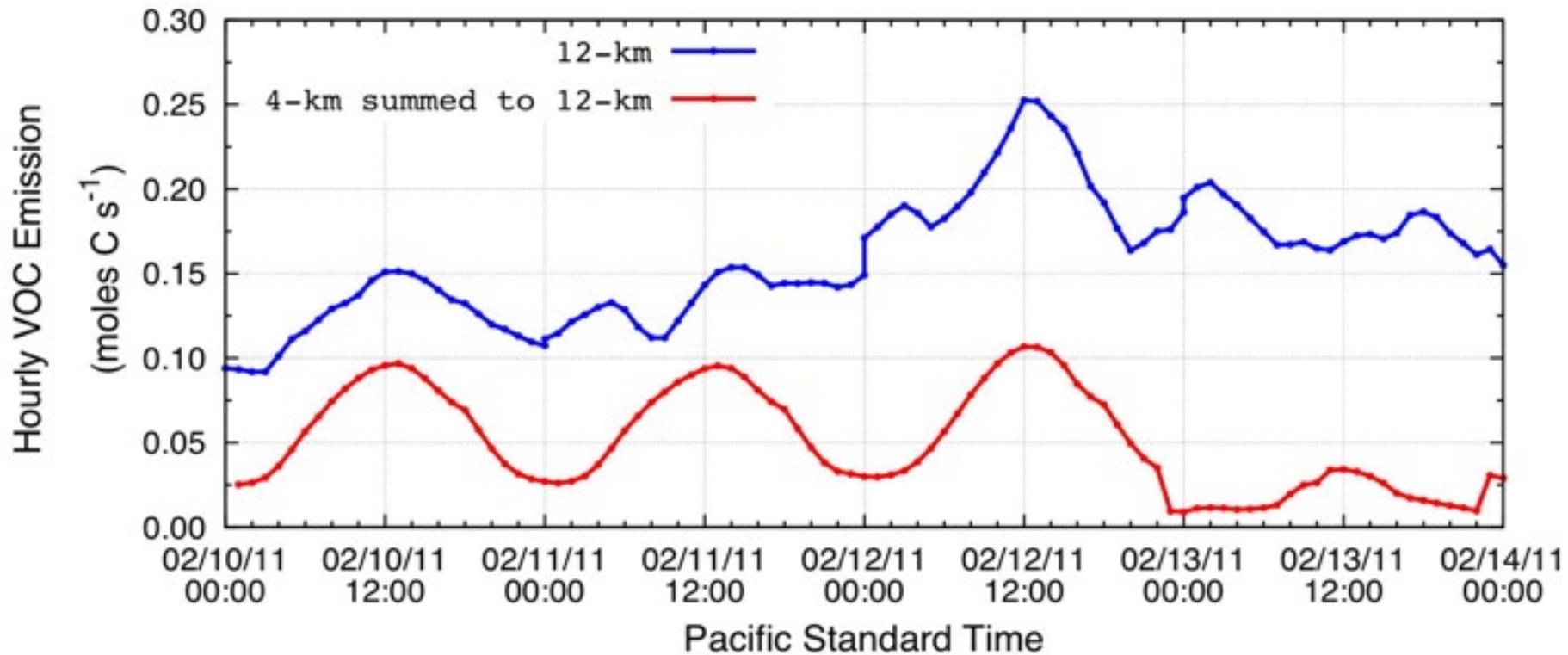
Enumclaw Mud Mt



Craters of The Moon

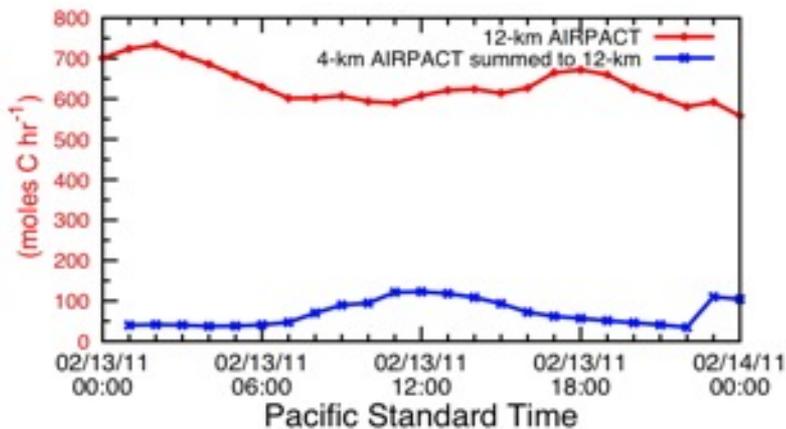


Craters Of The Moon

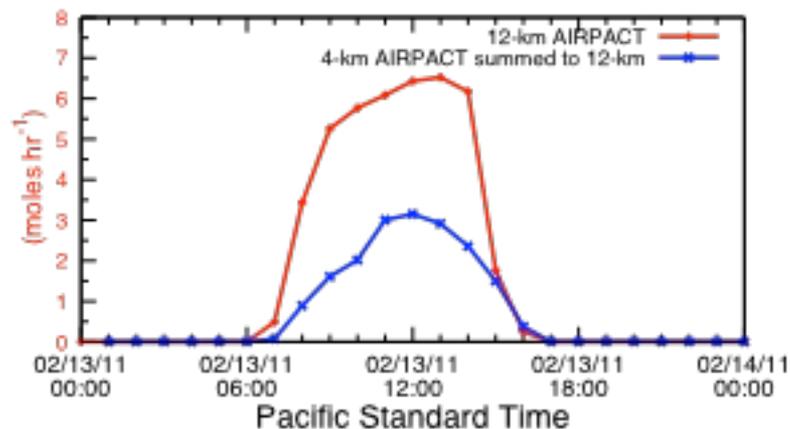


Craters of the Moon: Monoterpene, Isoprene, and Total VOC Comparison

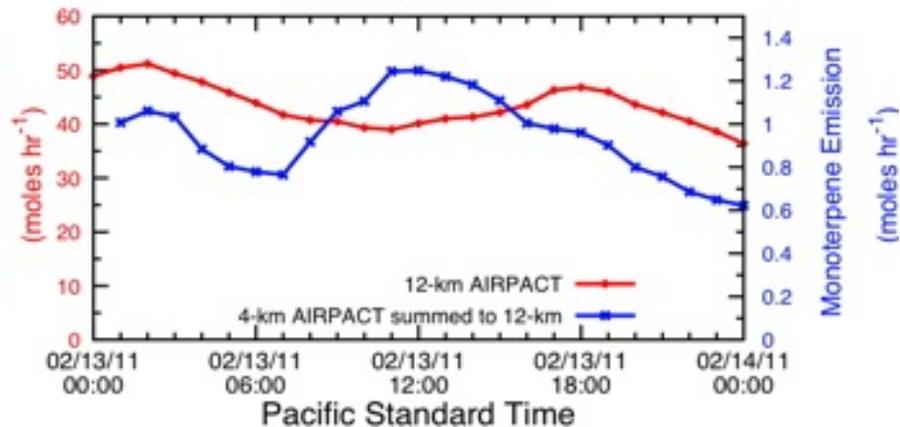
Total VOC



Isoprene

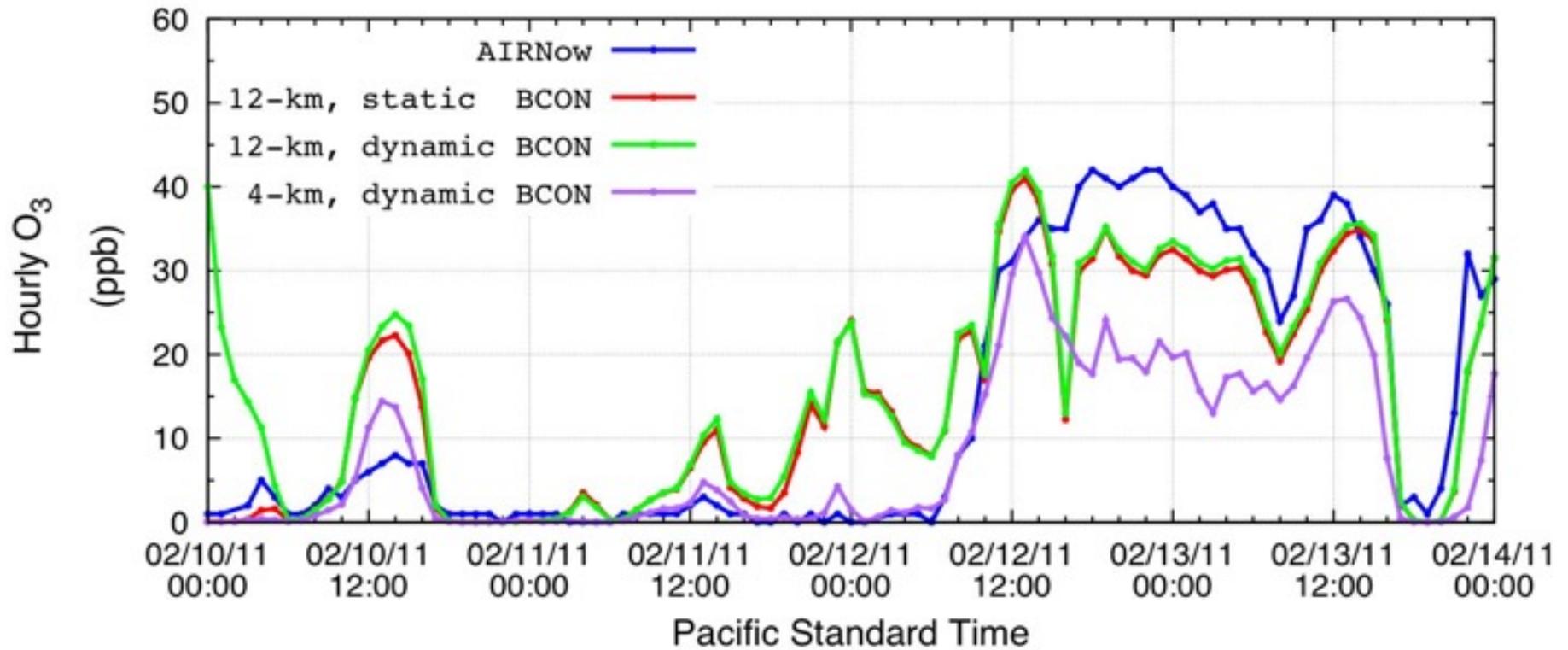


Monoterpene

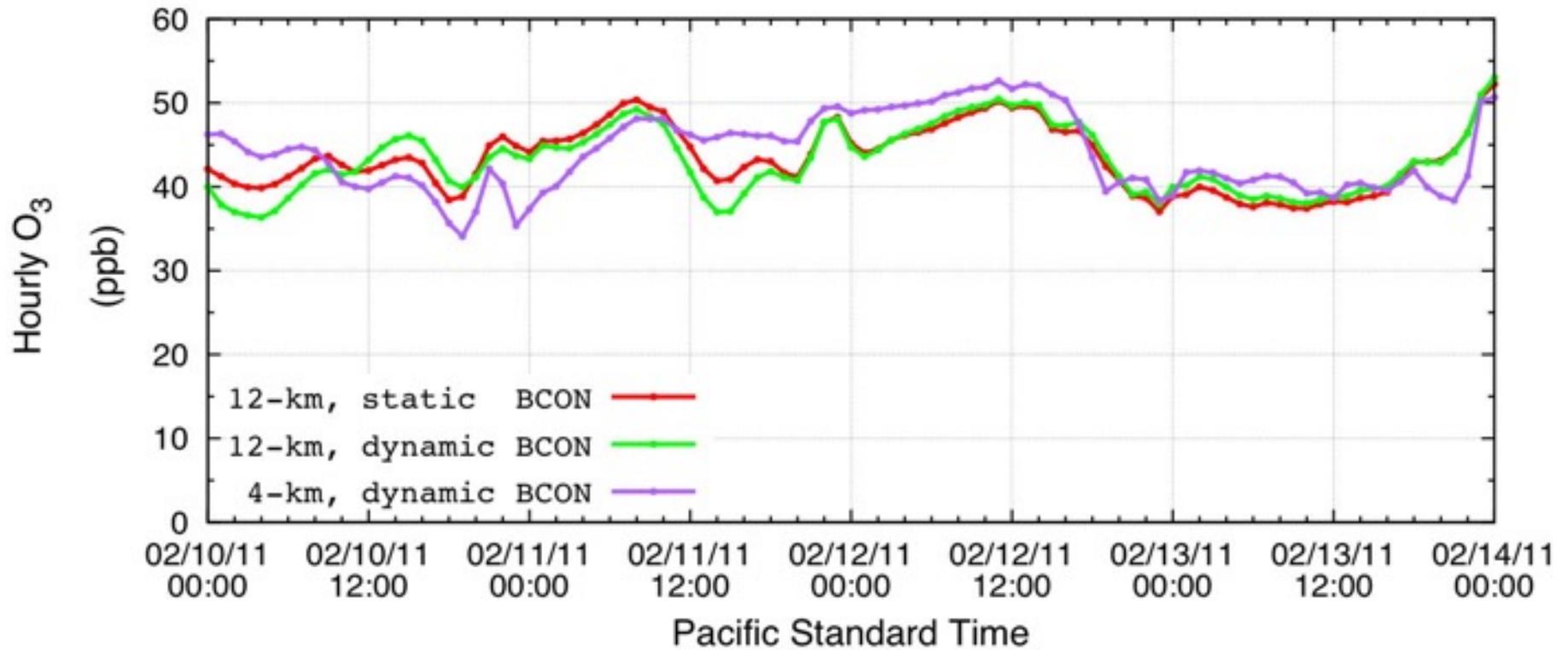


Ozone

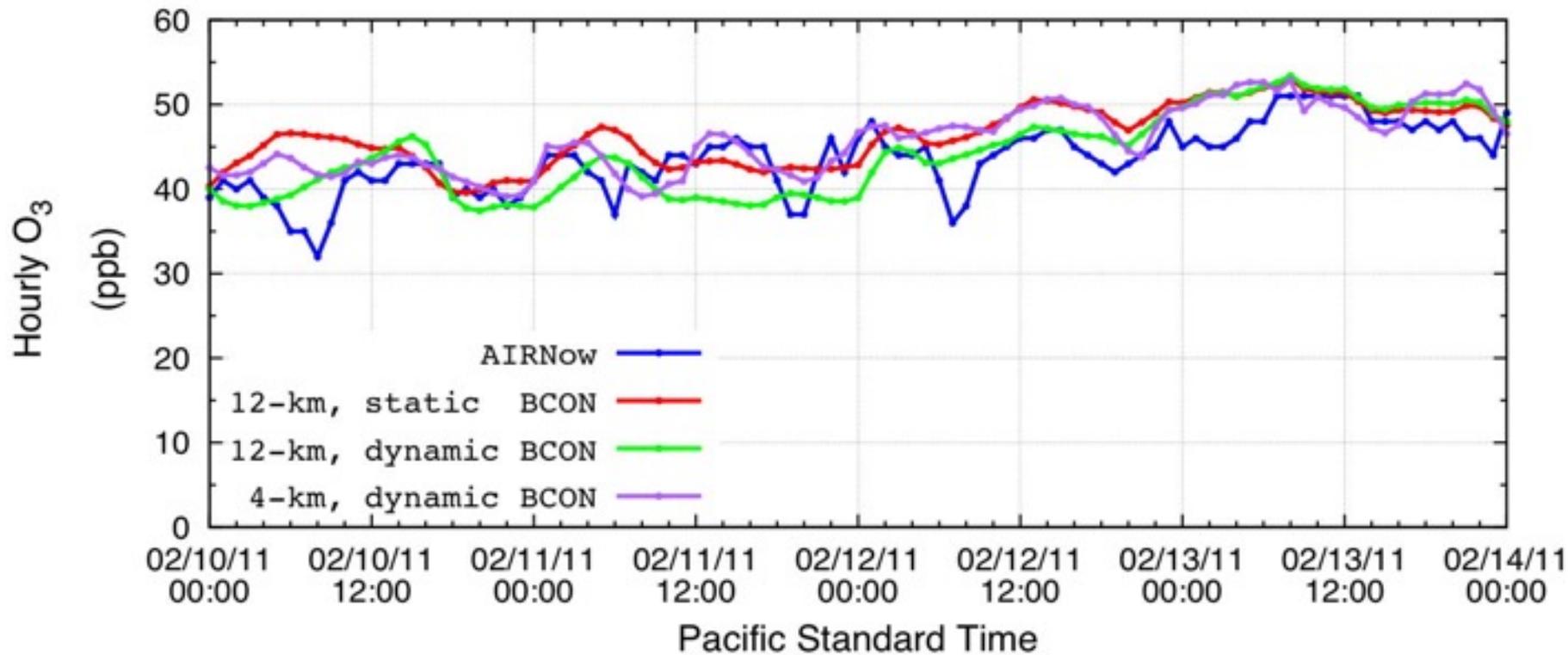
Seattle - Beacon Hill



Enumclaw Mud Mt

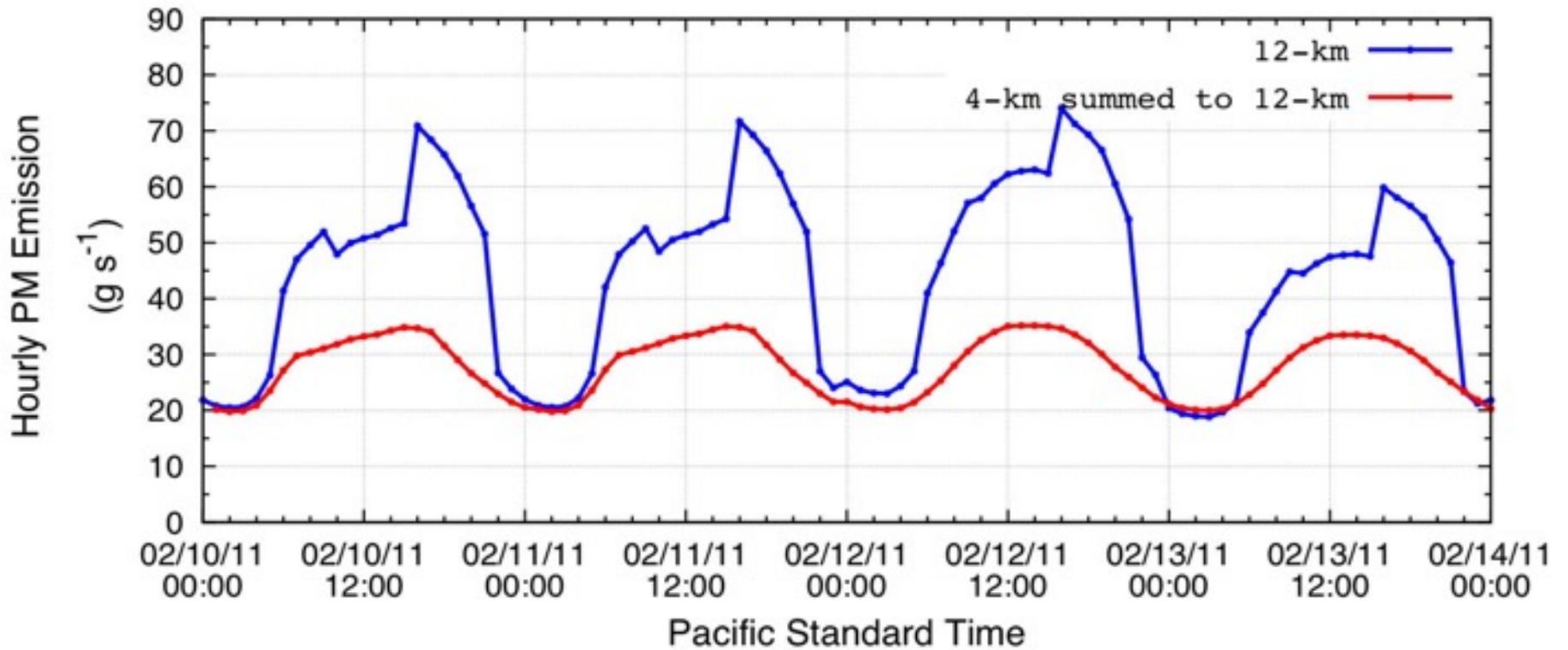


Craters of the Moon

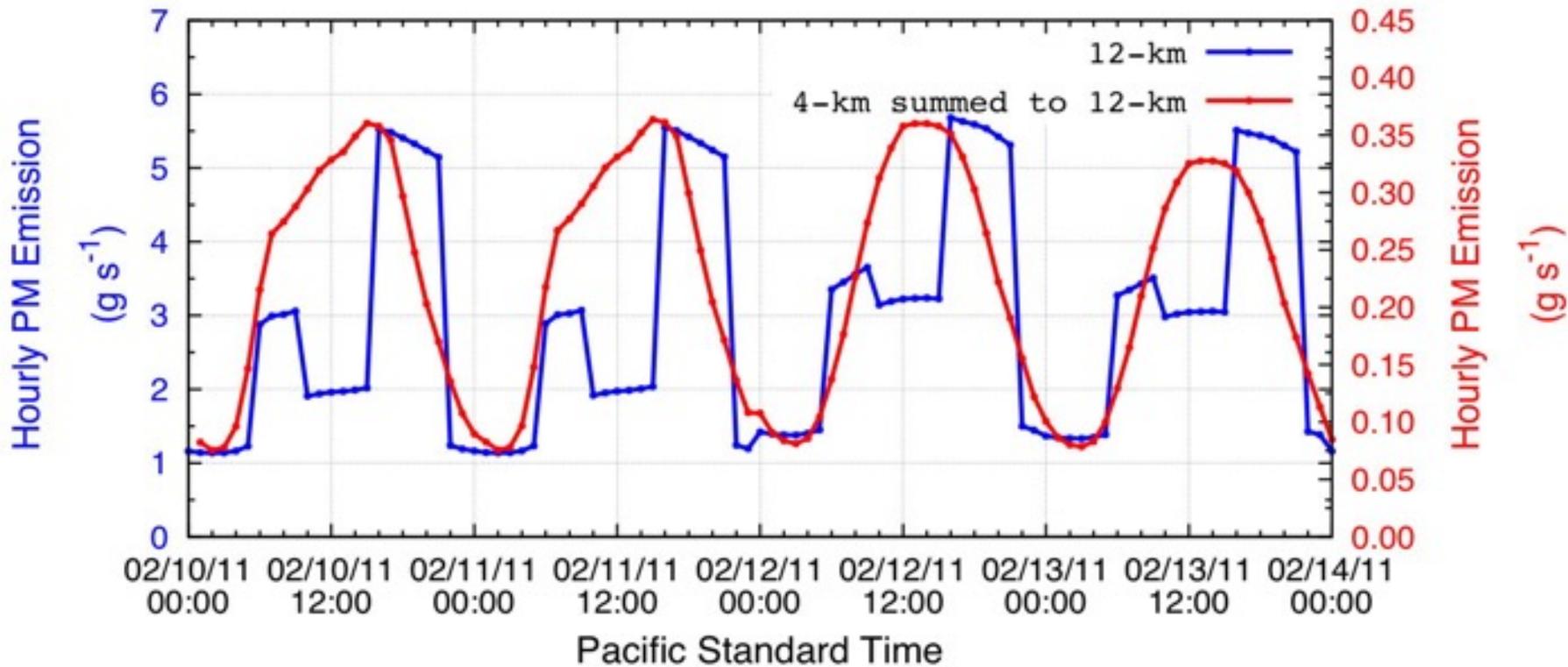


PM Emissions

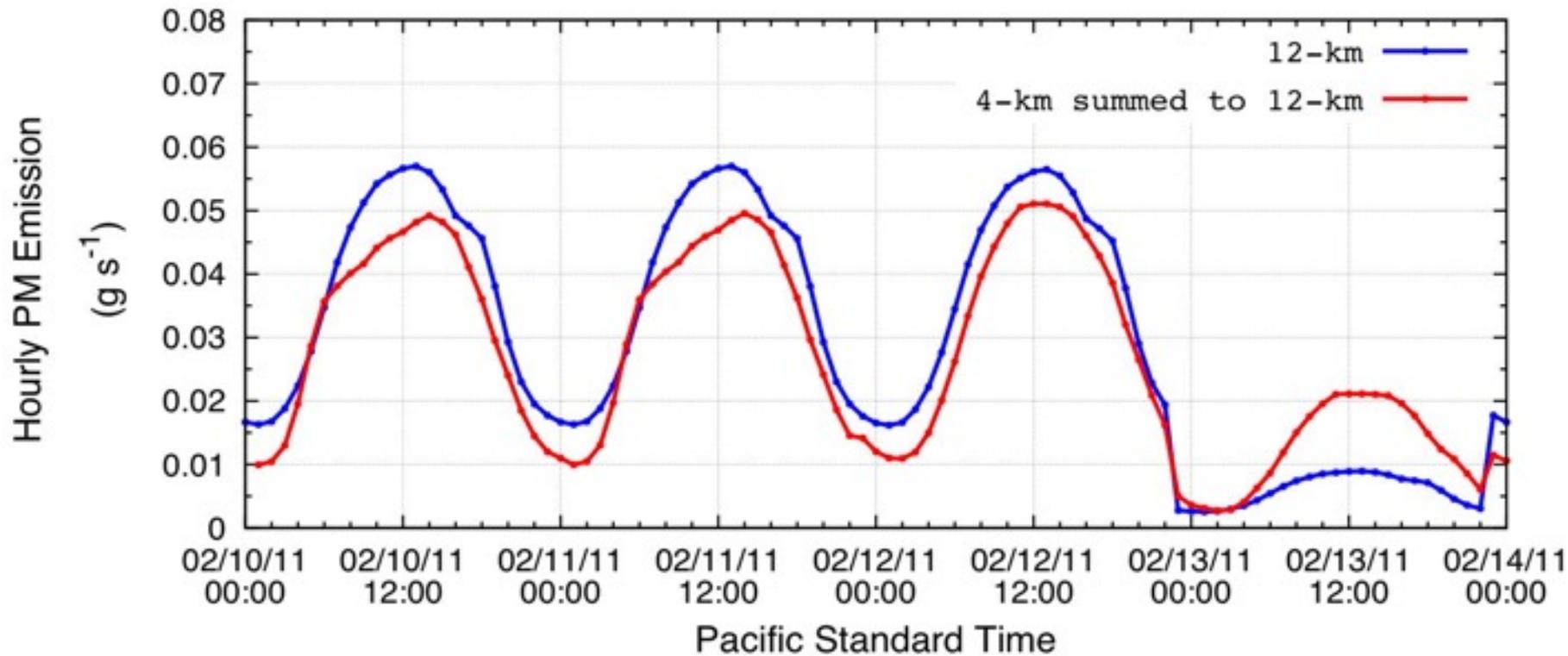
Seattle - Beacon Hill



Enumclaw Mud Mt

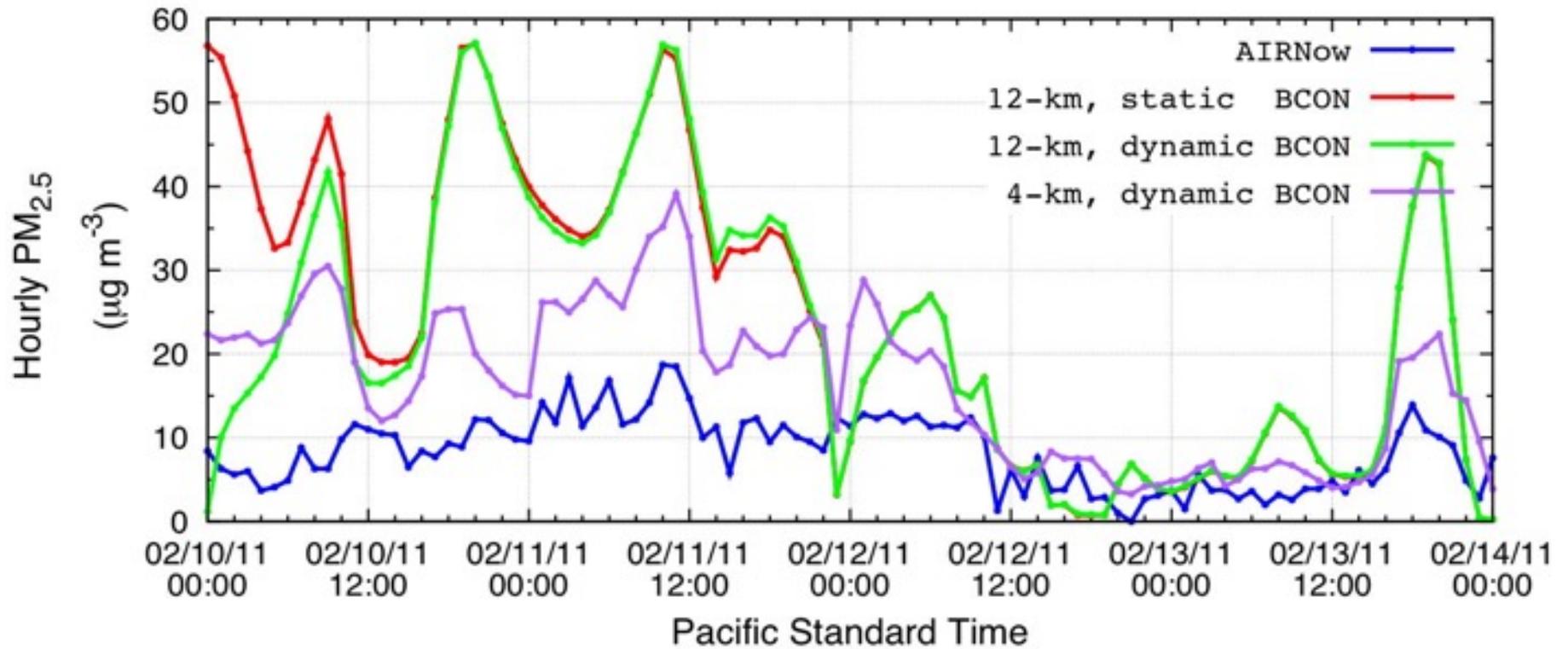


Craters Of The Moon

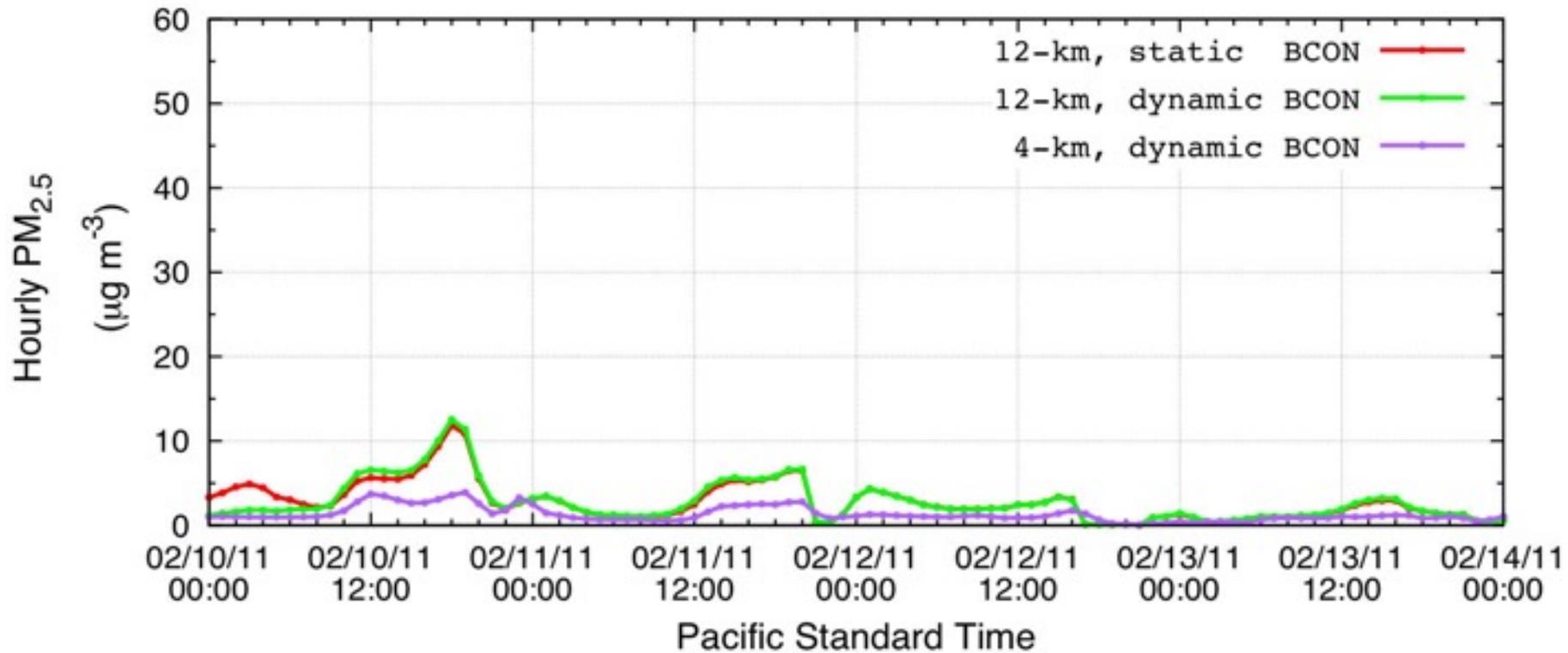


PM Concentrations

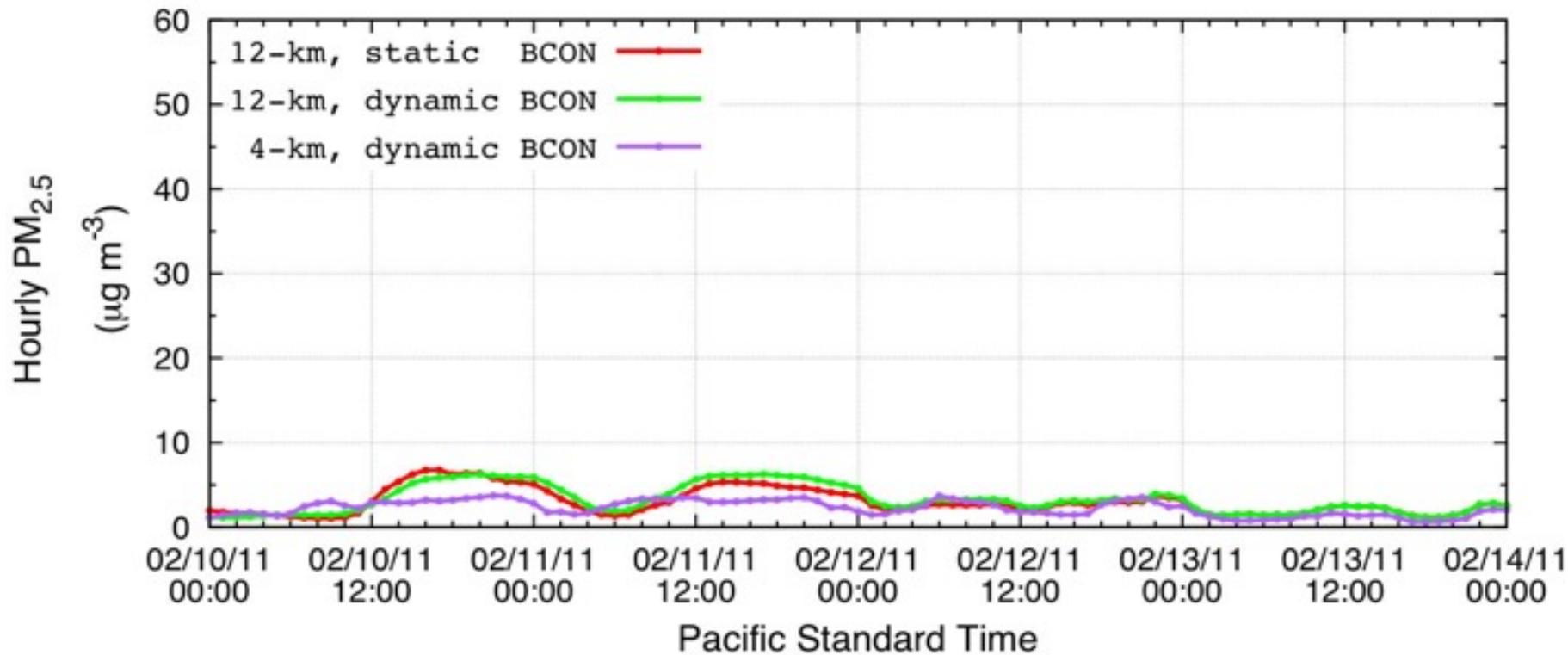
Seattle - Beacon Hill



Enumclaw Mud Mt



Craters of the Moon



Initial Summary

– VOC/NO_x emissions

- Urban NO_x: AP4 > AP3, Urban VOC: AP4 < AP3 (VOC/NO_x ratio decreases)
- Rural NO_x: AP4 > AP3, Rural VOC: AP4 << AP3
- MEGAN Isoprene < BEIS Isoprene (one location)

– O₃ Concentrations

- Urban O₃ AP4 < AP3 and less than observed (but wintertime conditions)
- Rural O₃ AP4 ~ AP3

– PM Emissions

- Urban PM: AP4 < AP3
- Rural PM: AP4 ~< AP3

– PM Concentrations

- Urban PM: AP4 > observed and better than AP3