NW-AIRQUEST ANNUAL MEETING 2012
6-8 June 2012, ETRL #101, WSU campus, Pullman, WA

AIRPACT-3/NASA update (10 min)

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Date: June 6, 2012

Laboratory for Atmospheric Research
Washington State University
World Class. Face to Face.

NASA Grant Project Goals:

Funded to utilize Aura/OMI data products

Primary project objectives:

- Quantify the significance of long range transport on AIRPACT performance
- Integrate satellite products and global modeling to update AIRPACT BCON
- Concentrates on the time period of 2007-2009

Overall approach :

- develop correlation relationships between CO and other satellite detected species including NO2, O3, SO2, and HCHO
- investigate methods as described by Paton-Walsh et al. (2010) where excess AOD (above background levels) detected by MODIS were used to estimate excess CO attributed to wildfires to correct for CO that remained in the region for multiple days so that the emission estimates only account for fresh CO emissions.
  - The method was also applied to estimate a number of other trace gas emissions from fires including ammonia, formaldehyde, and a number of other VOCs.
- Application of the excess method using the AOD from OMI and/or MODIS in conjunction with AIRPACT modeling results for evaluation of AIRPACT wildfire emissions
- Investigate use of the excess AOD method for application to urban plumes

NASA Grant Project Status:

- Using inert tracer CMAQ build to model flow from instrusion/transport to ground level
- Use satellite data to watch the intrusion/transport
  - NO2 and trop O3 (Ziemke and Liu) from OMI
  - O3 and CO from AIRS and MOPITT

- Mt Batchelor data – dates identified by Dan Jaffe
- Presentations on the BCON/MOZART effects on the AQ model will be presented at the Aura meeting in October (publication in ACP, 2012)

- A summer REU student will be working on comparison of the Ziemke/Xiong trop ozone data sets and applications of those data sets for intrusions/transport

IASI CO

- Louisa is currently doing IASI CO/tracers for the DC3 campaign
- IASI CO coverage is much better than MOPPIT – could change CO in the model. Louisa will be comparing at some point in the future (IASI has a wider swath)

Collaboration with MBO/Jaffe:

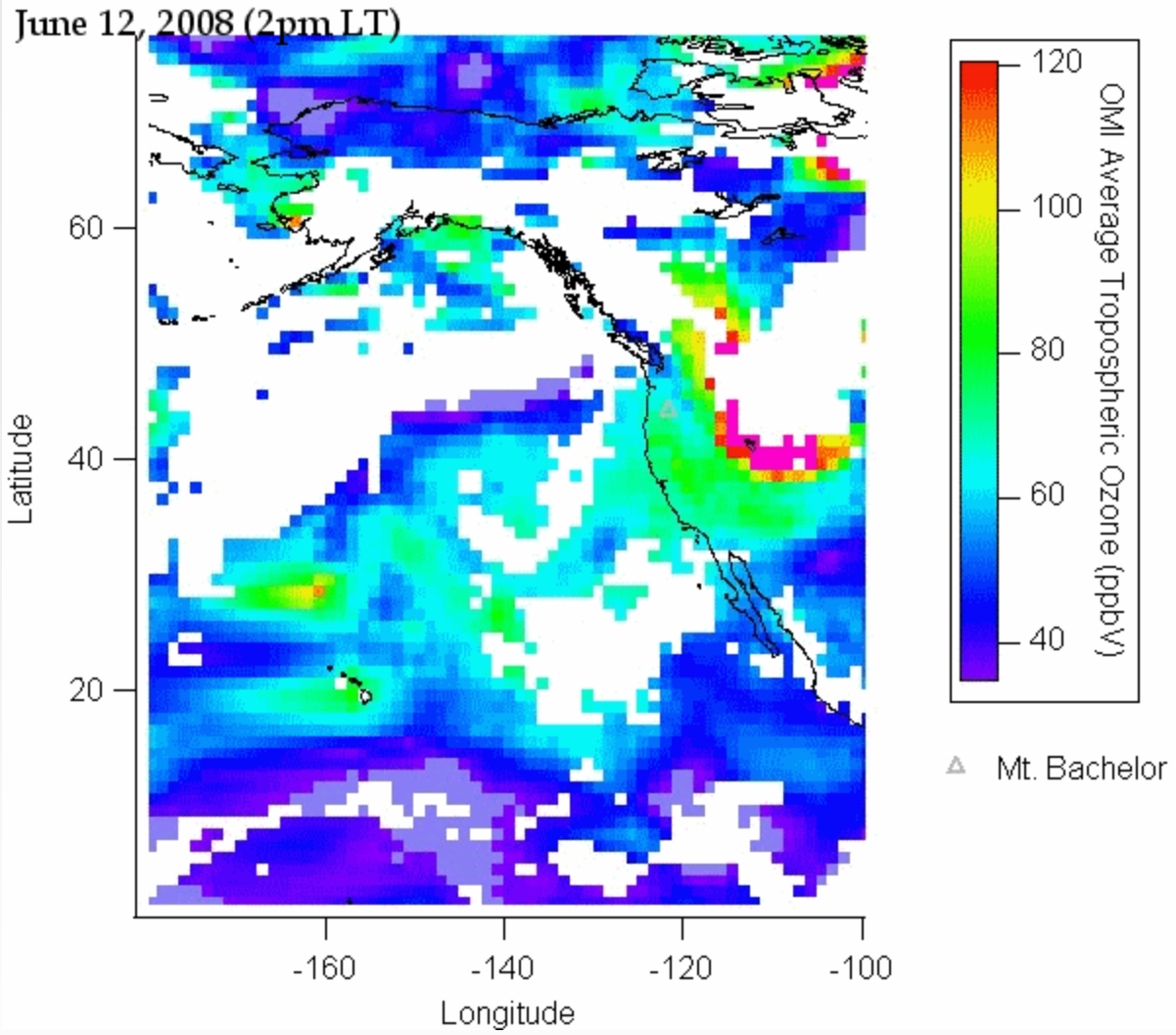
high ozone (>70 ppbv) from subsidence of UT/LS air masses at MBO:

8 March 2005
23 July 2005
22 April 2006
14 June 2008
25 June 2008
26 March 2009
5 April 2009
16 May 2009

high ozone (>70 ppbv) due to a combination of subsidence of UT/LS air masses and long-range transport of Asian emissions at MBO:

13 May 2006
28 April 2007
15 June 2008
7-8 July 2008
15 May 2009

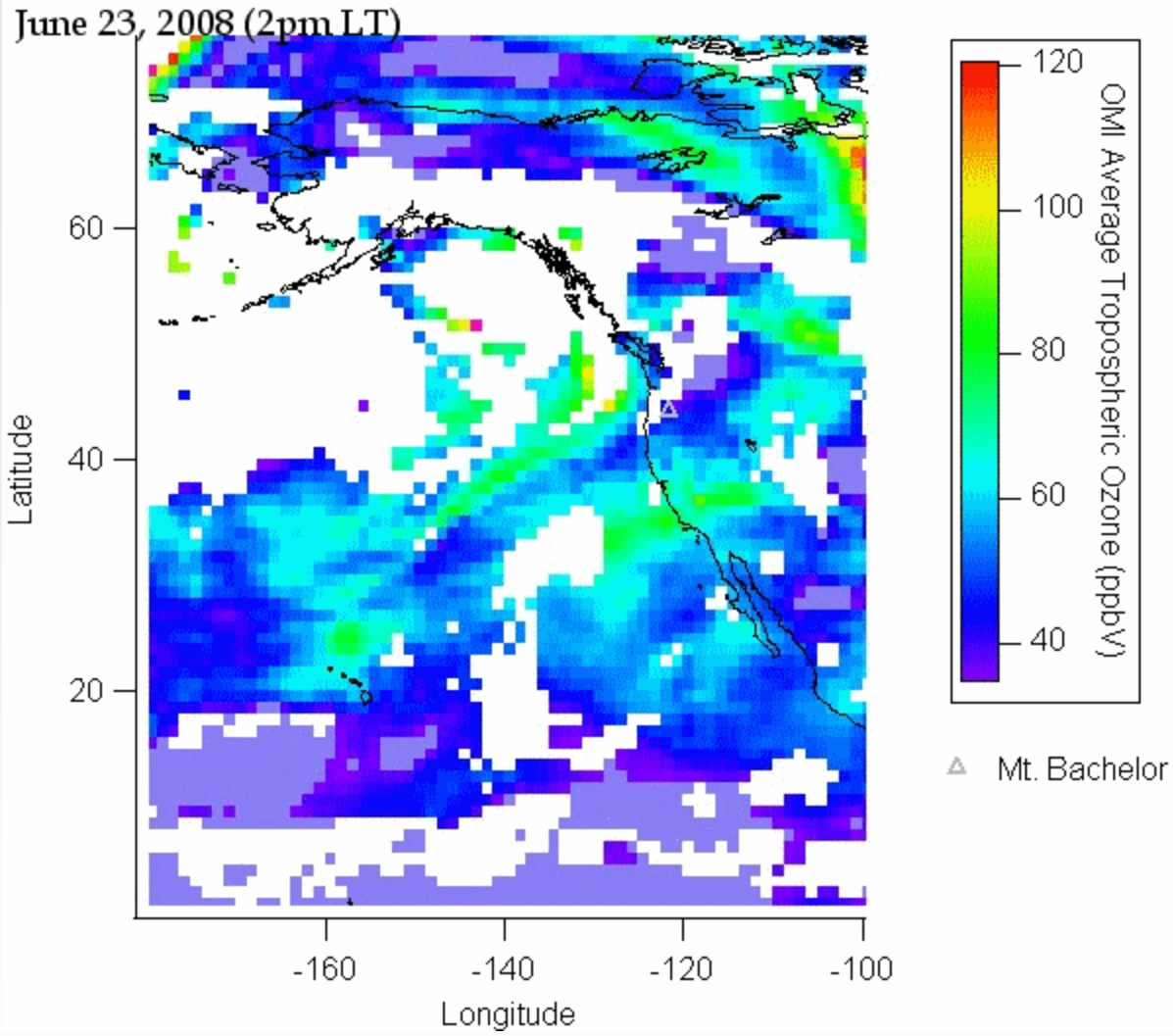
from (Ambrose et al., 2011)



OMI Trop. Ozone

(developed by Jerry Ziemke)

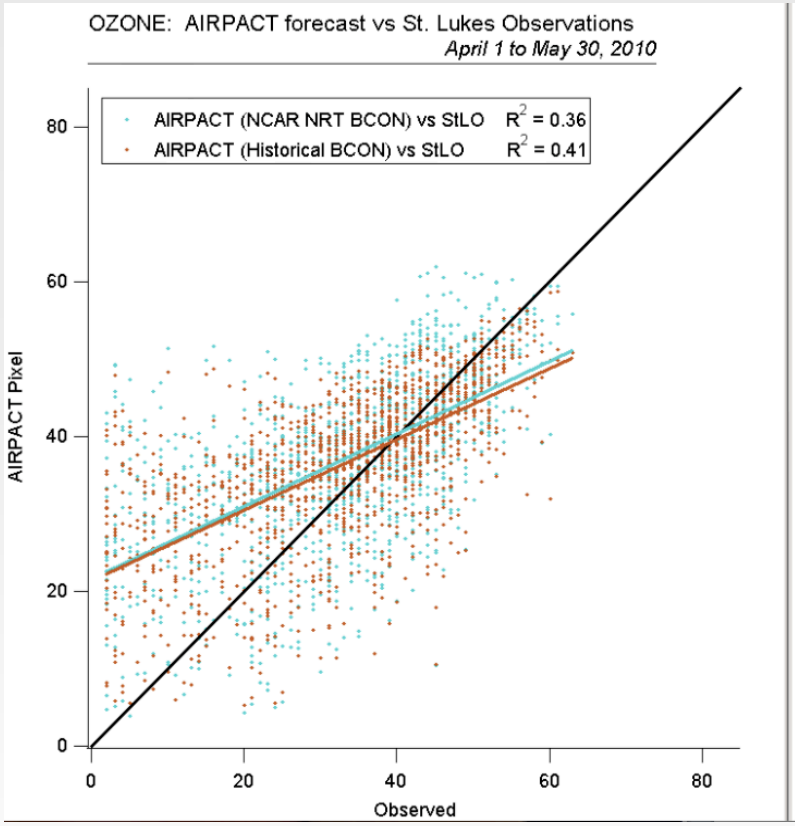
June 12 – 16 (2 pm LT), 2008

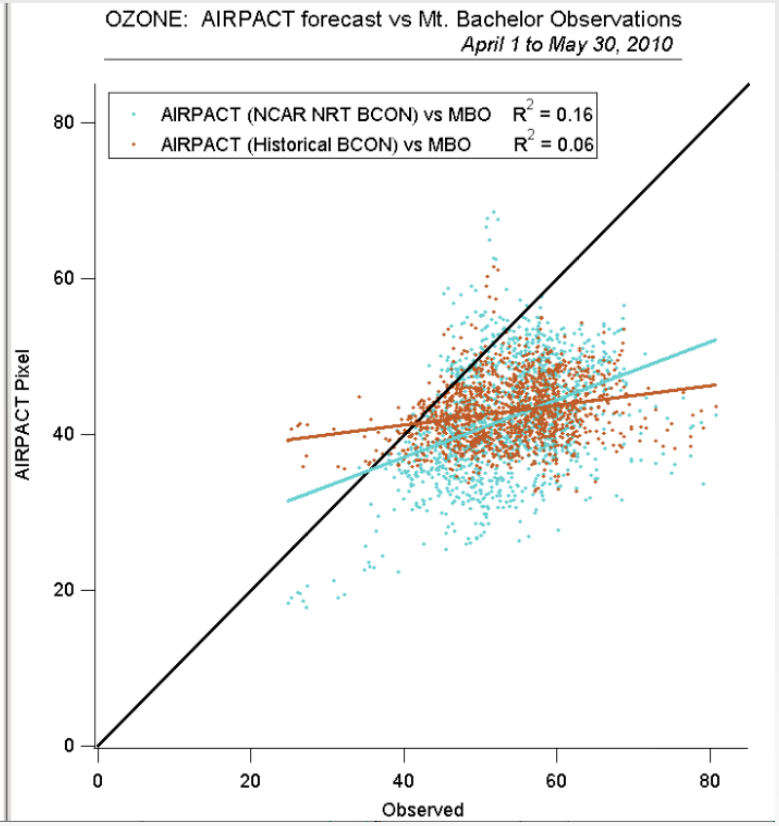


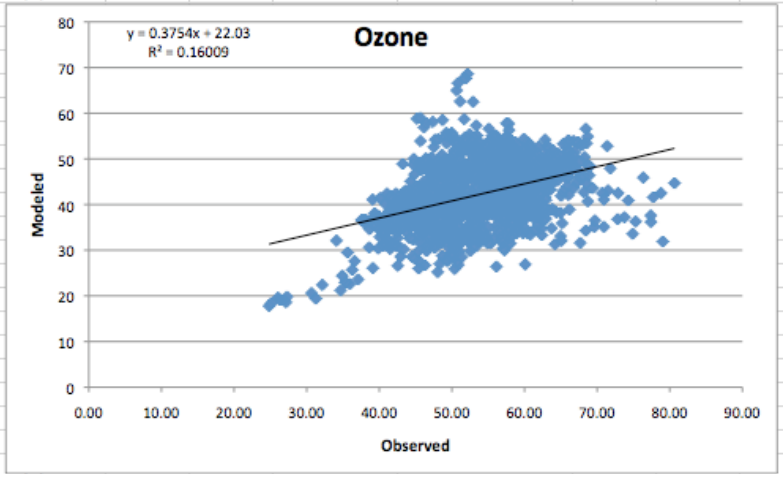
OMI Trop. Ozone

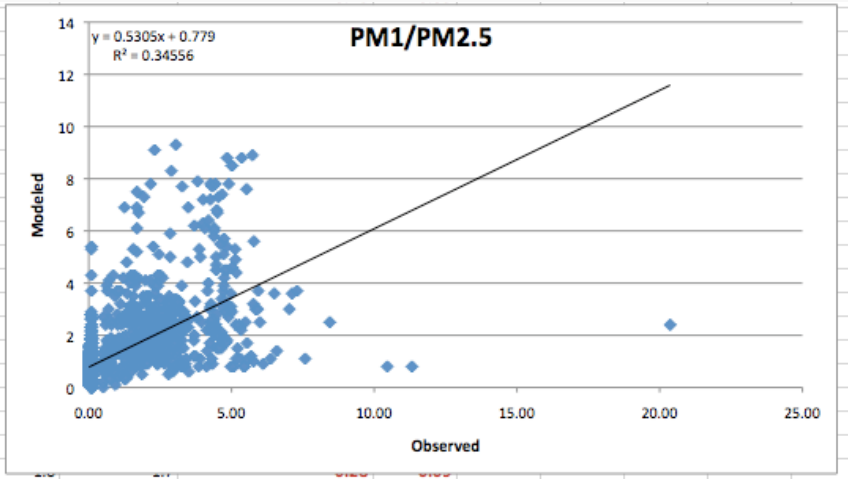
(developed by Jerry Ziemke)

June 23 – 26 (2 pm LT), 2008


OZONE: AIRPACT forecast vs St. Lukes Observations
April 1 to May 30, 2010
AIRPACT (NCAR NRT BCON) vs StLO R2 = 0.36
AIRPACT (Historical BCON) vs StLO R2 = 0.41
AIRPACT Pixel
Observed
0
20
40
60
80

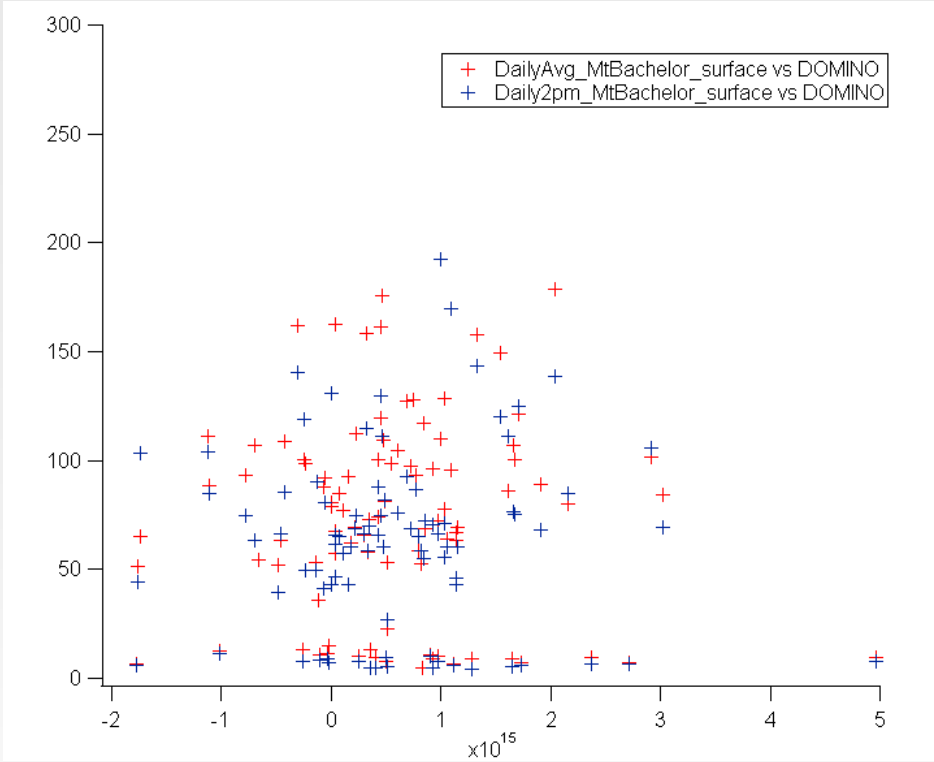

OZONE: AIRPACT forecast vs Mt. Bachelor Observations
April 1 to May 30, 2010
AIRPACT (NCAR NRT BCON) vs MBO R2 = 0.16
AIRPACT (Historical BCON) vs MBO R2 = 0.06
AIRPACT Pixel
Observed
0
20
40
60
80

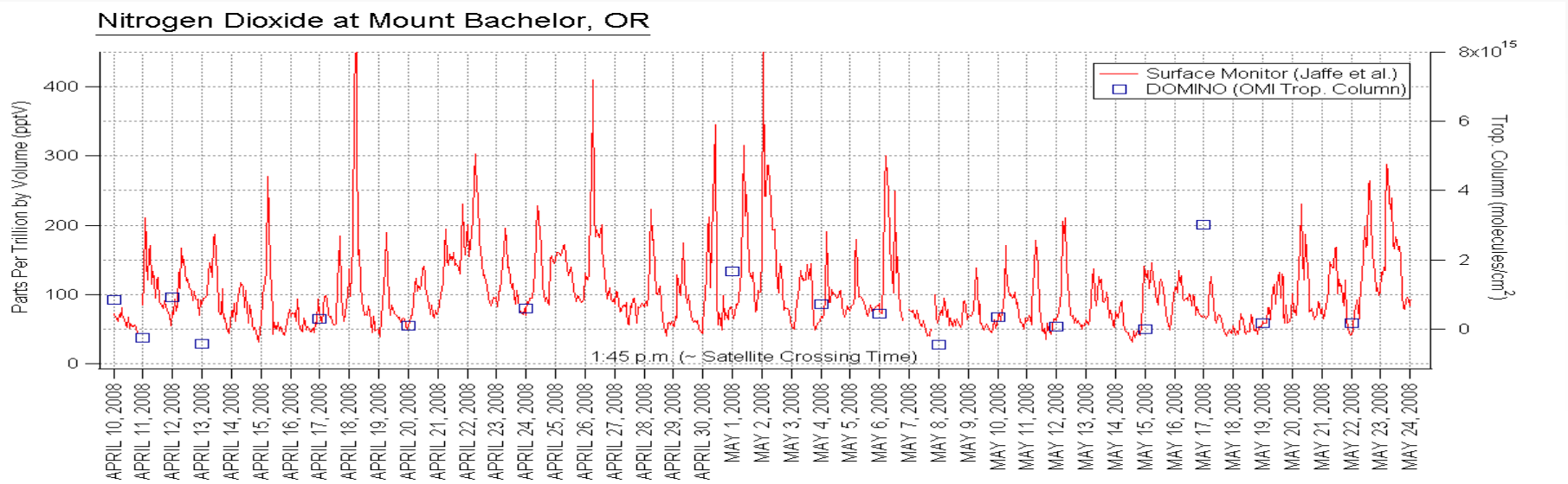

Ozone
y = 0.3754x + 22.03
R² = 0.16009
Modeled
Observed
0
10
20
30
40
50
60
70
80
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00

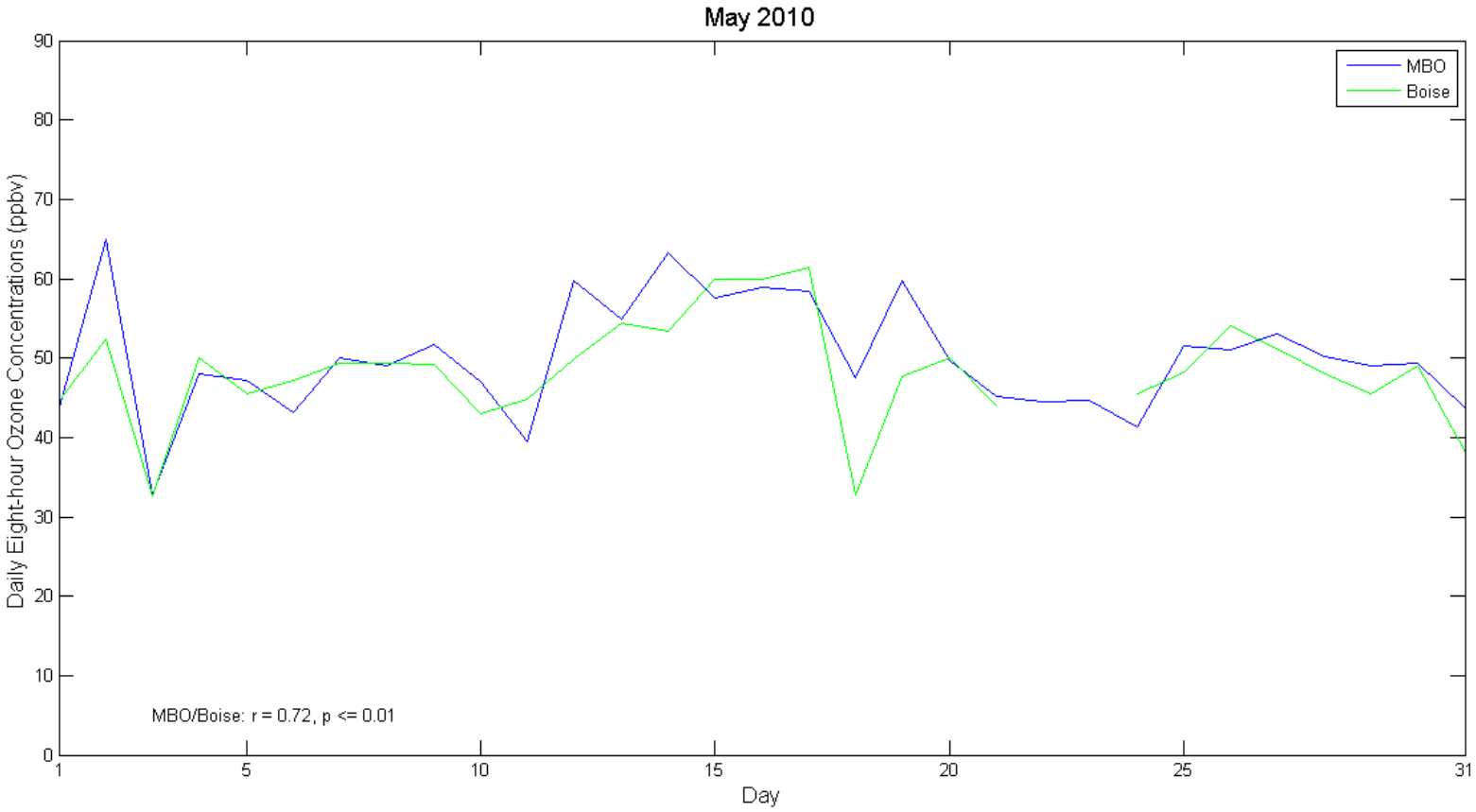

PM1/PM2.5
y = 0.5305x + 0.779
R² = 0.34556
Modeled
Observed
0
2
4
6
8
10
12
14
0.00
5.00
10.00
15.00
20.00
25.00

April 10 to June 18, 2008

OMI Trop NO2 vs MBO NO2







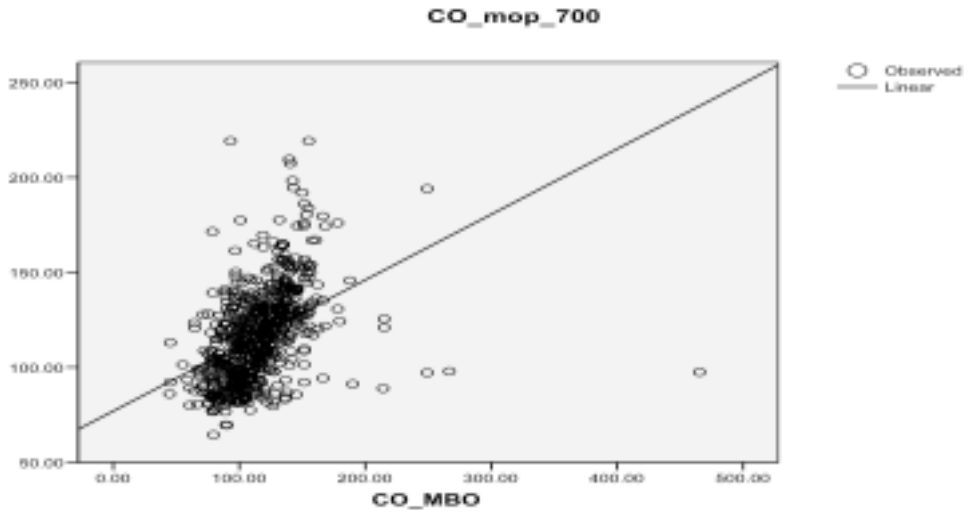
Dan Jaffe– Mt Batchelor

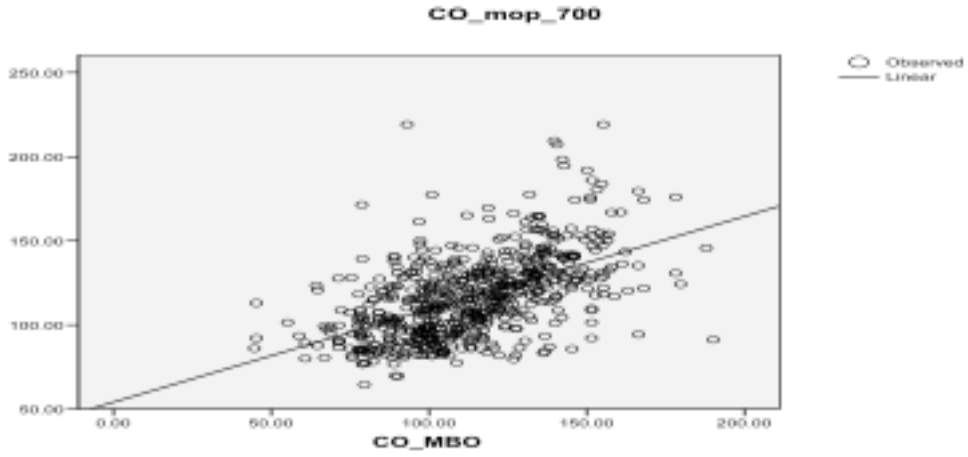
looking at the relationship of Mt. Bachelor data to satellite data and regional AQ. Boise AQ site, May 2010, MDA8

For MBO this is at night and for Boise this is in the afternoon.

So this correlation reflects an approx 12 hour lag/tranpsort time.

MOPITT CO, 2007 vs Mt. Bachelor Observations (from Louisa Emmons, NCAR)





The second plot eliminates points with MBO > 200 ppbv. This gives an R^2 of around 0.3 But most of the correlation is driven by the seasonal cycle, rather than daily variations.