4.5 Years of v4.0.9.0 AIRS CO

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with a big thanks to Jason Li at the GSFC DISC,
International and other Collaborators,
and the entire AIRS Team!

Supported by NASA AIRS, Validation, Tropospheric Chemistry
and Global Carbon Cycle Programs

Motivation

- v4 already in use by some researchers and contributed to several papers (McMillan, Warner, Thompson, Soja, Stohl).
- Collect v4.0.9.0 CO subset before we lose it to v5.
- Compare v4.0.9.0 to v5 on a global scale across the entire AIRS data record.
  - How good is v4 total column CO?
  - How much better is v5 information content?
  - How good are v5 CO profiles?
- Do what science we can now while we wait for v5 processing then update.

4.5 Years of AIRS CO

- Today's talk v4.0.9.0 as produced at the GSFC DISC
  - 20050701 to 20061231 from AIRS support files
  - 20020831 to 20050630 from GSFC DISC special CO subset (thanks to Jason Li).
  - 20070101 to 20070228 GSFC DISC CO subset
- Tomorrow's talk: Comparison of v4.0.9.0 to v5.0.7.0
  - Focus Day global comparisons
  - Averaging kernel differences
  - New error estimates

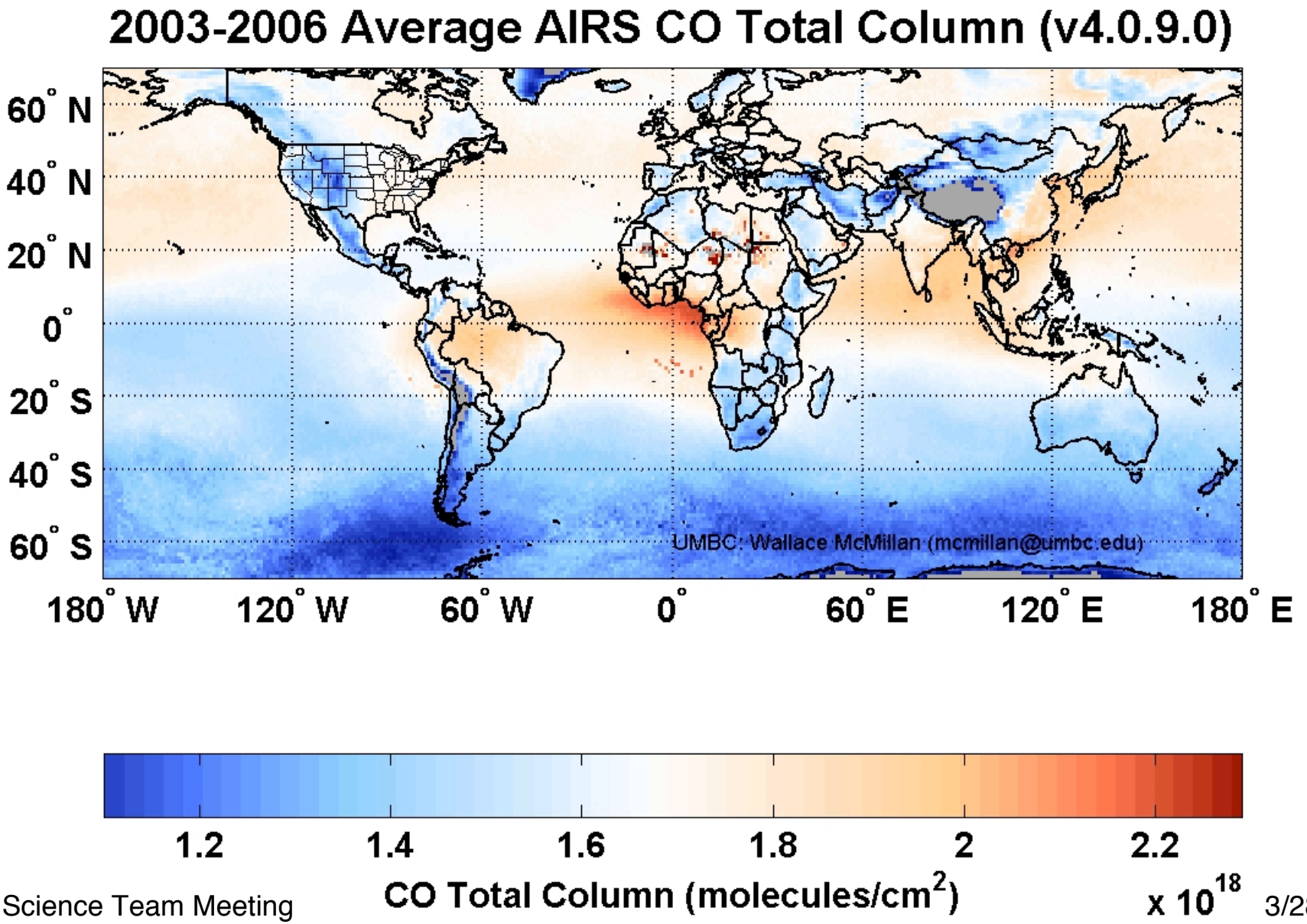
OUTLINE

- The Big Picture
  - 2003-2006 4-Year Average
  - Interannual differences
  - Seasonal Cycle
- Daily AIRS CO movie for January-November 2006 (thanks to Stephanie Granger)
- v4.0.9.0 Total CO Burden
- v4.0.9.0 Total Column Validation
- A few case studies

UMBC

JCET

http://physics.umbc.edu/~mcmillan



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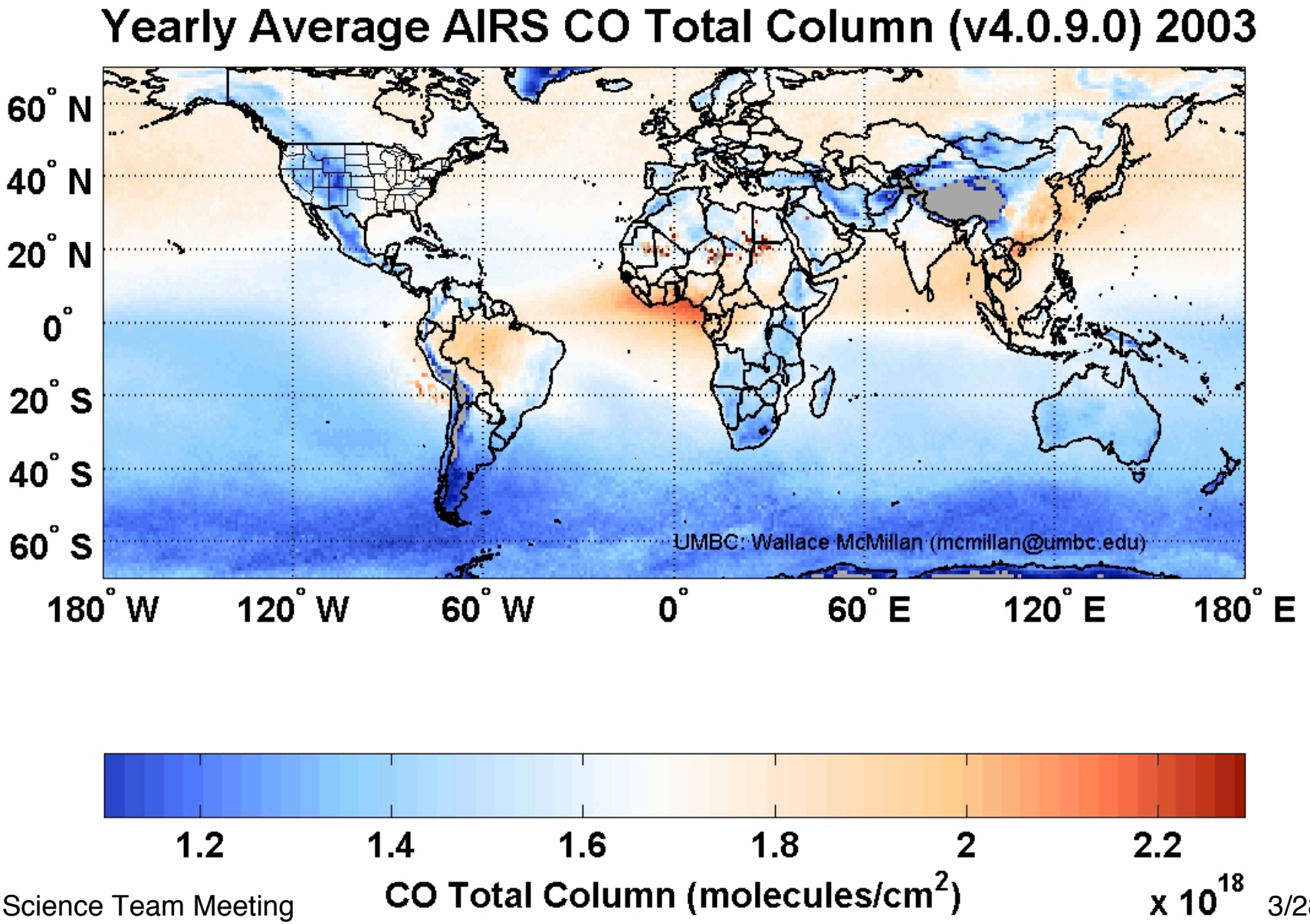

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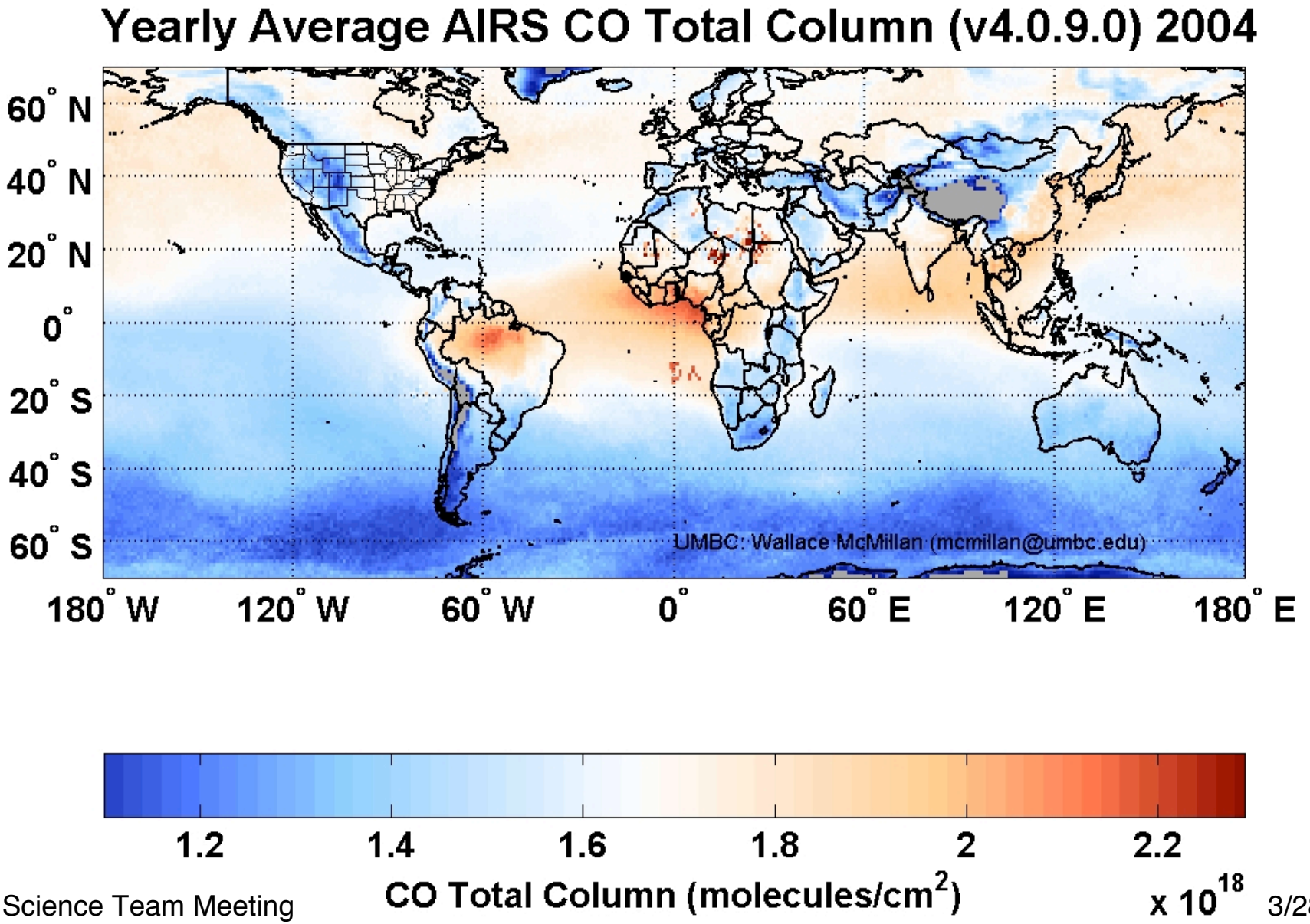

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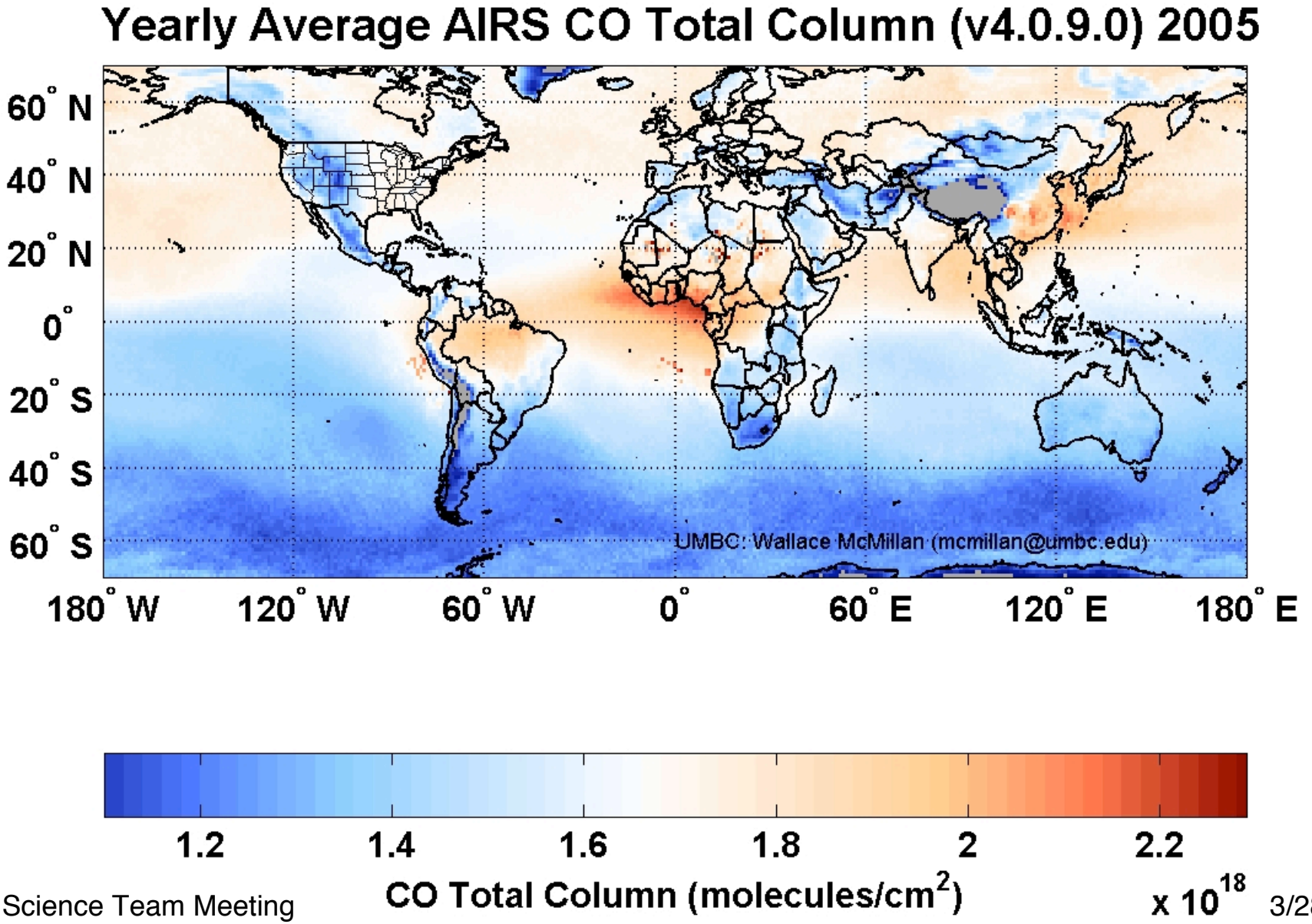

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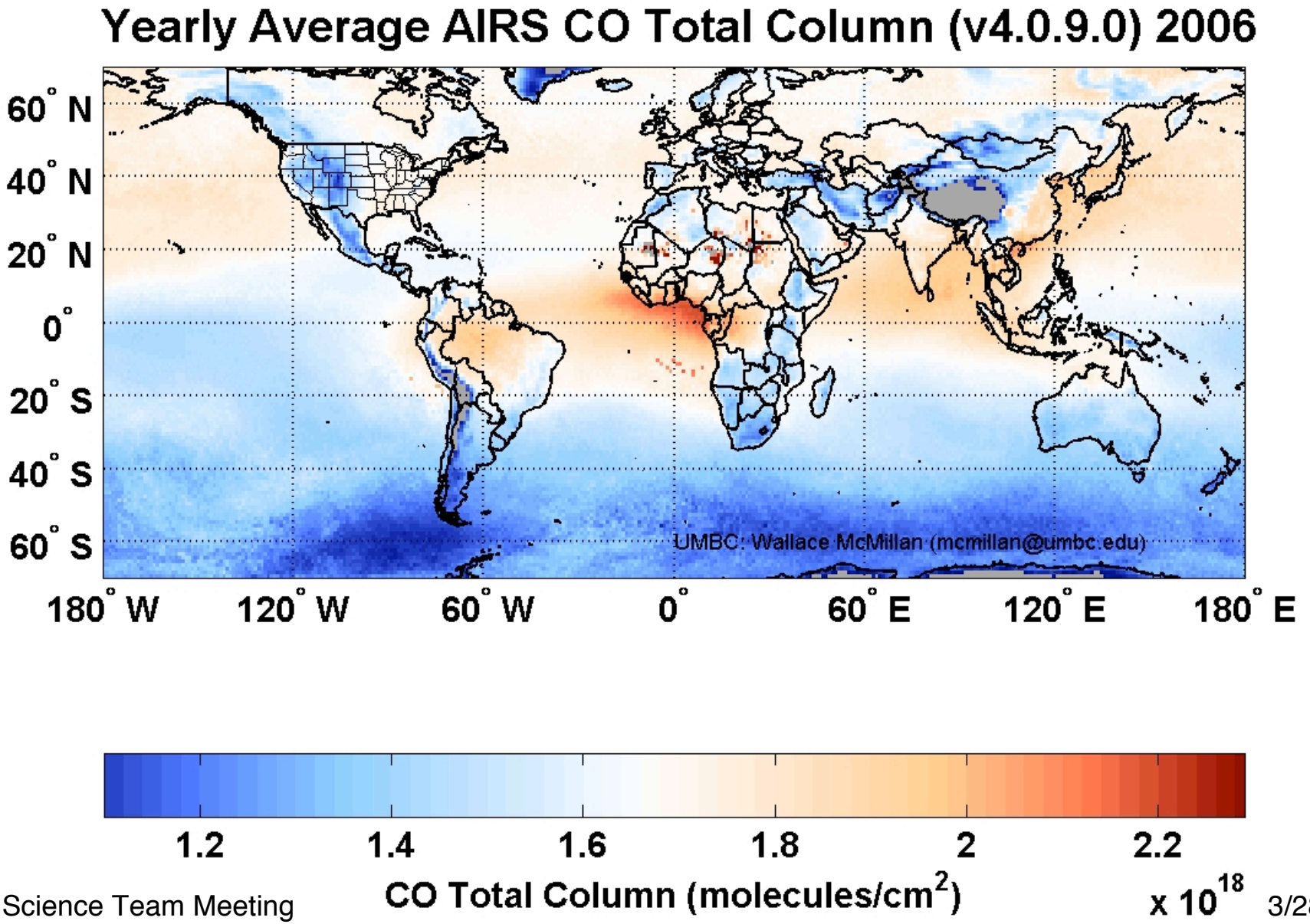

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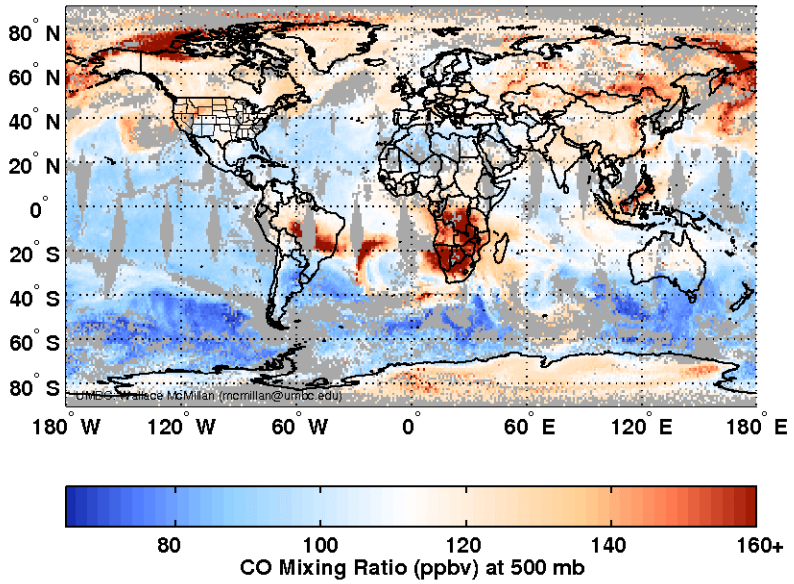
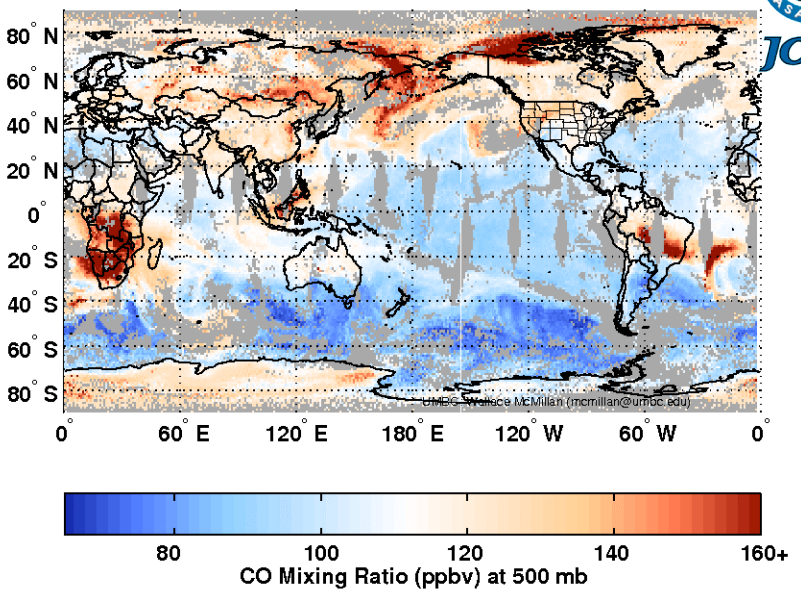
Daily AIRS CO at 500 mb v4.0.9.0: 20020831



Daily AIRS CO at 500 mb v4.0.9.0: 20020831



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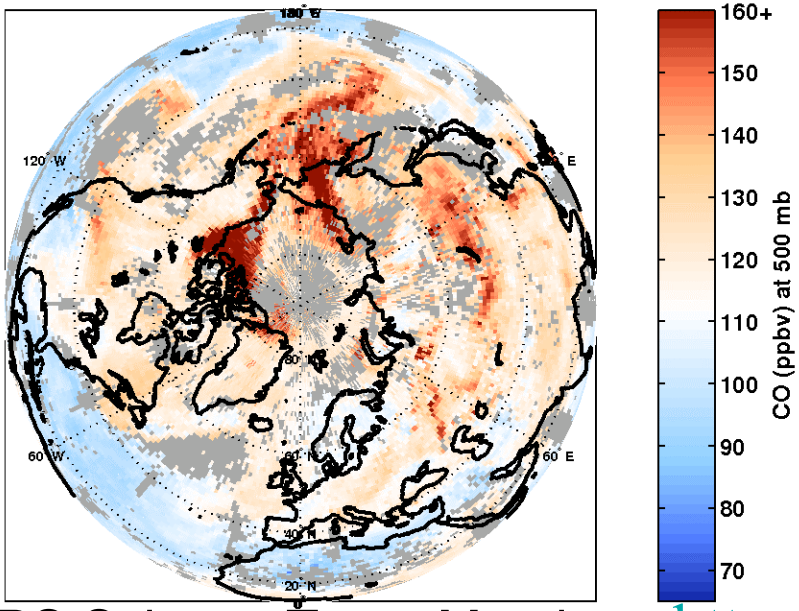
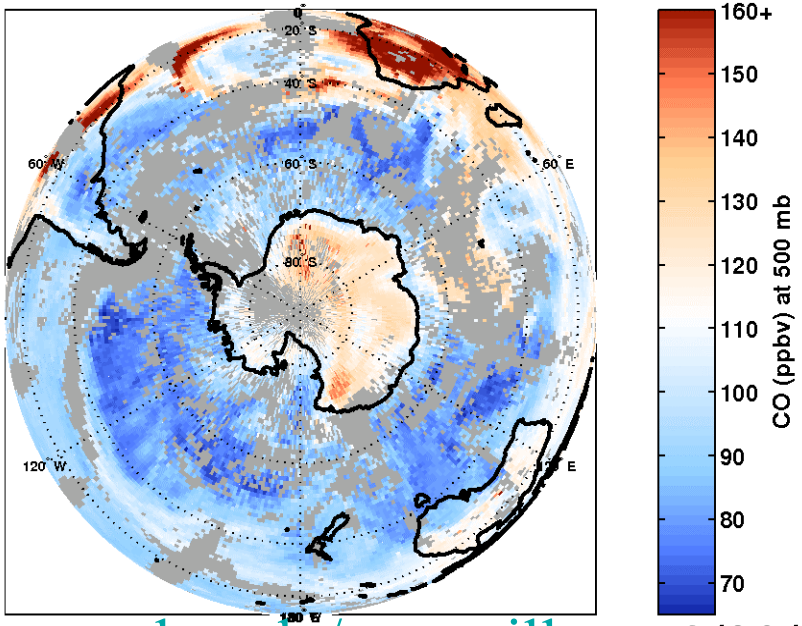
AIRS.2002.08.31 Day+Night CO(ppb) at 500 mb



AIRS.2002.08.31 Day+Night CO(ppb) at 500 mb



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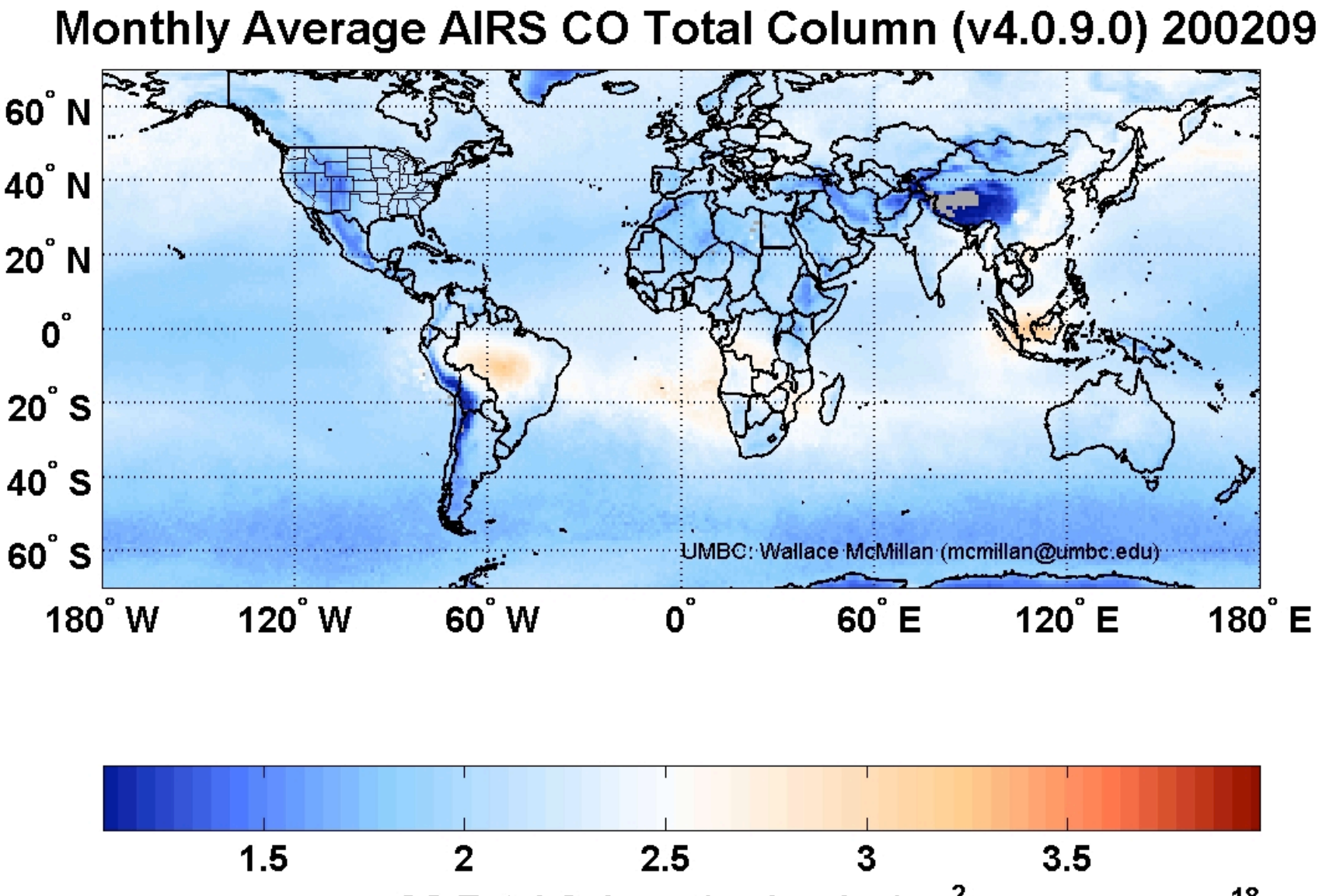
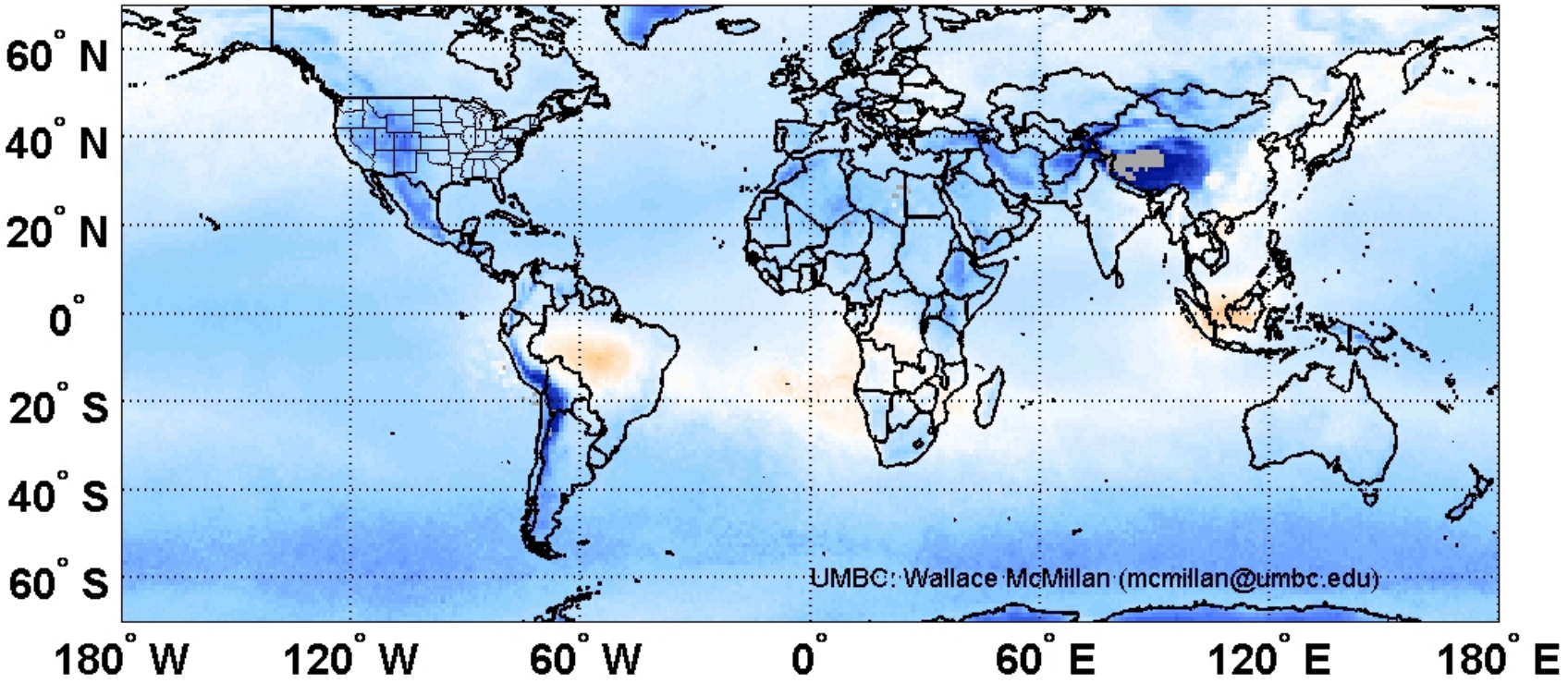
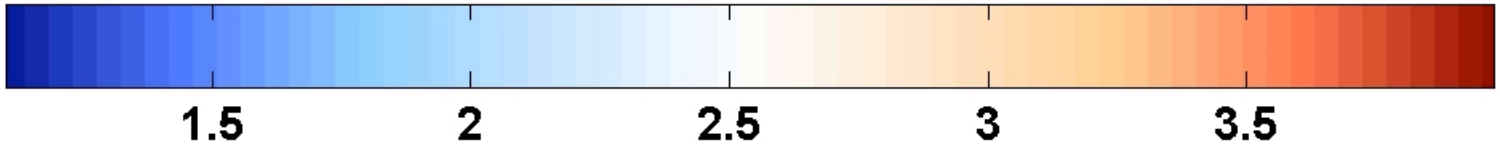


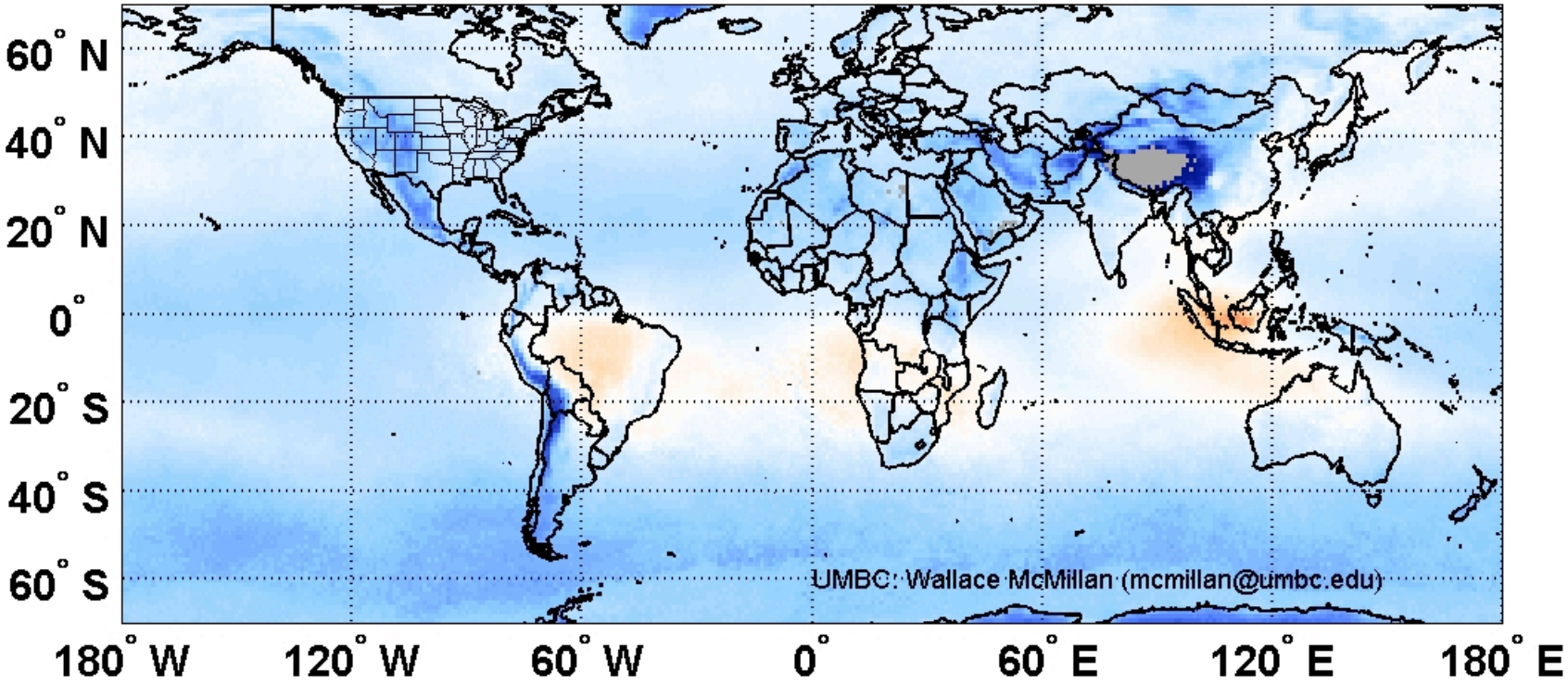
Monthly Average AIRS CO Total Column (v4.0.9.0) 200209





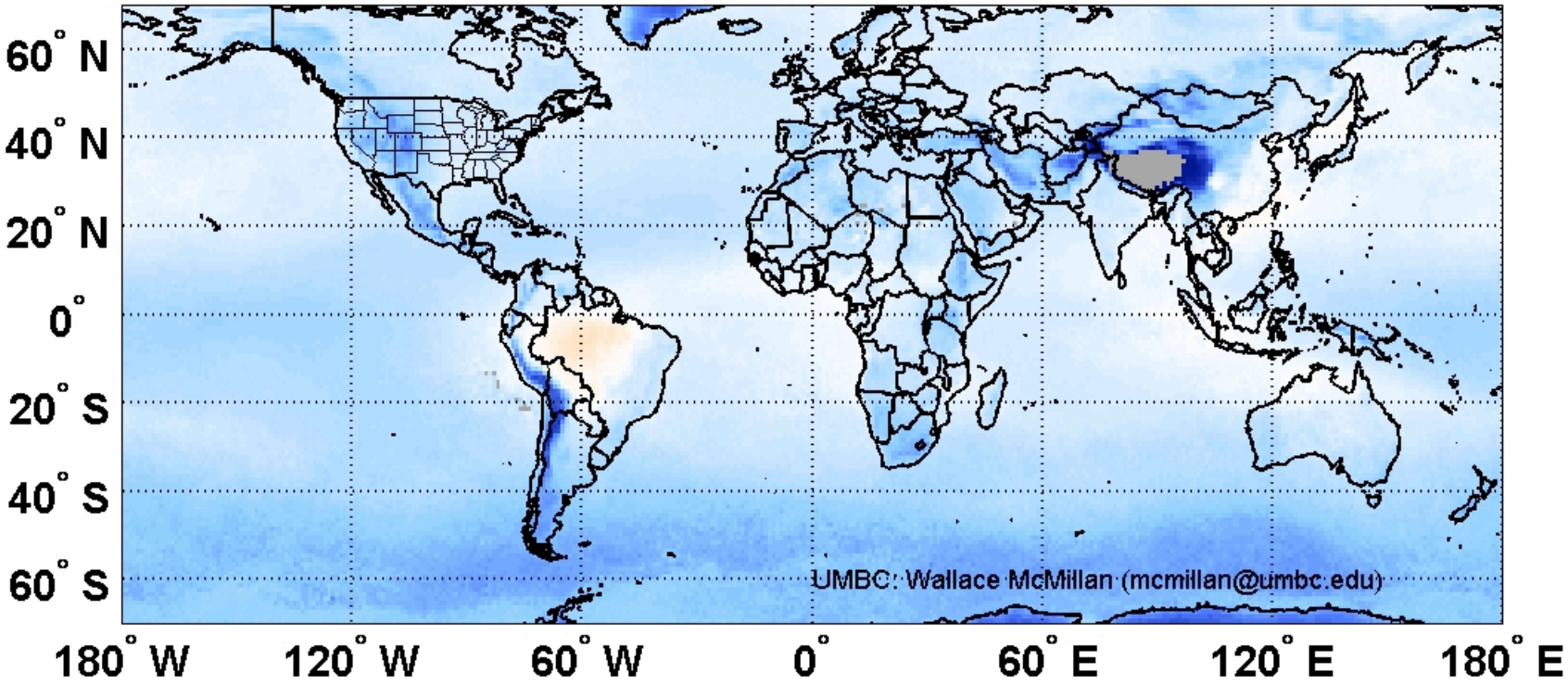
CO Total Column (molecules/cm^2) x 10^{18}

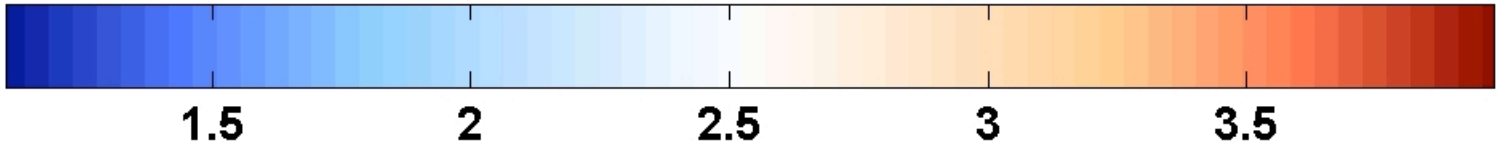
Monthly Average AIRS CO Total Column (v4.0.9.0) 200210



CO Total Column (molecules/cm^2) x 10^{18}

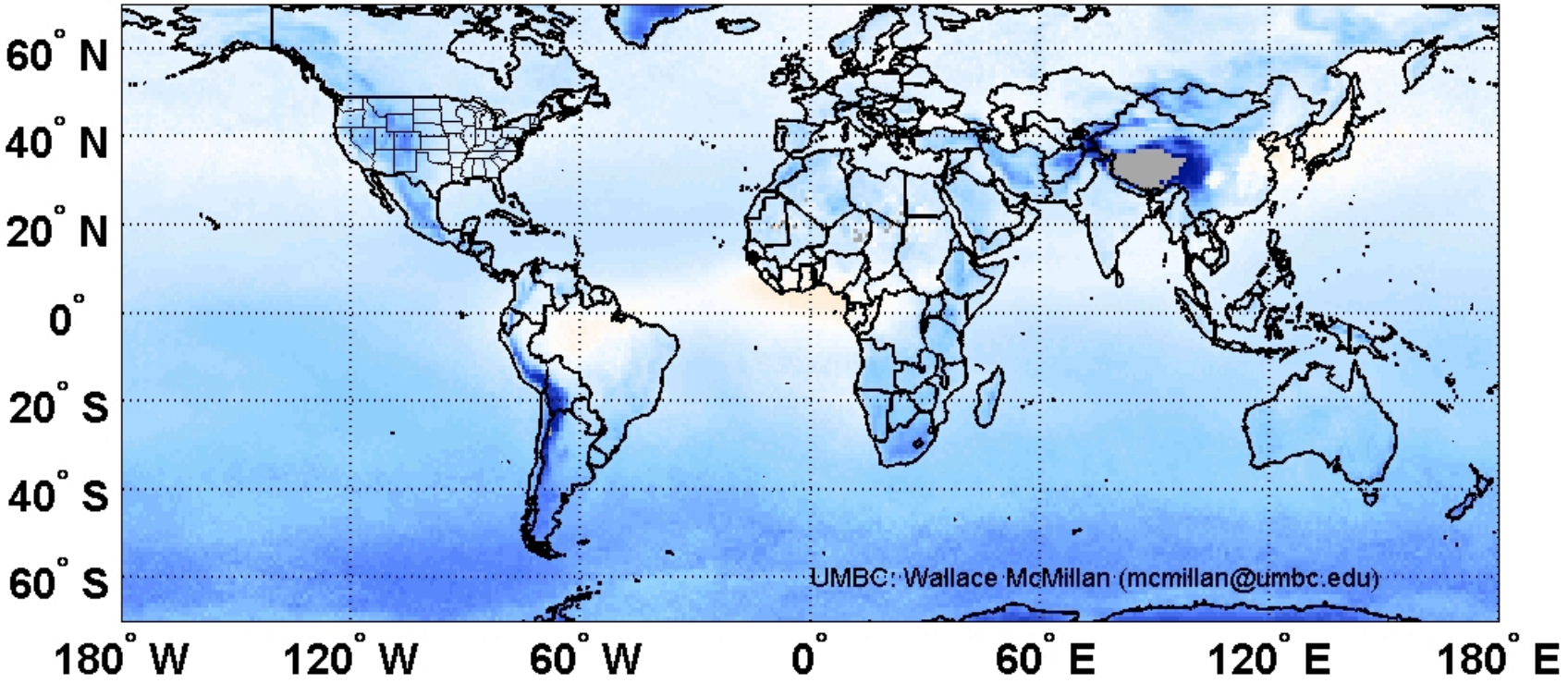
Monthly Average AIRS CO Total Column (v4.0.9.0) 200211

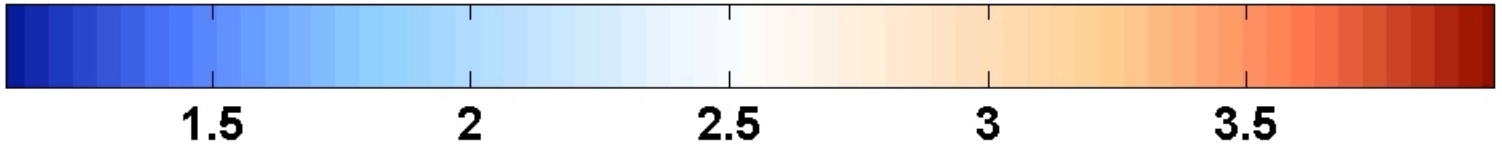




CO Total Column (molecules/cm^2) x 10^{18}

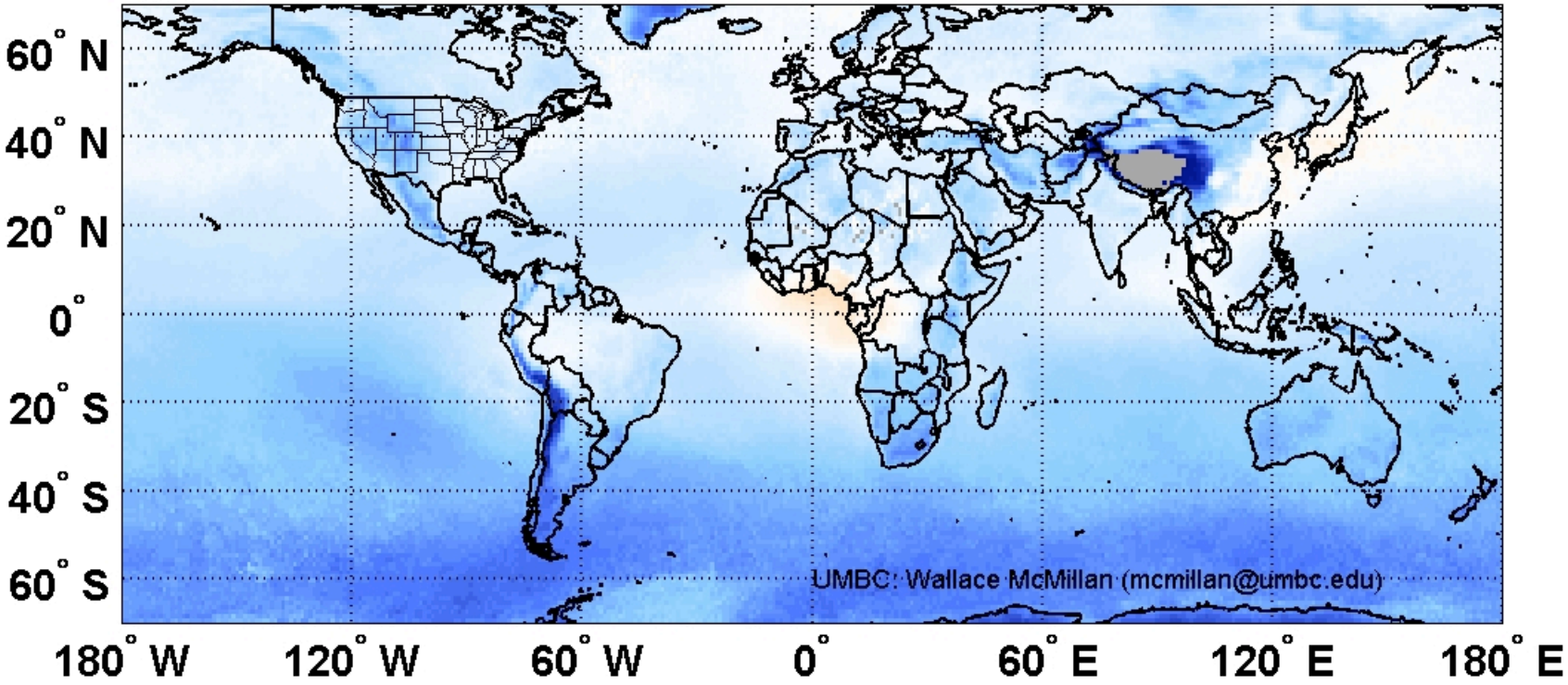
Monthly Average AIRS CO Total Column (v4.0.9.0) 200212

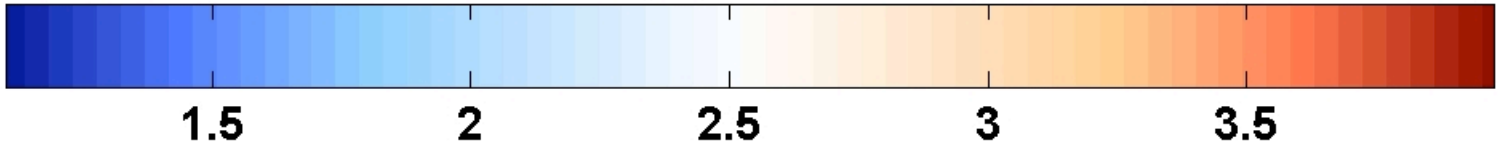




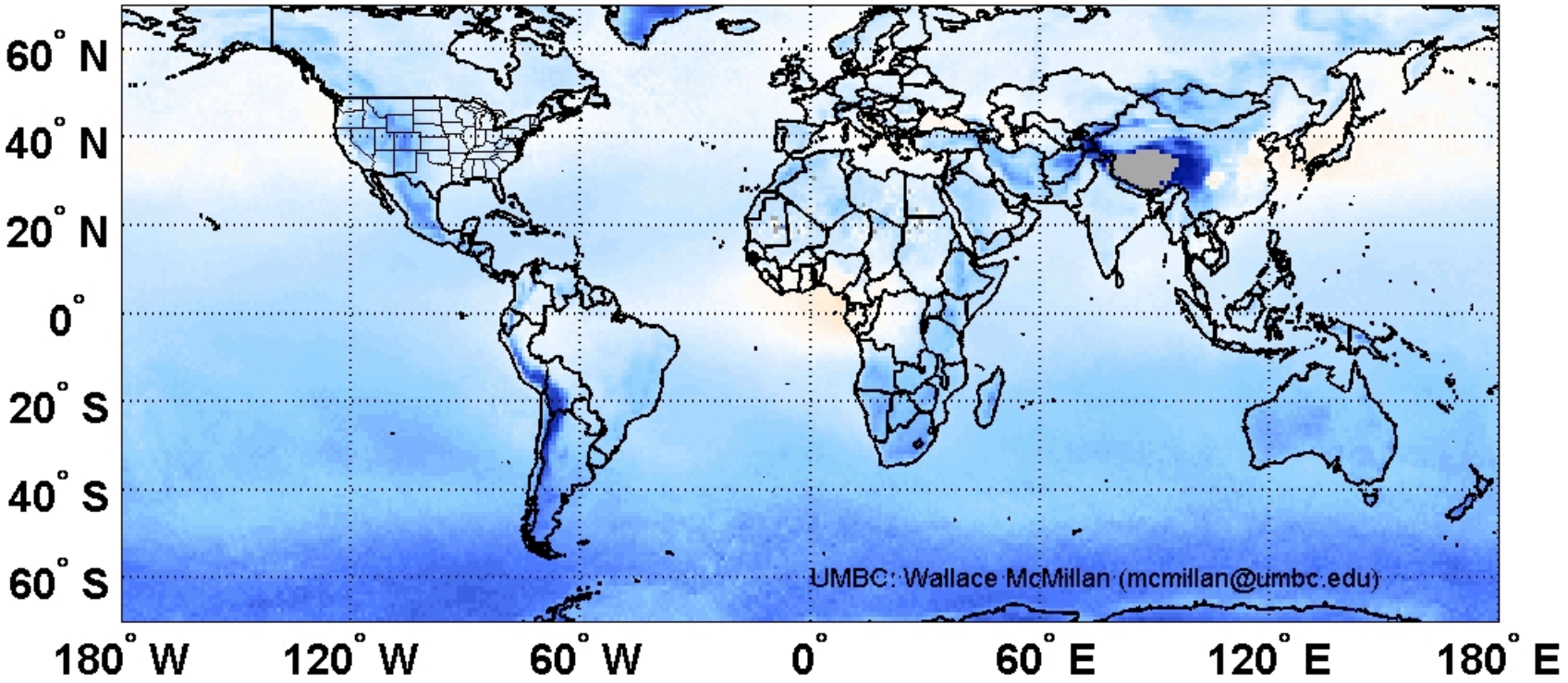
CO Total Column (molecules/cm^2) x 10^{18}

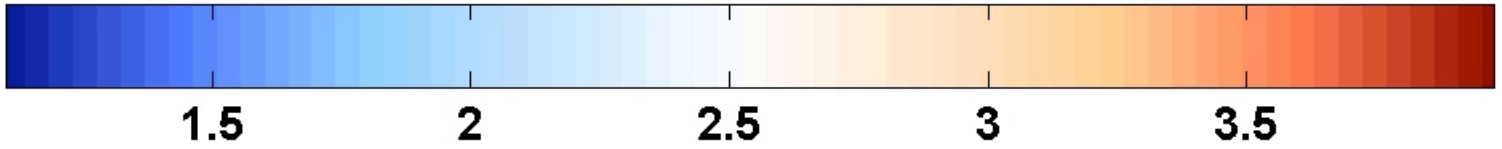
Monthly Average AIRS CO Total Column (v4.0.9.0) 200301



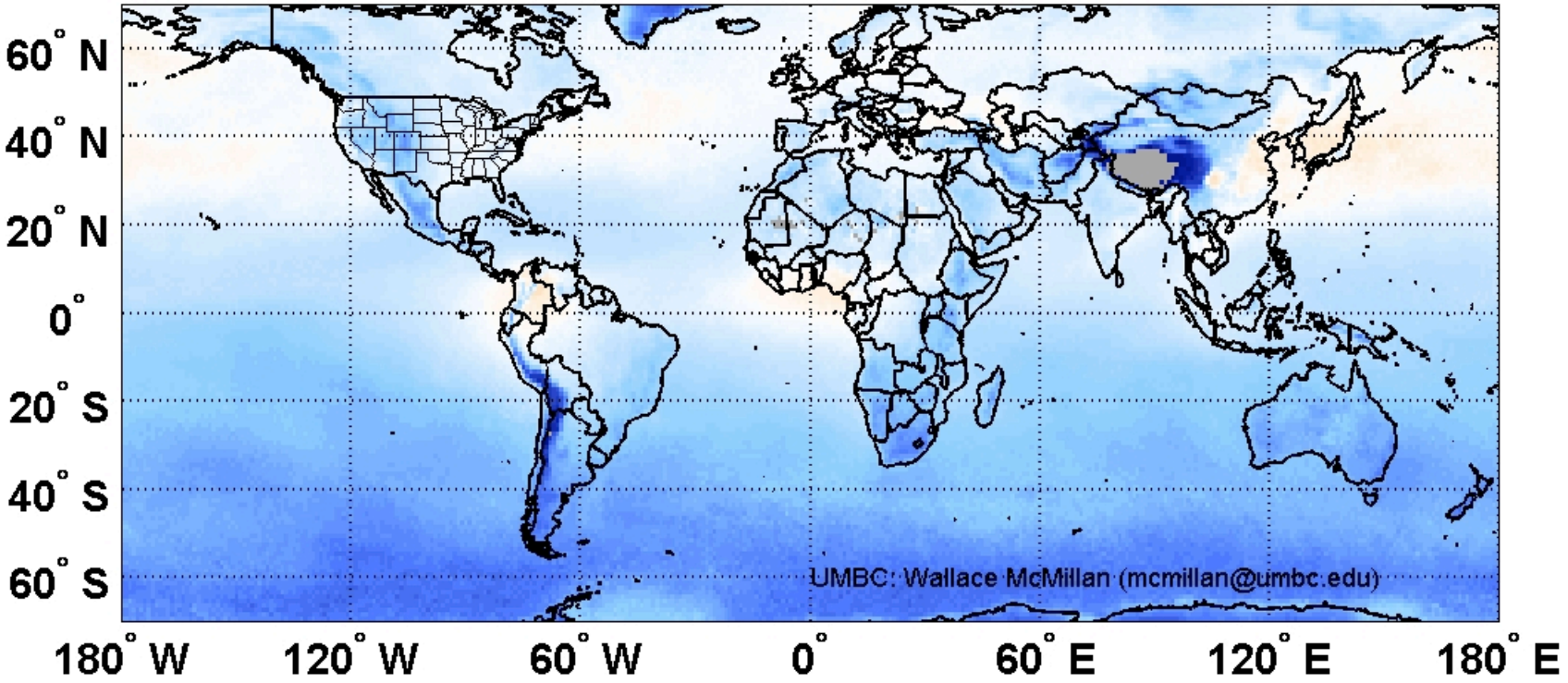


Monthly Average AIRS CO Total Column (v4.0.9.0) 200302



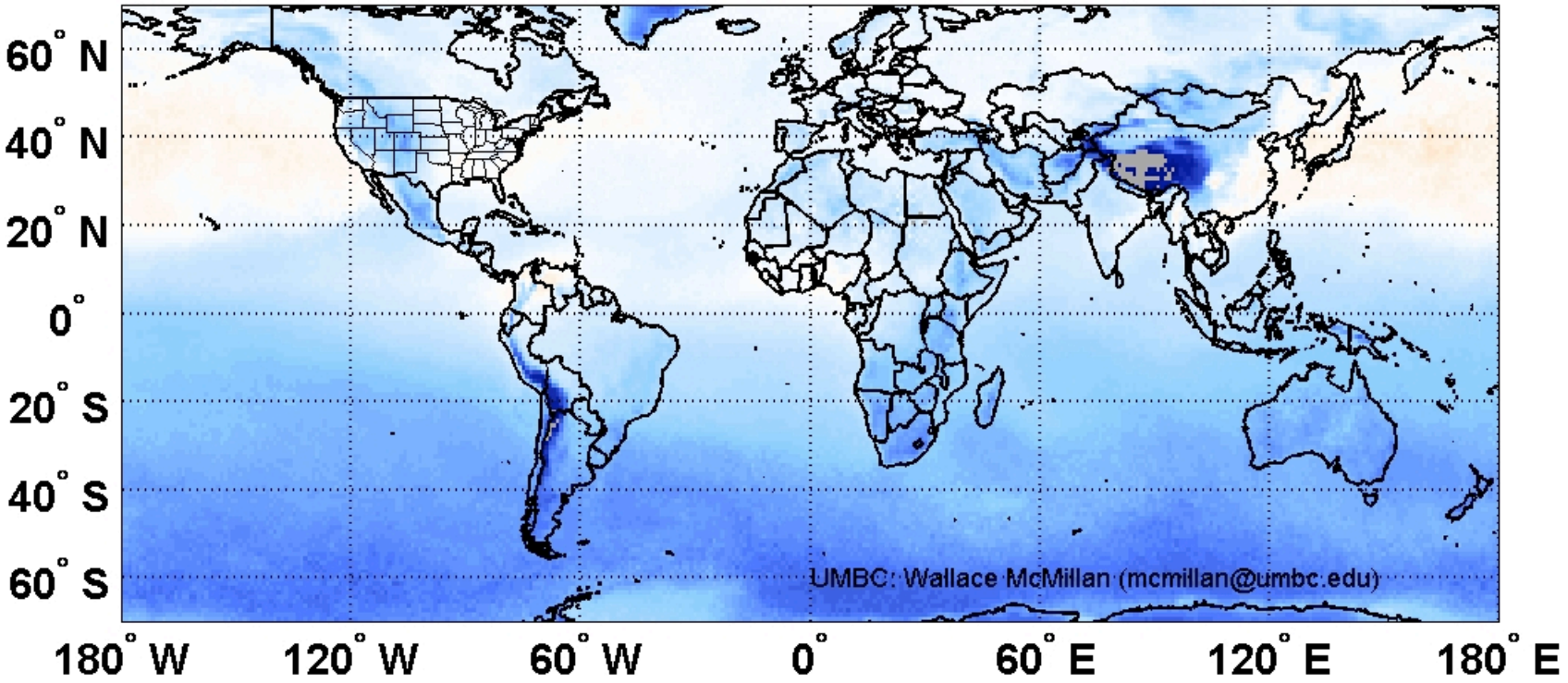


Monthly Average AIRS CO Total Column (v4.0.9.0) 200303



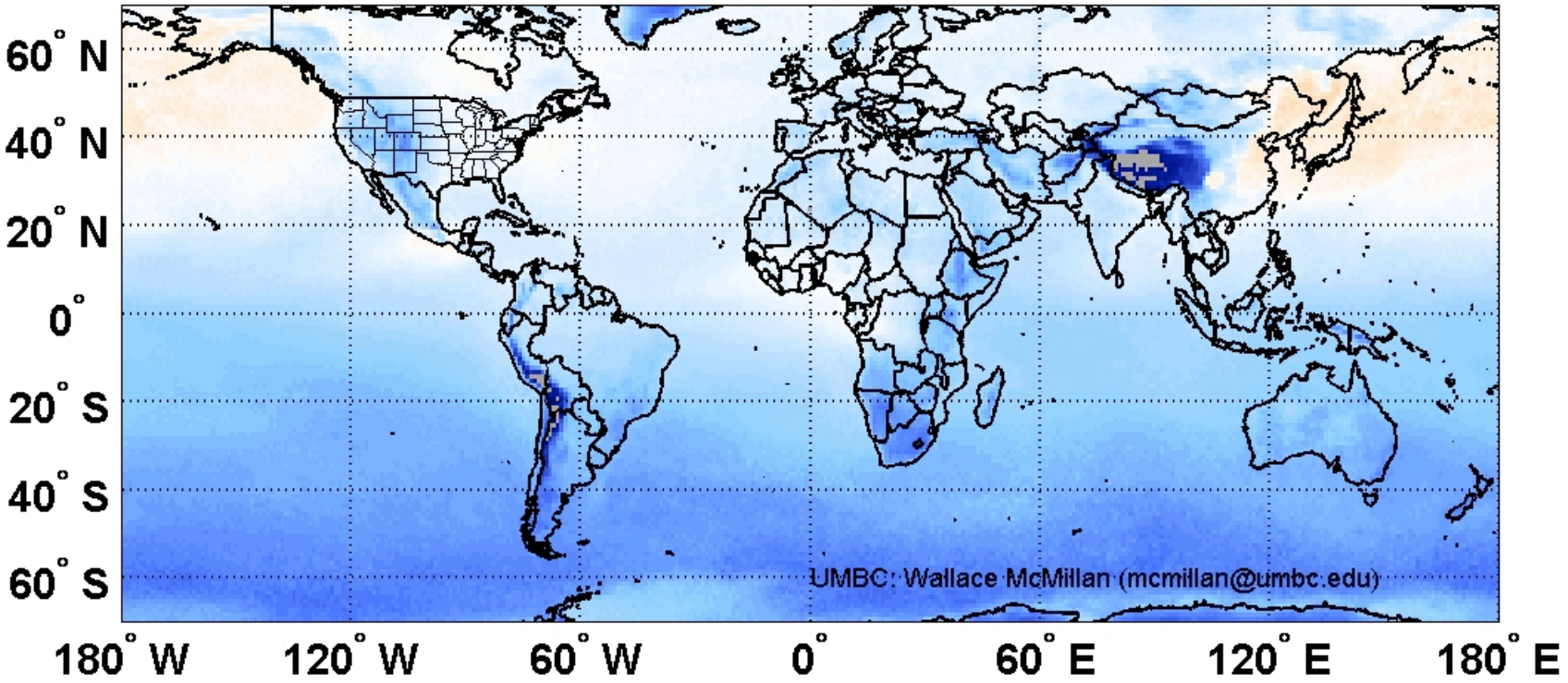
CO Total Column (molecules/cm^2) x 10^{18}

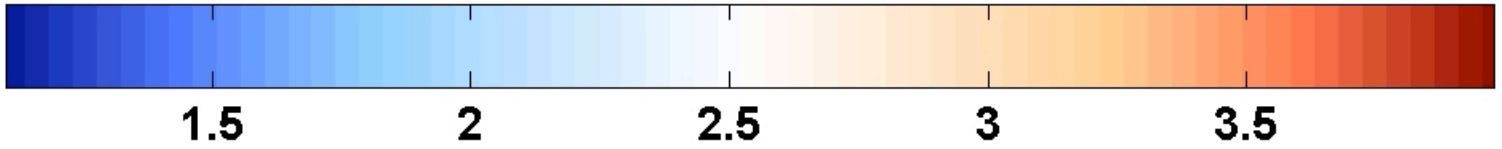
Monthly Average AIRS CO Total Column (v4.0.9.0) 200304



CO Total Column (molecules/cm^2) x 10^{18}

Monthly Average AIRS CO Total Column (v4.0.9.0) 200305





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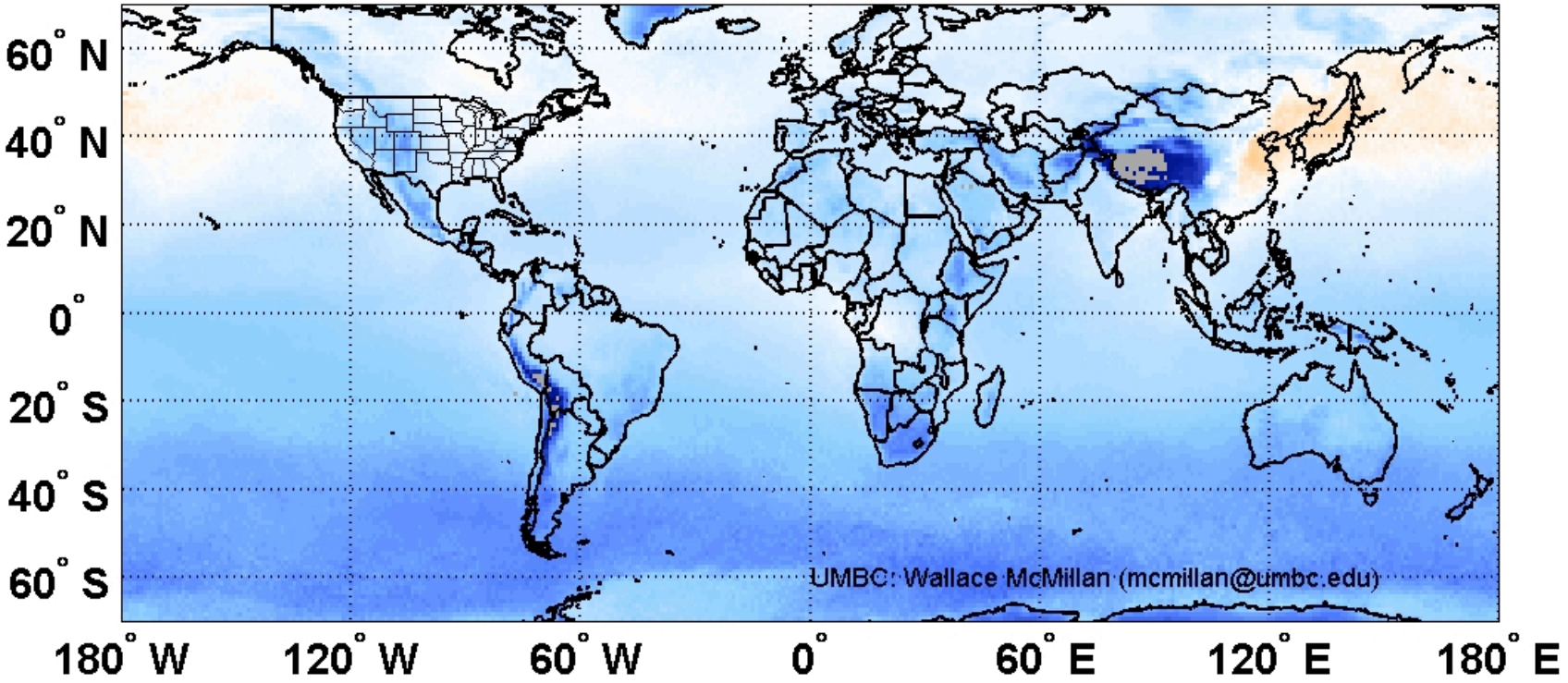

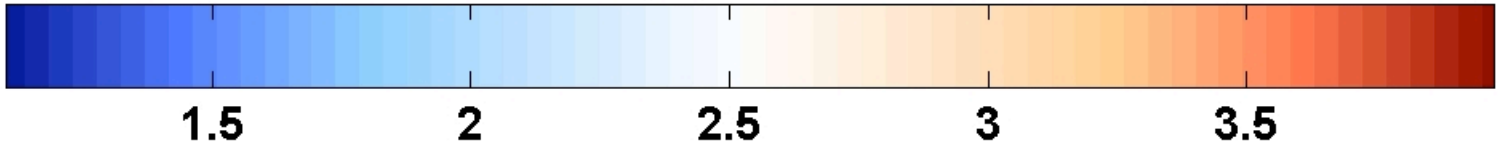

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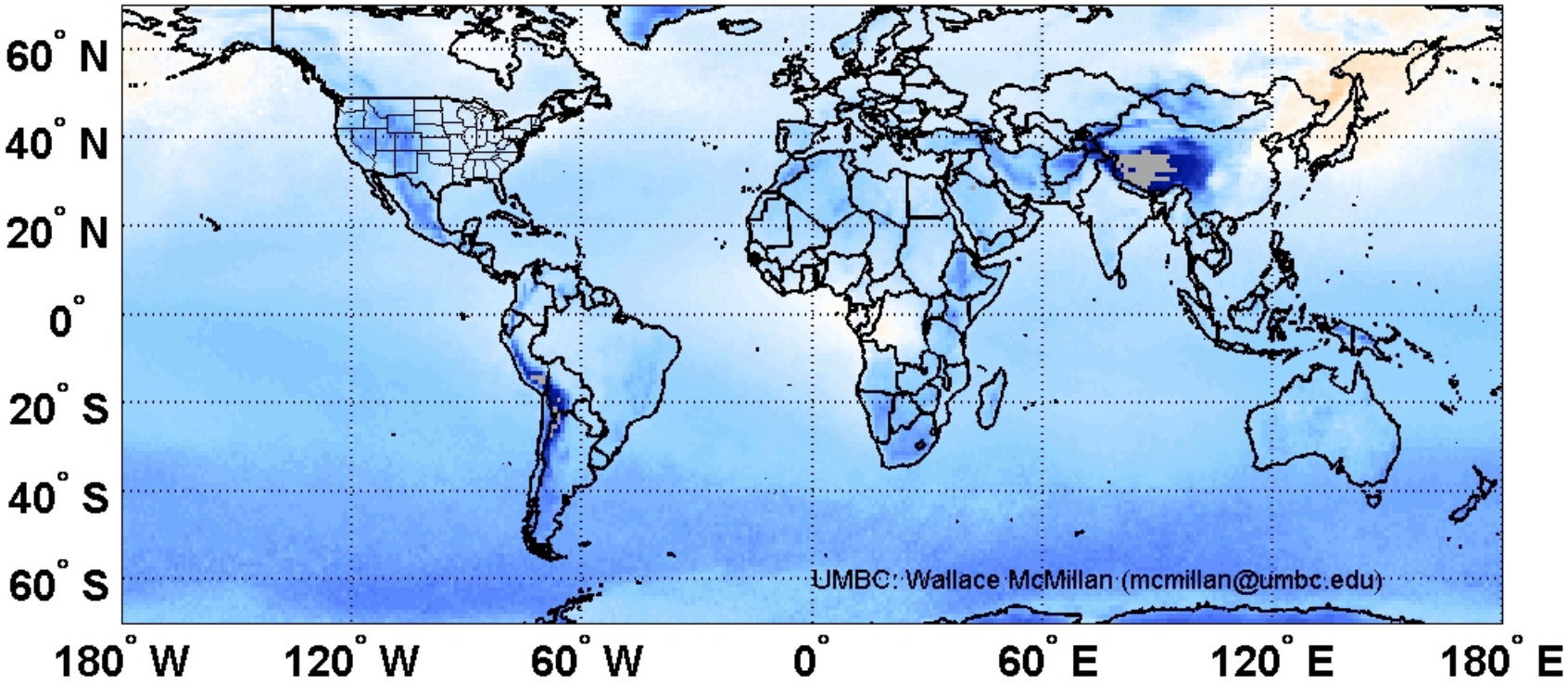
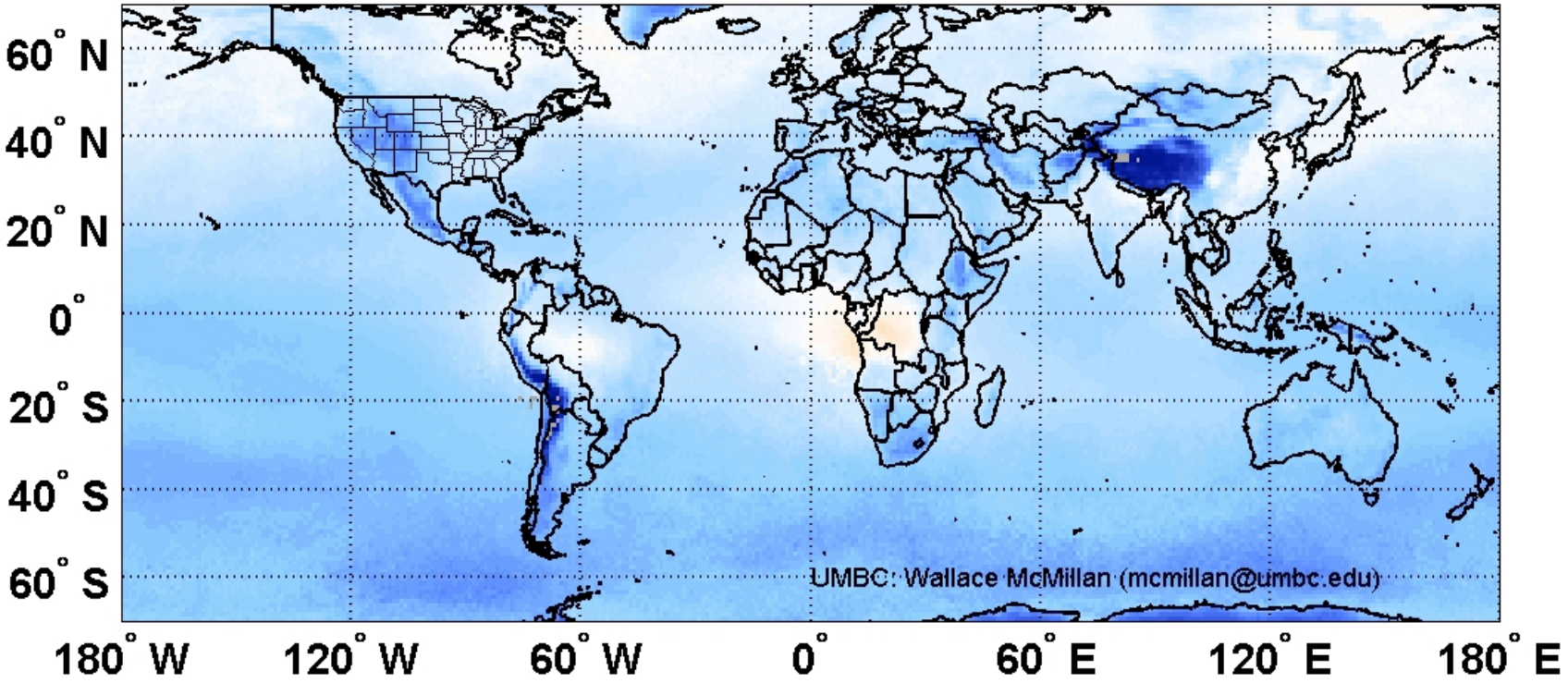
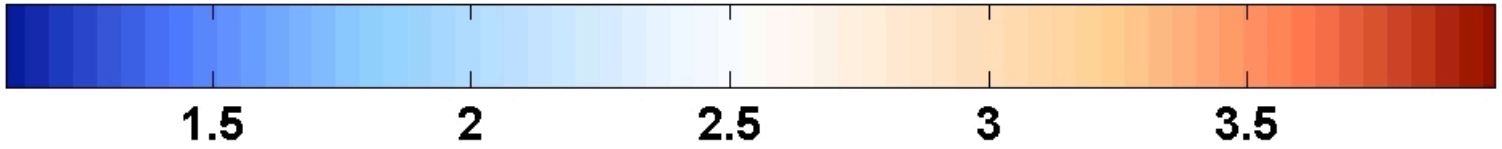


CO Total Column (molecules/cm^2) x 10^{18}

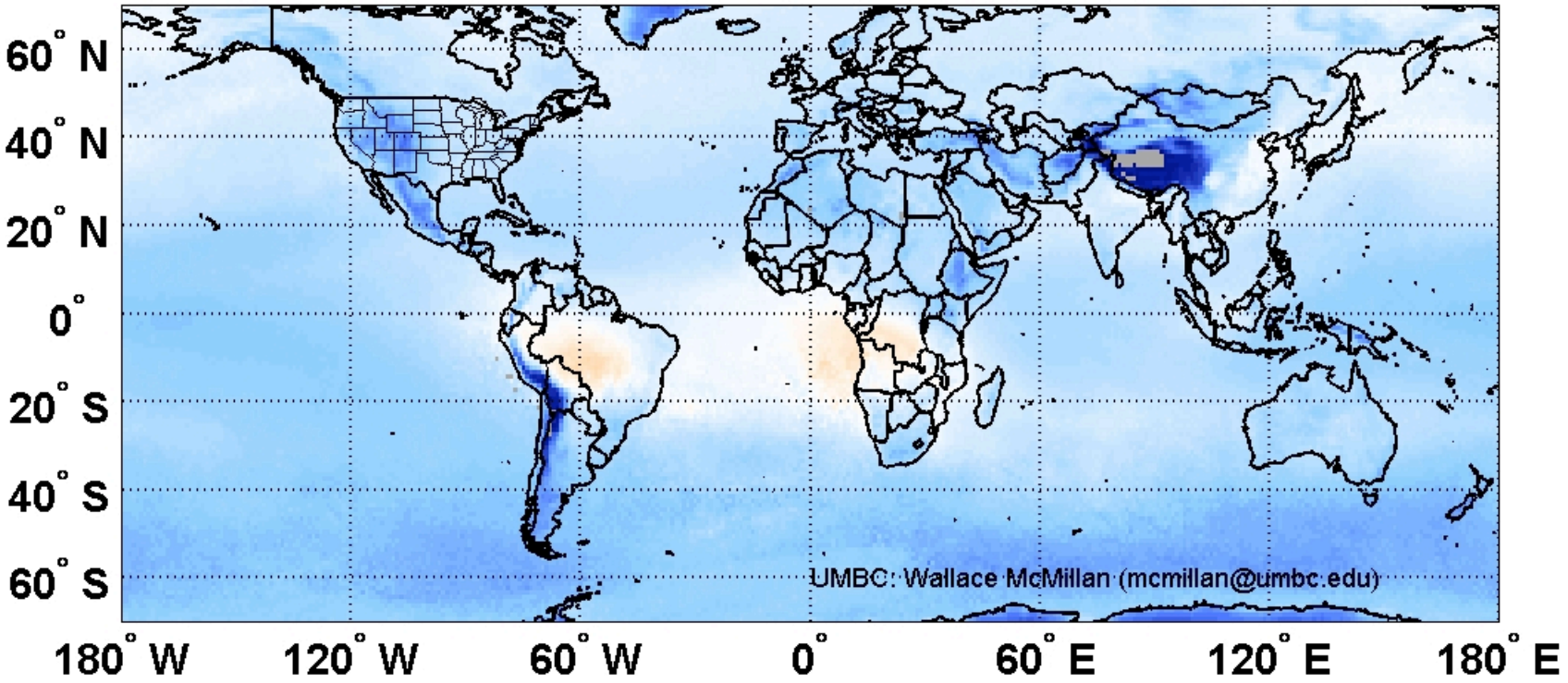
Monthly Average AIRS CO Total Column (v4.0.9.0) 200308

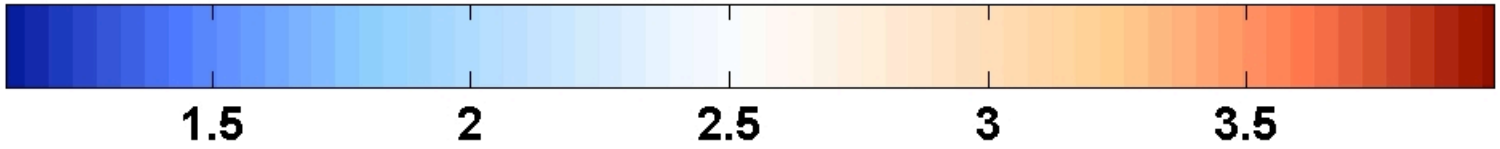




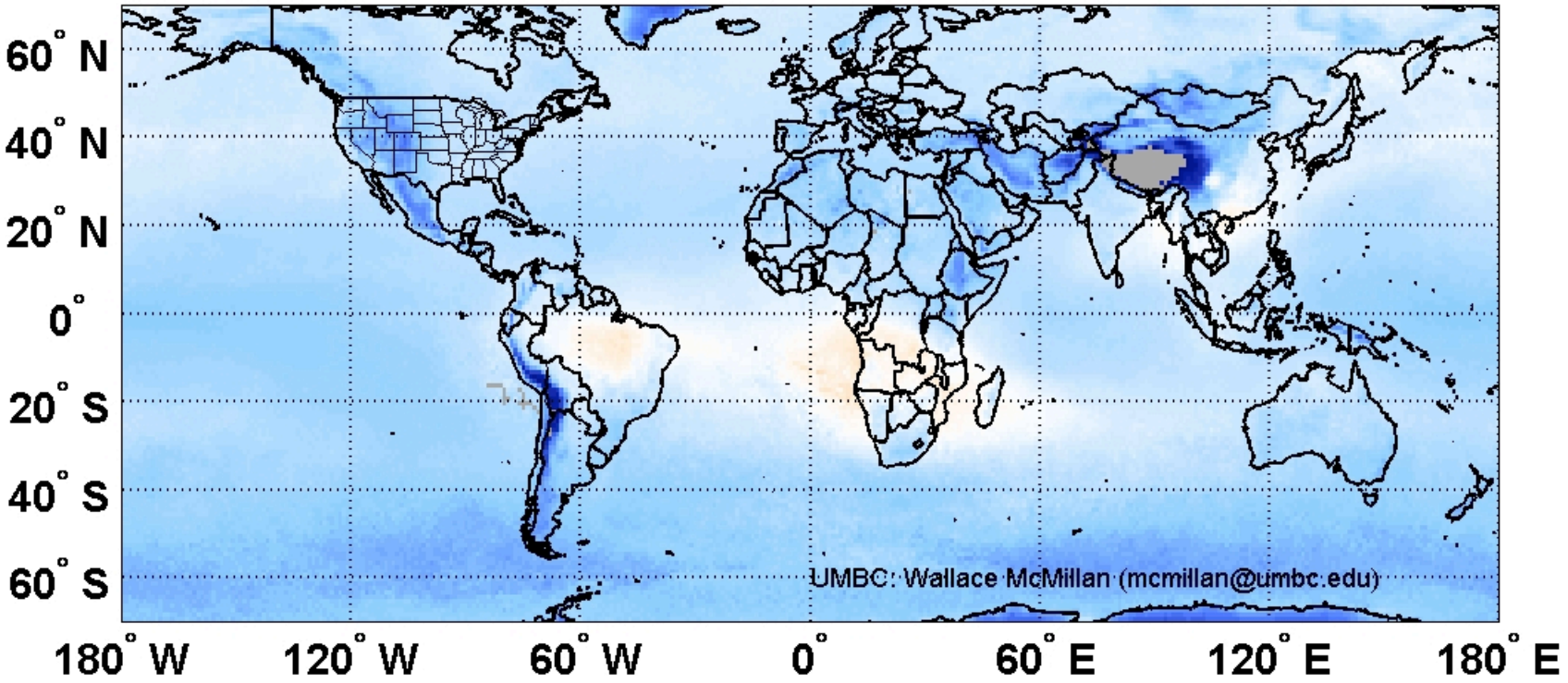
CO Total Column (molecules/cm^2) x 10^{18}

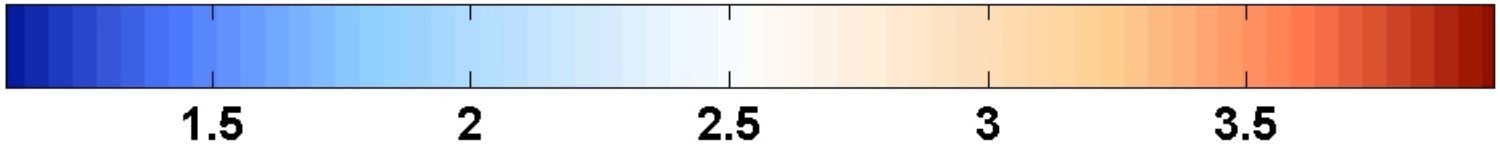
Monthly Average AIRS CO Total Column (v4.0.9.0) 200309





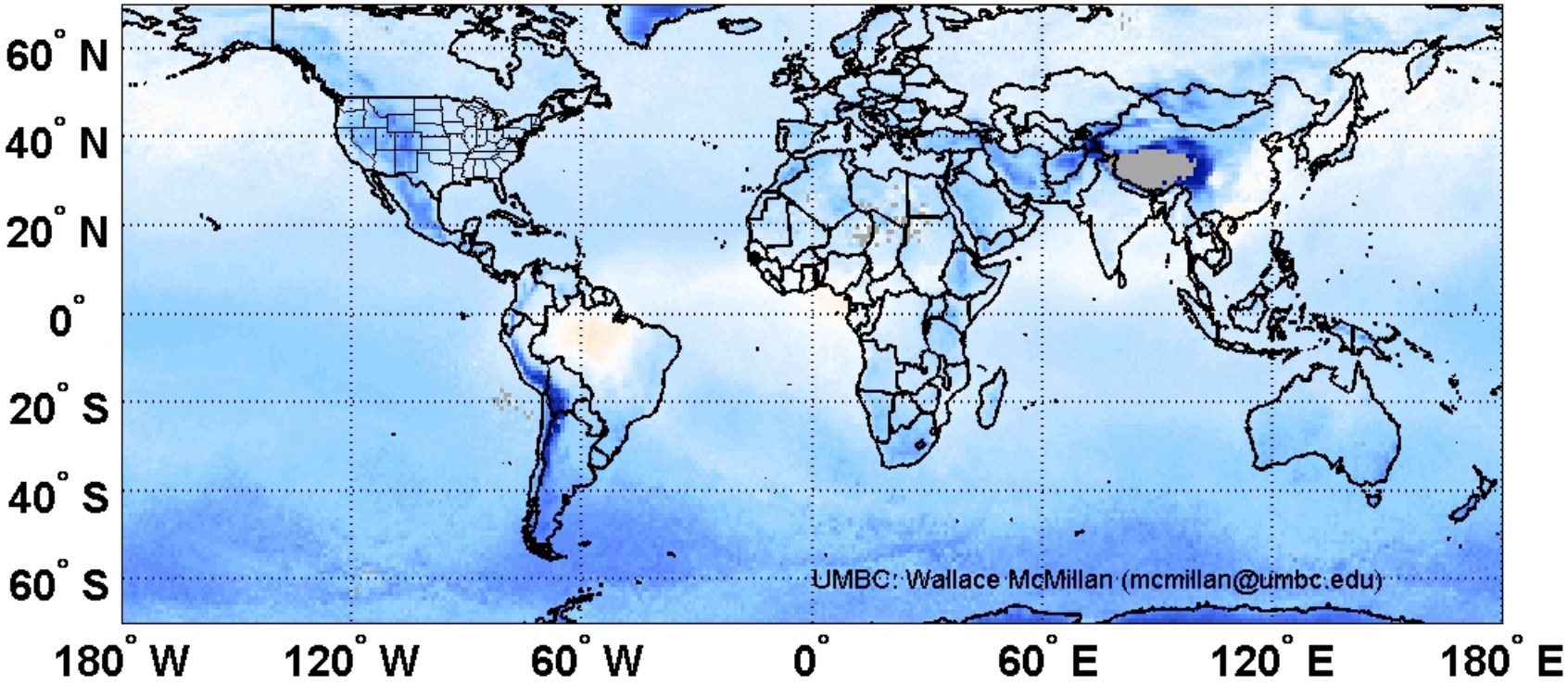
Monthly Average AIRS CO Total Column (v4.0.9.0) 200310





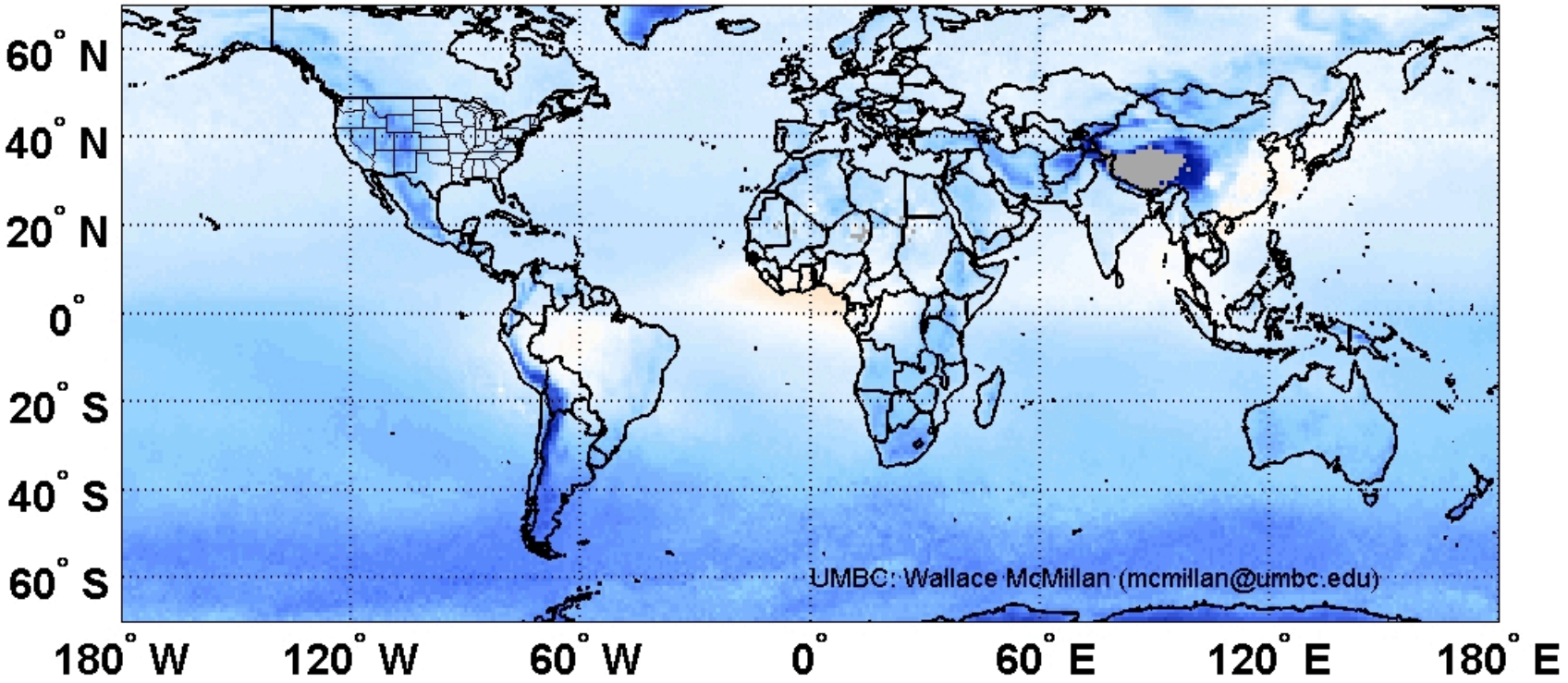
CO Total Column (molecules/cm^2) x 10^{18}

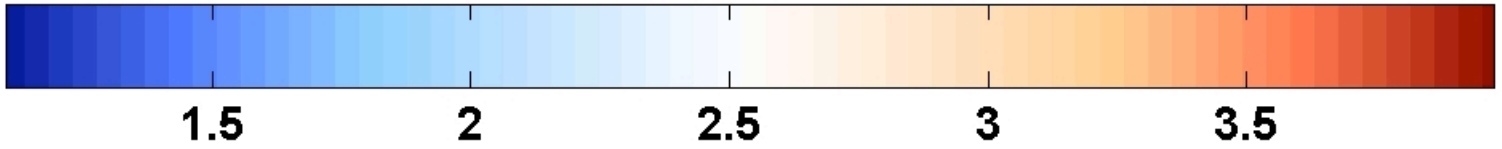
Monthly Average AIRS CO Total Column (v4.0.9.0) 200311



CO Total Column (molecules/cm^2) x 10^{18}

Monthly Average AIRS CO Total Column (v4.0.9.0) 200312





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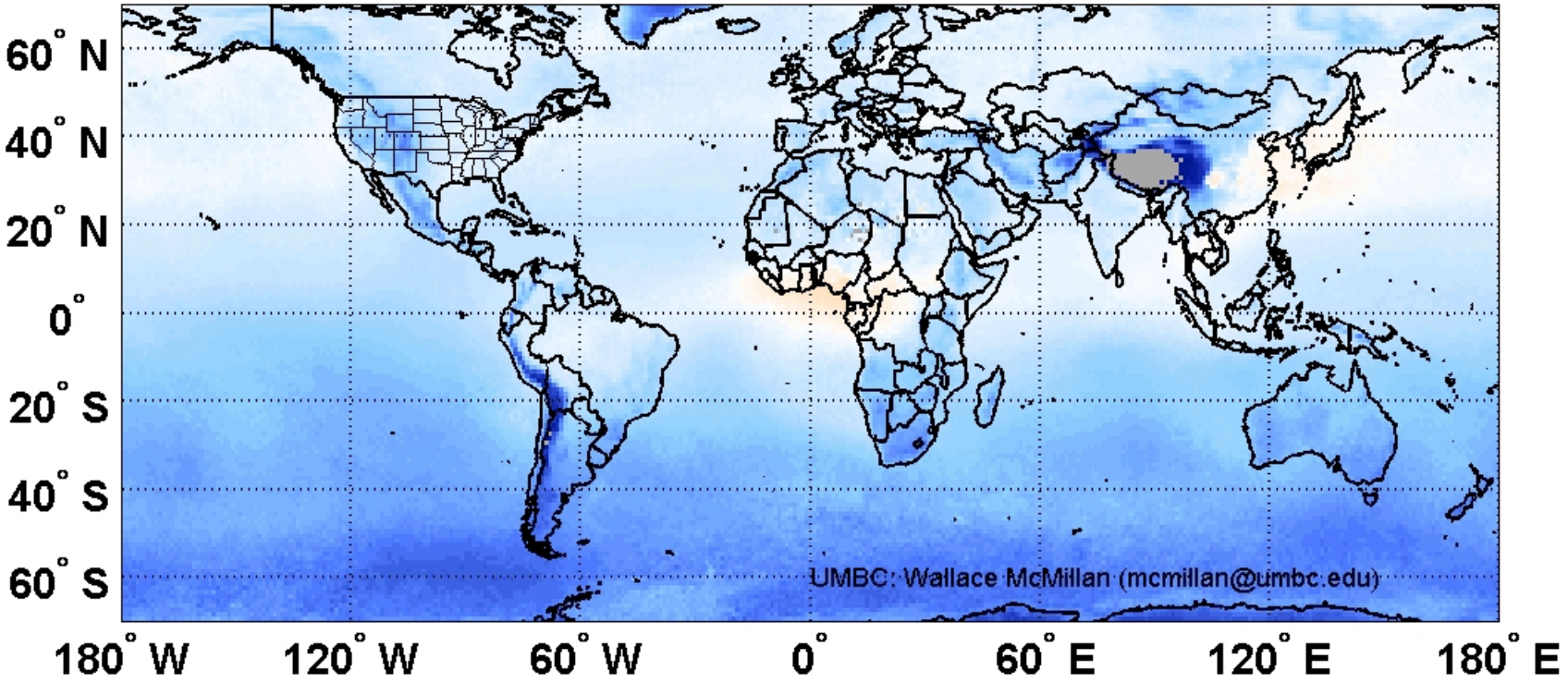
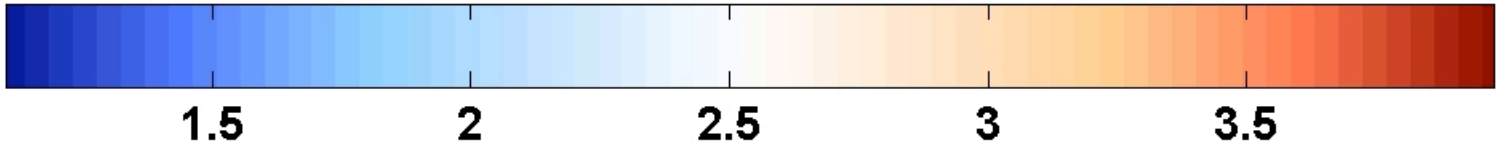
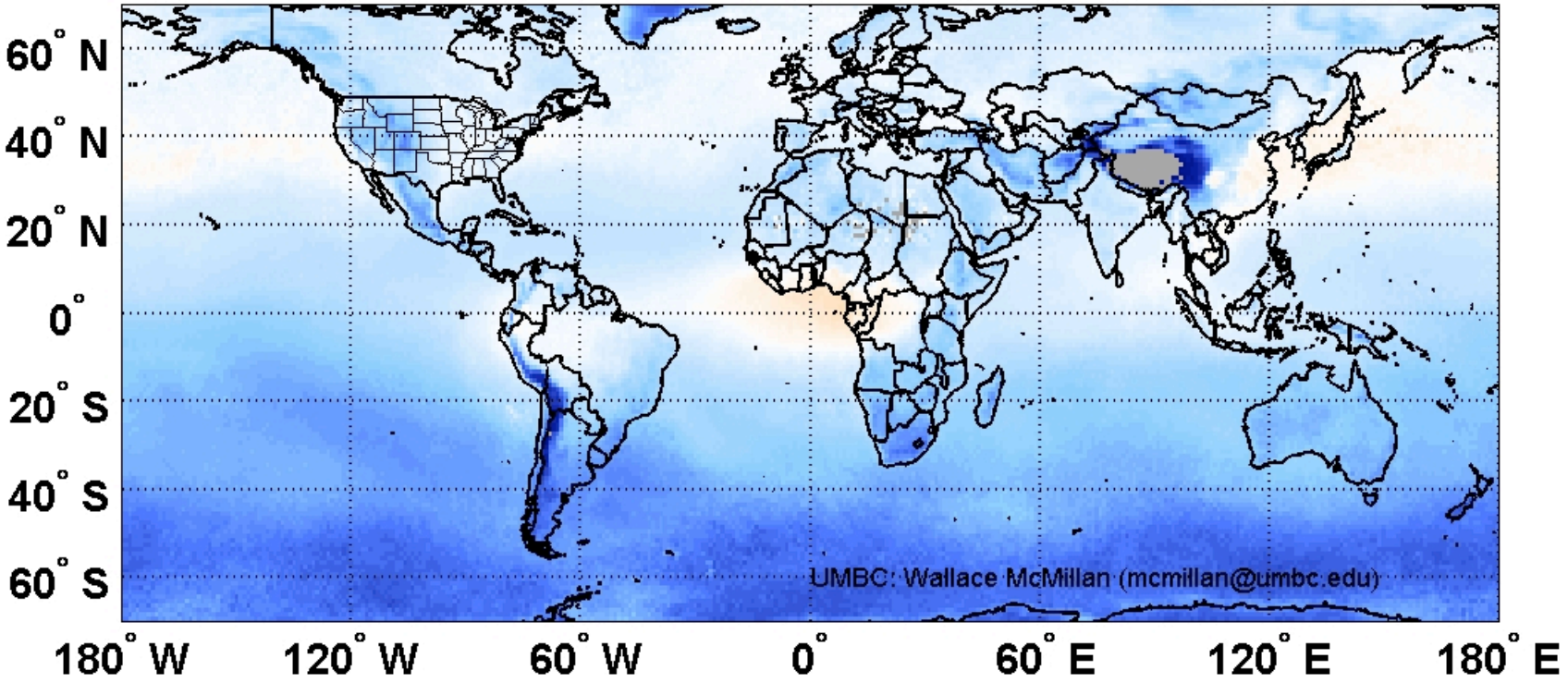
Monthly Average AIRS CO Total Column (v4.0.9.0) 200401

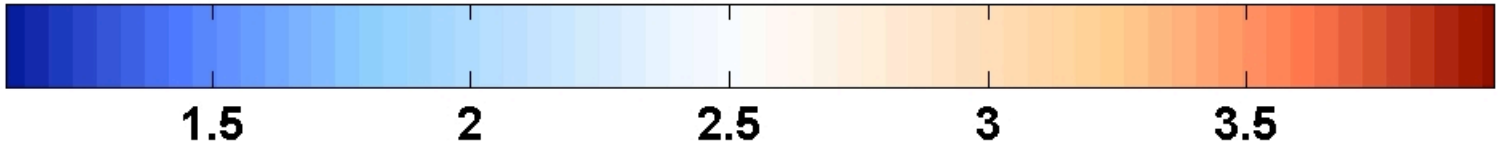




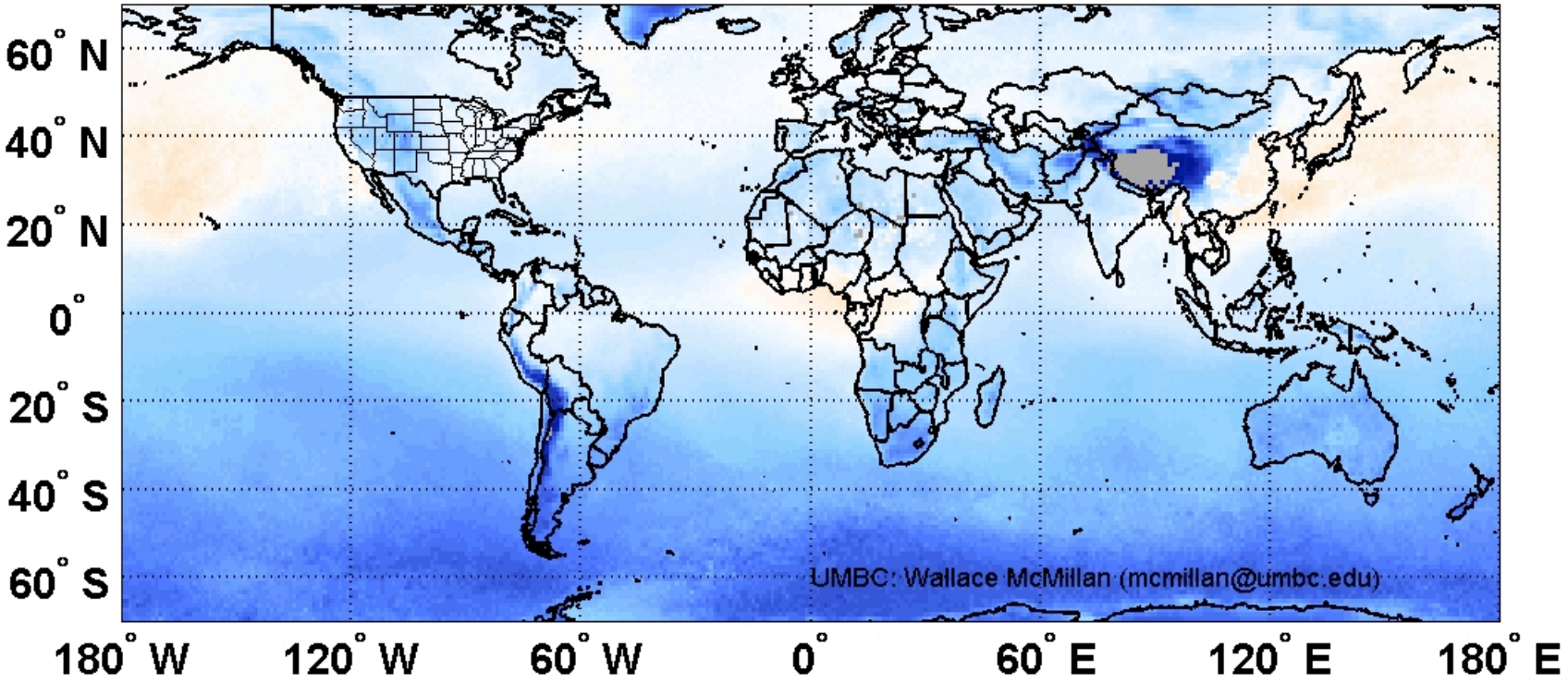
CO Total Column (molecules/cm^2) x 10^{18}

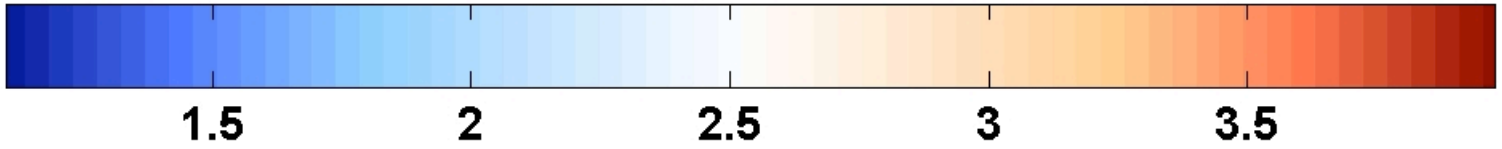
Monthly Average AIRS CO Total Column (v4.0.9.0) 200402





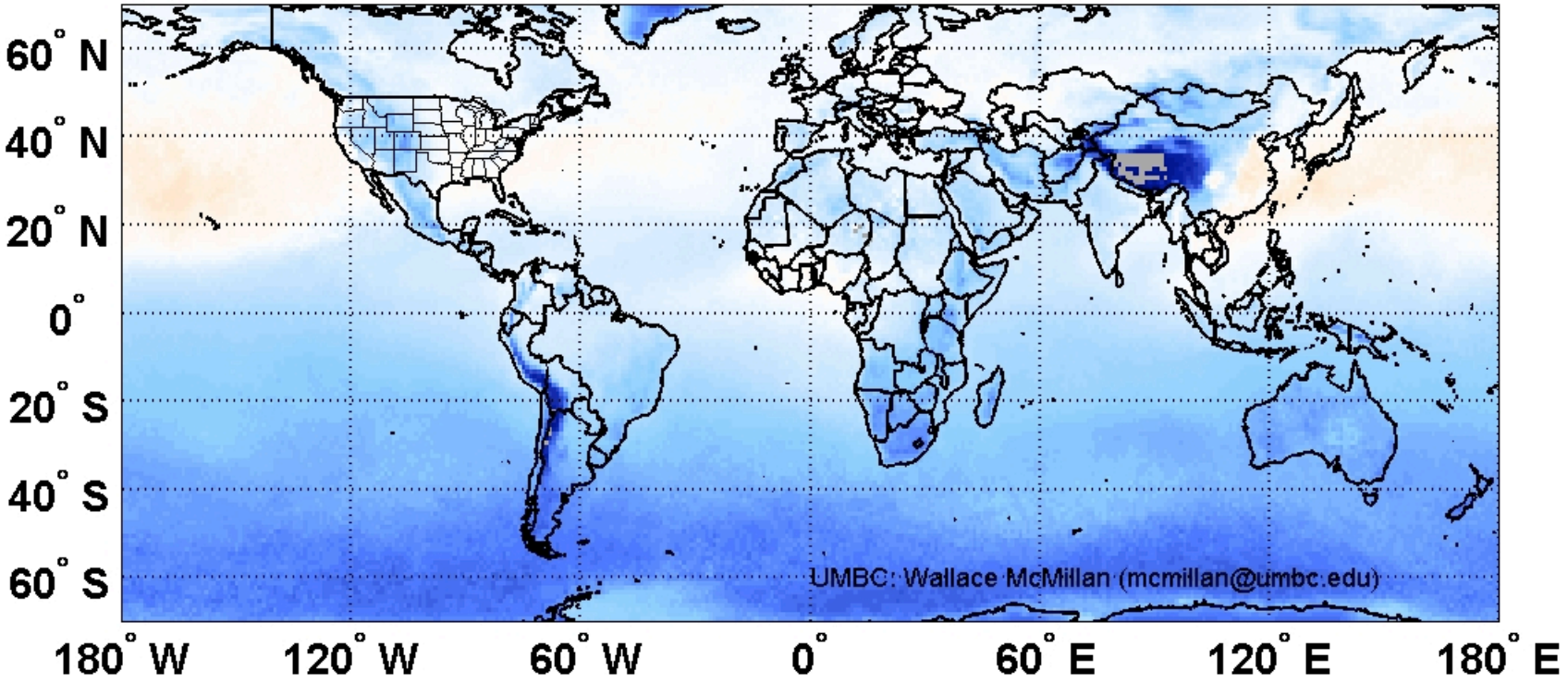
Monthly Average AIRS CO Total Column (v4.0.9.0) 200403





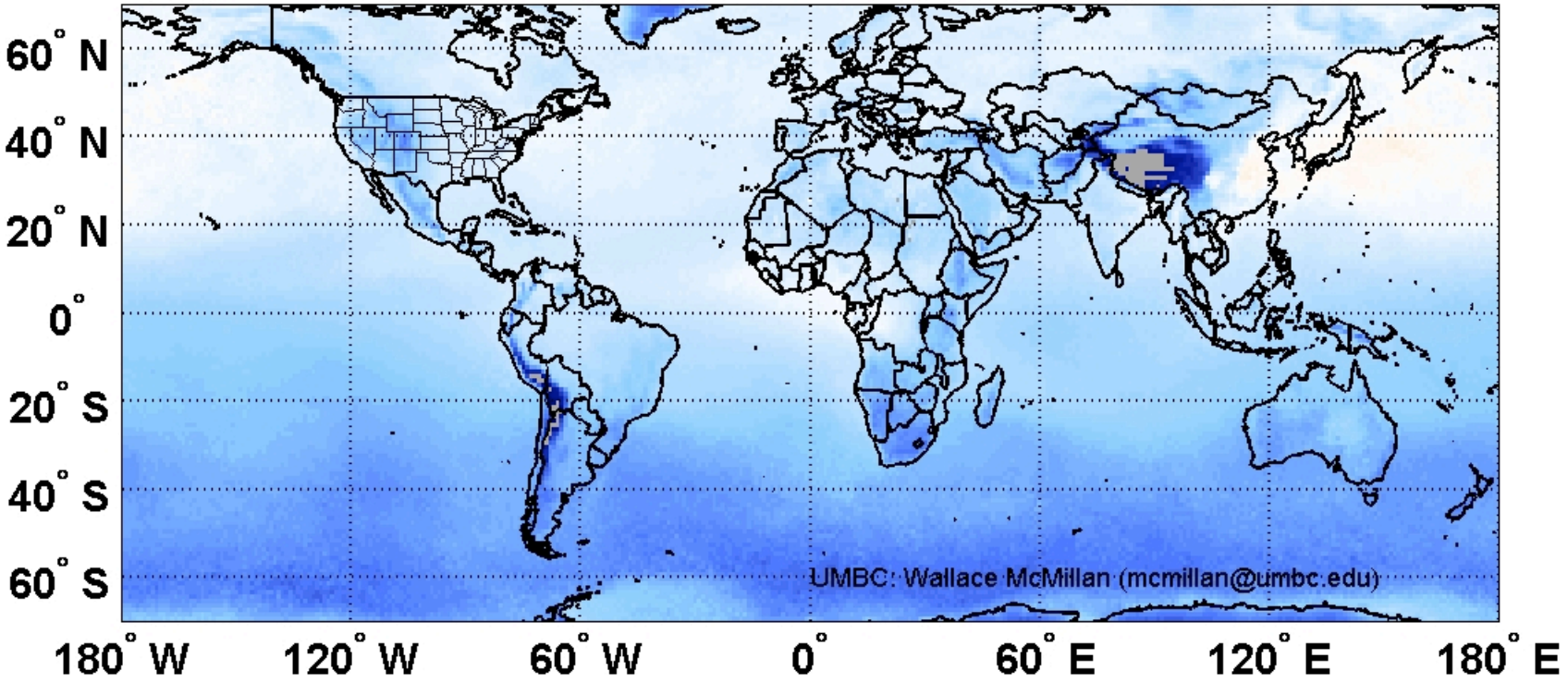
CO Total Column (molecules/cm^2) x 10^{18}

Monthly Average AIRS CO Total Column (v4.0.9.0) 200404



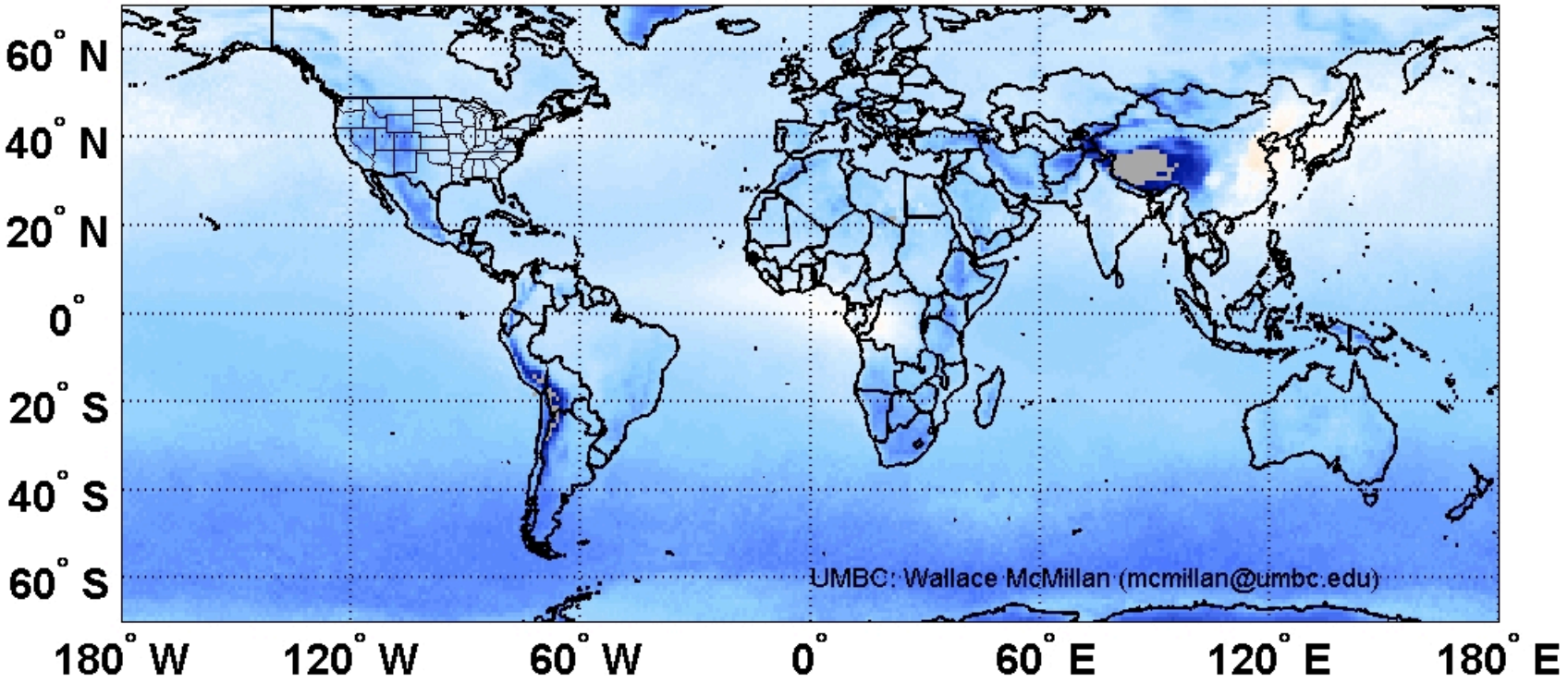
CO Total Column (molecules/cm^2) x 10^{18}

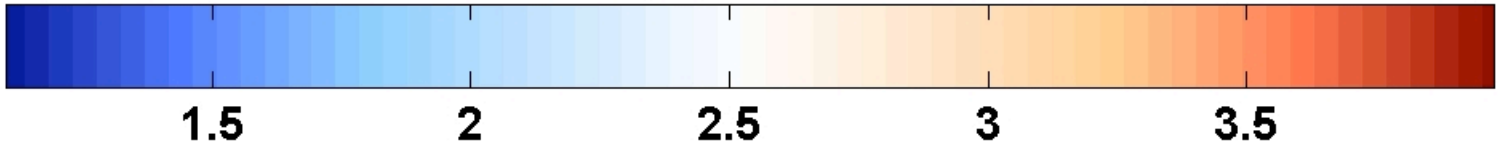
Monthly Average AIRS CO Total Column (v4.0.9.0) 200405



CO Total Column (molecules/cm^2) x 10^{18}

Monthly Average AIRS CO Total Column (v4.0.9.0) 200406





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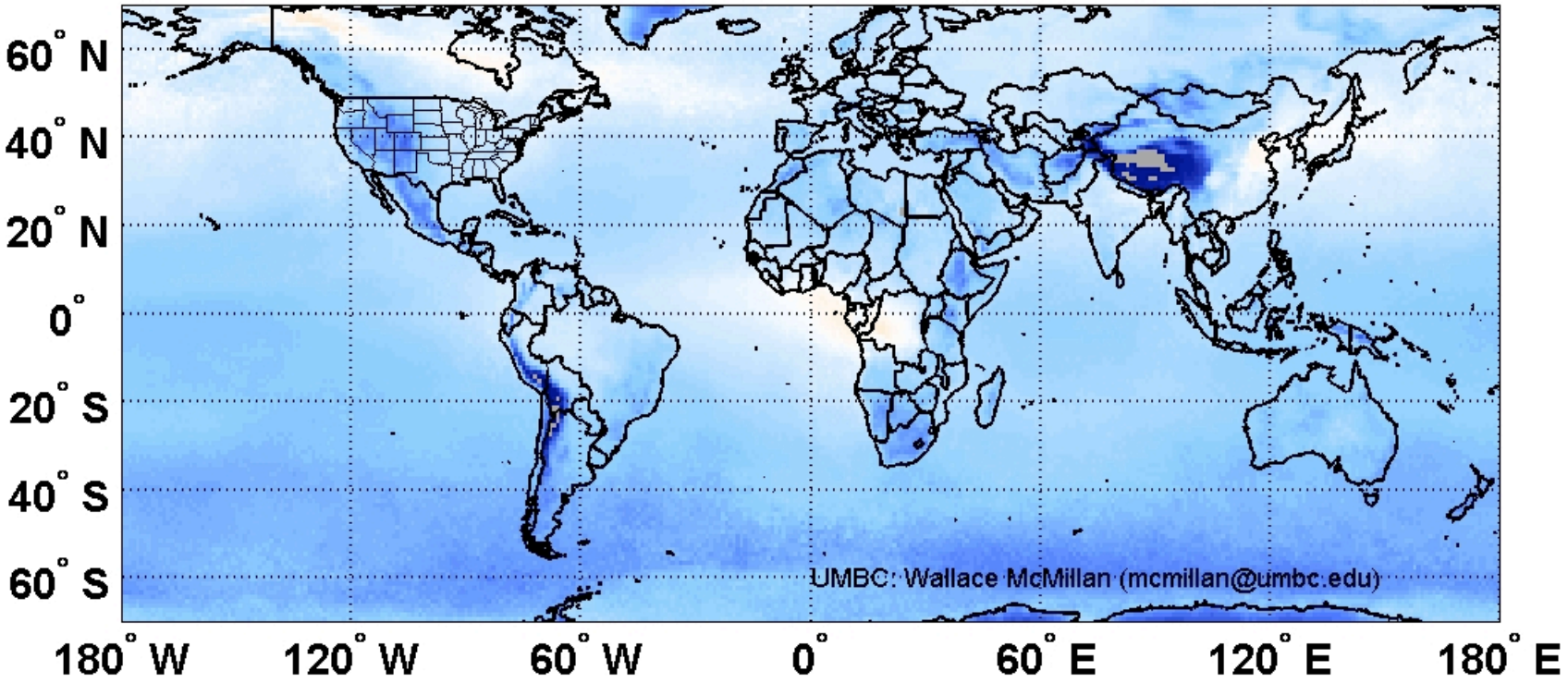
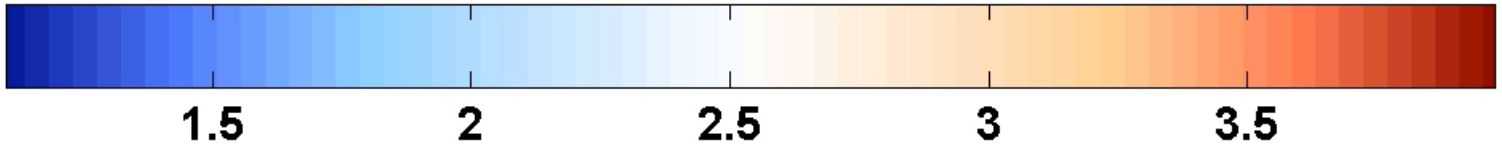
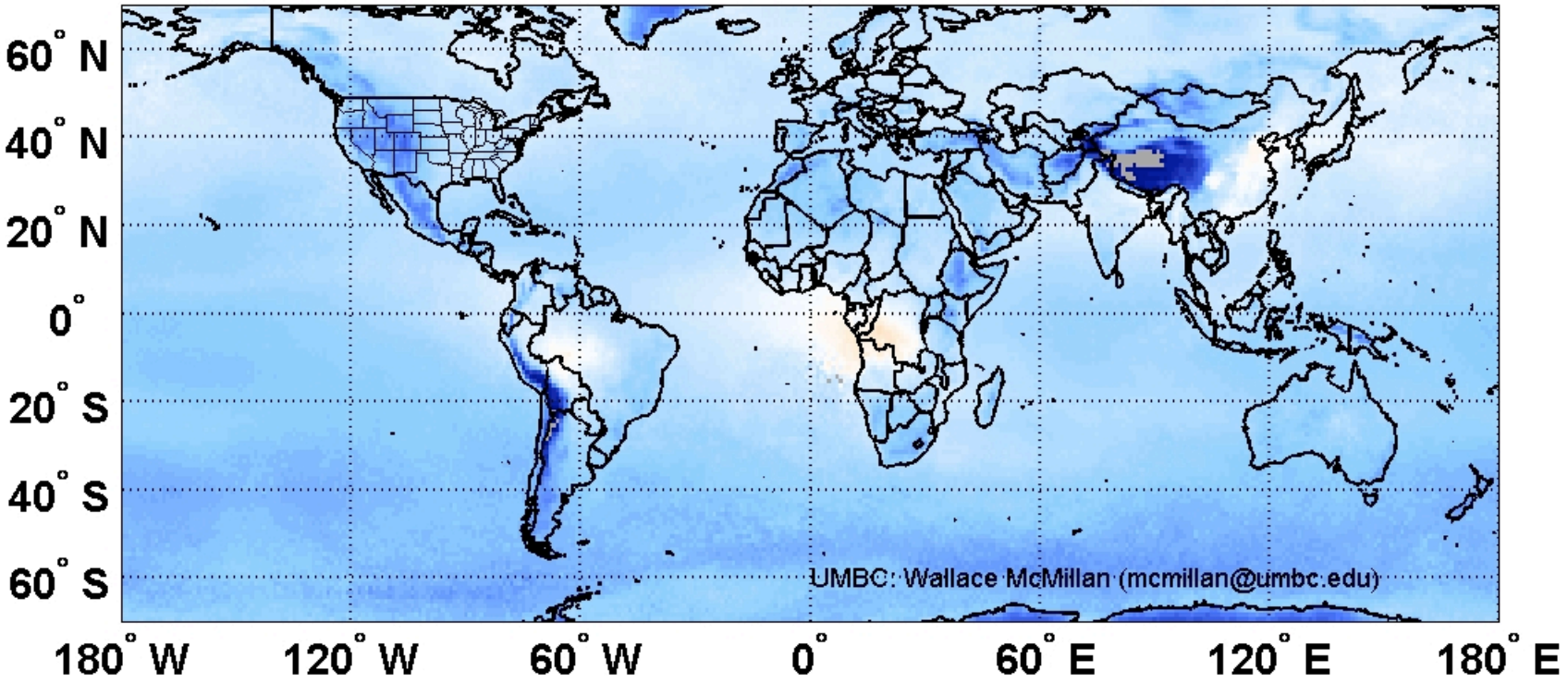
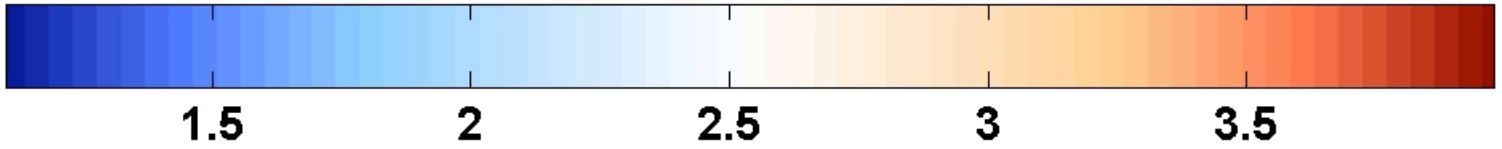




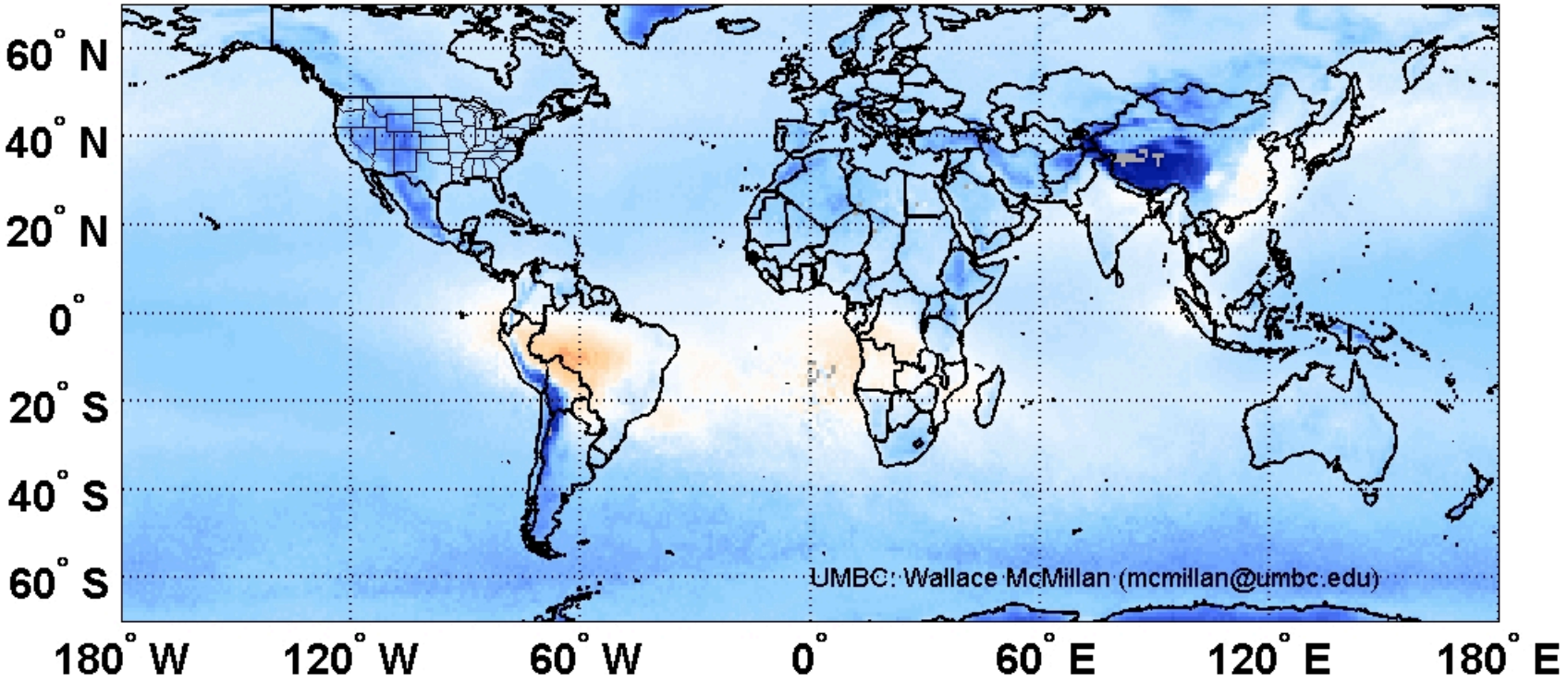
Monthly Average AIRS CO Total Column (v4.0.9.0) 200408

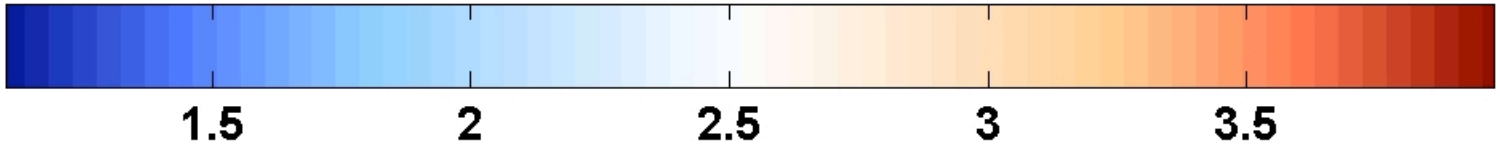




CO Total Column (molecules/cm^2) x 10^{18}

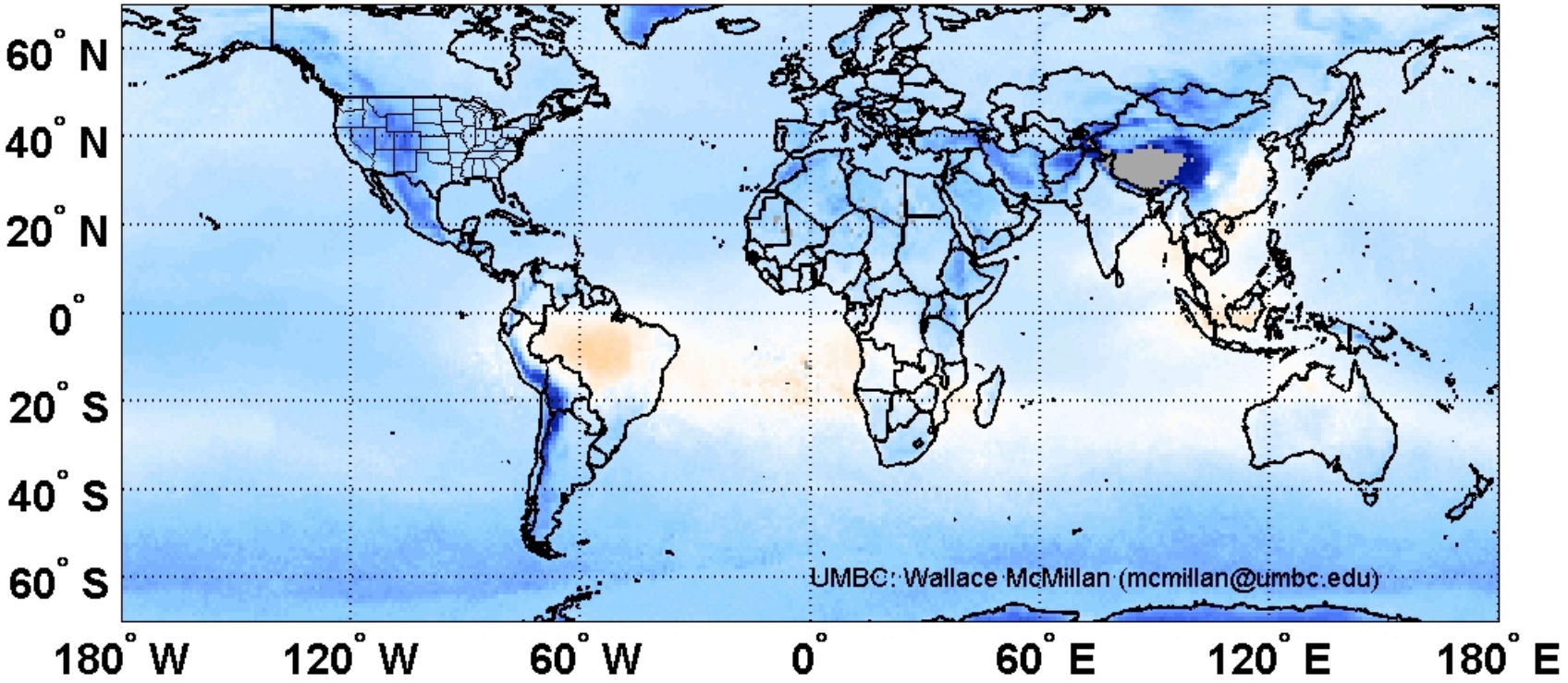
Monthly Average AIRS CO Total Column (v4.0.9.0) 200409

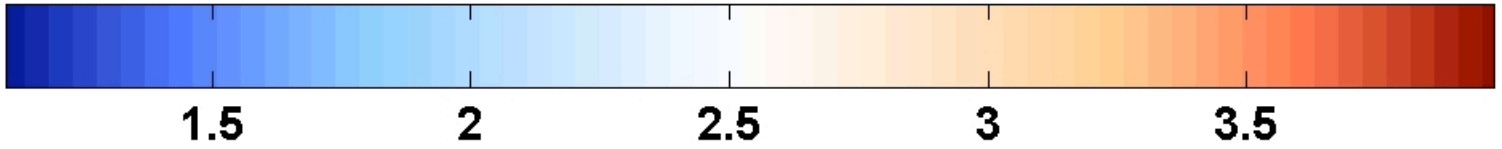




CO Total Column (molecules/cm^2) x 10^{18}

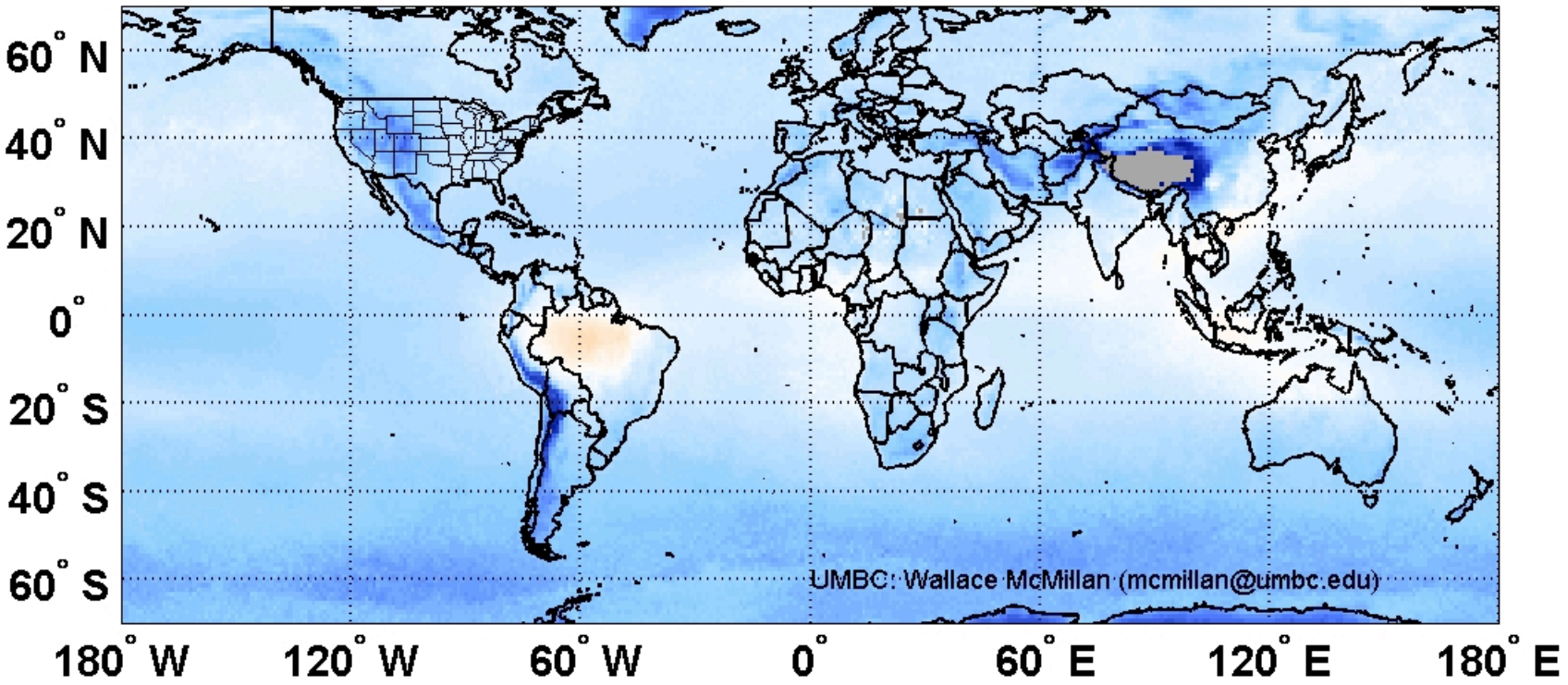
Monthly Average AIRS CO Total Column (v4.0.9.0) 200410

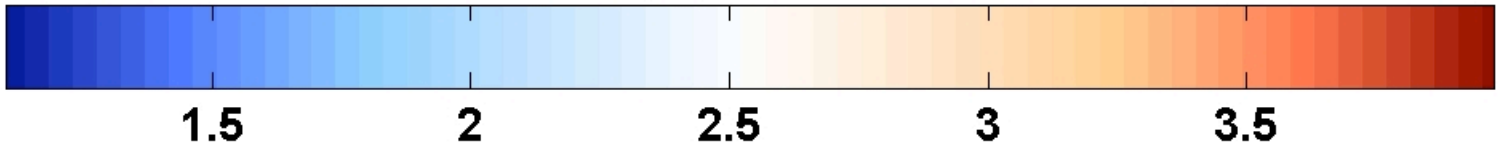




CO Total Column (molecules/cm^2) x 10^{18}

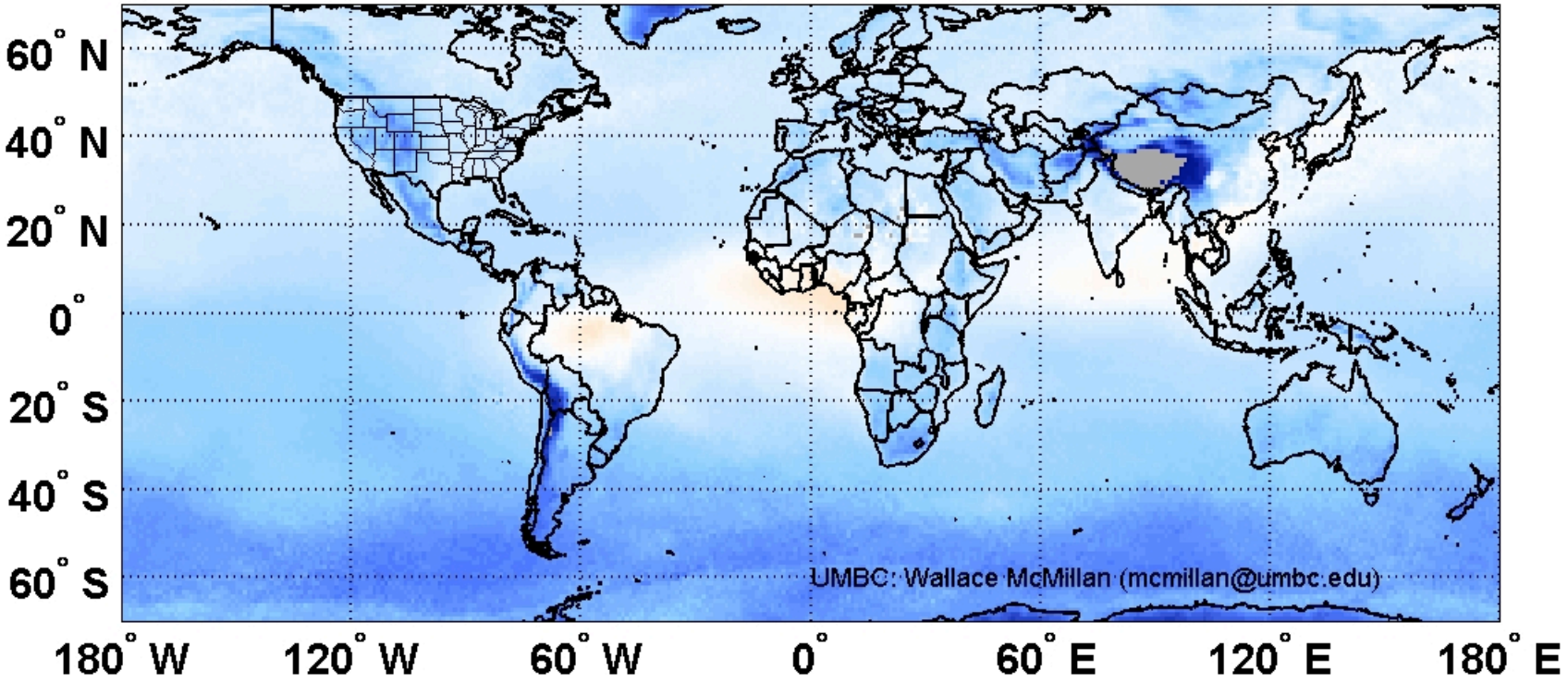
Monthly Average AIRS CO Total Column (v4.0.9.0) 200411

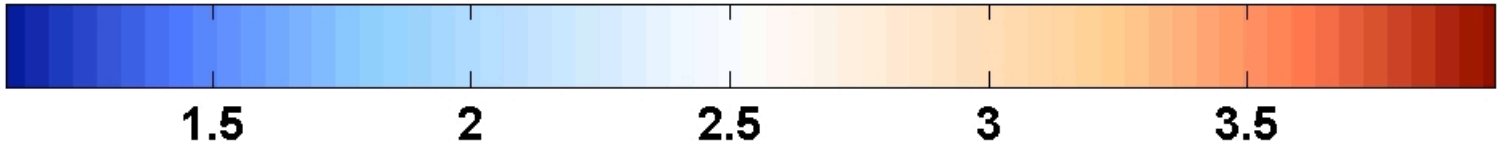




CO Total Column (molecules/cm^2) x 10^{18}

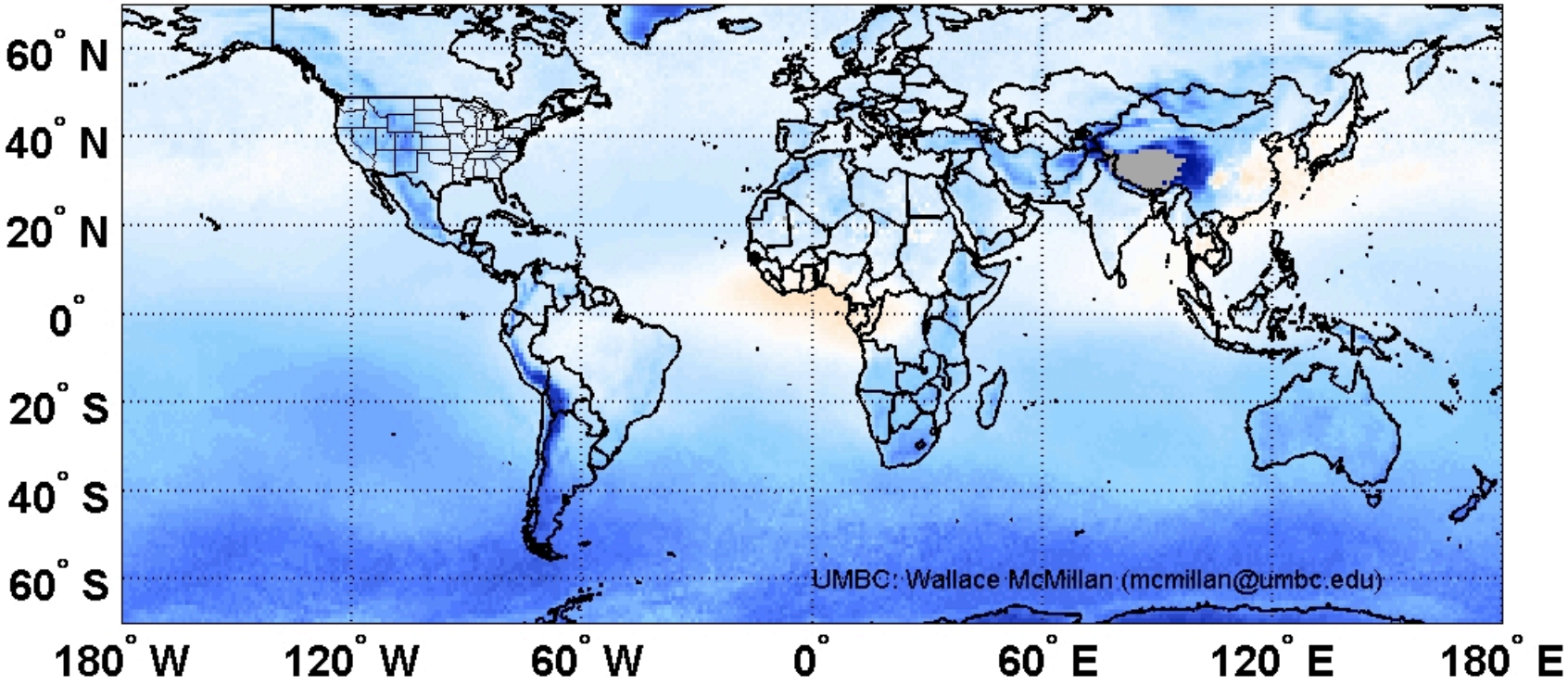
Monthly Average AIRS CO Total Column (v4.0.9.0) 200412





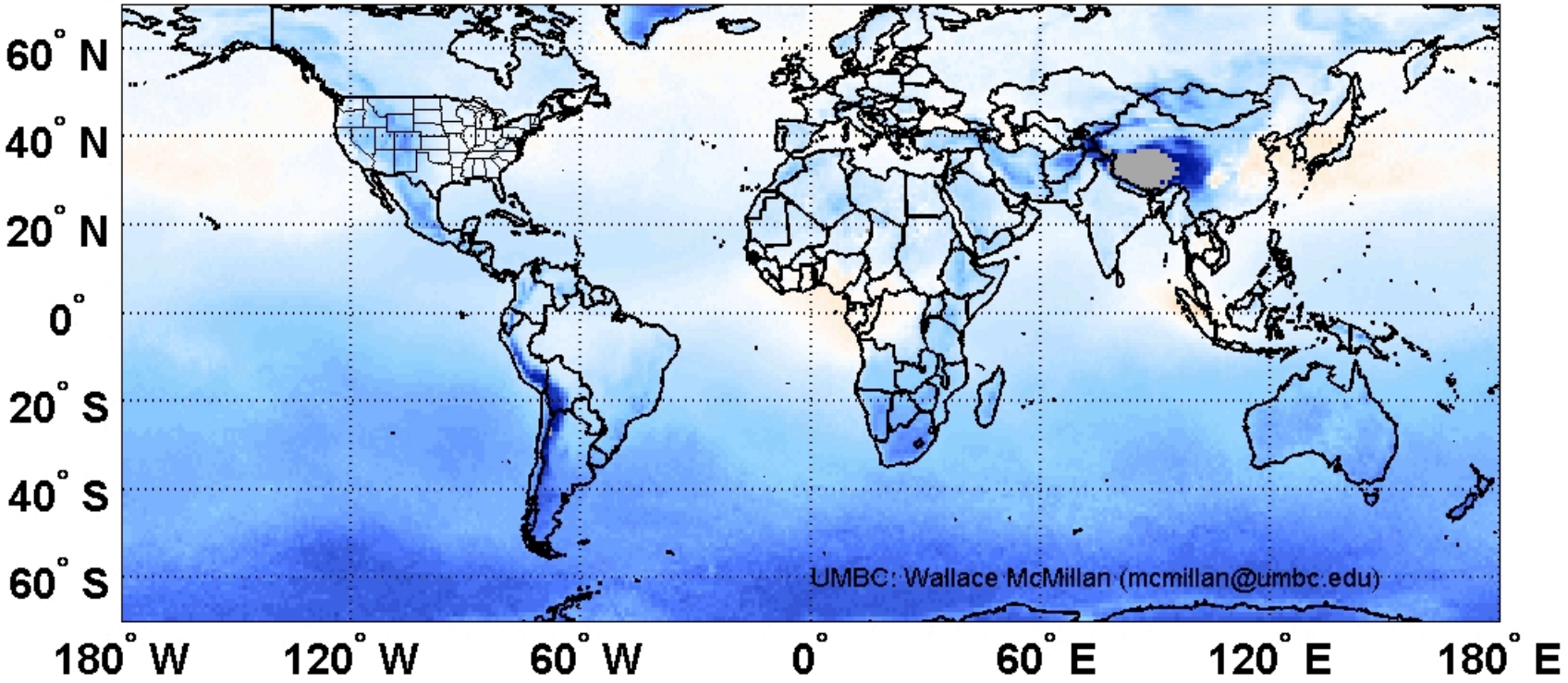
CO Total Column (molecules/cm^2) x 10^{18}

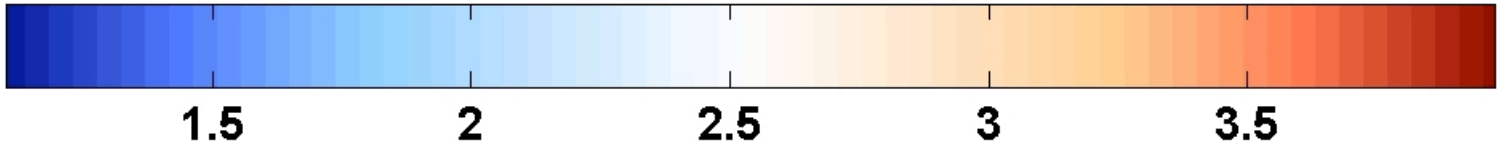
Monthly Average AIRS CO Total Column (v4.0.9.0) 200501



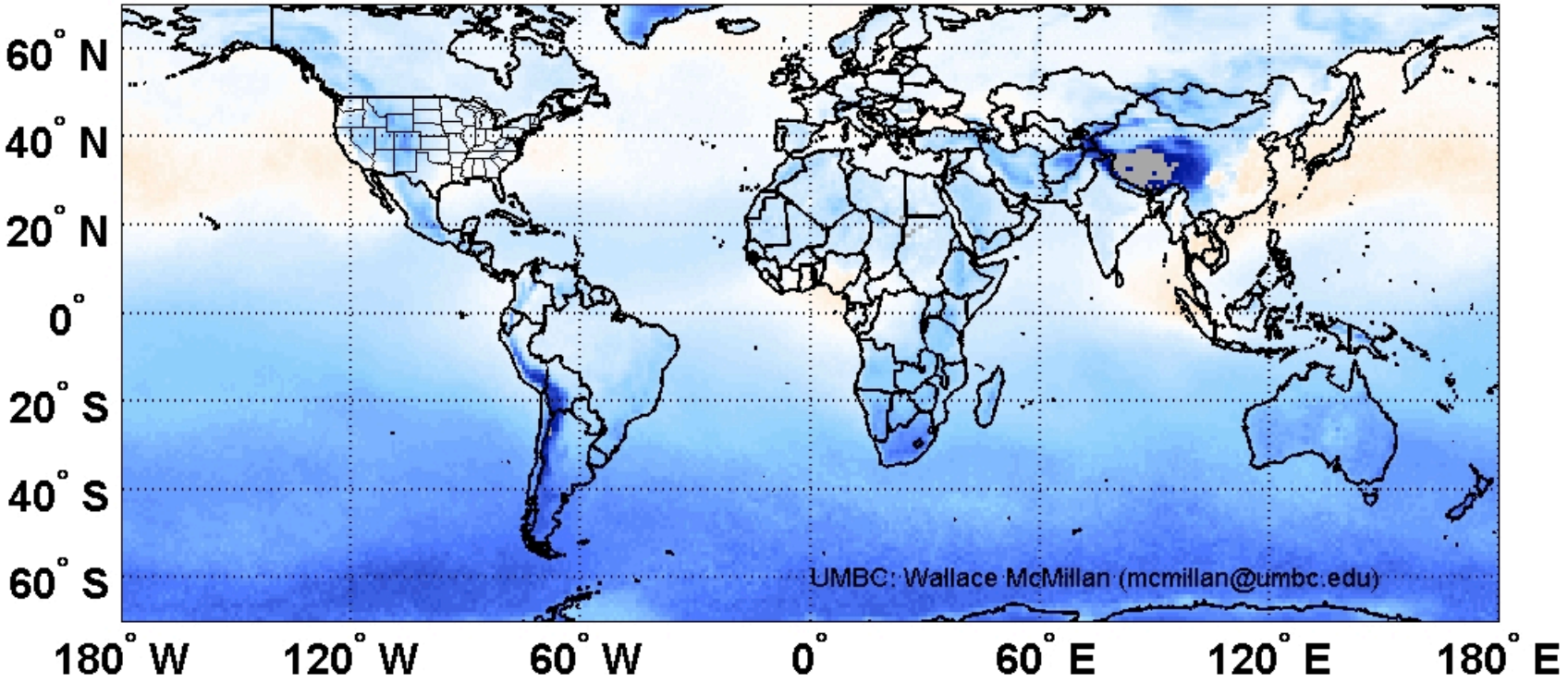
CO Total Column (molecules/cm^2) x 10^{18}

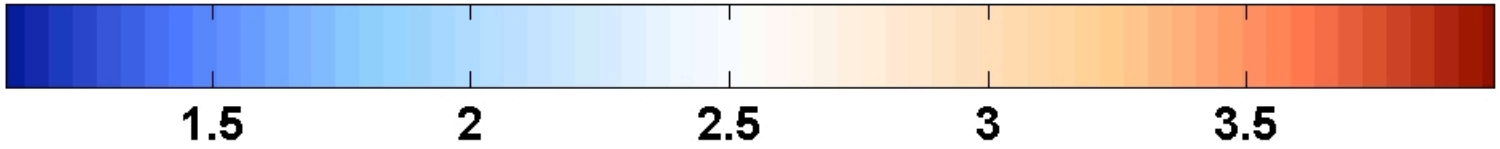
Monthly Average AIRS CO Total Column (v4.0.9.0) 200502





Monthly Average AIRS CO Total Column (v4.0.9.0) 200503





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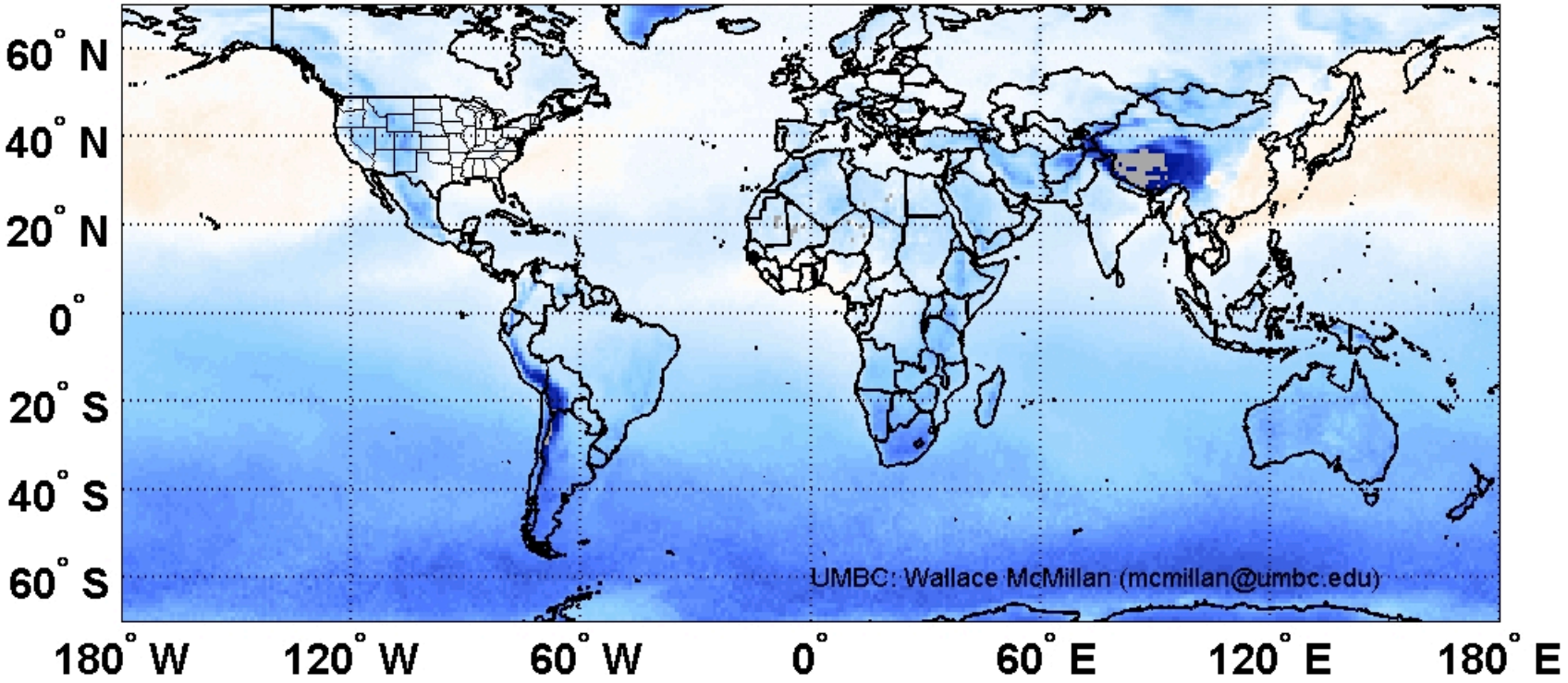
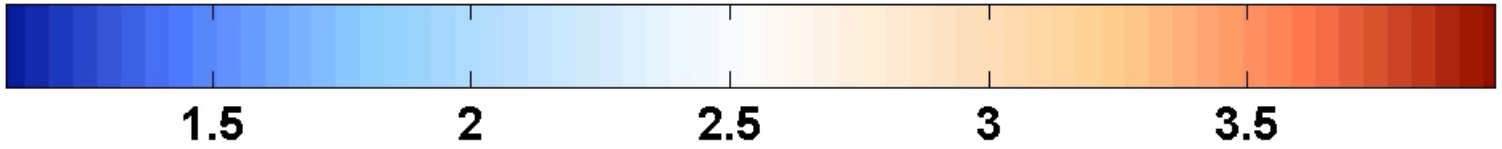
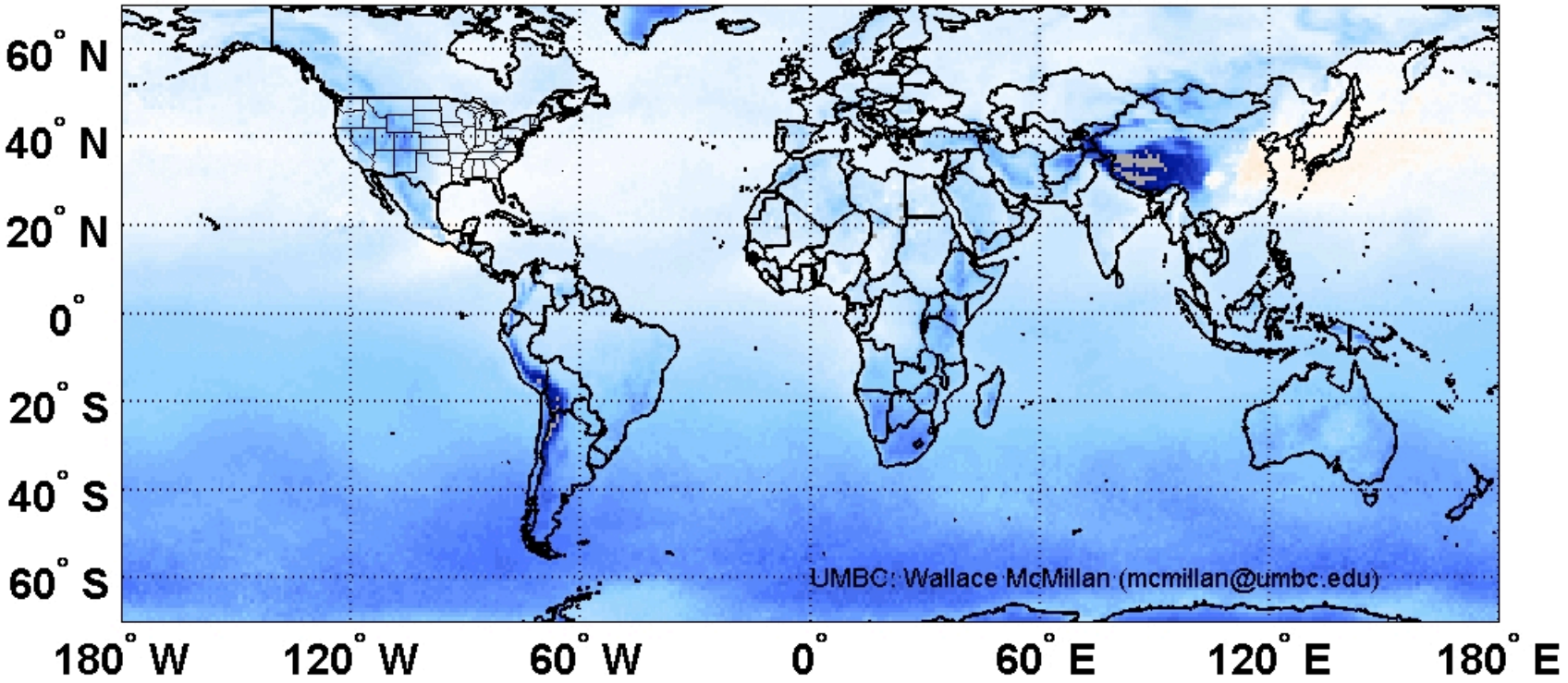
Monthly Average AIRS CO Total Column (v4.0.9.0) 200504

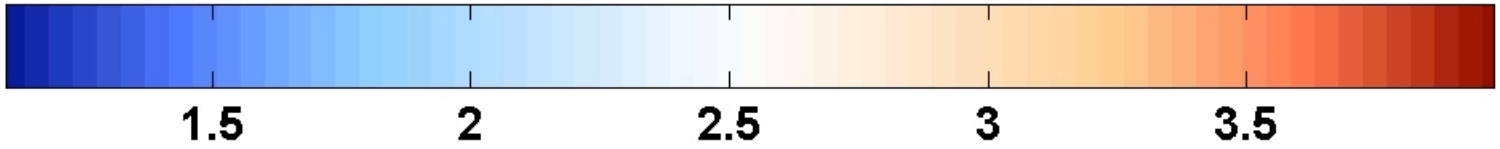




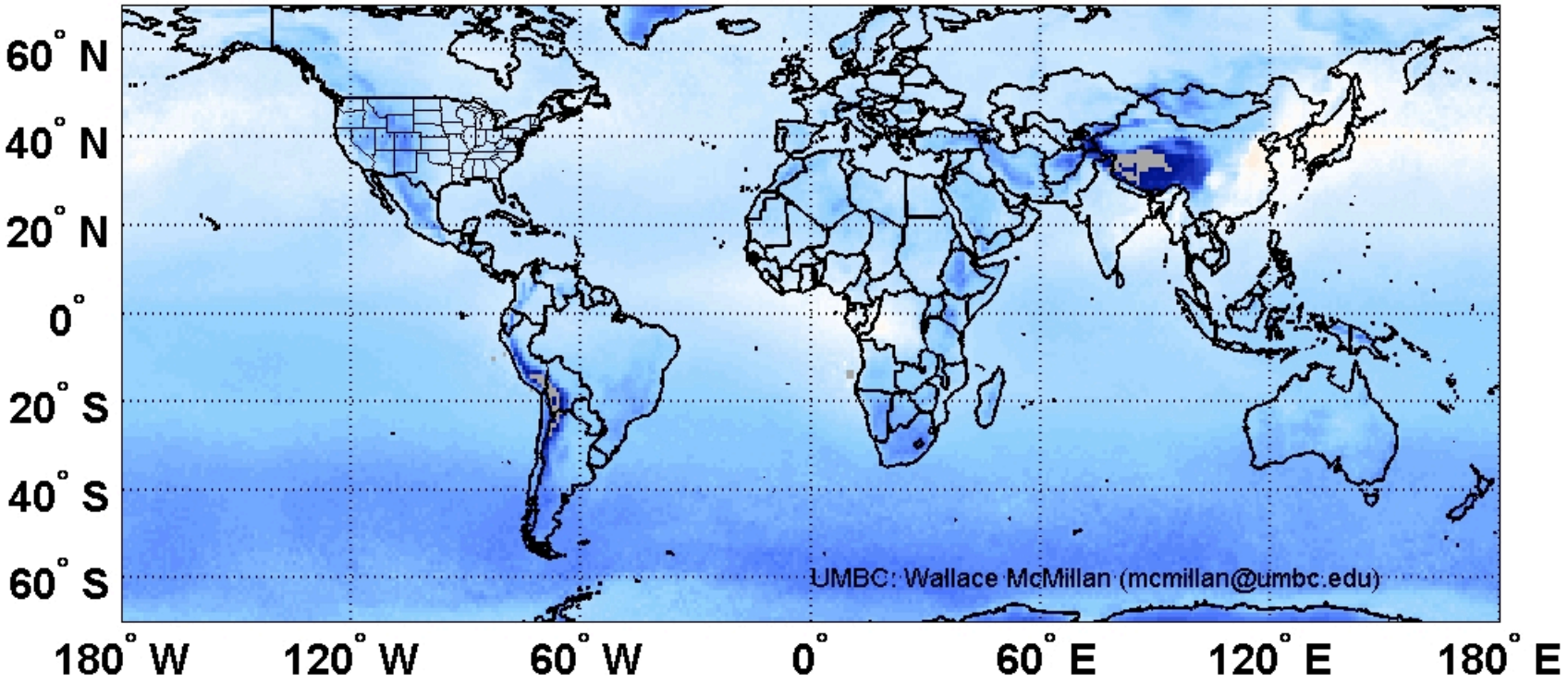
CO Total Column (molecules/cm^2) x 10^{18}

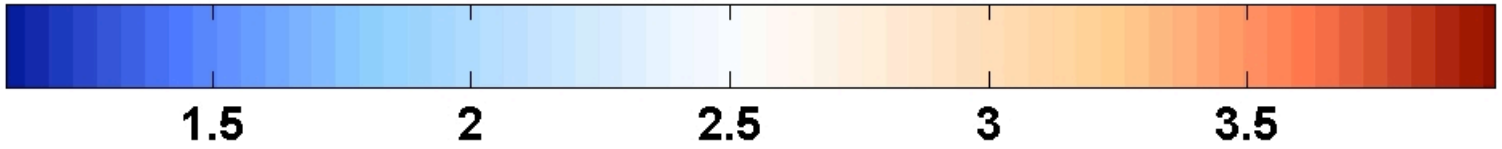
Monthly Average AIRS CO Total Column (v4.0.9.0) 200505



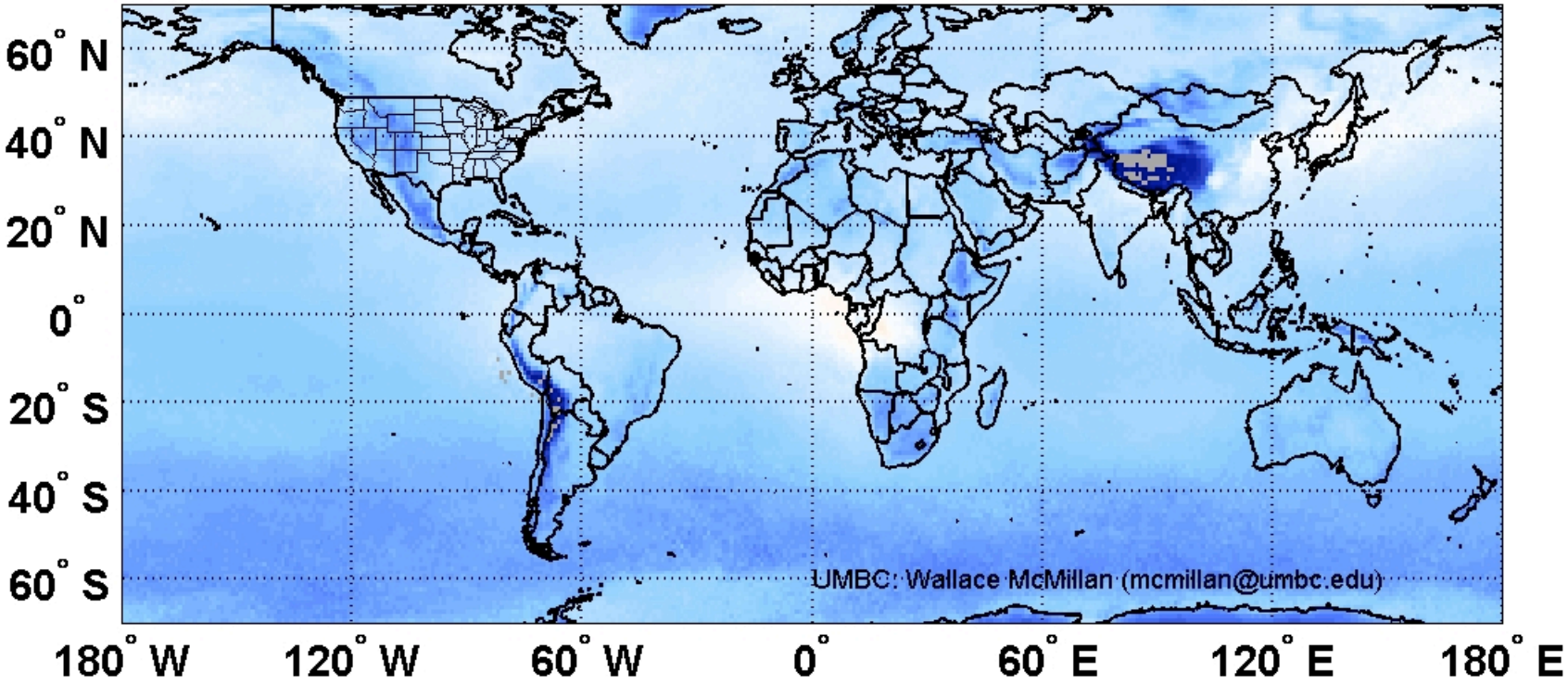


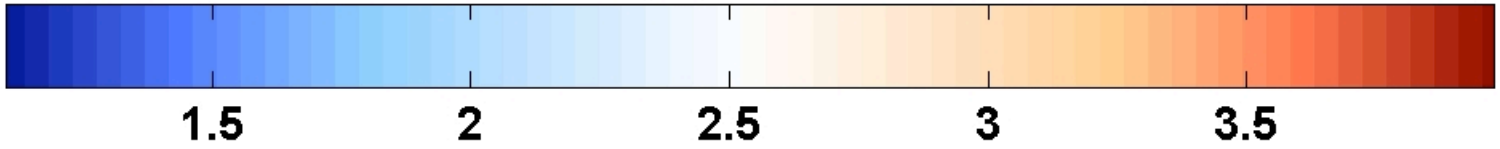
Monthly Average AIRS CO Total Column (v4.0.9.0) 200506





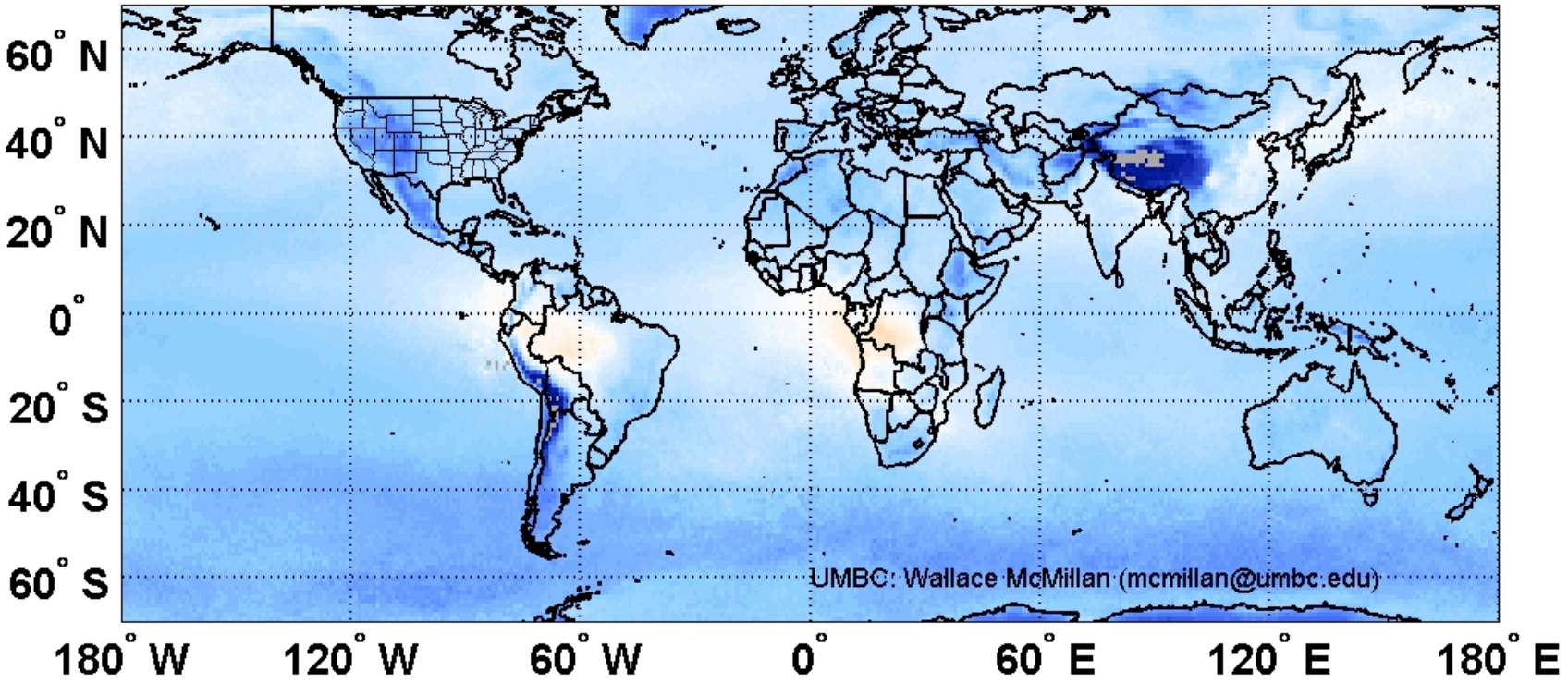
Monthly Average AIRS CO Total Column (v4.0.9.0) 200507

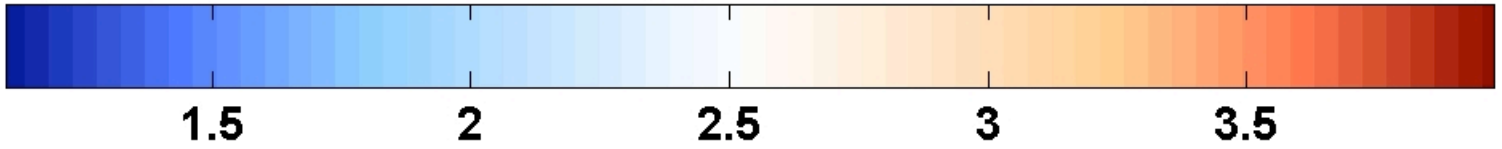




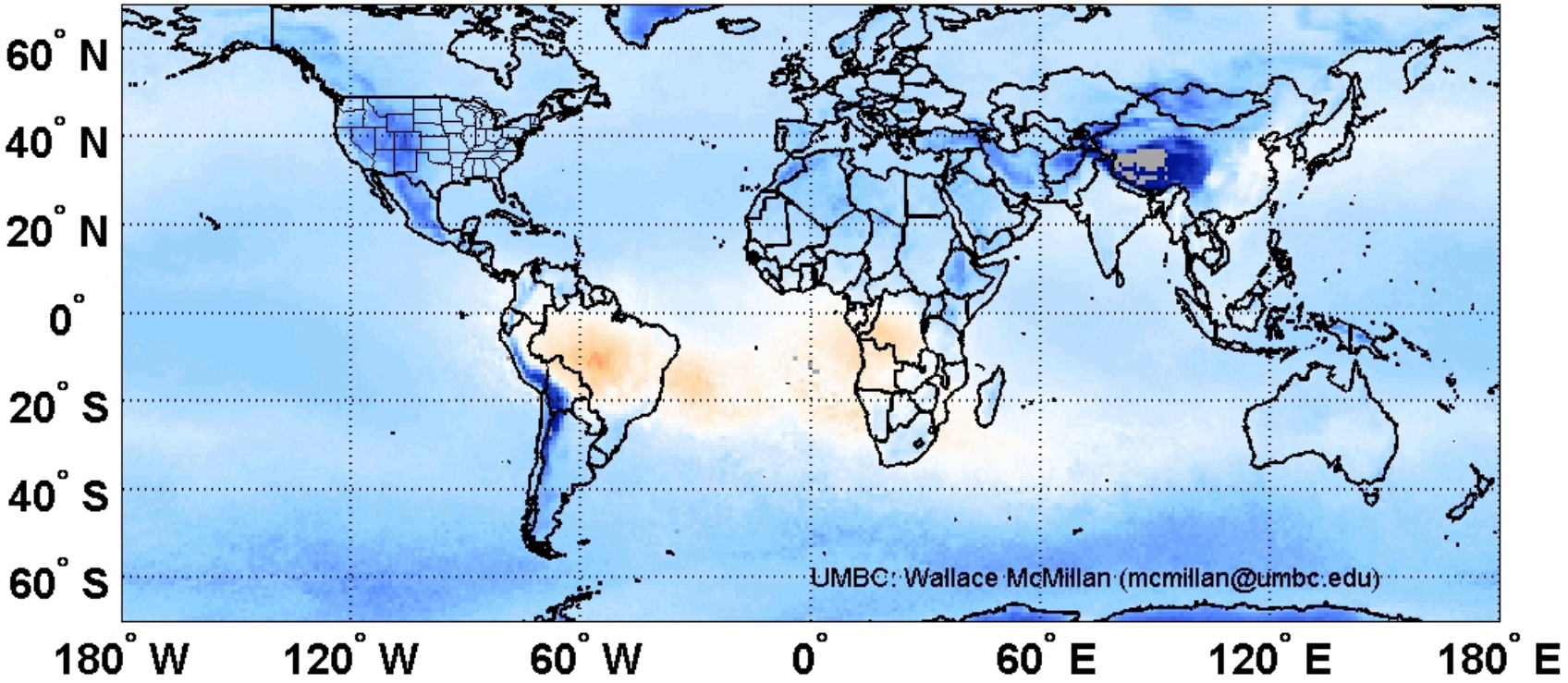
CO Total Column (molecules/cm^2) x 10^{18}

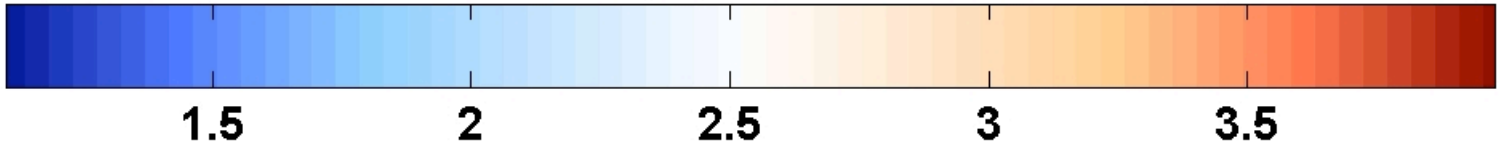
Monthly Average AIRS CO Total Column (v4.0.9.0) 200508



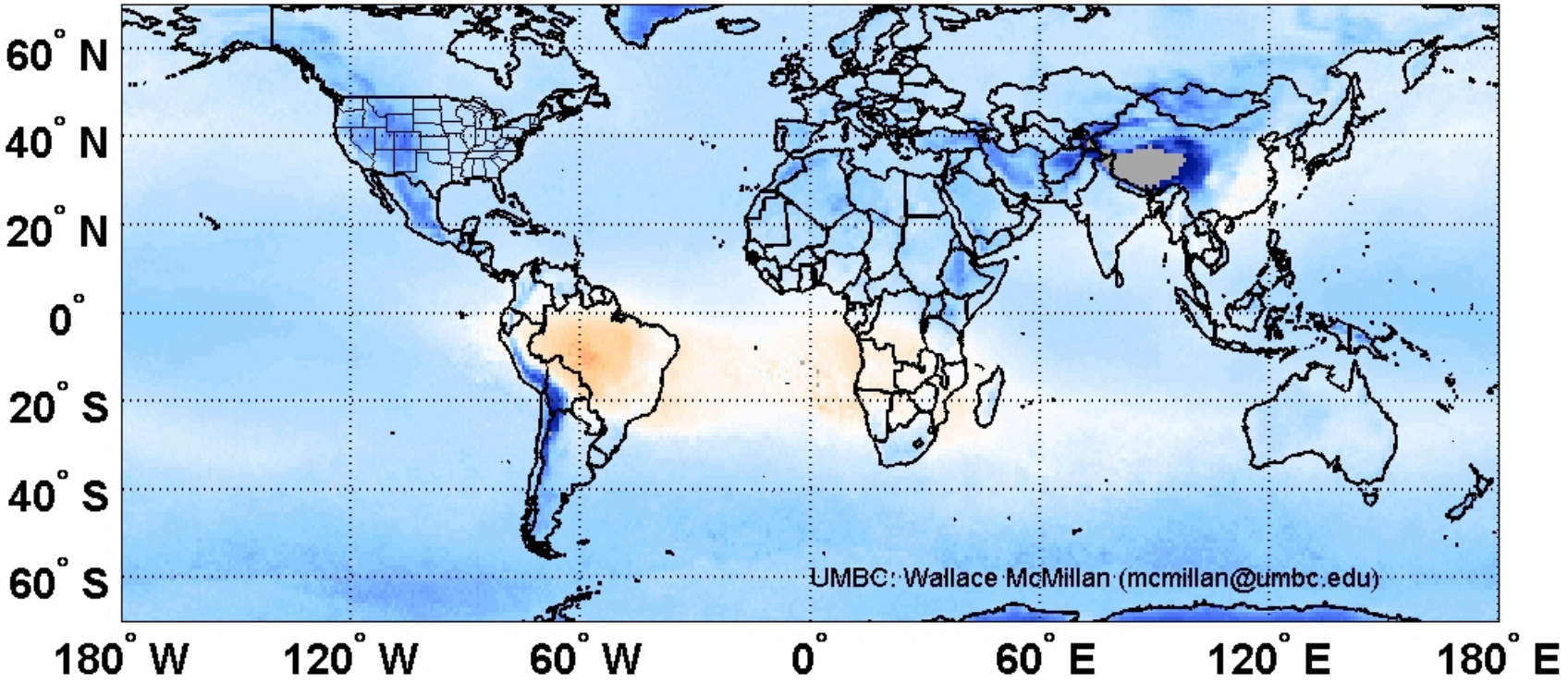


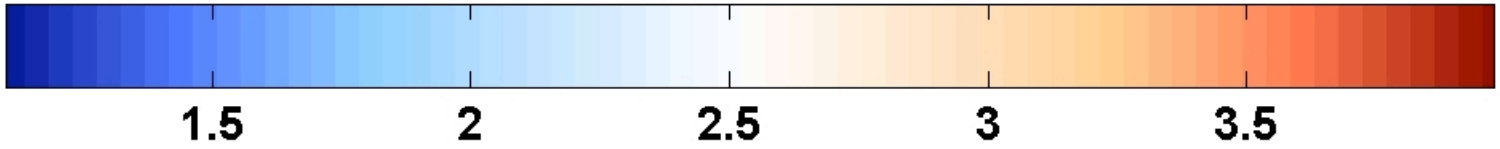
Monthly Average AIRS CO Total Column (v4.0.9.0) 200509





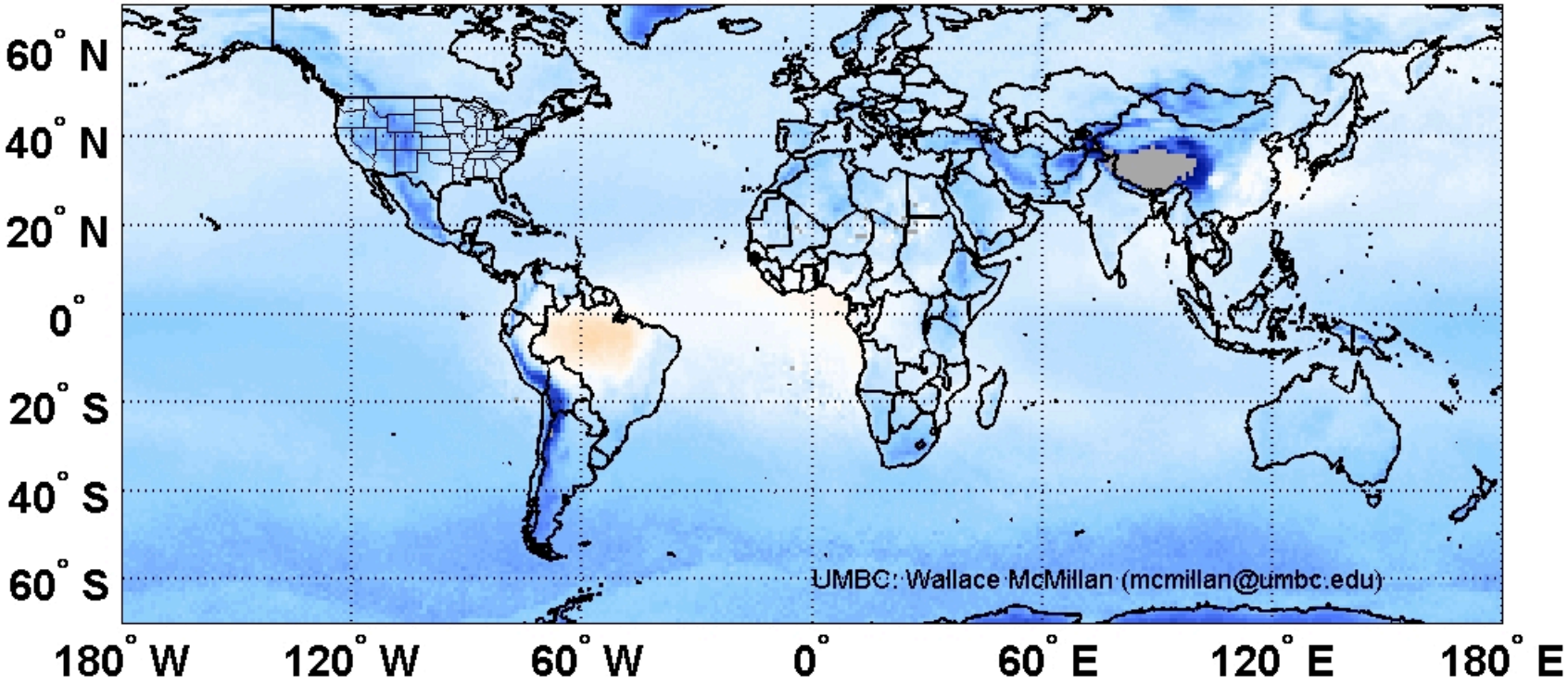
Monthly Average AIRS CO Total Column (v4.0.9.0) 200510

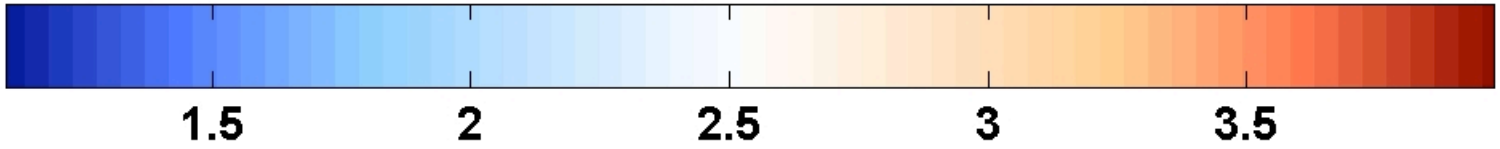




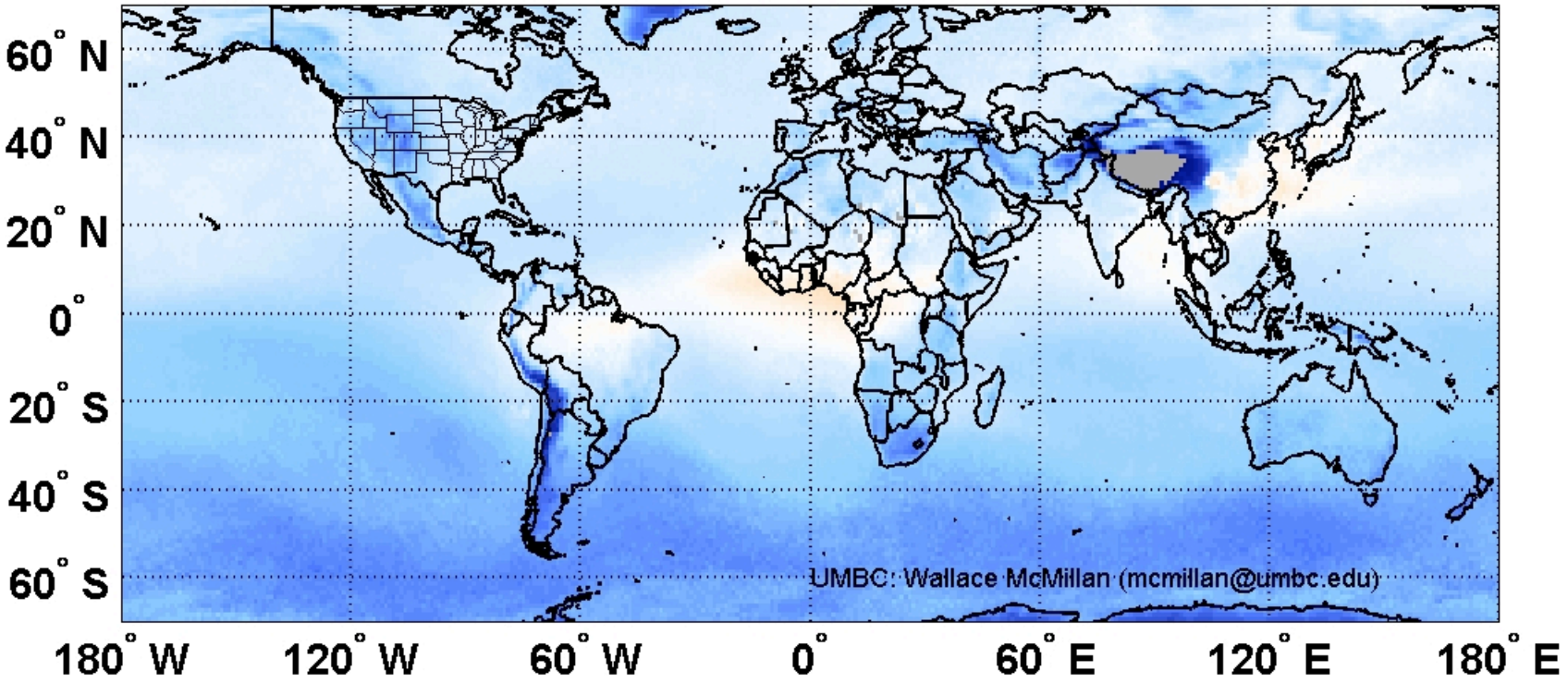
CO Total Column (molecules/cm^2) x 10^{18}

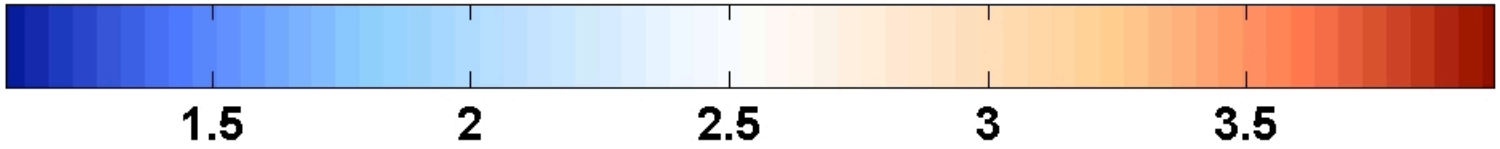
Monthly Average AIRS CO Total Column (v4.0.9.0) 200511



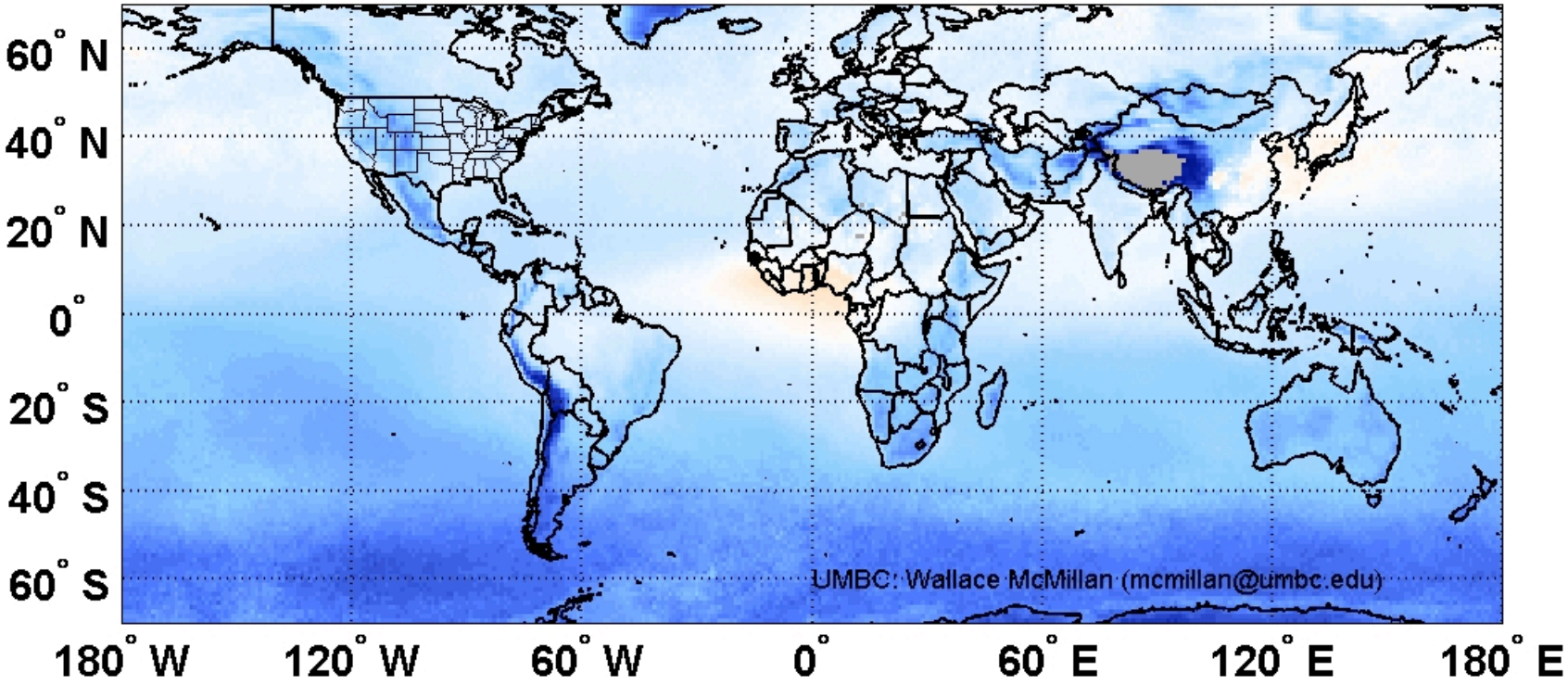


Monthly Average AIRS CO Total Column (v4.0.9.0) 200512



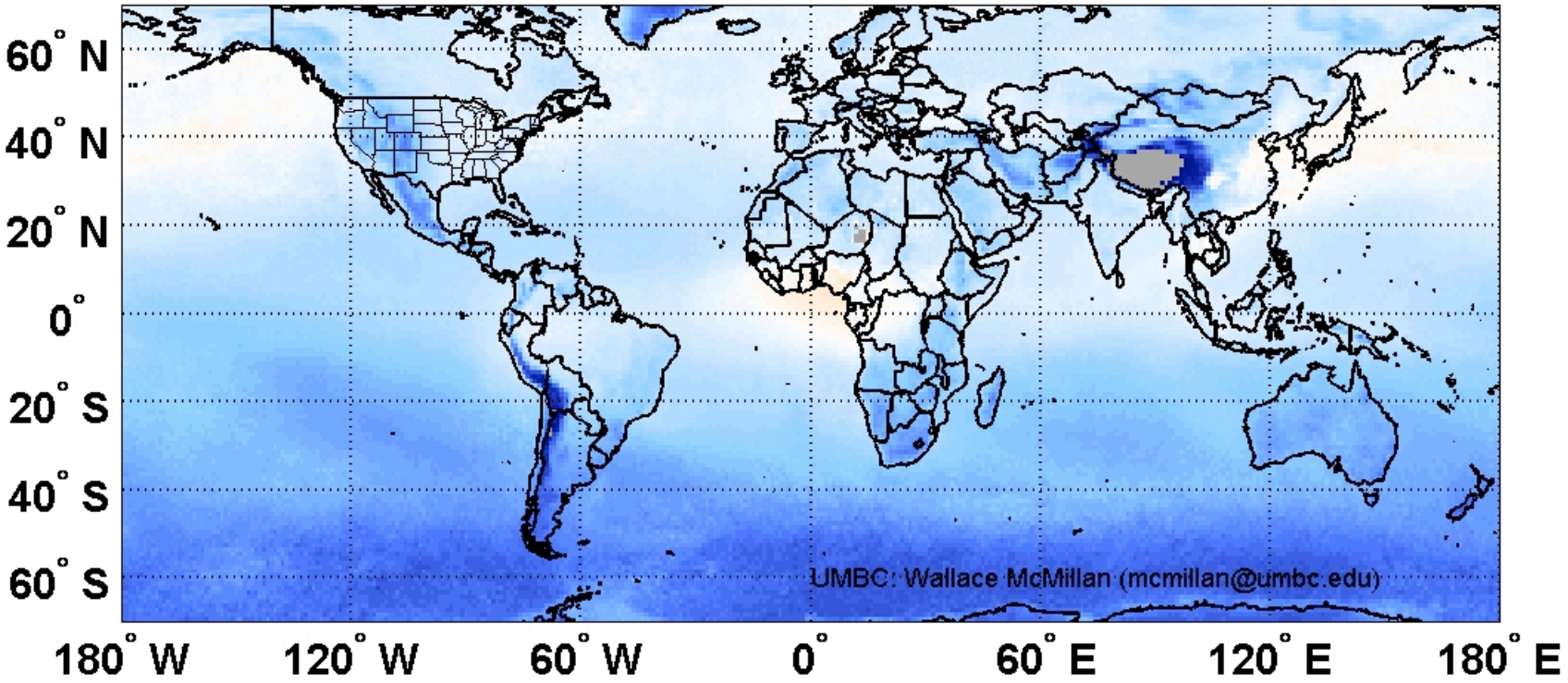


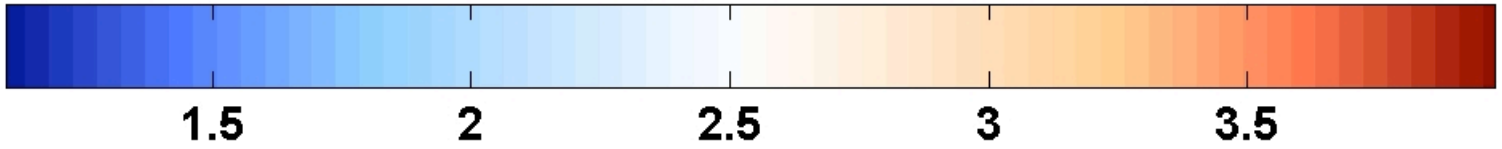
Monthly Average AIRS CO Total Column (v4.0.9.0) 200601



CO Total Column (molecules/cm^2) x 10^{18}

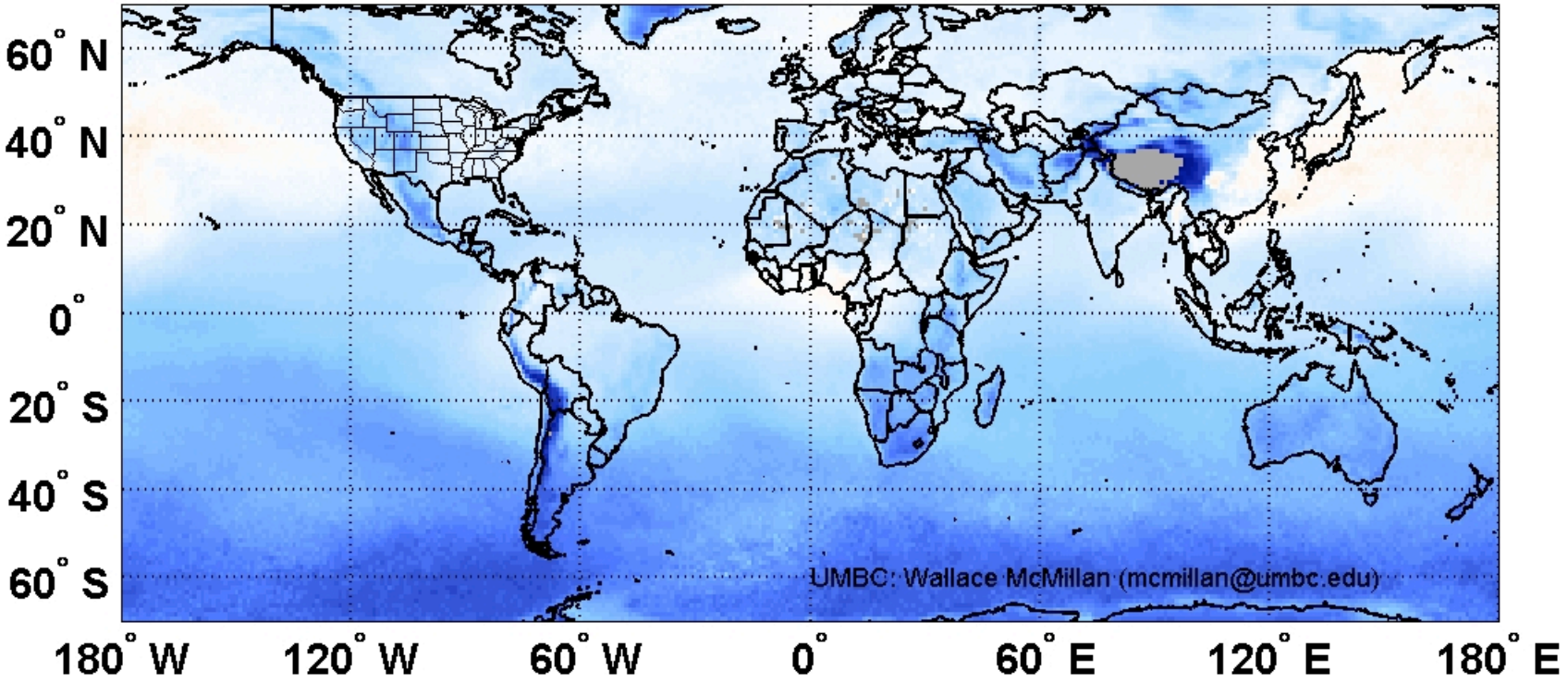
Monthly Average AIRS CO Total Column (v4.0.9.0) 200602

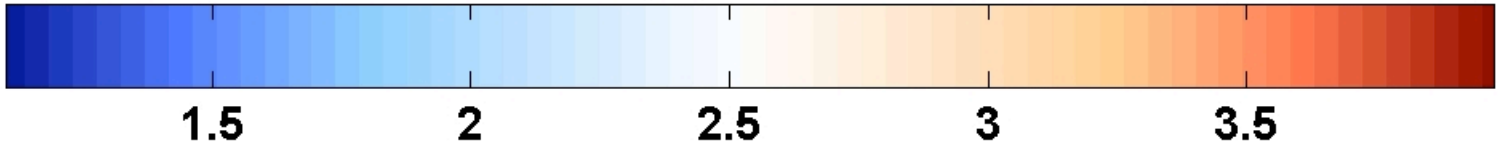




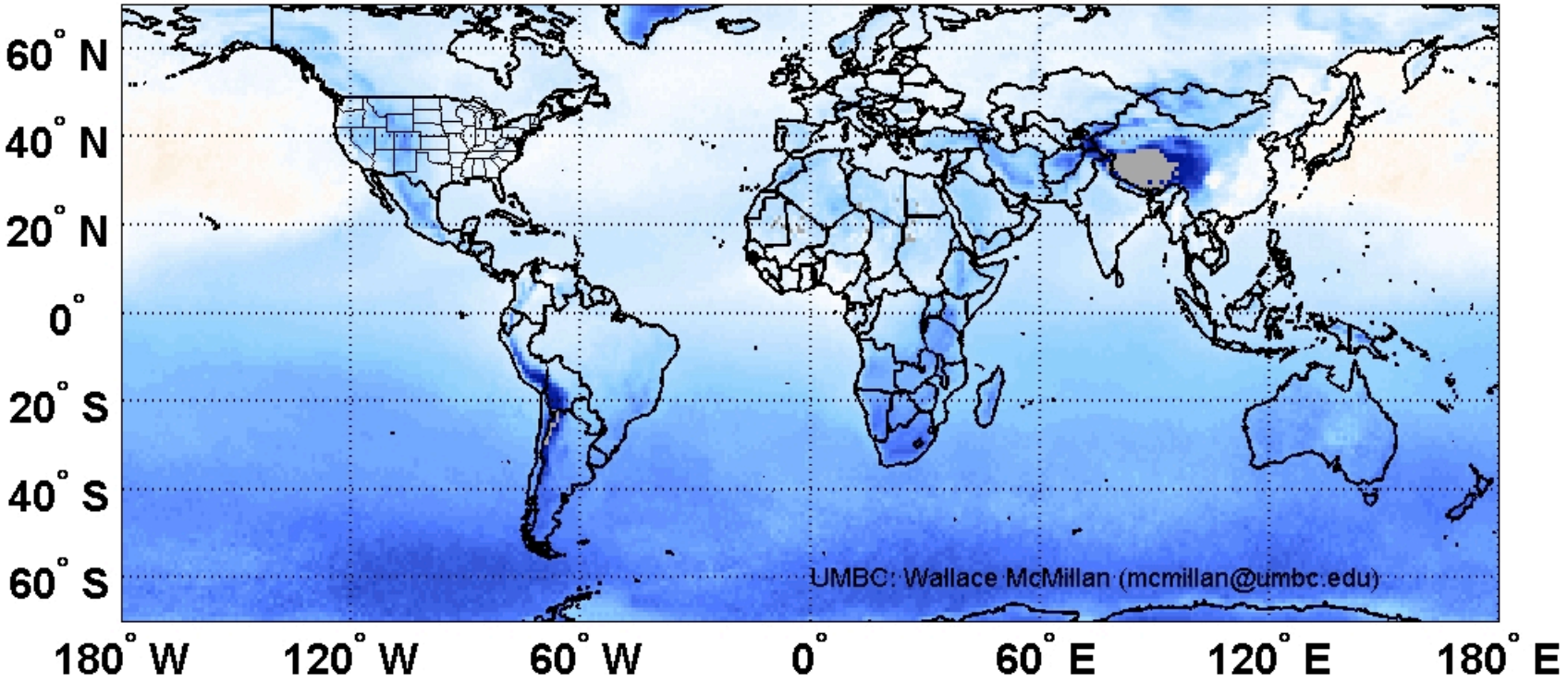
CO Total Column (molecules/cm^2) x 10^{18}

Monthly Average AIRS CO Total Column (v4.0.9.0) 200603



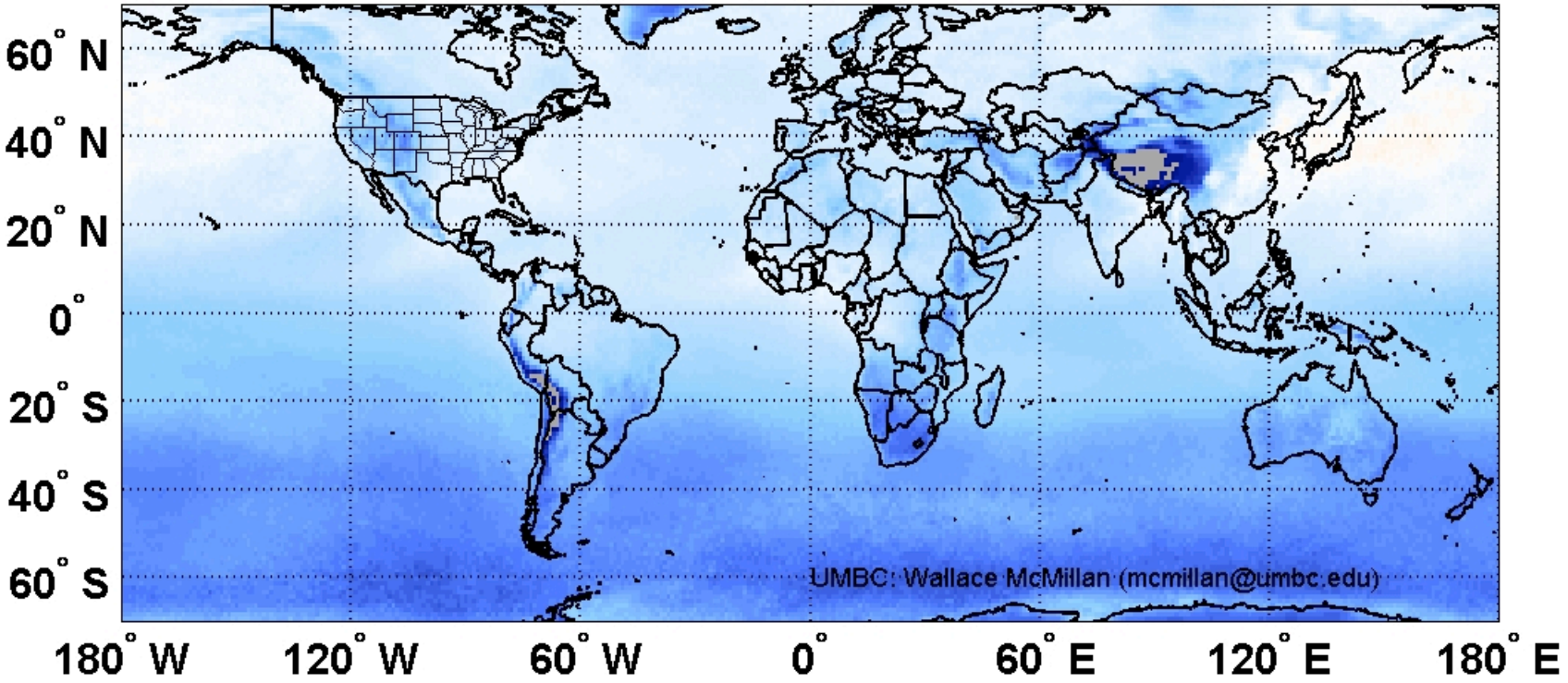


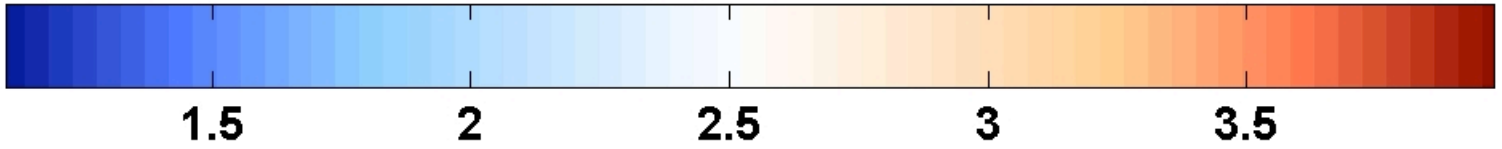
Monthly Average AIRS CO Total Column (v4.0.9.0) 200604



CO Total Column (molecules/cm^2) x 10^{18}

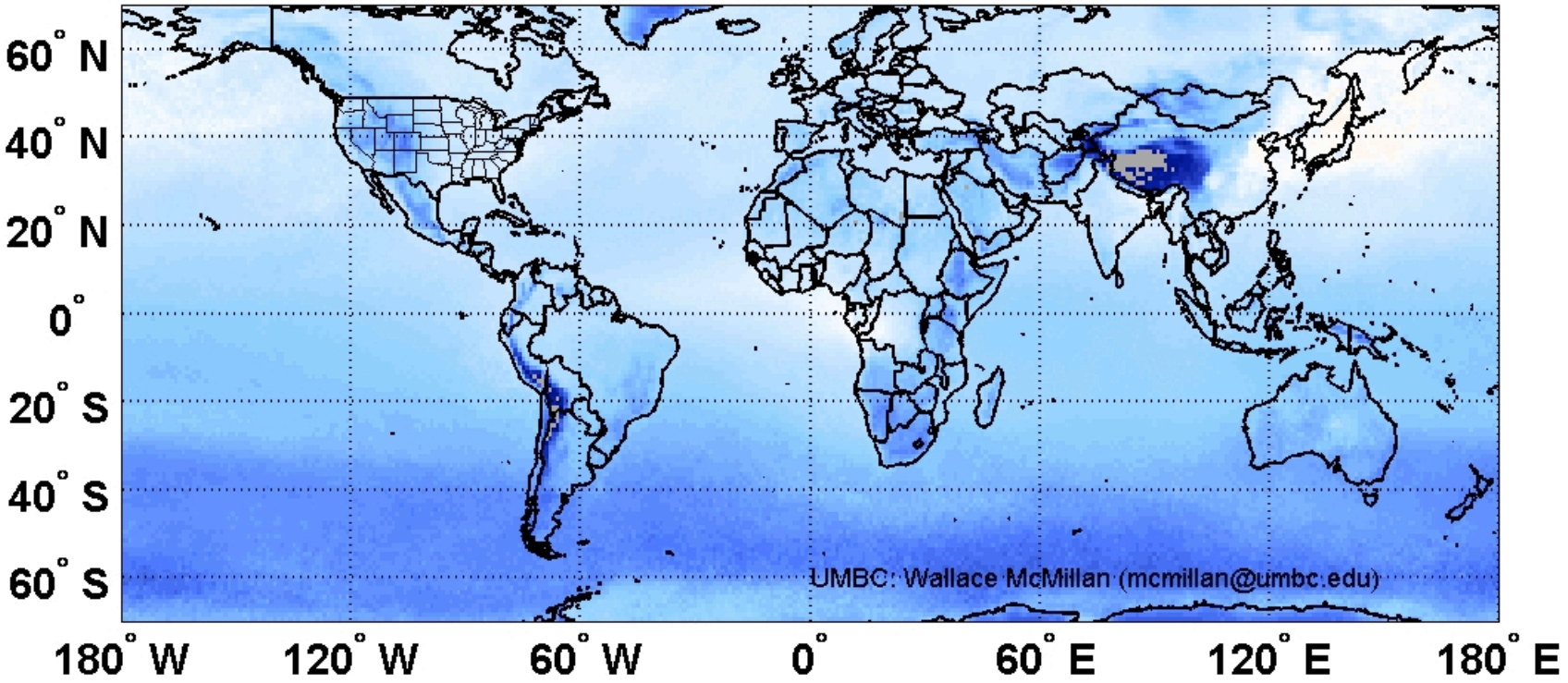
Monthly Average AIRS CO Total Column (v4.0.9.0) 200605

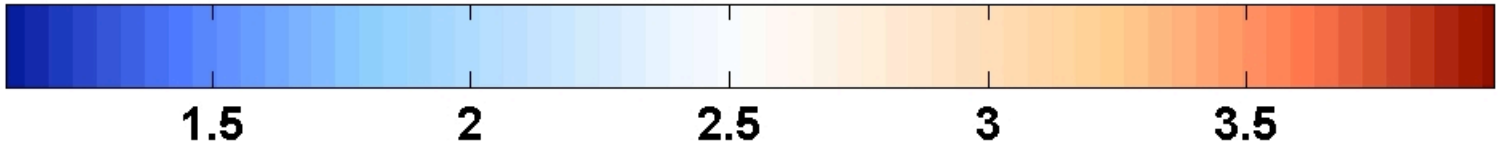




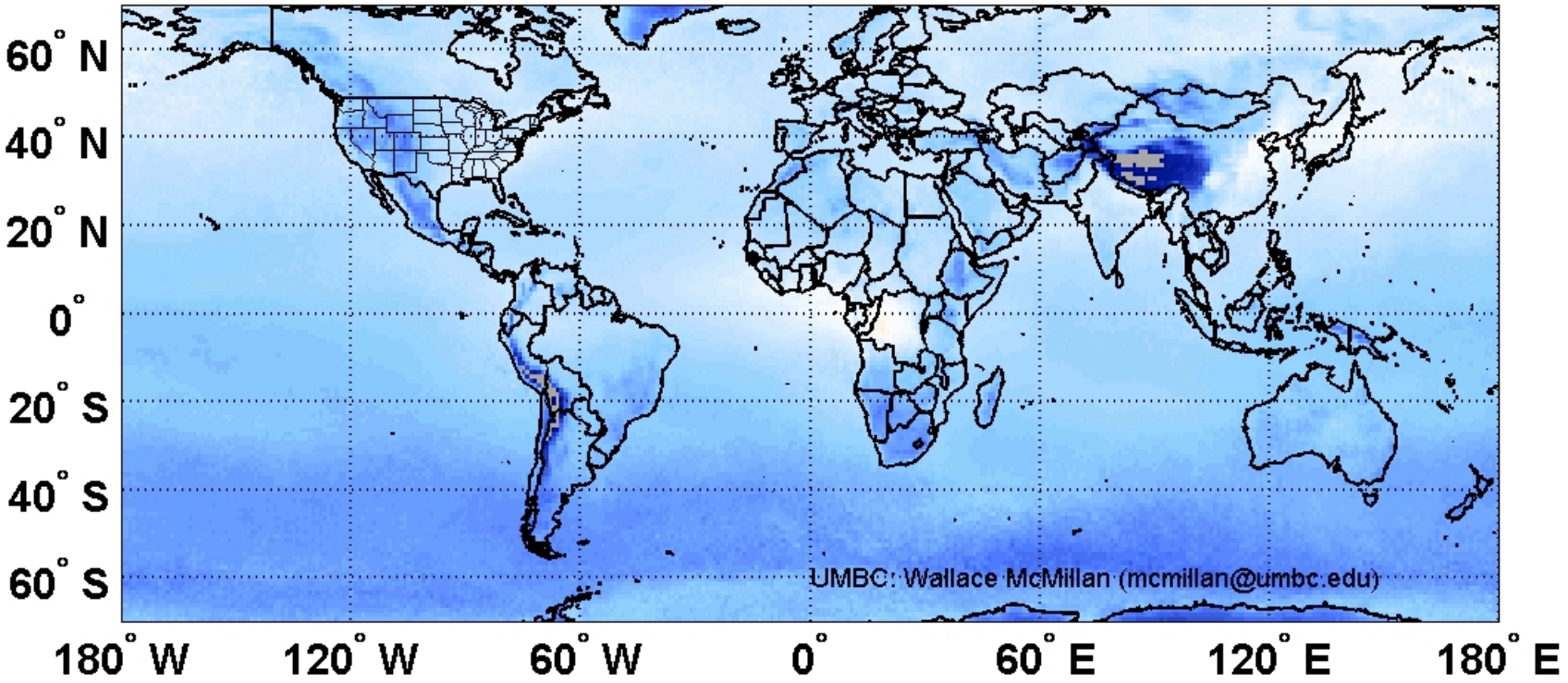
CO Total Column (molecules/cm^2) x 10^{18}

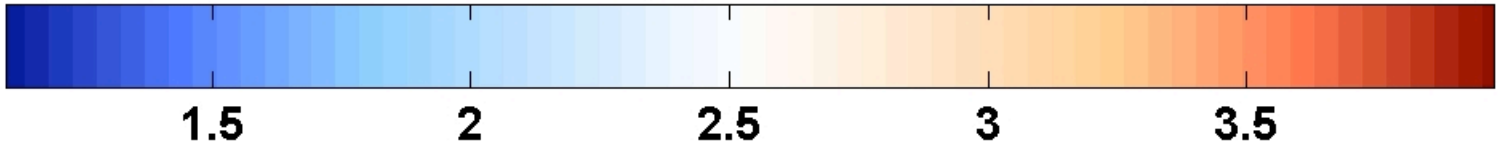
Monthly Average AIRS CO Total Column (v4.0.9.0) 200606





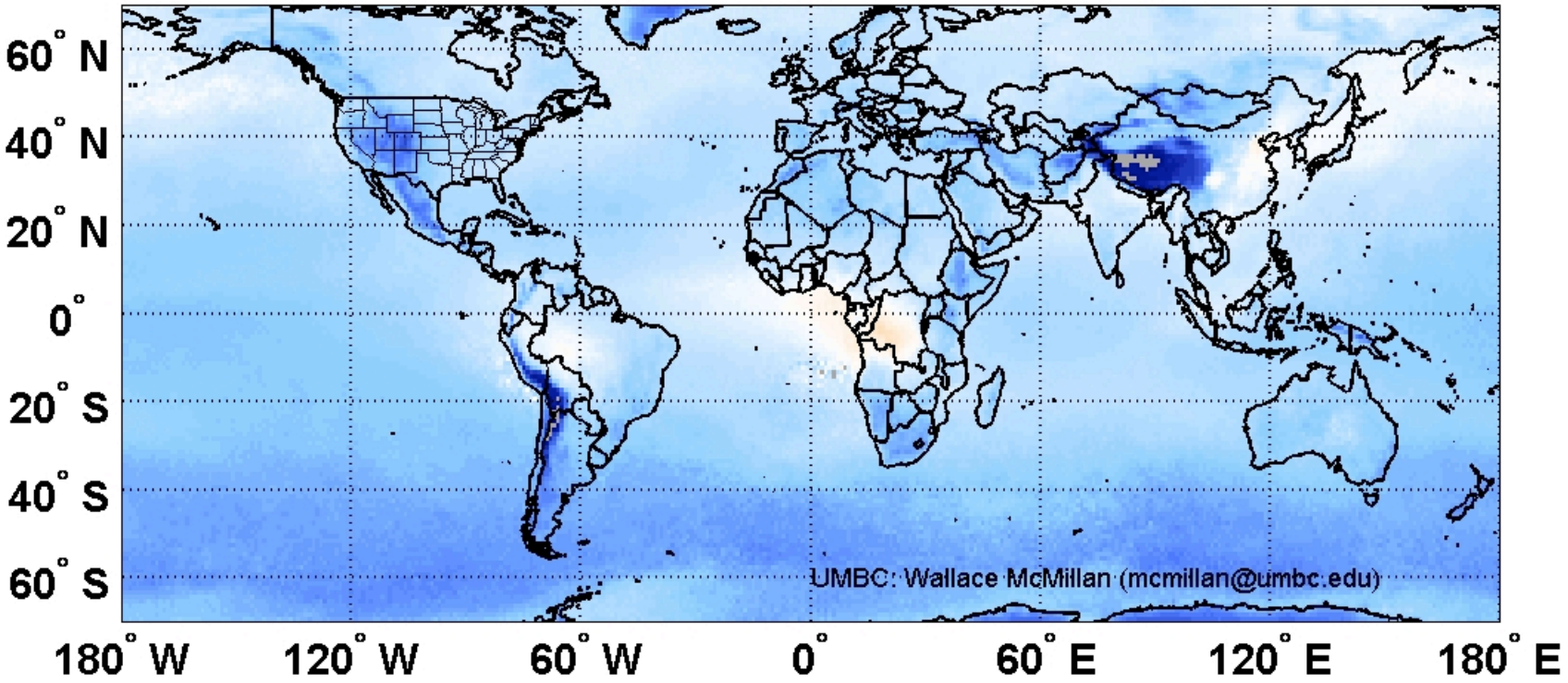
Monthly Average AIRS CO Total Column (v4.0.9.0) 200607

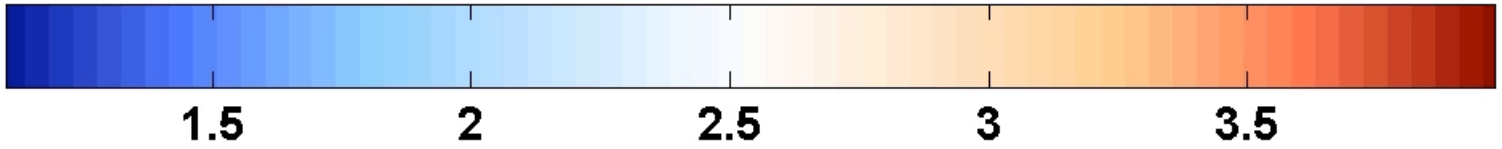




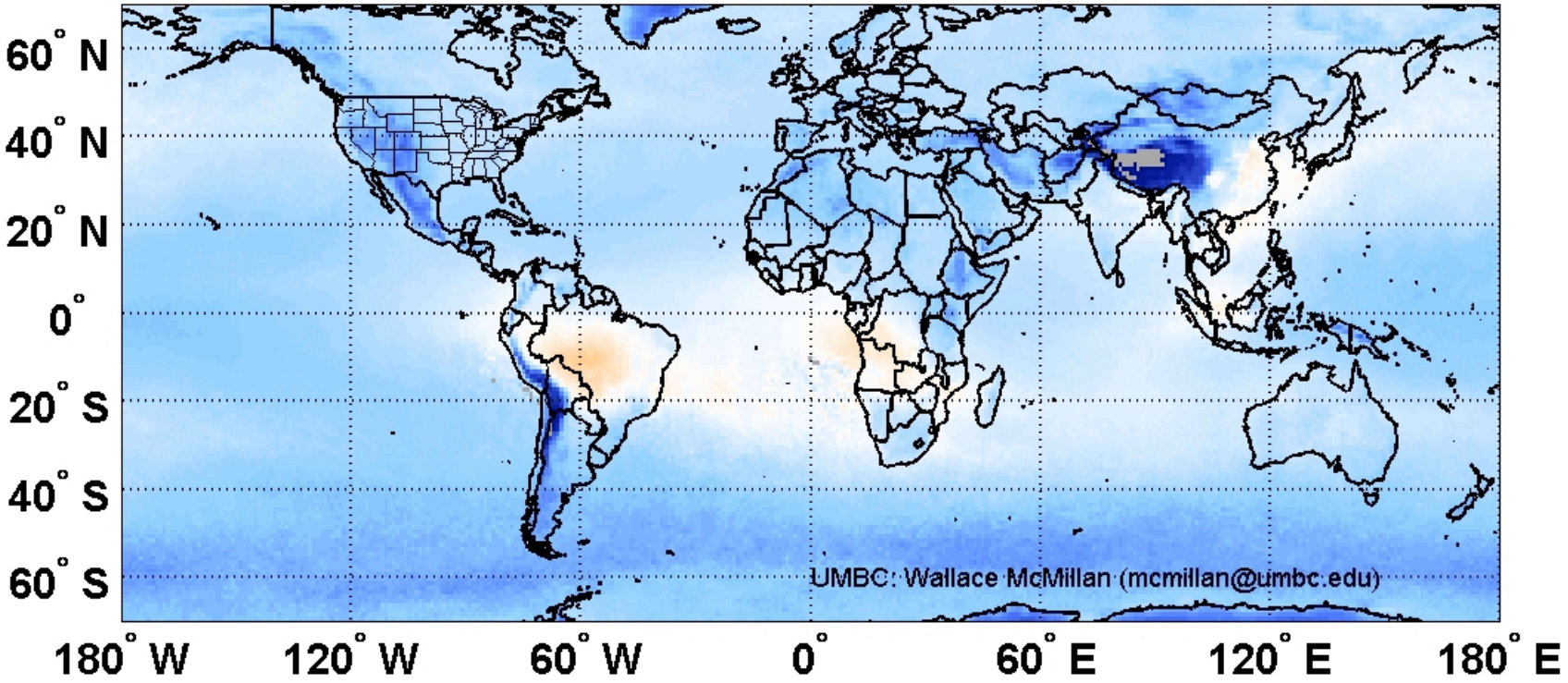
CO Total Column (molecules/cm^2) x 10^{18}

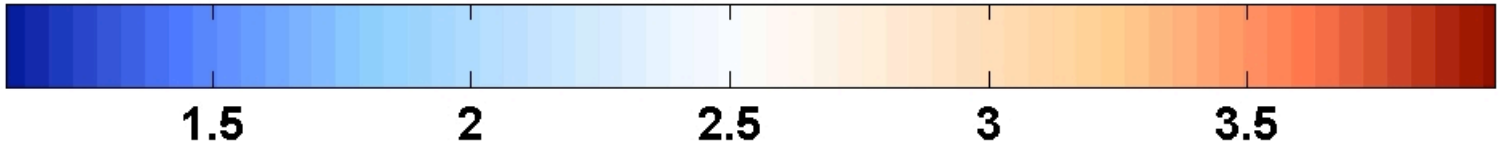
Monthly Average AIRS CO Total Column (v4.0.9.0) 200608





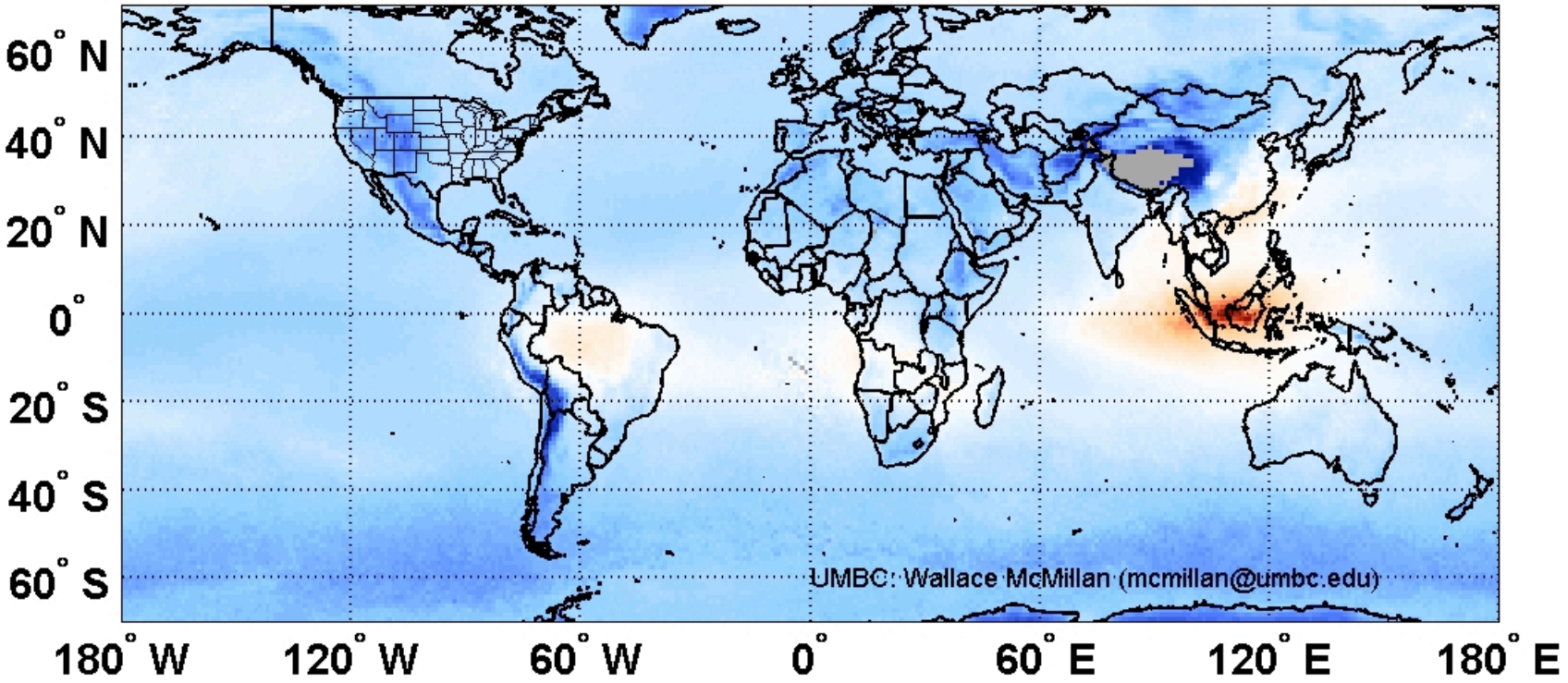
Monthly Average AIRS CO Total Column (v4.0.9.0) 200609

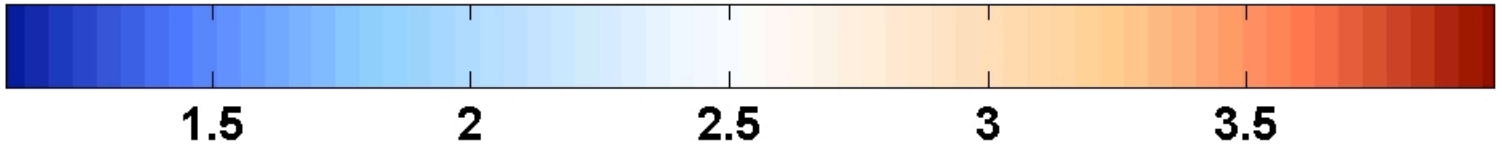




CO Total Column (molecules/cm^2) x 10^{18}

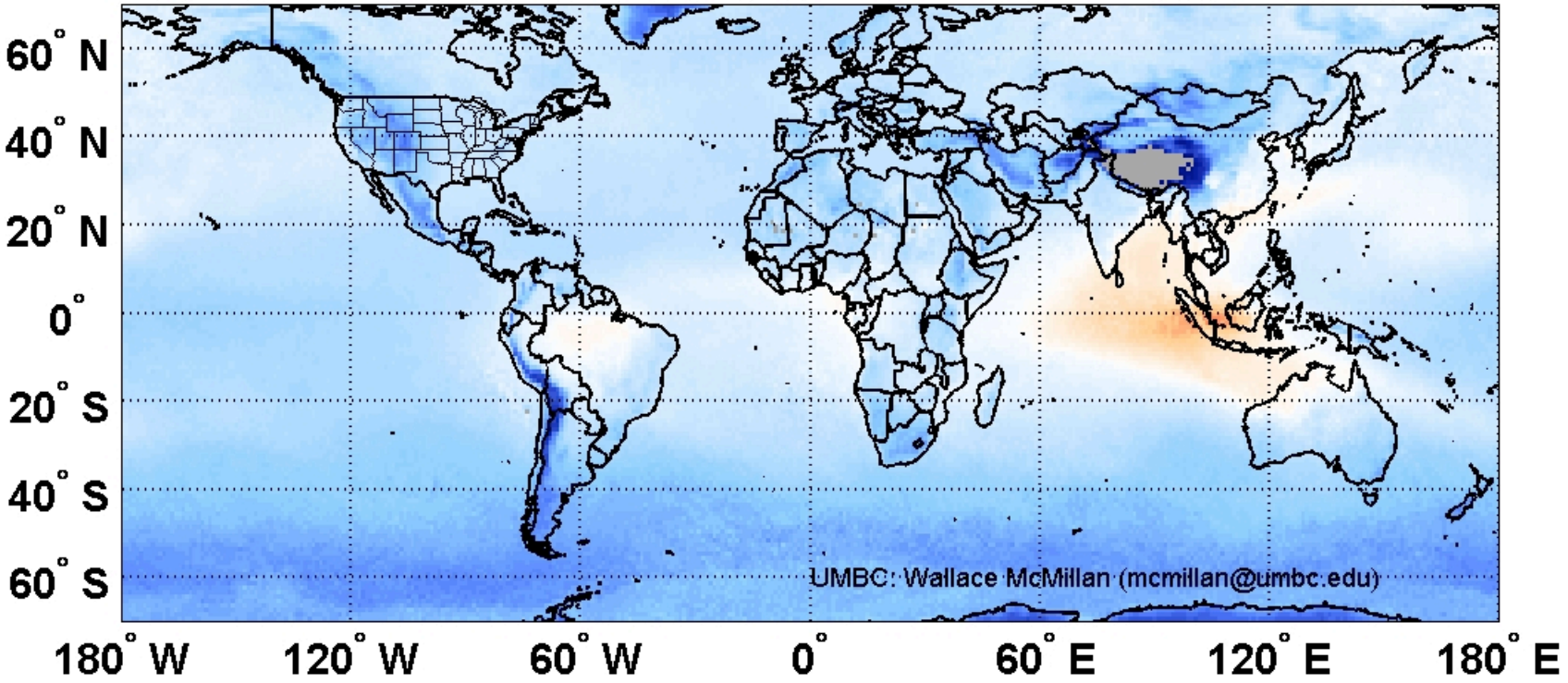
Monthly Average AIRS CO Total Column (v4.0.9.0) 200610





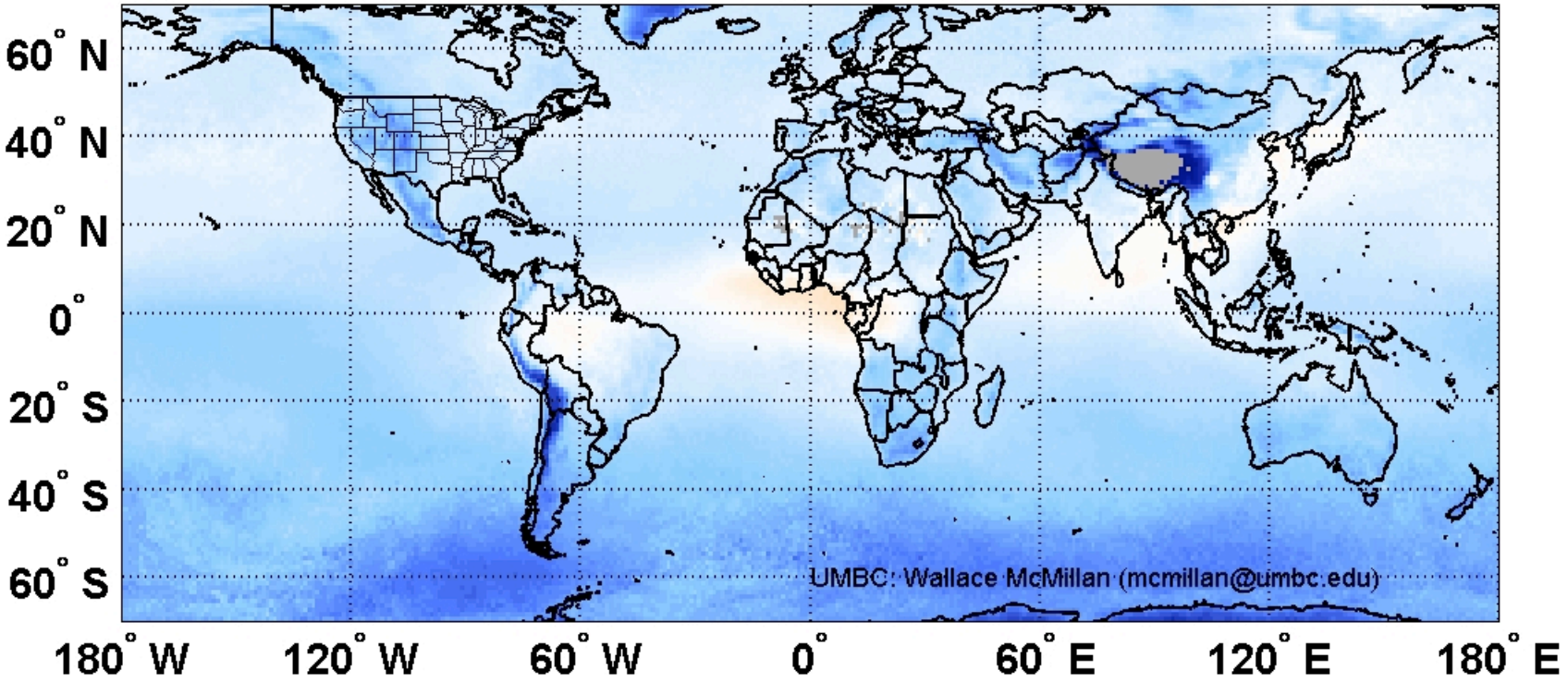
CO Total Column (molecules/cm^2) x 10^{18}

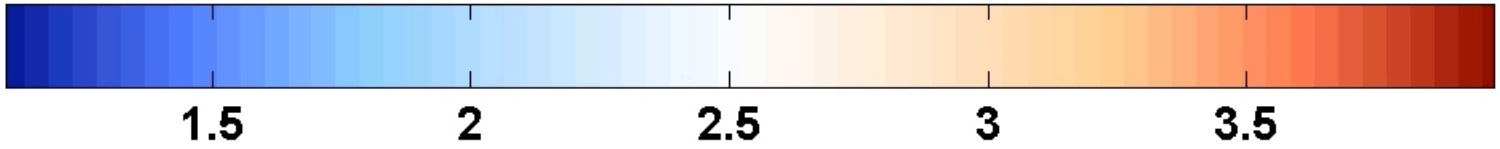
Monthly Average AIRS CO Total Column (v4.0.9.0) 200611



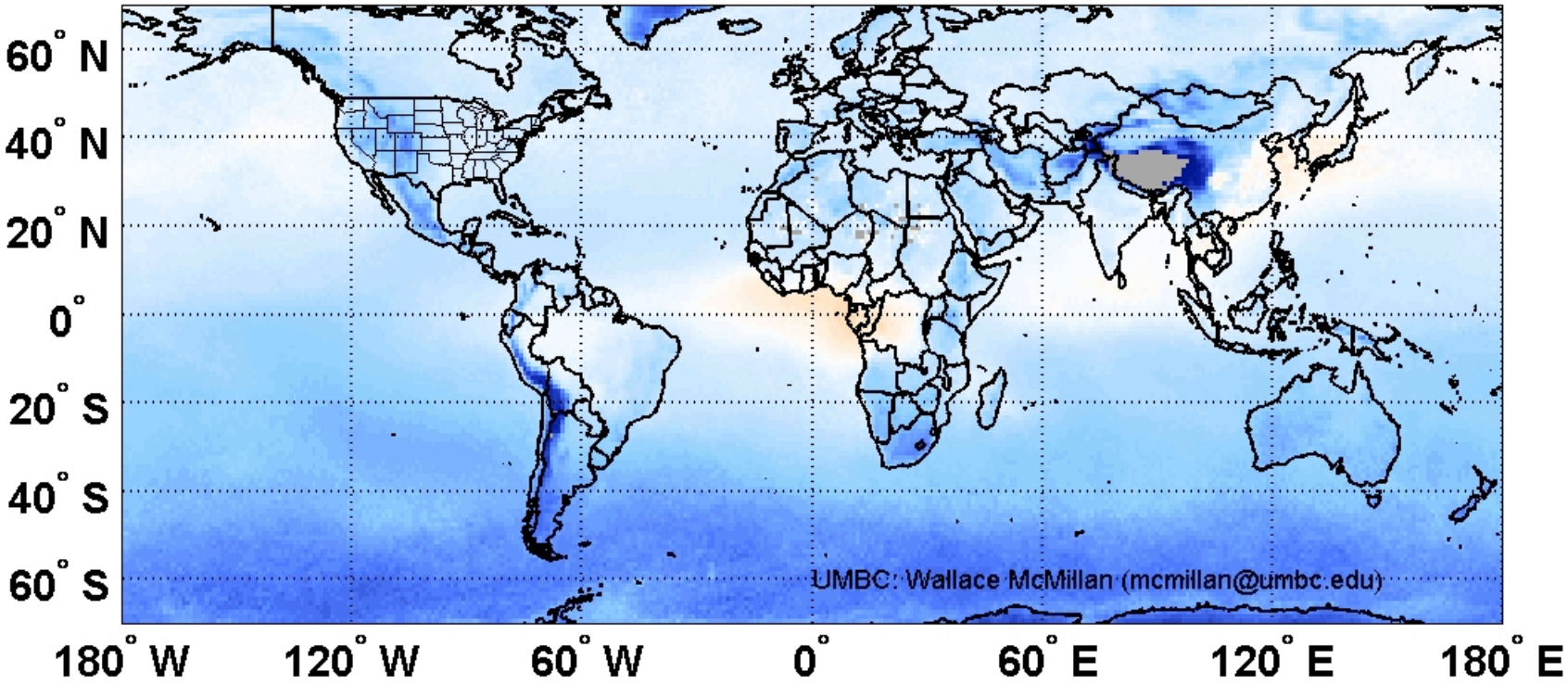
CO Total Column (molecules/cm^2) x 10^{18}

Monthly Average AIRS CO Total Column (v4.0.9.0) 200612





Monthly Average AIRS CO Total Column (v4.0.9.0) 200701



CO Total Column (molecules/cm^2) x 10^{18}

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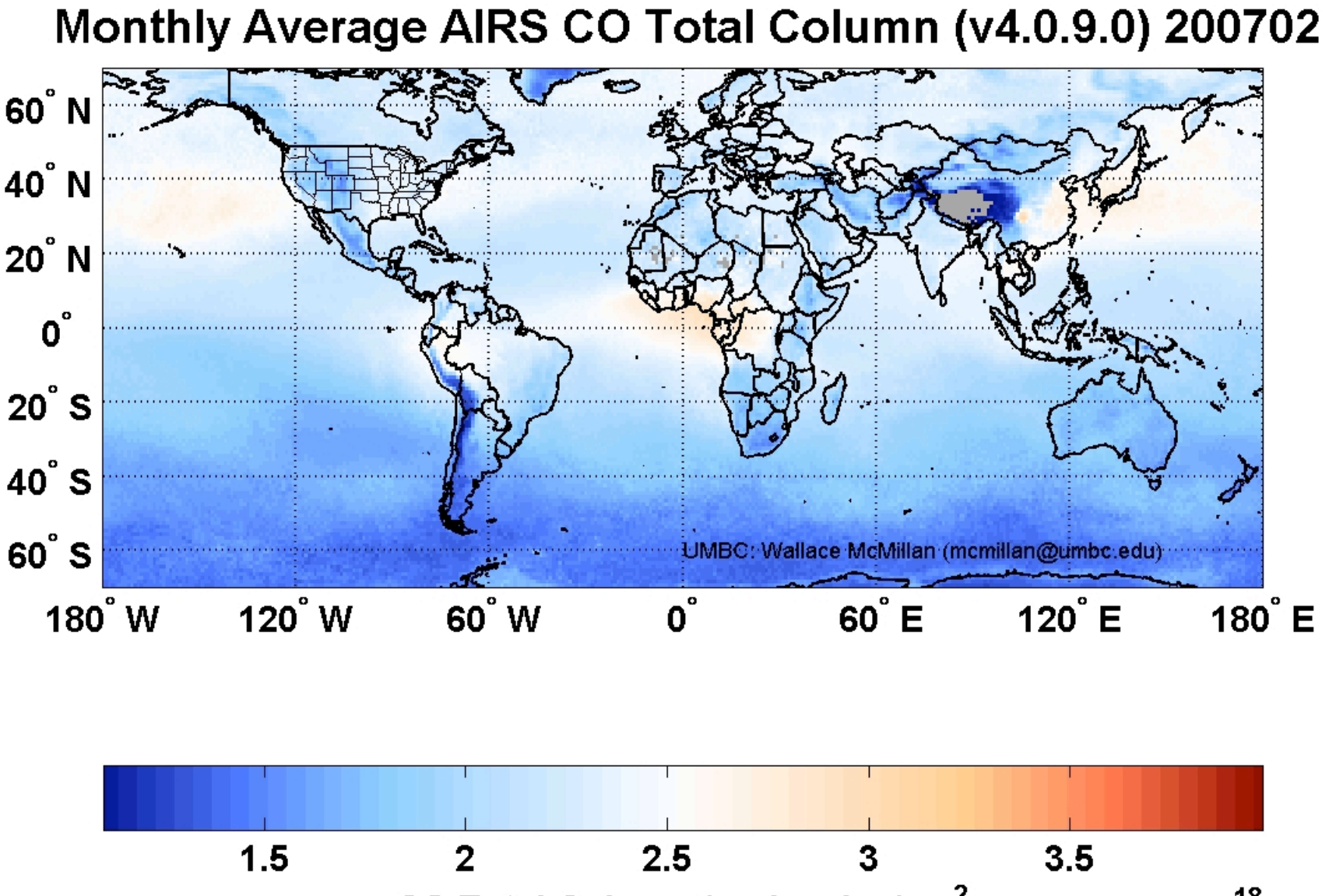
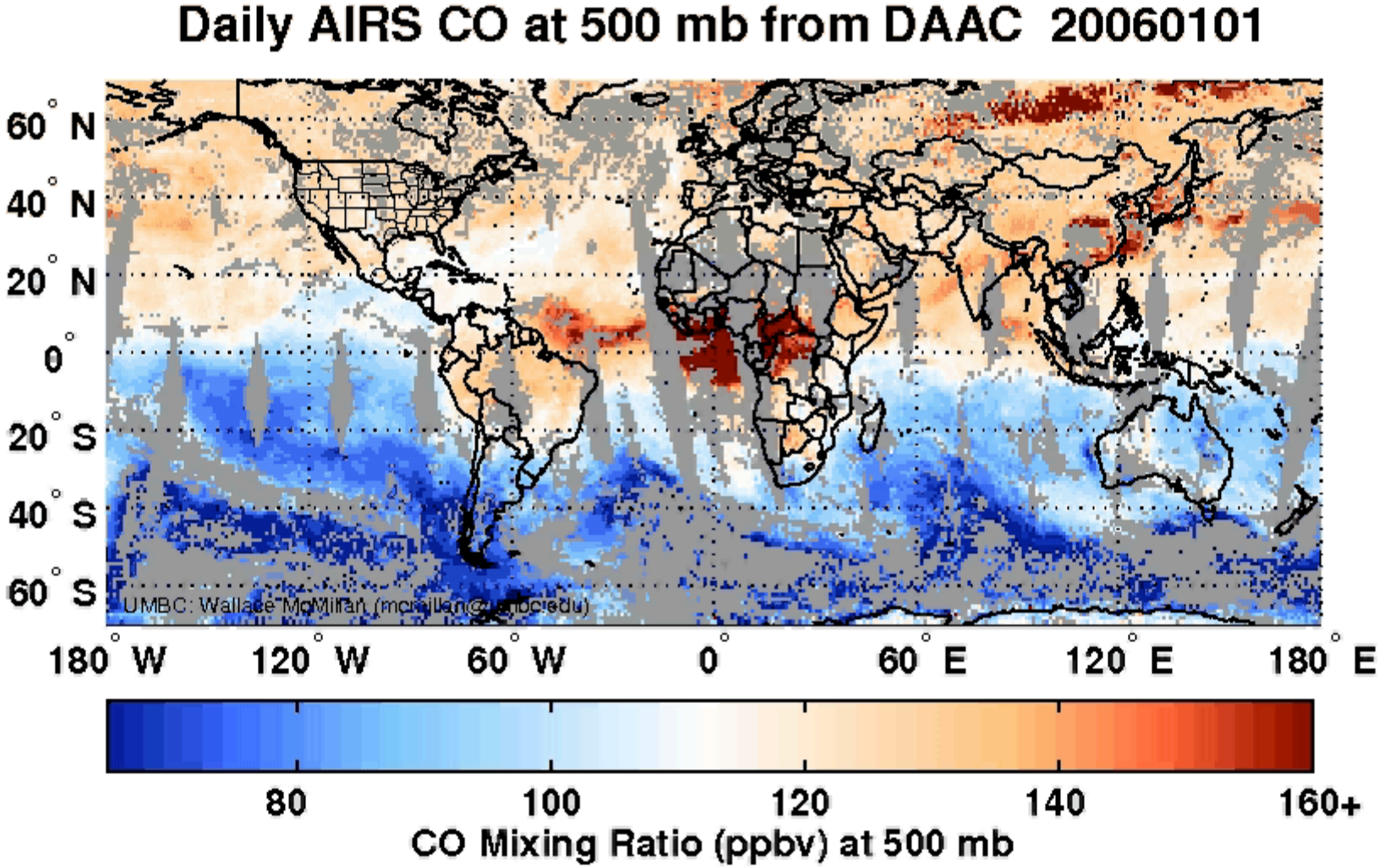
http://physics.umbc.edu/~mcmillan



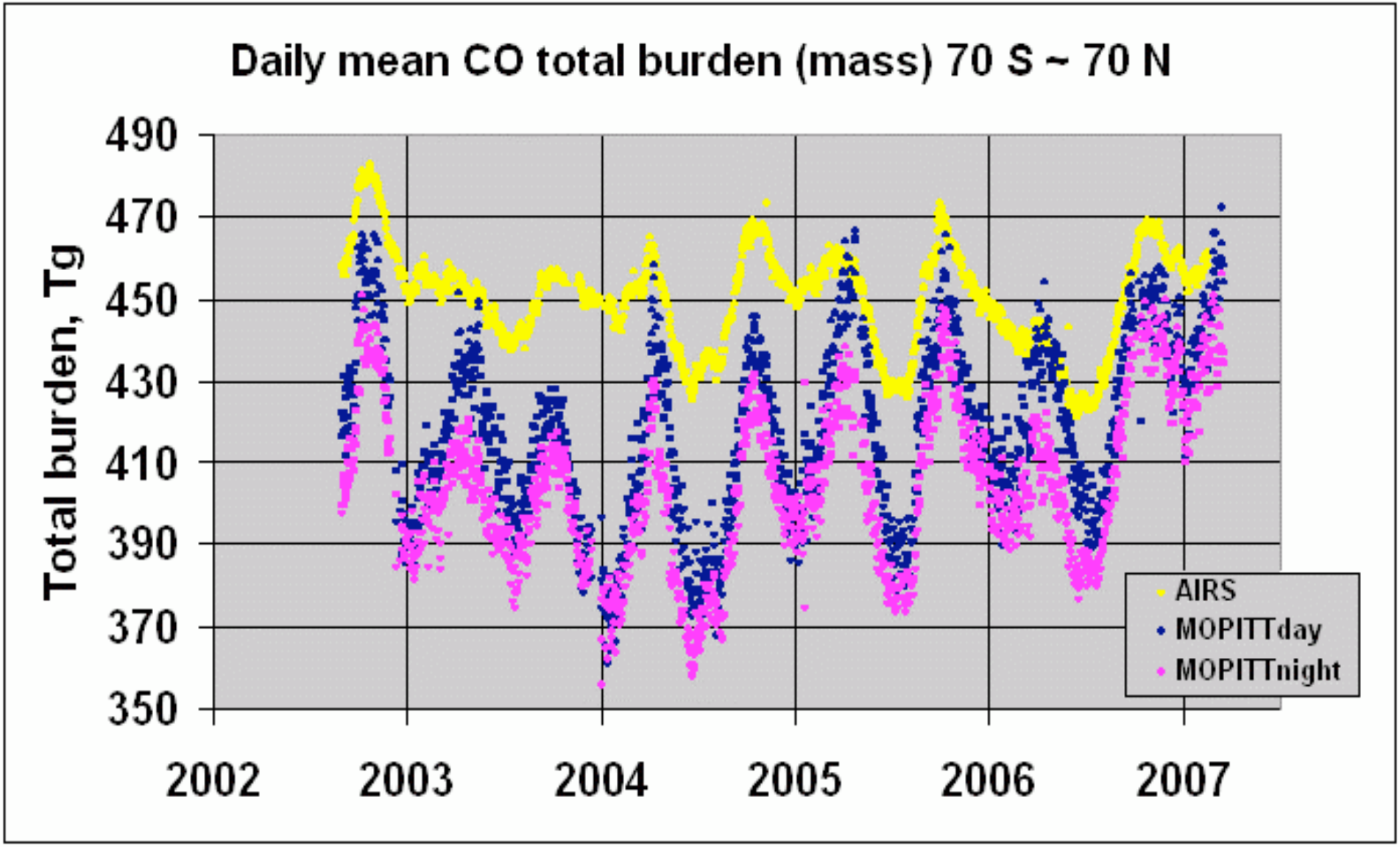
v4.0.9.0 CO Movie: Jan-Nov 2006

1x1 deg grid

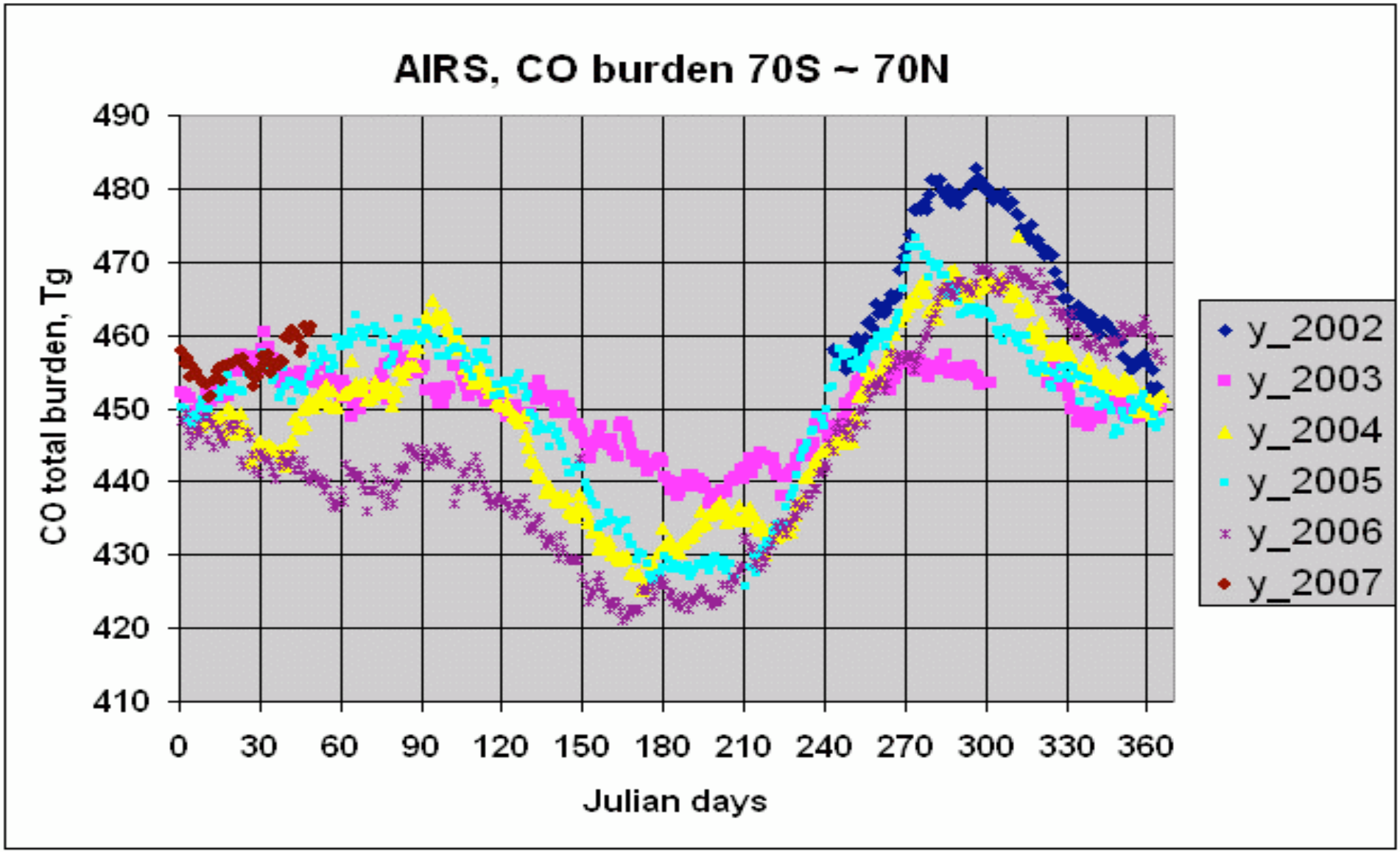


Animation by Stephanie Granger

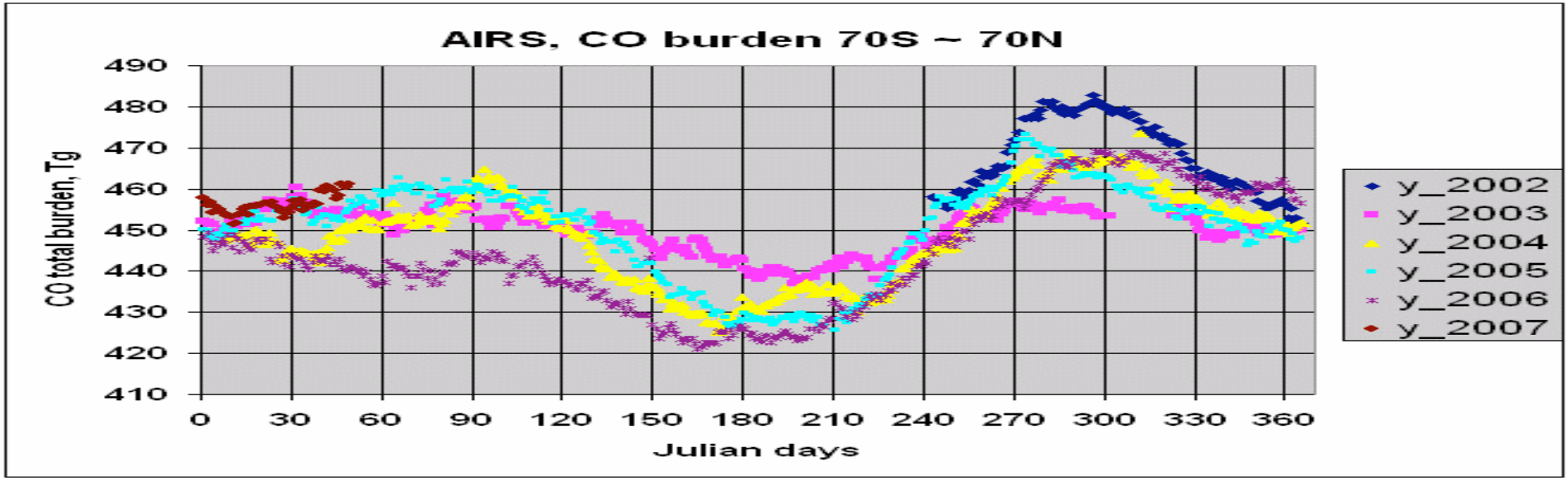
AIRS Daily Global CO Burden

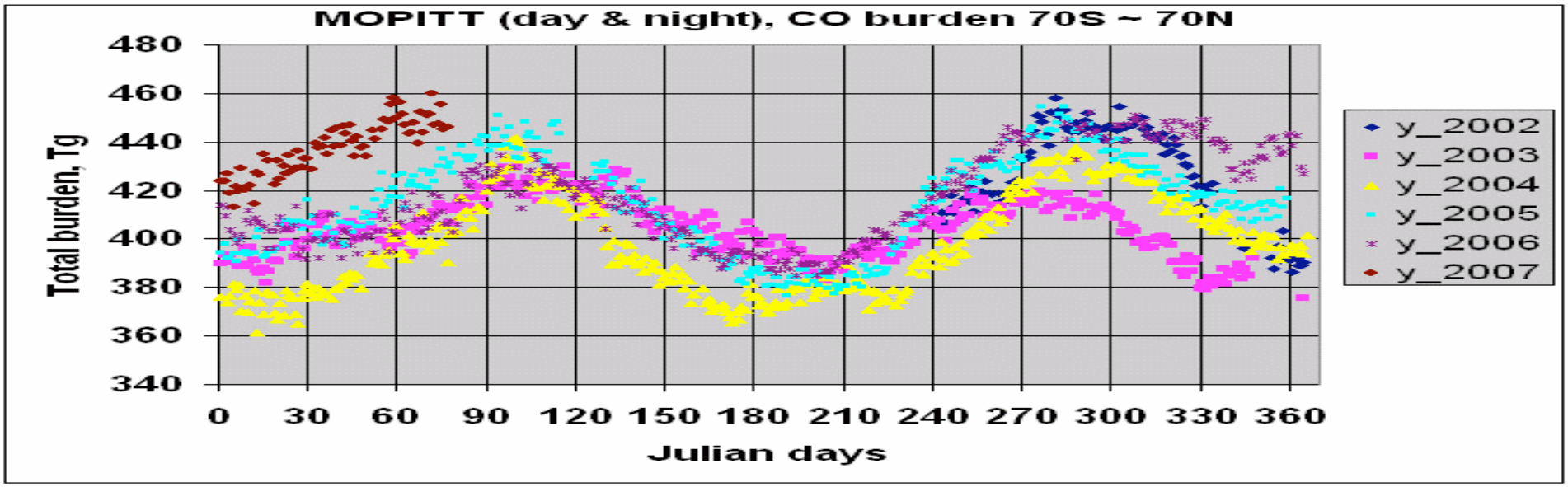


AIRS CO Interannual Variations

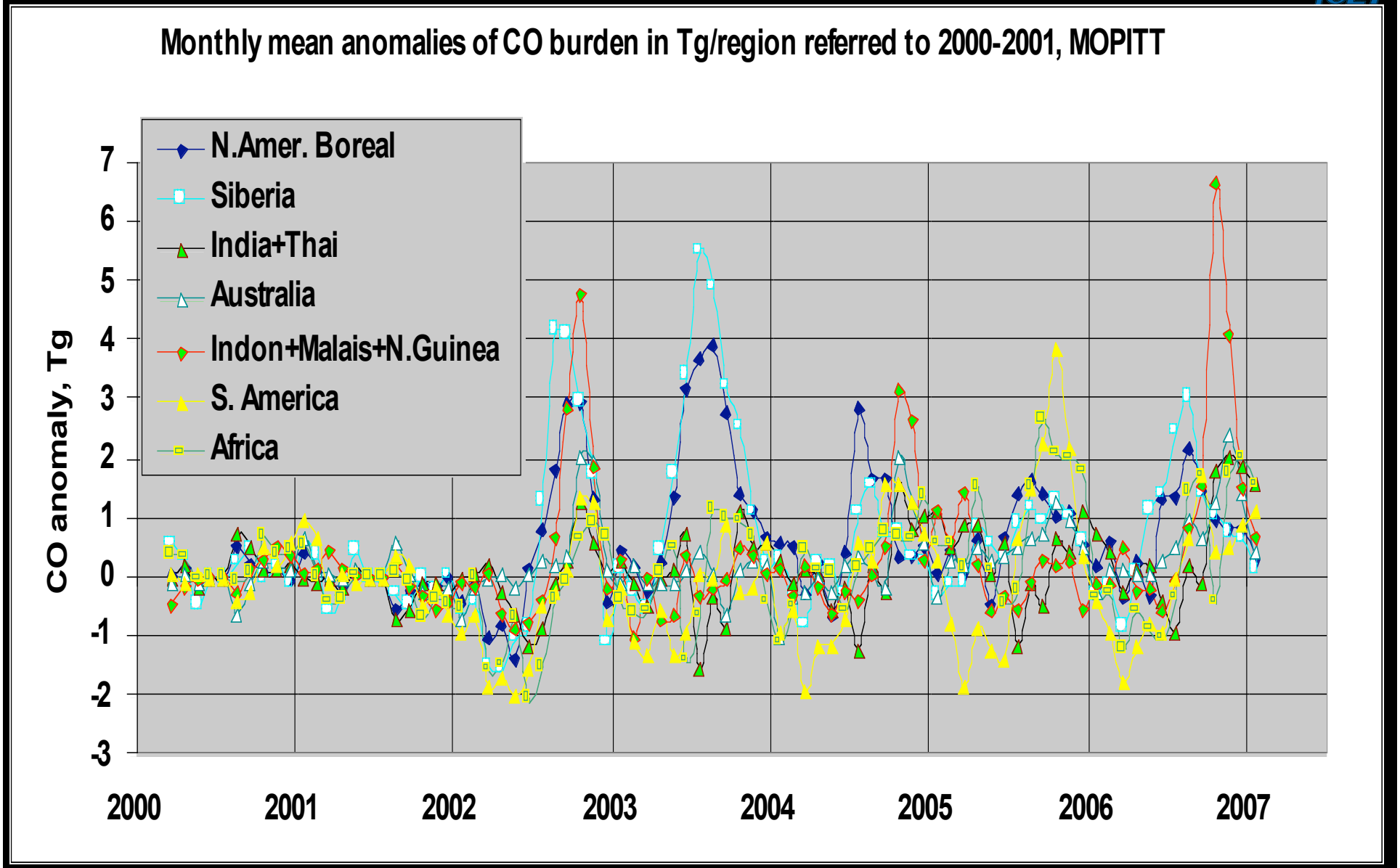


AIRS vs MOPITT

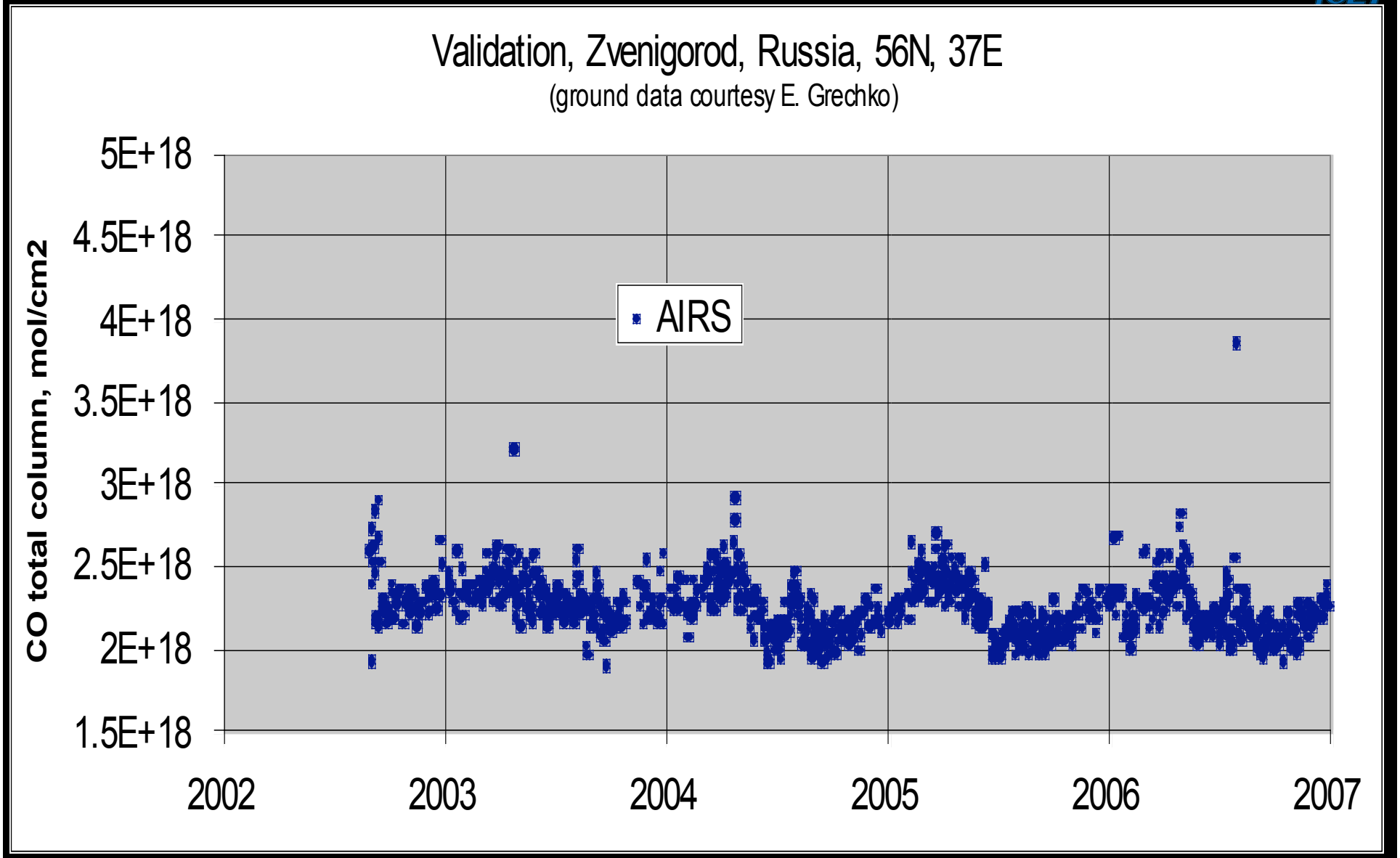




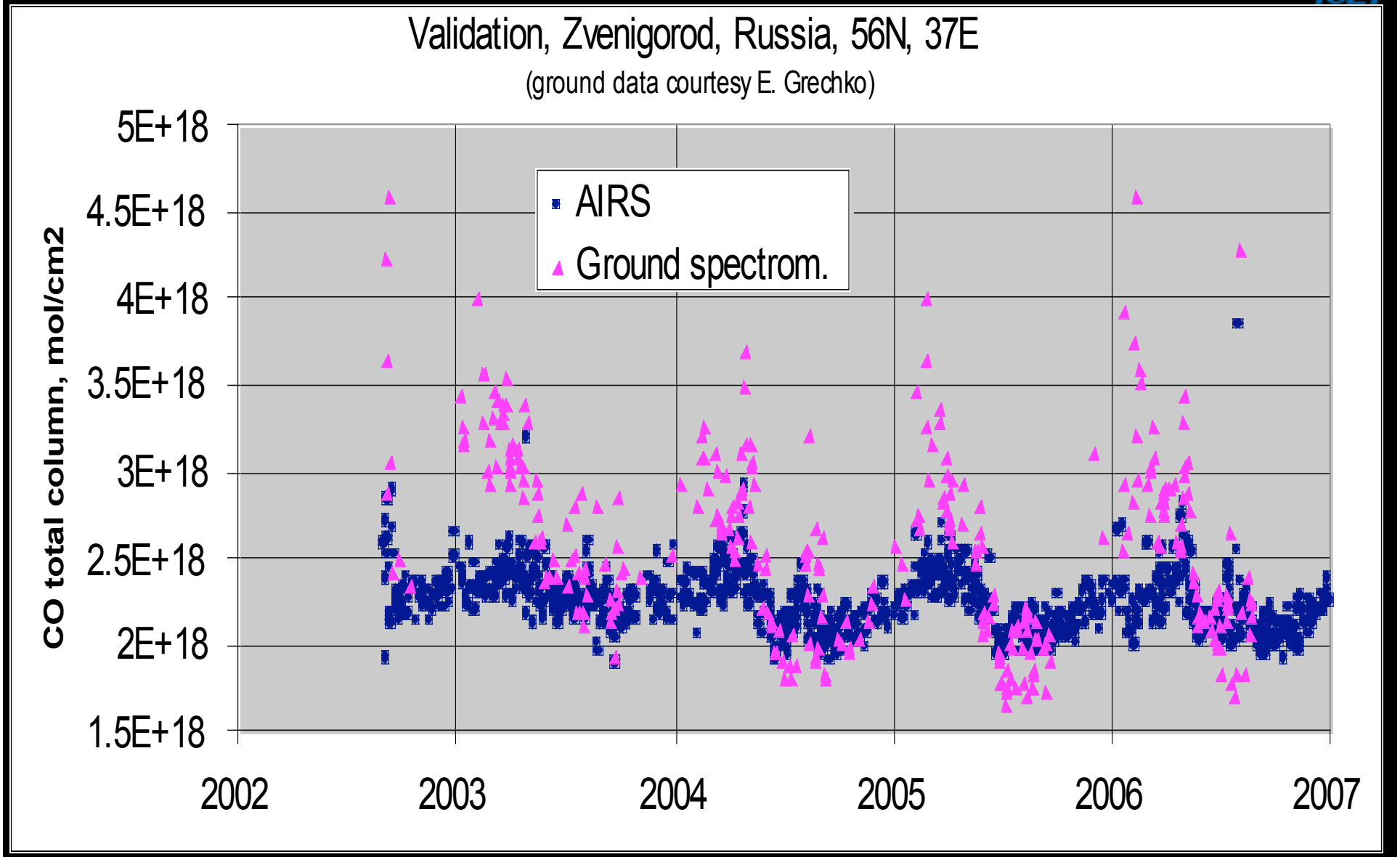
MOPITT CO Burden Anomalies



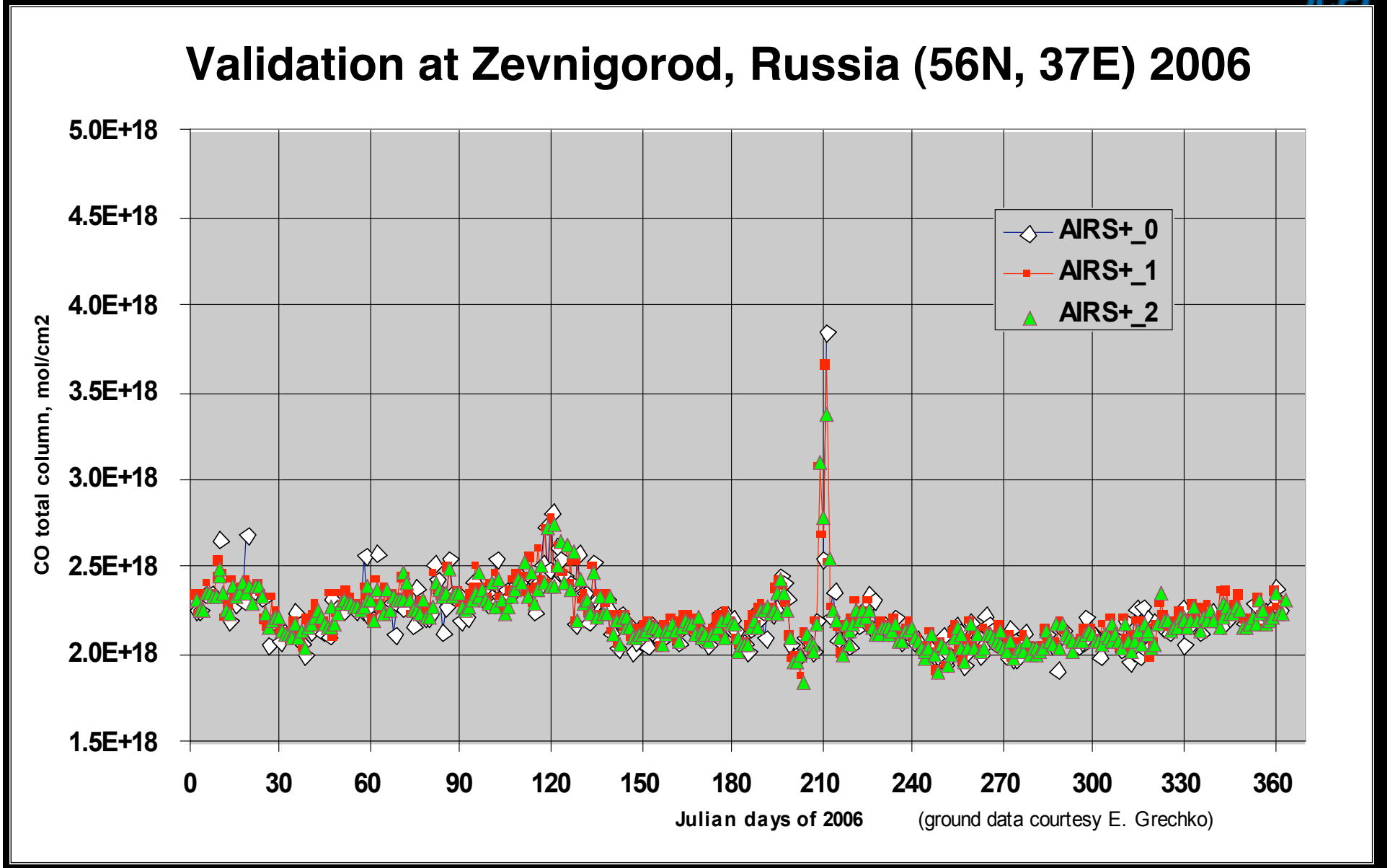
Daily Global Average Total Column



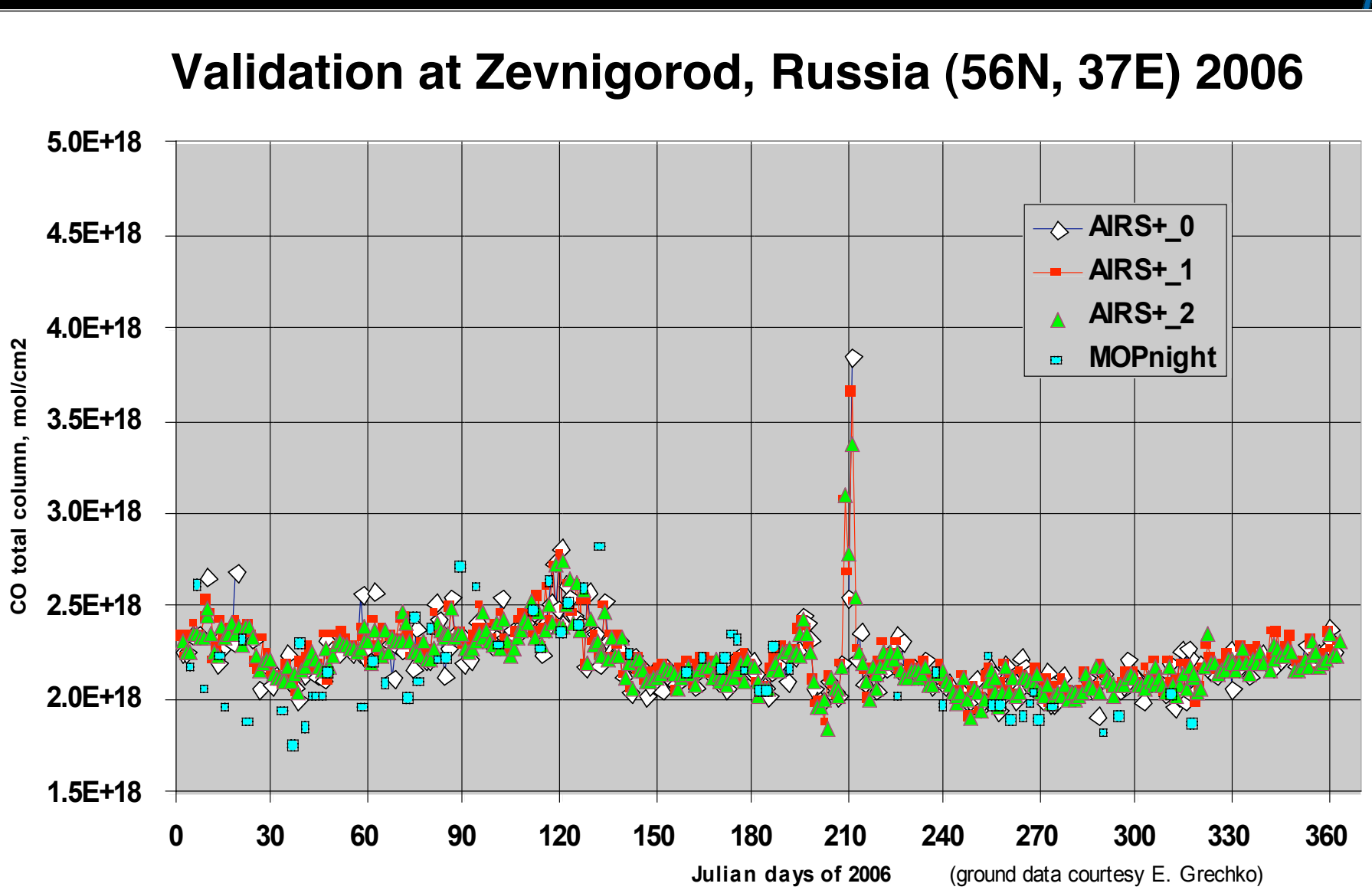
Daily Global Average Total Column



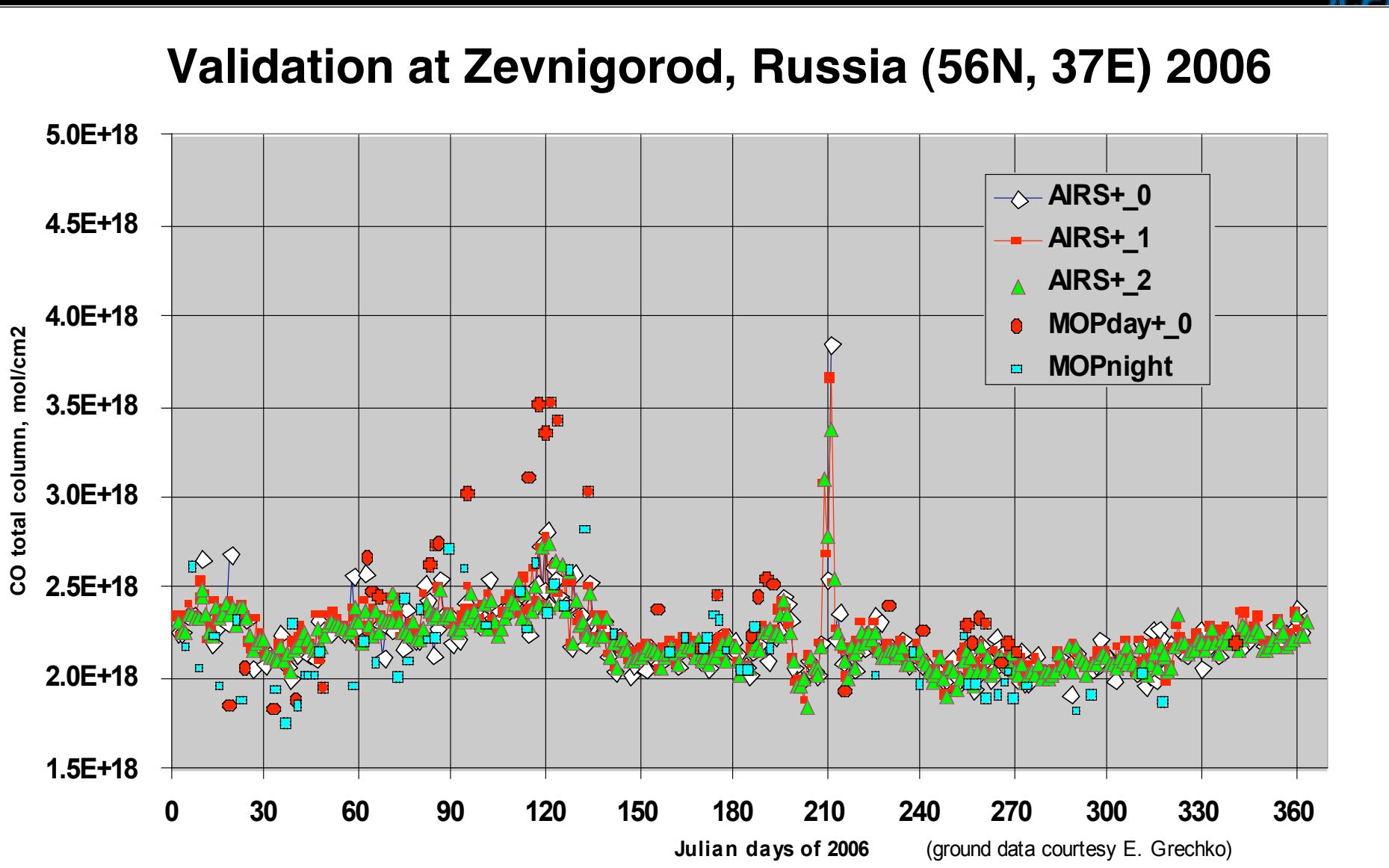
UMBC AIRS CO Column: Zevnigorod, Rus.



UMBC AIRS CO Column: Zevnigorod, Rus.

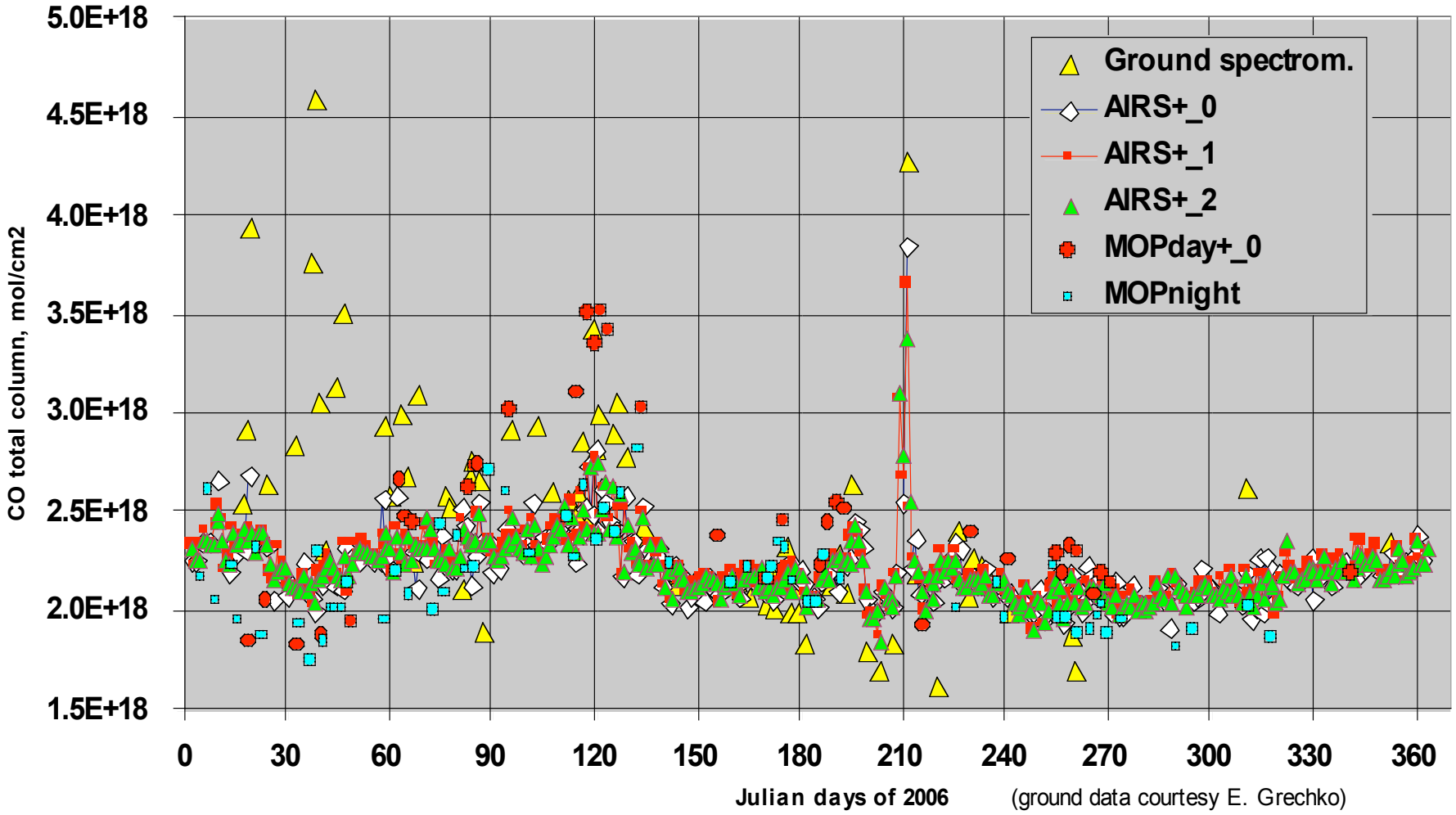


UMBC AIRS CO Column: Zevnigorod, Rus.



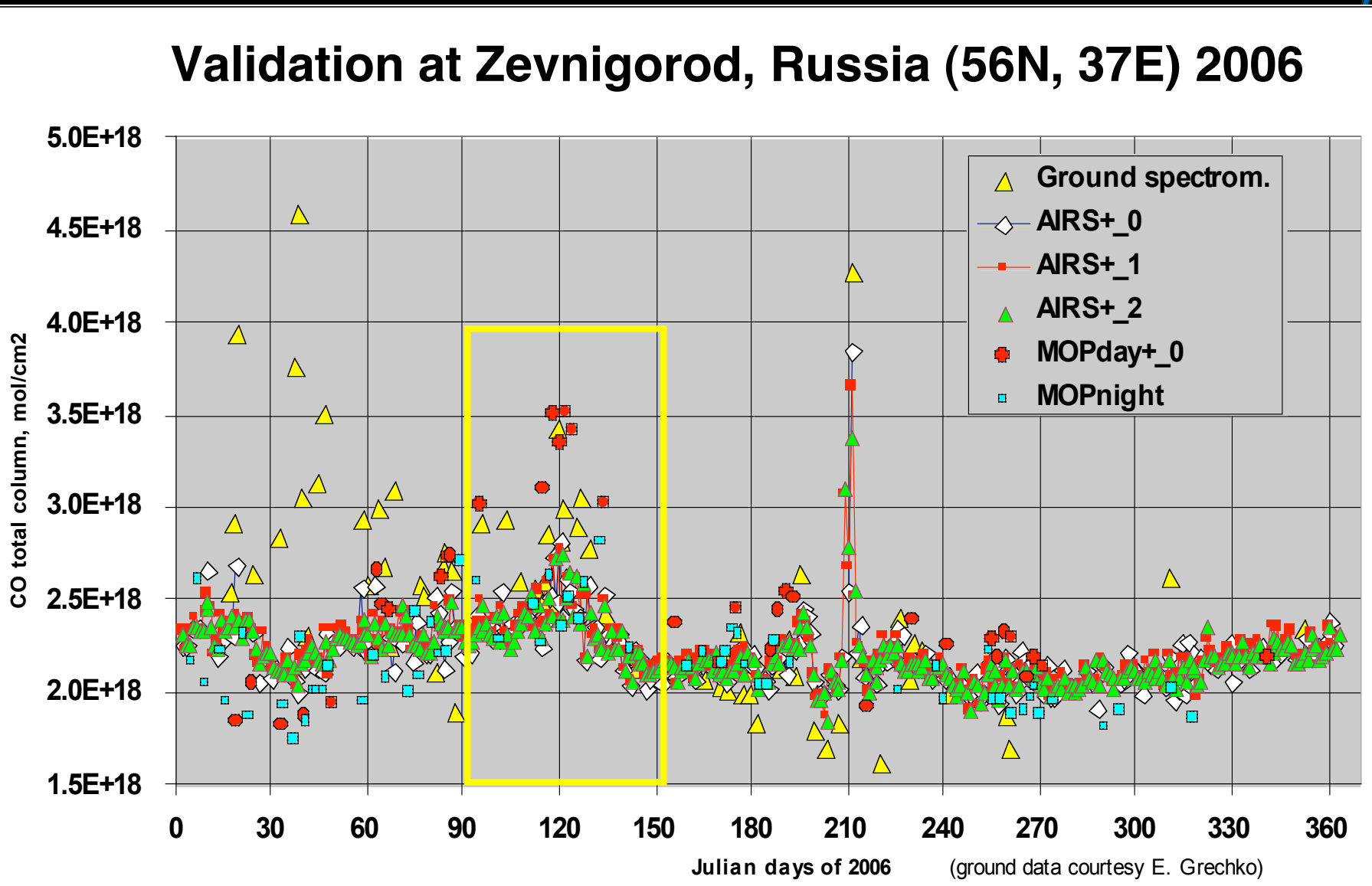
UMBC AIRS CO Column: Zevnigorod, Rus.

Validation at Zevnigorod, Russia (56N, 37E) 2006

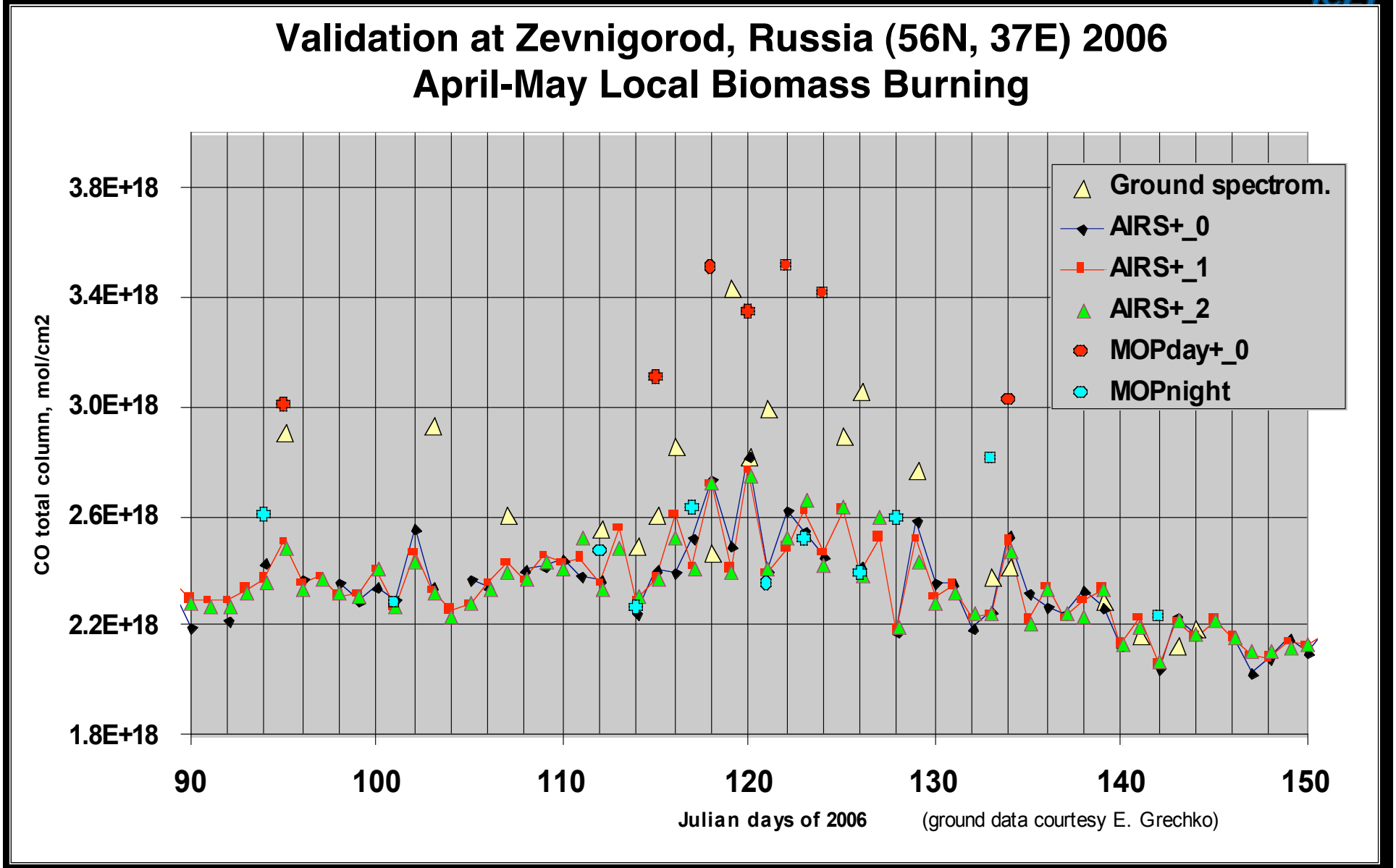


(ground data courtesy E. Grechko)

AIRS CO Column: Zevnigorod, Rus.

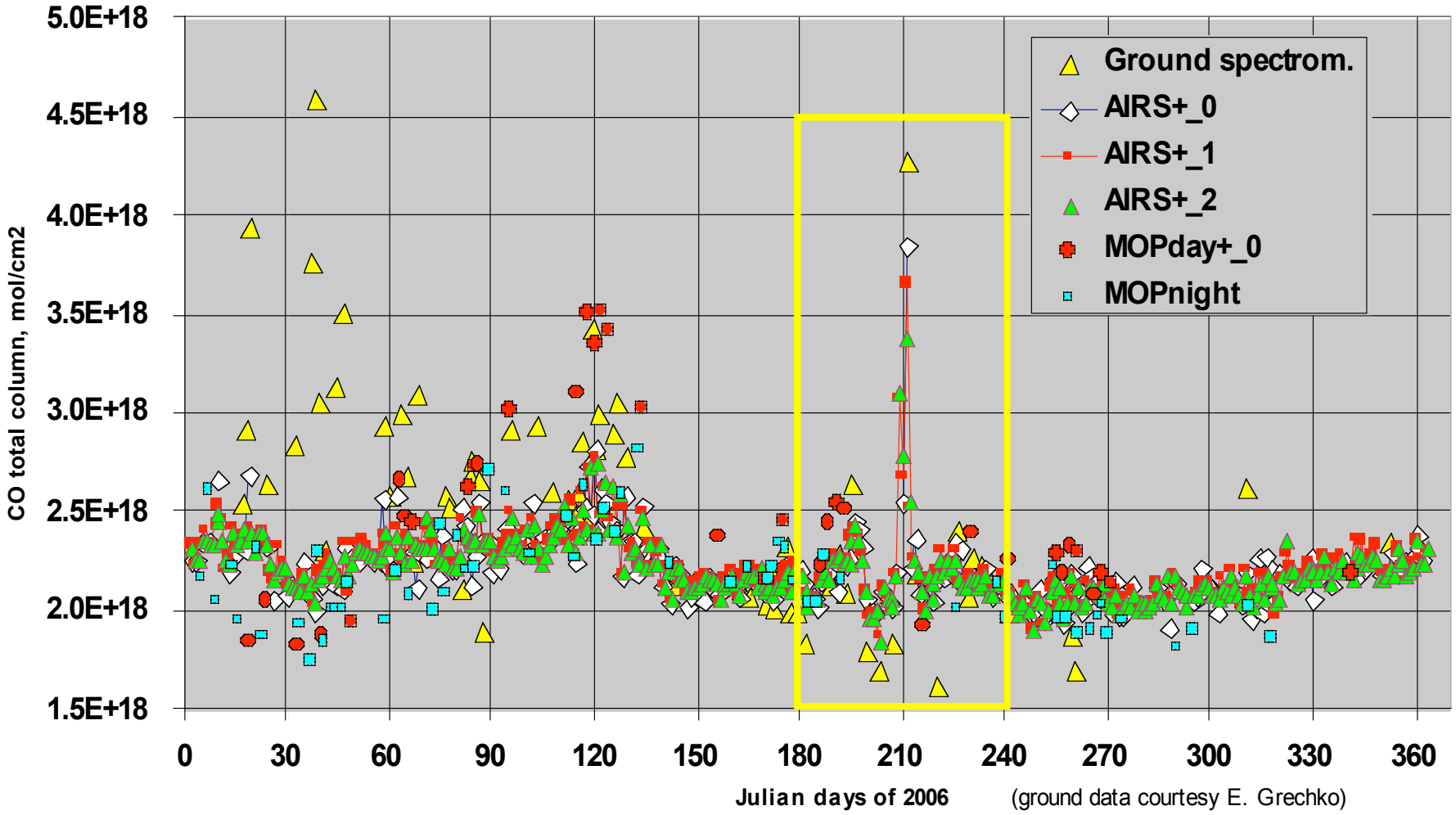


UMBC AIRS CO Column: Zevnigorod, Rus.



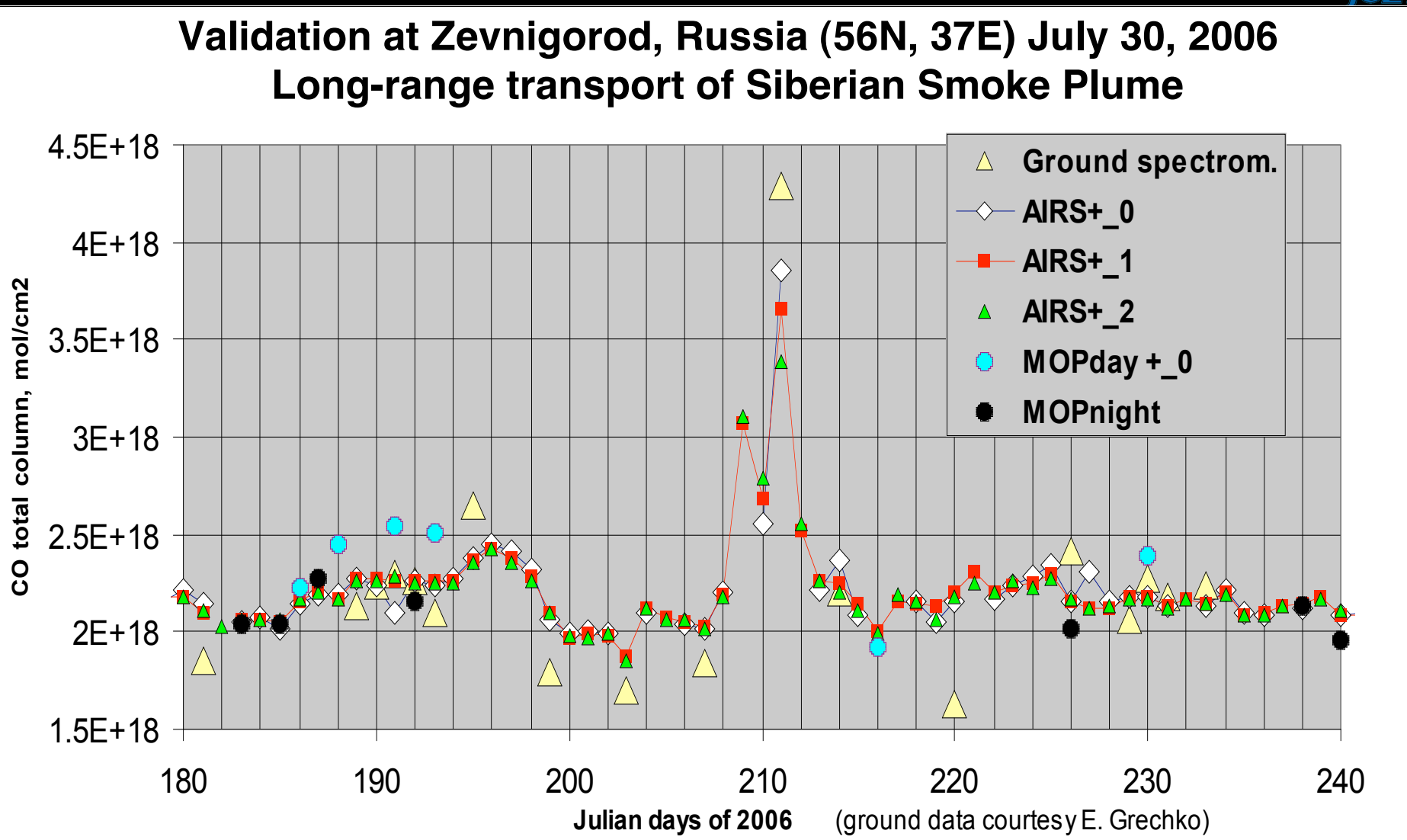
UMBC AIRS CO Column: Zevnigorod, Rus.

Validation at Zevnigorod, Russia (56N, 37E) 2006

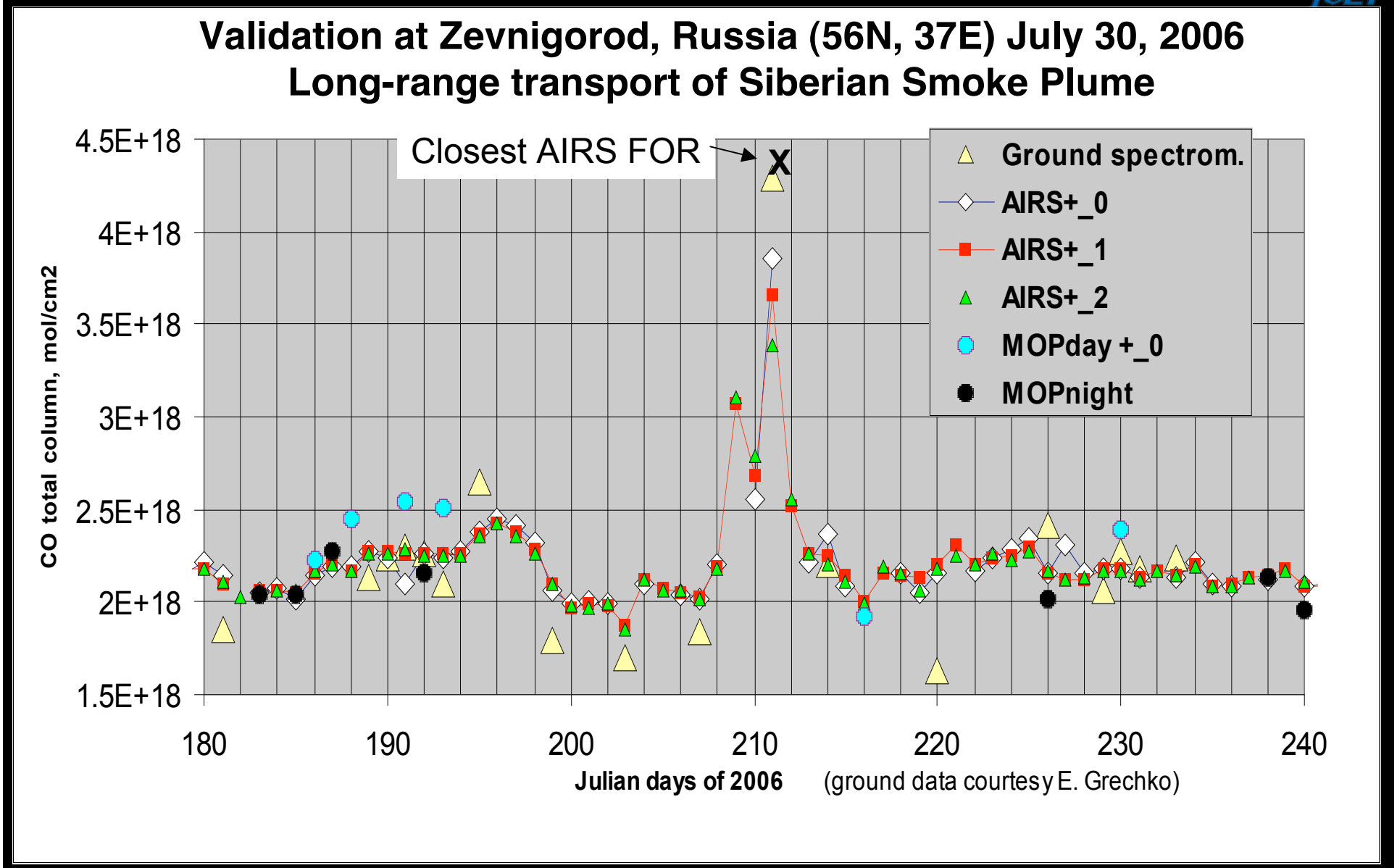


(ground data courtesy E. Grechko)

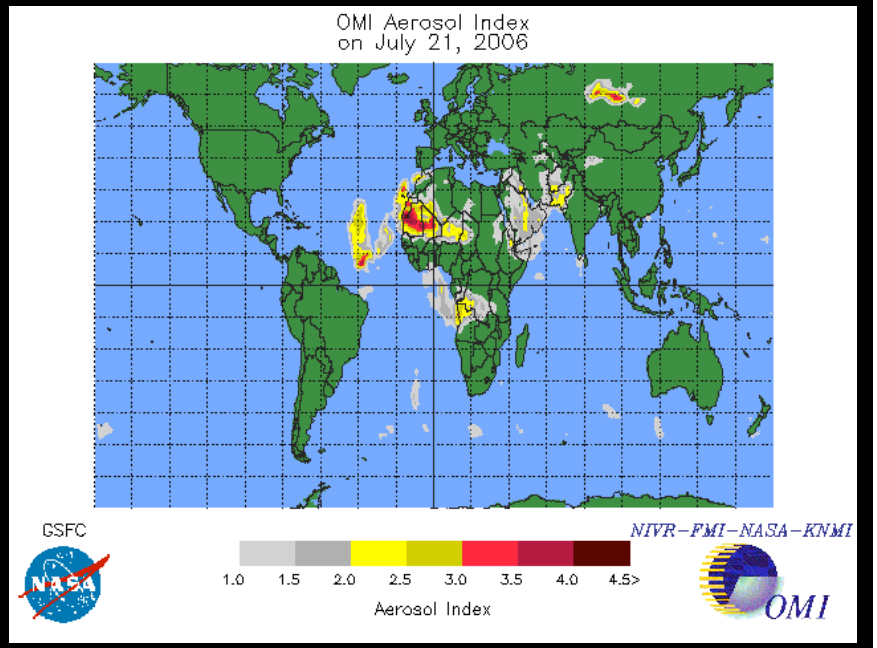
UMBC AIRS CO Column: Zevnigorod, Rus.

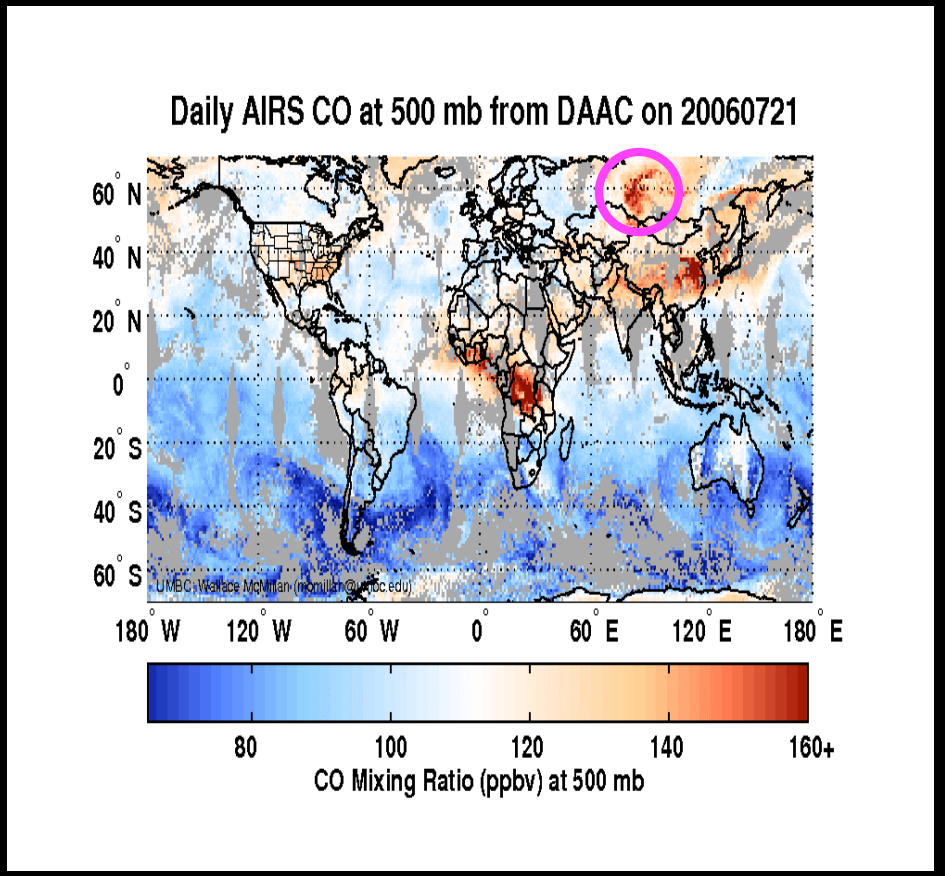


UMBC AIRS CO Column: Zevnigorod, Rus.

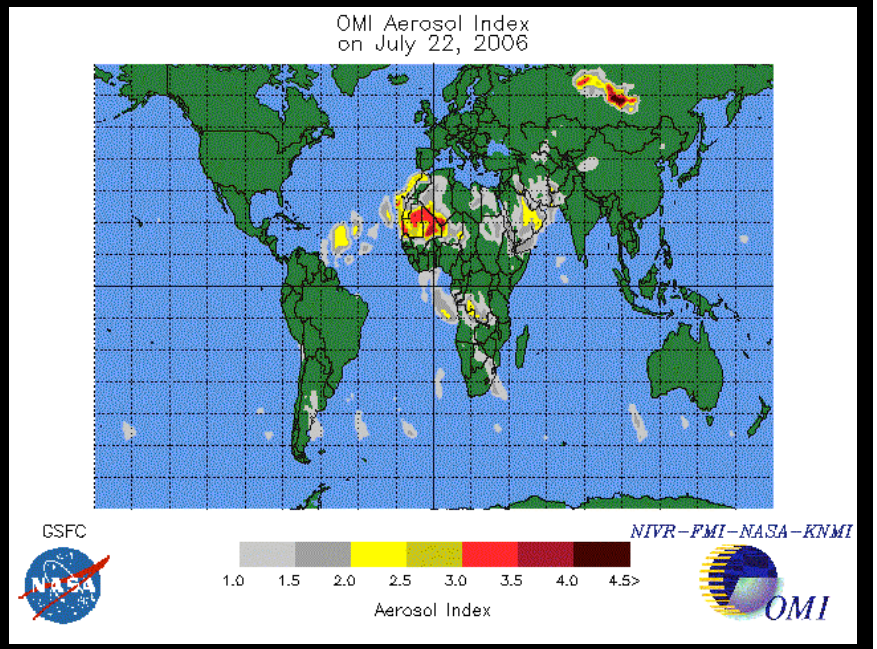


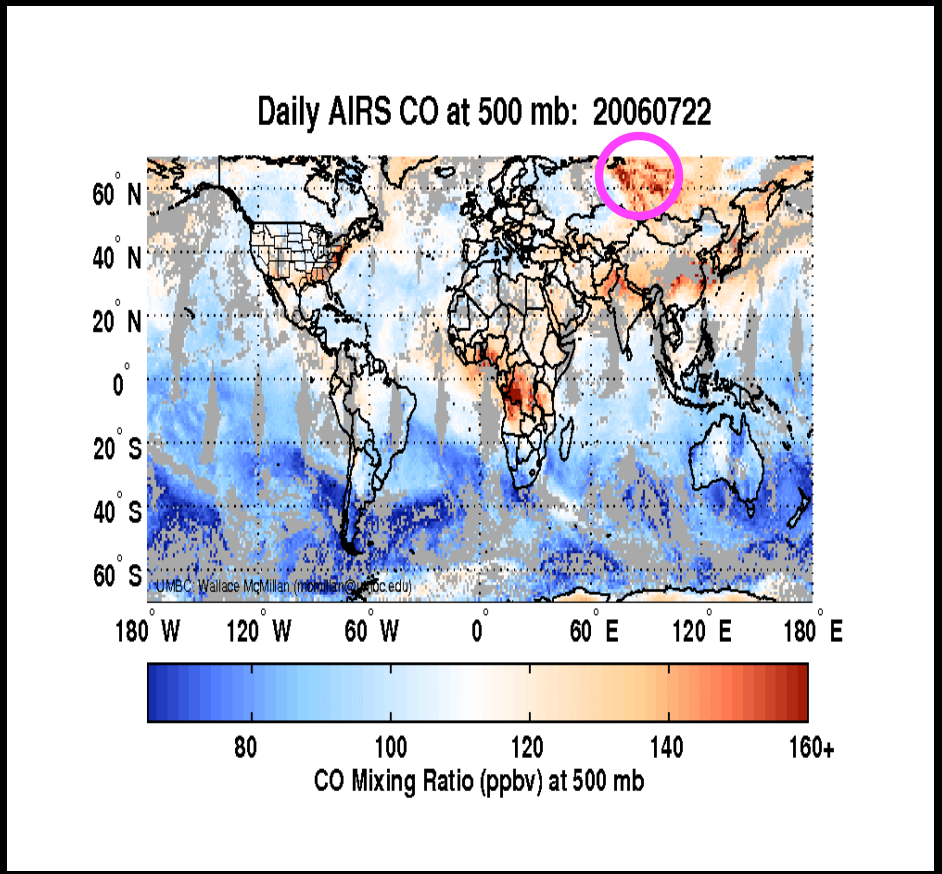
July, 2006, fires in central Siberia



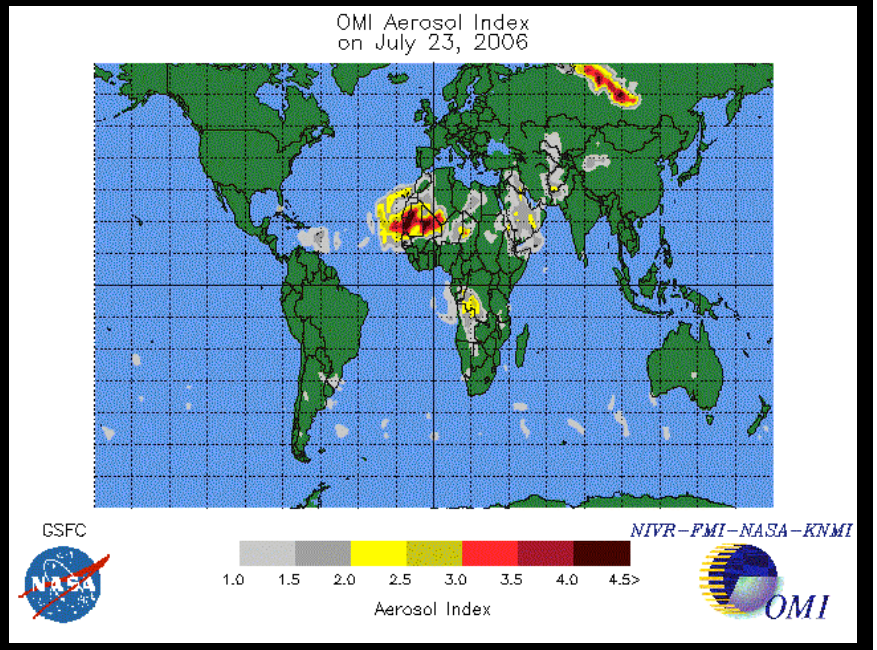


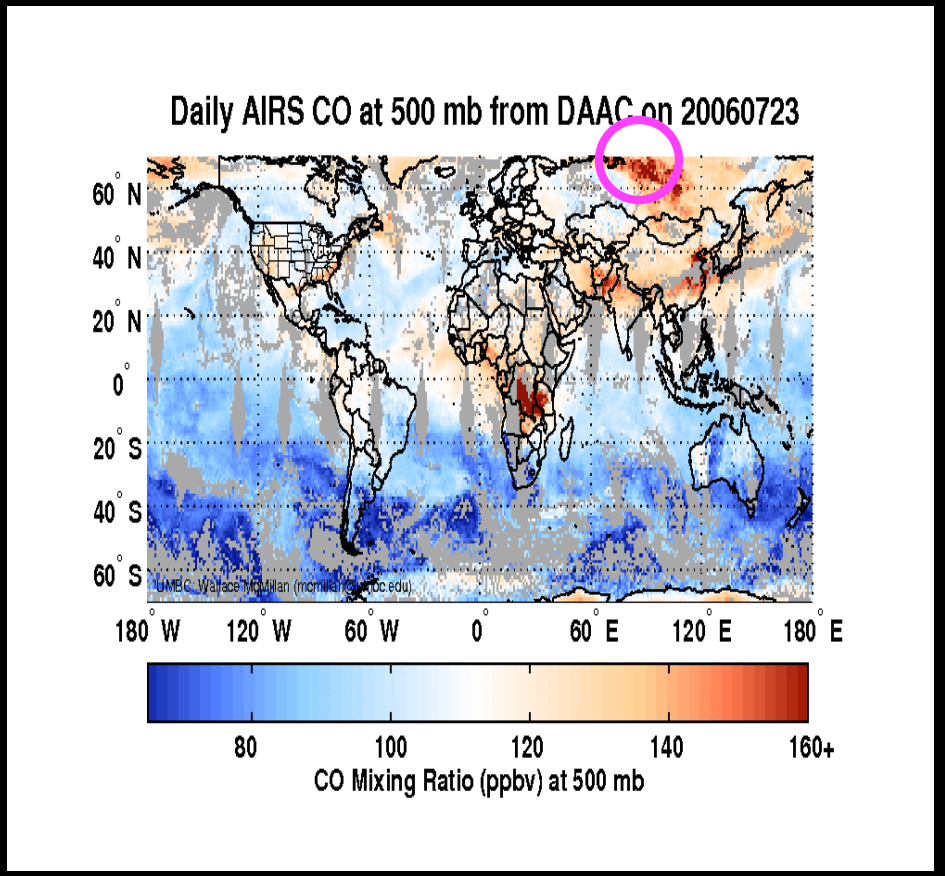
July, 2006, fires in central Siberia



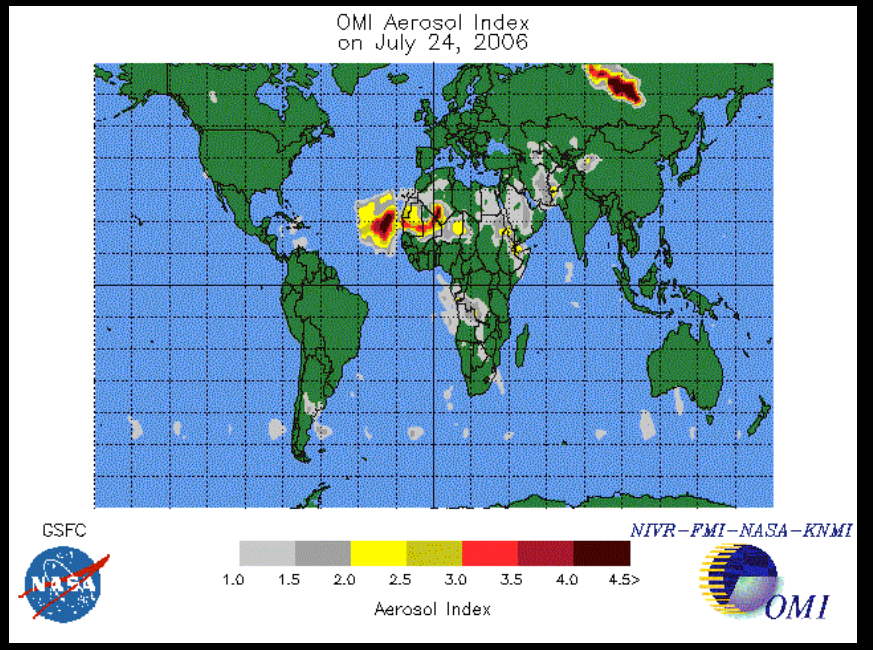


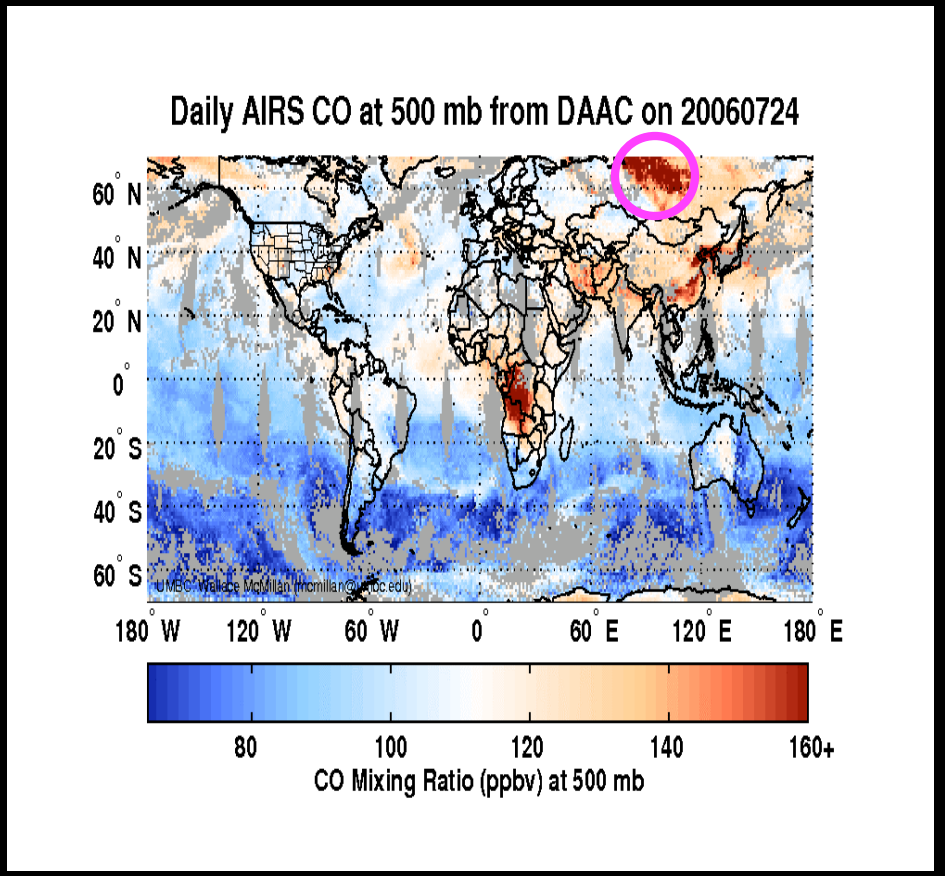
July, 2006, fires in central Siberia



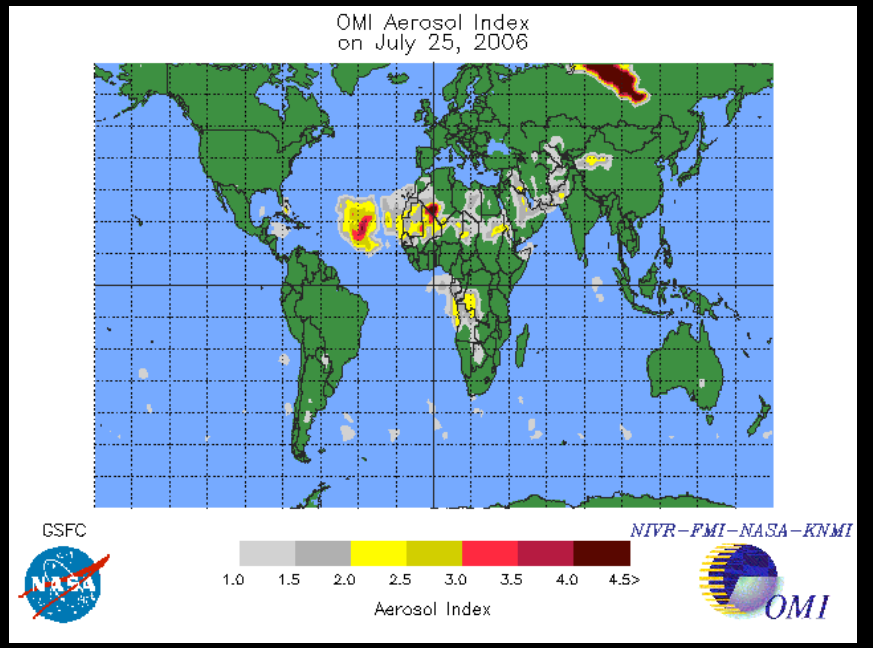


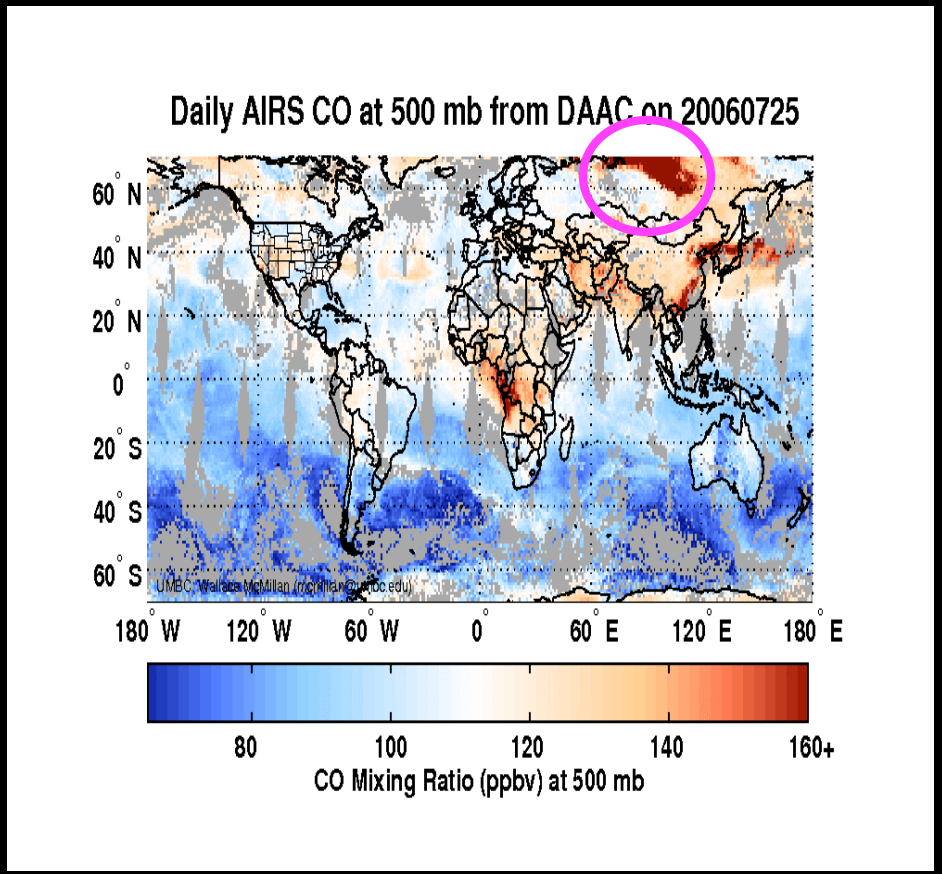
July, 2006, fires in central Siberia



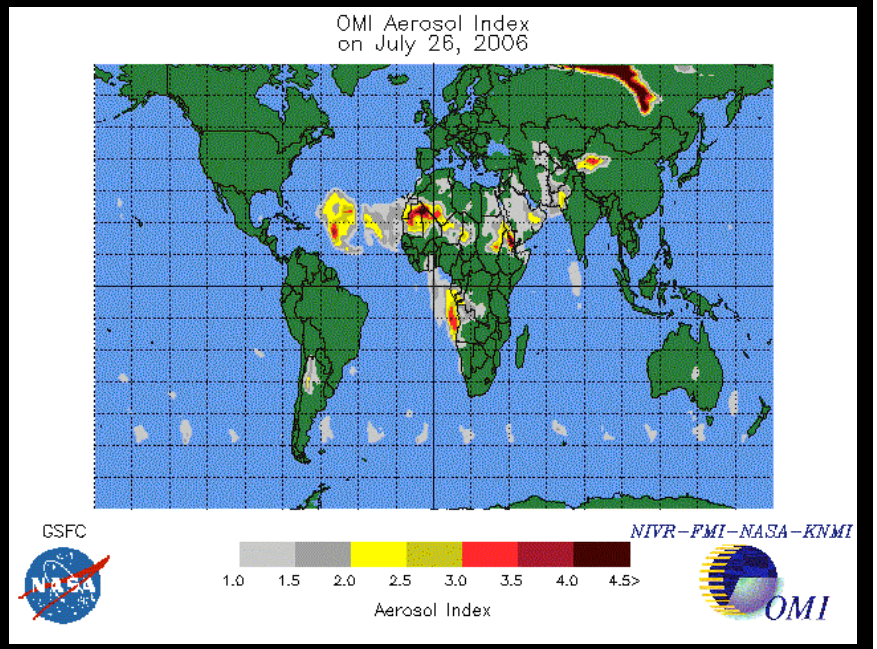


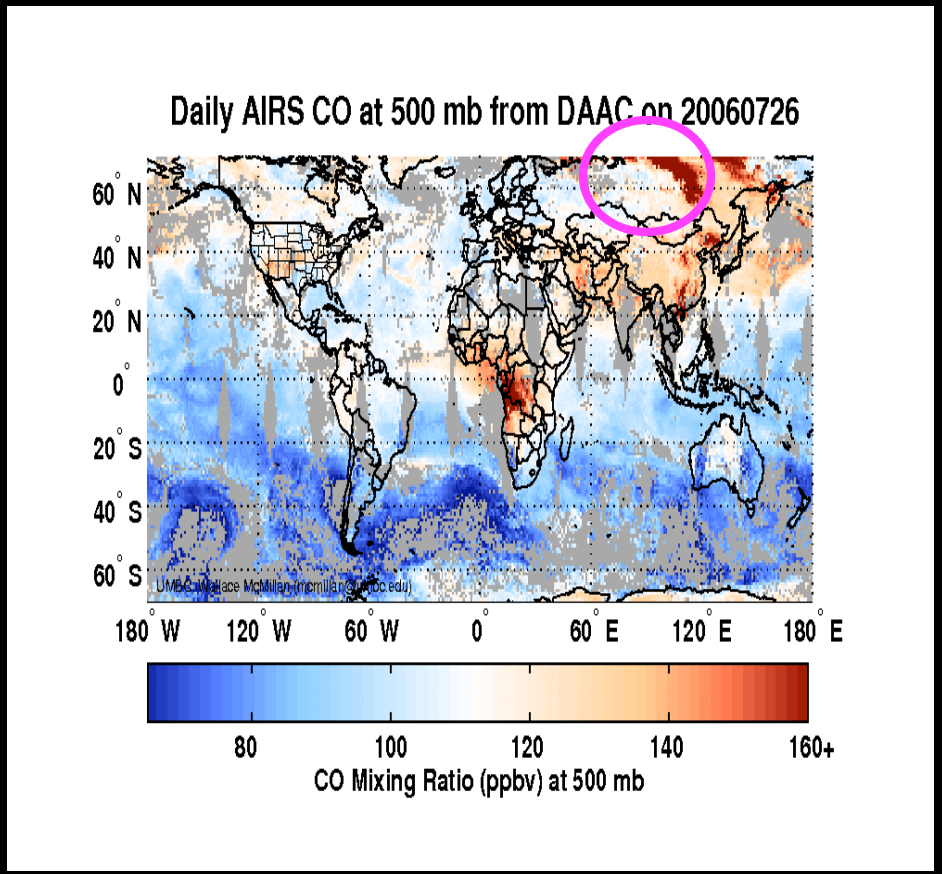
July, 2006, fires in central Siberia



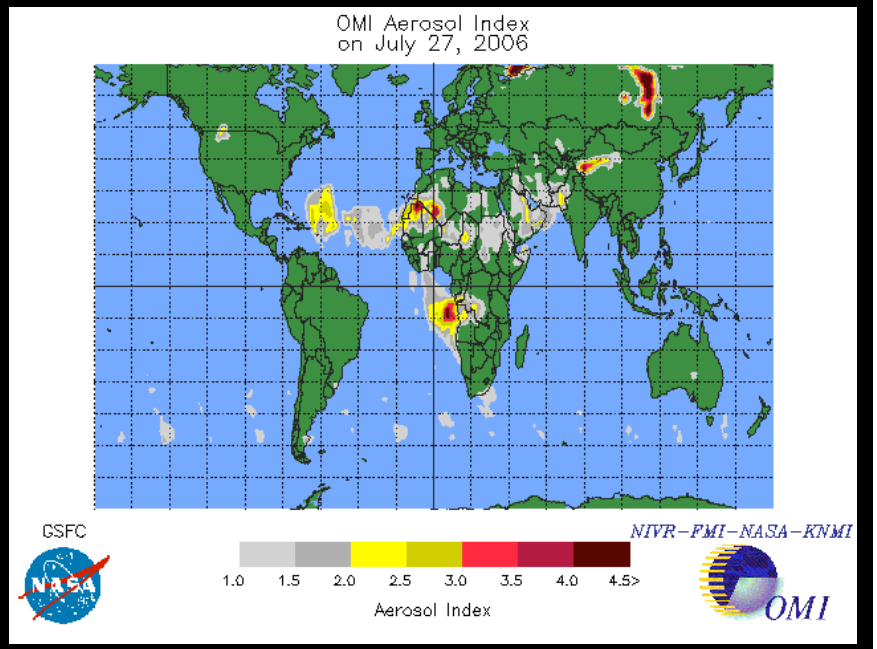


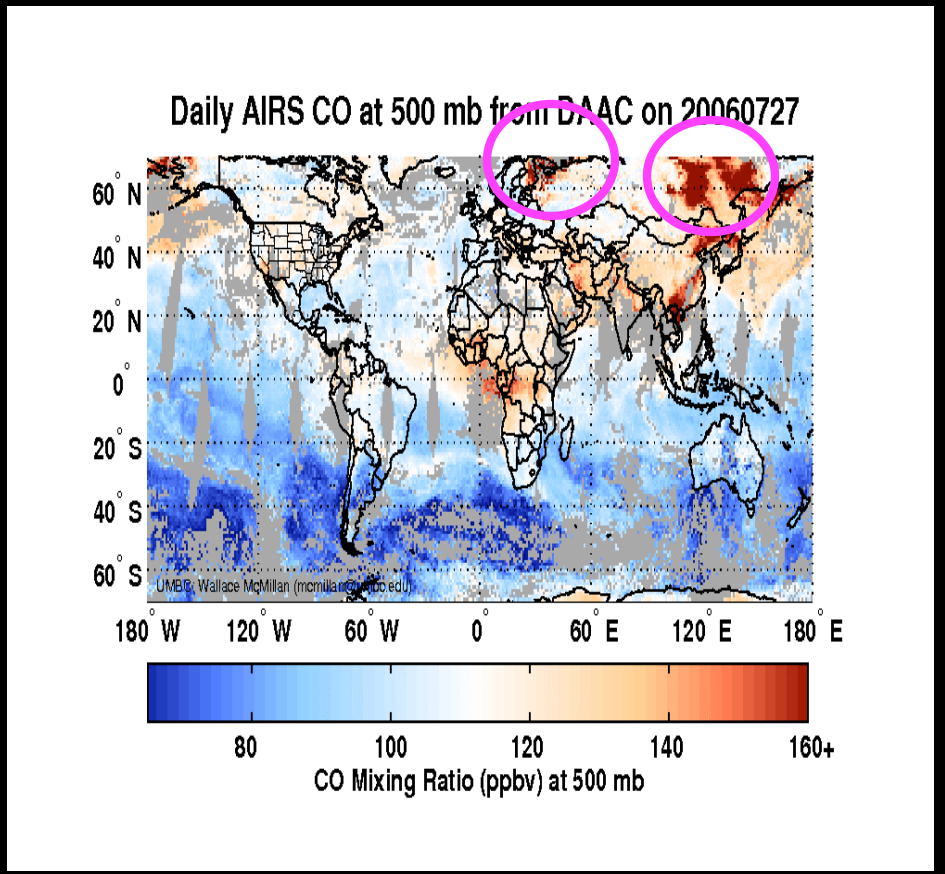
July, 2006, fires in central Siberia



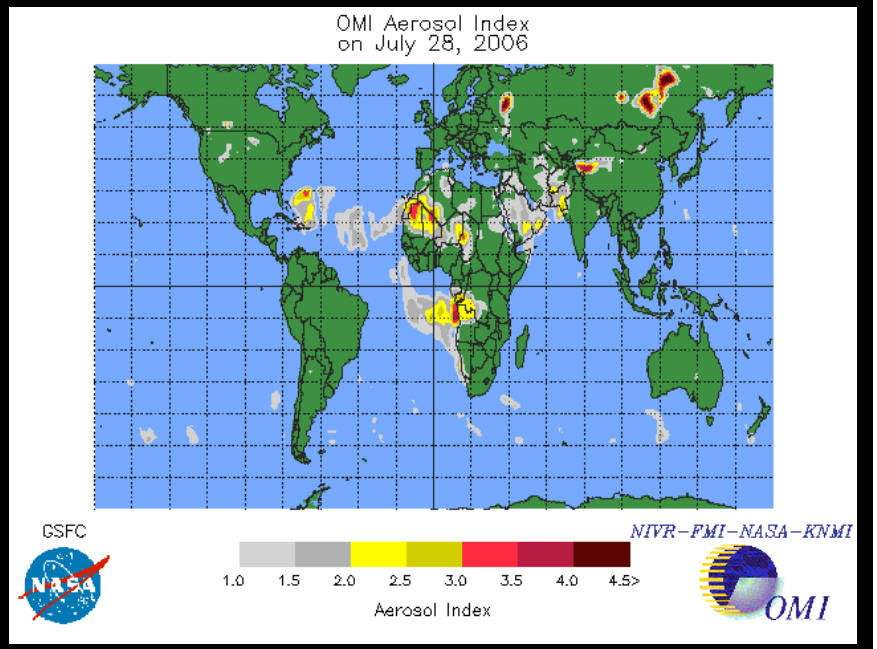


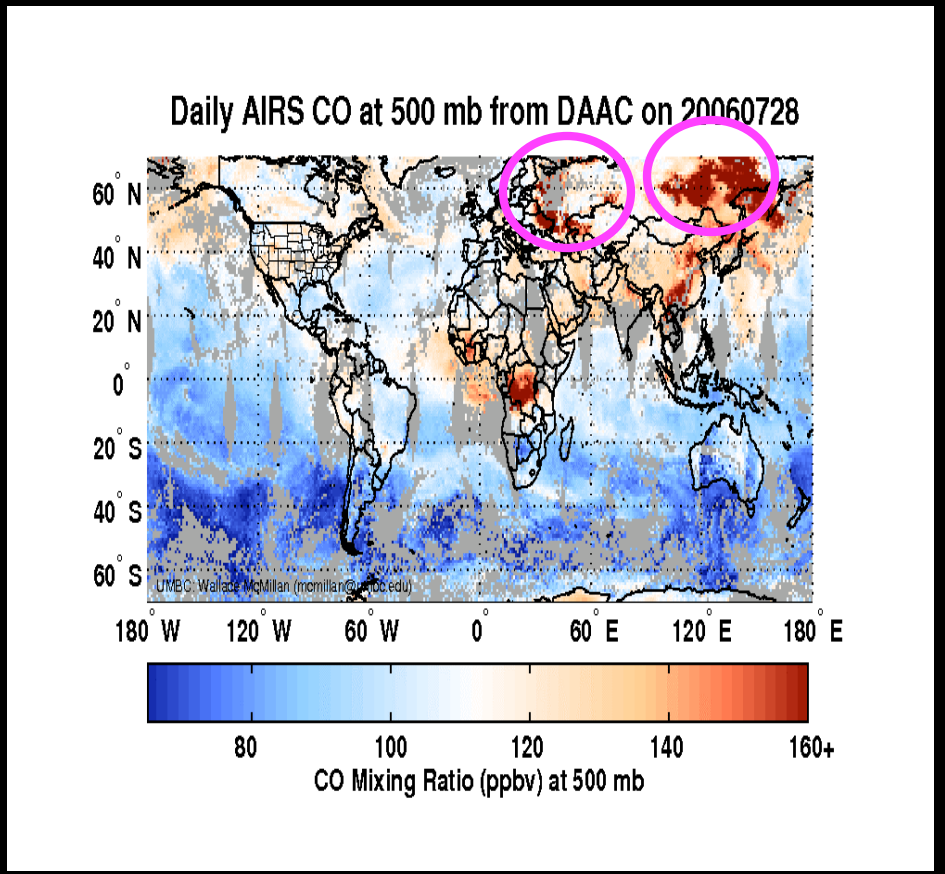
July, 2006, fires in central Siberia



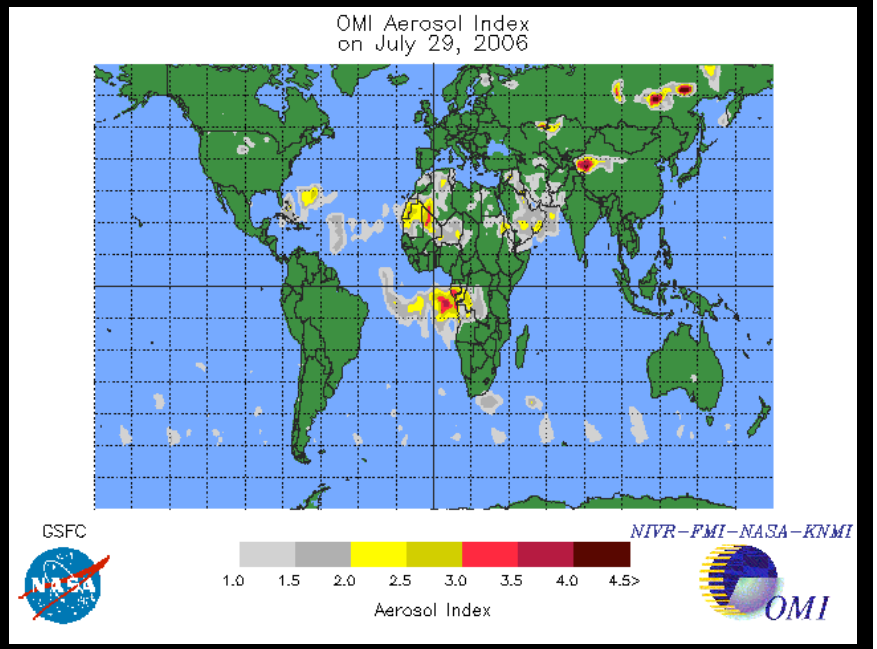


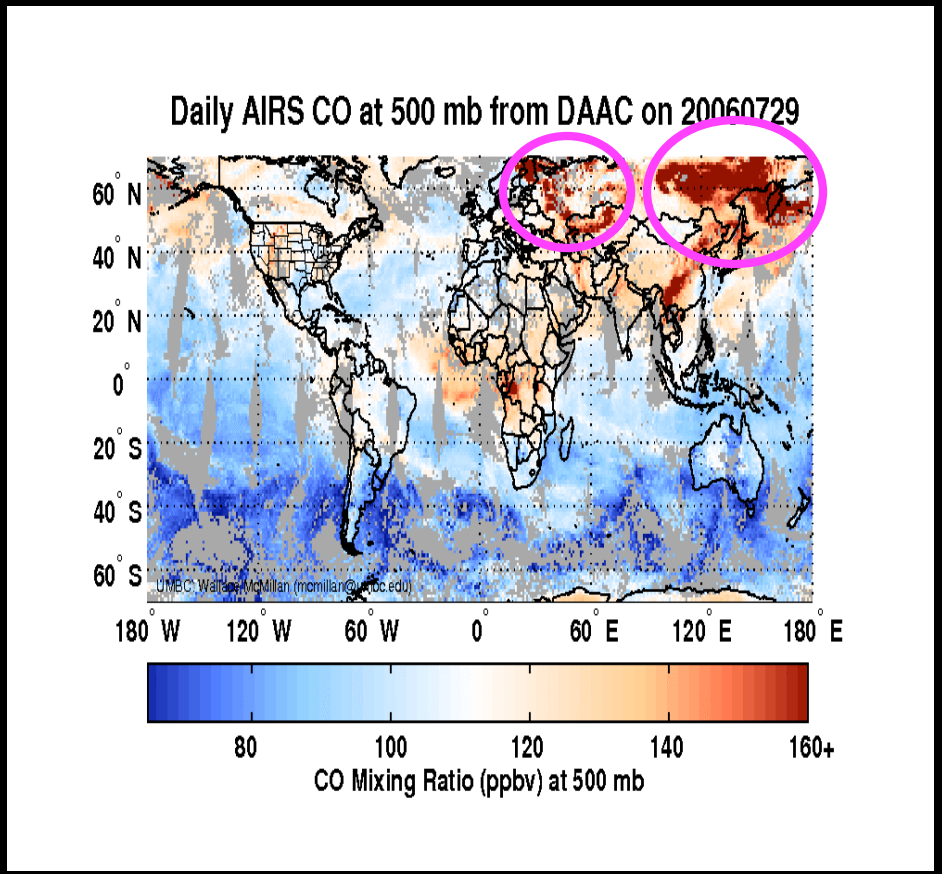
July, 2006, fires in central Siberia



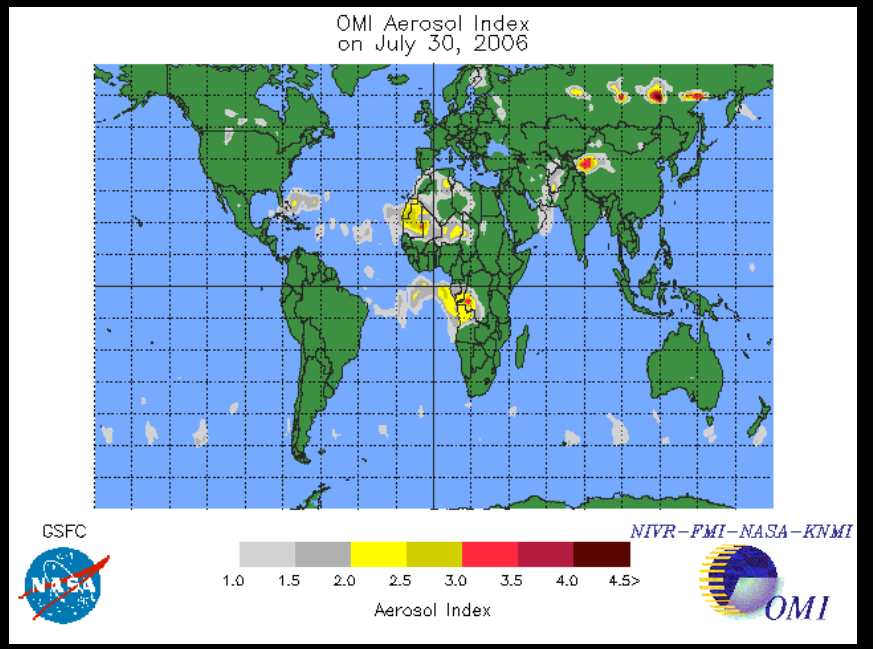


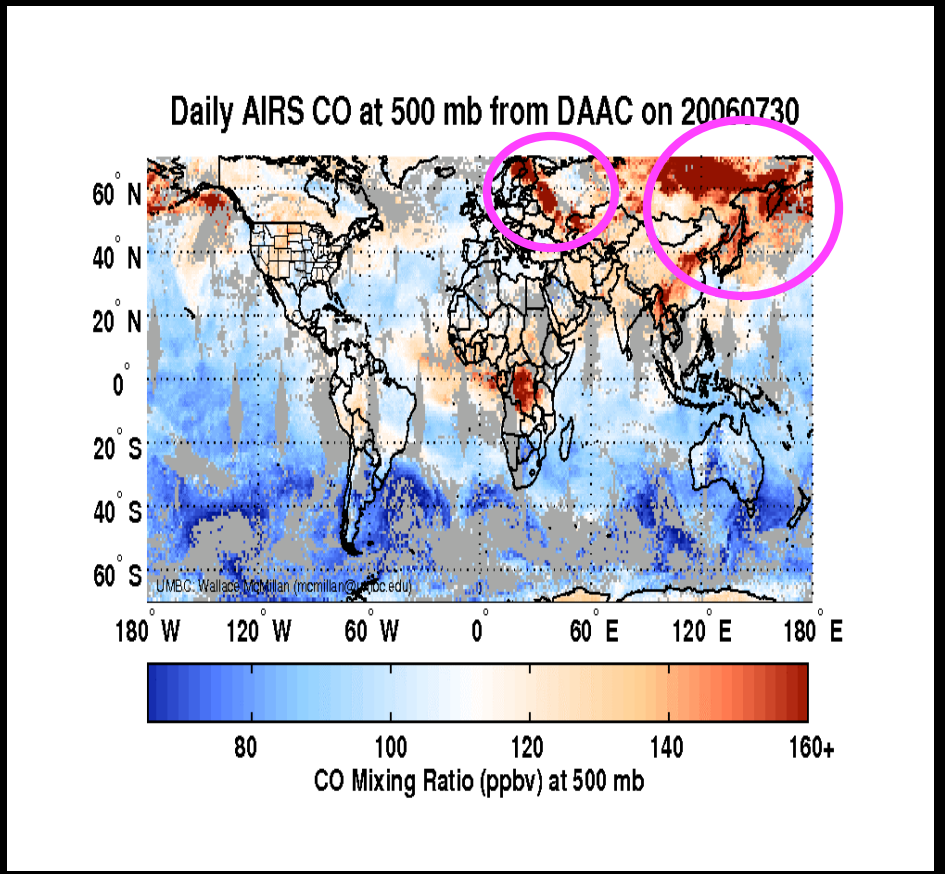
July, 2006, fires in central Siberia





July, 2006, fires in central Siberia





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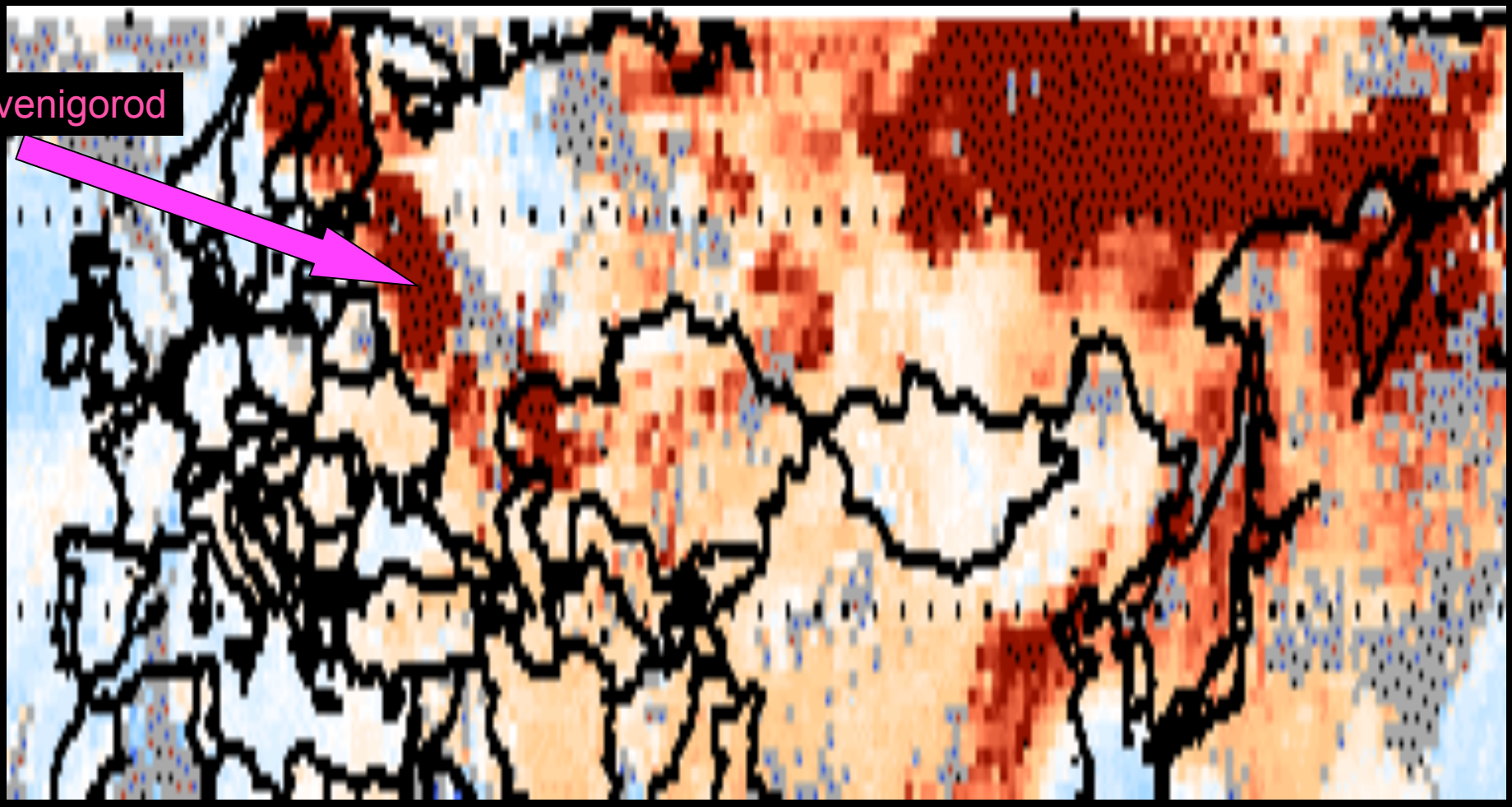
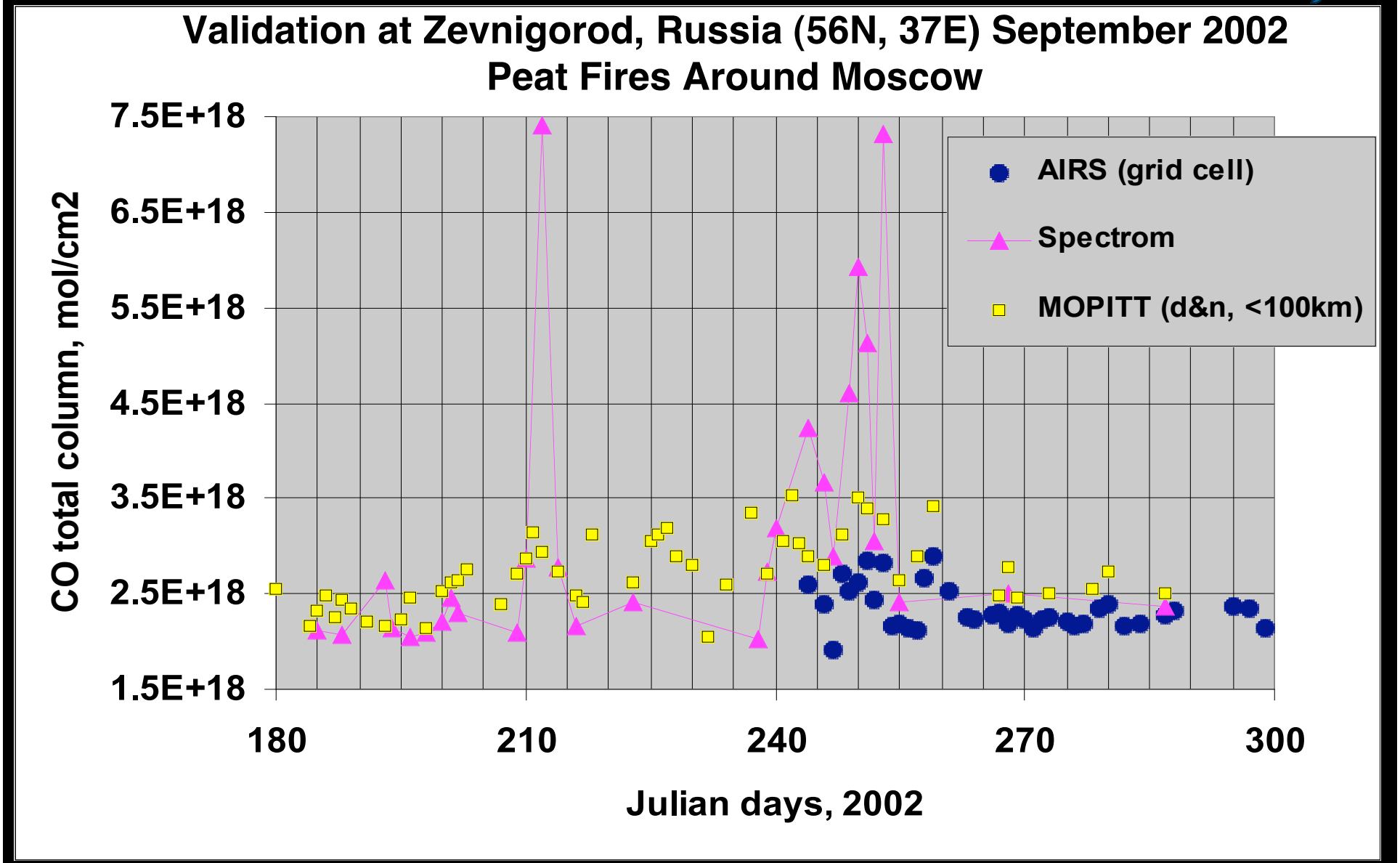
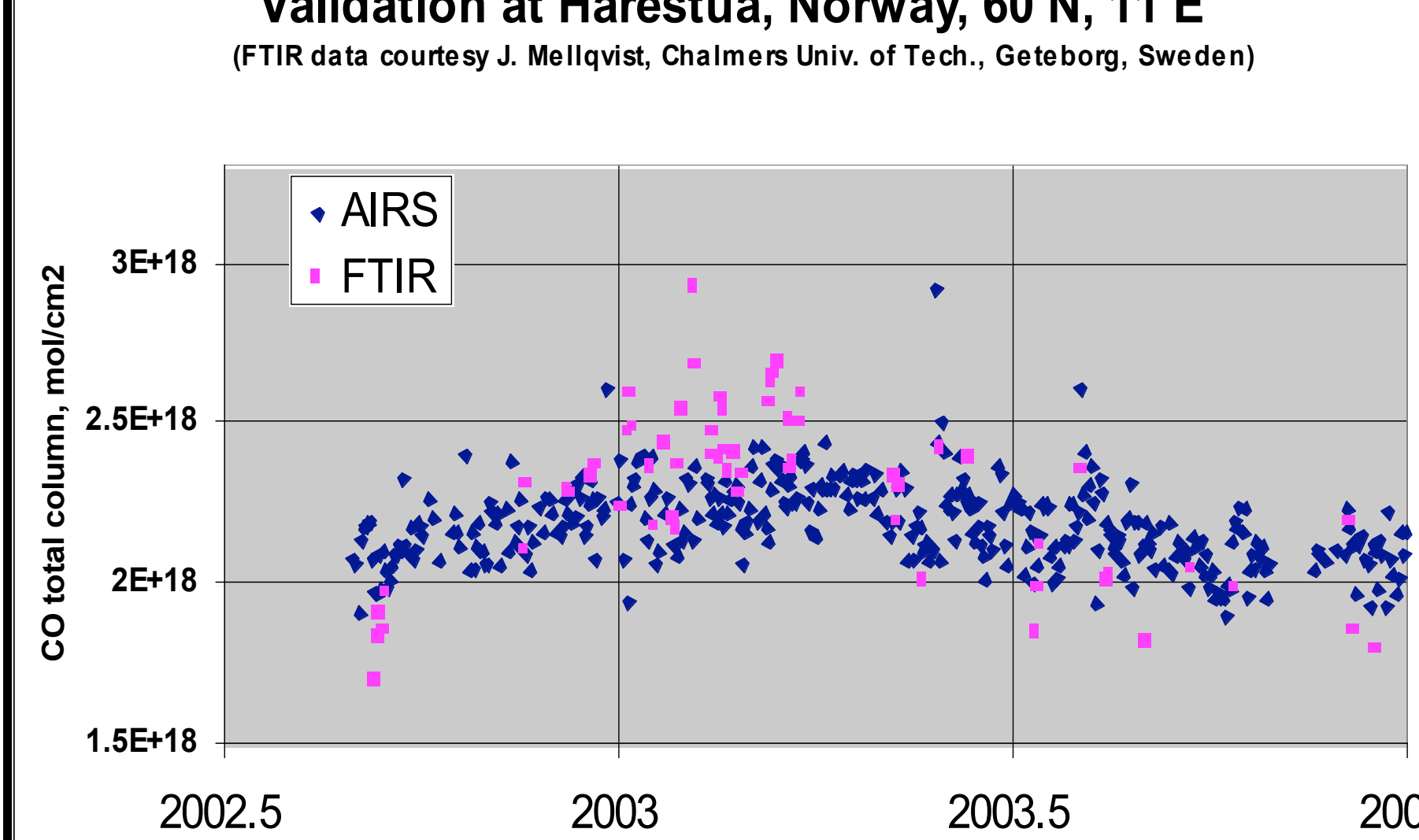
30 July 2006: Siberian Plume



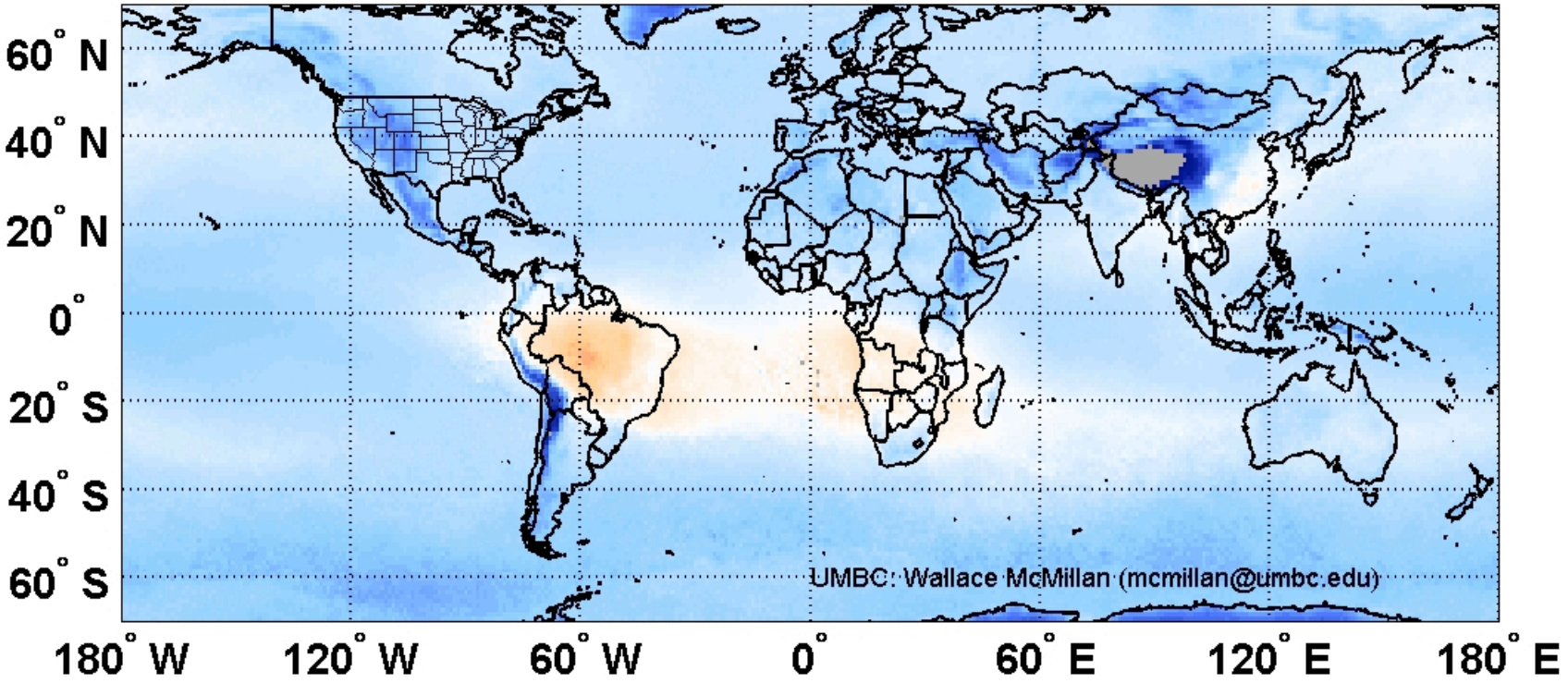
AIRS CO Column: Zevnigorod, Rus.

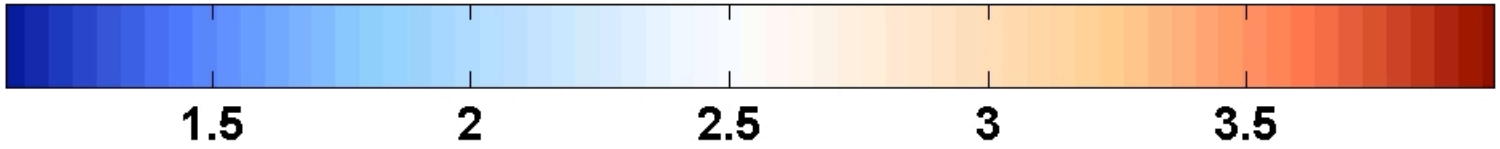


UMBC AIRS CO Column: Harestua, Norway



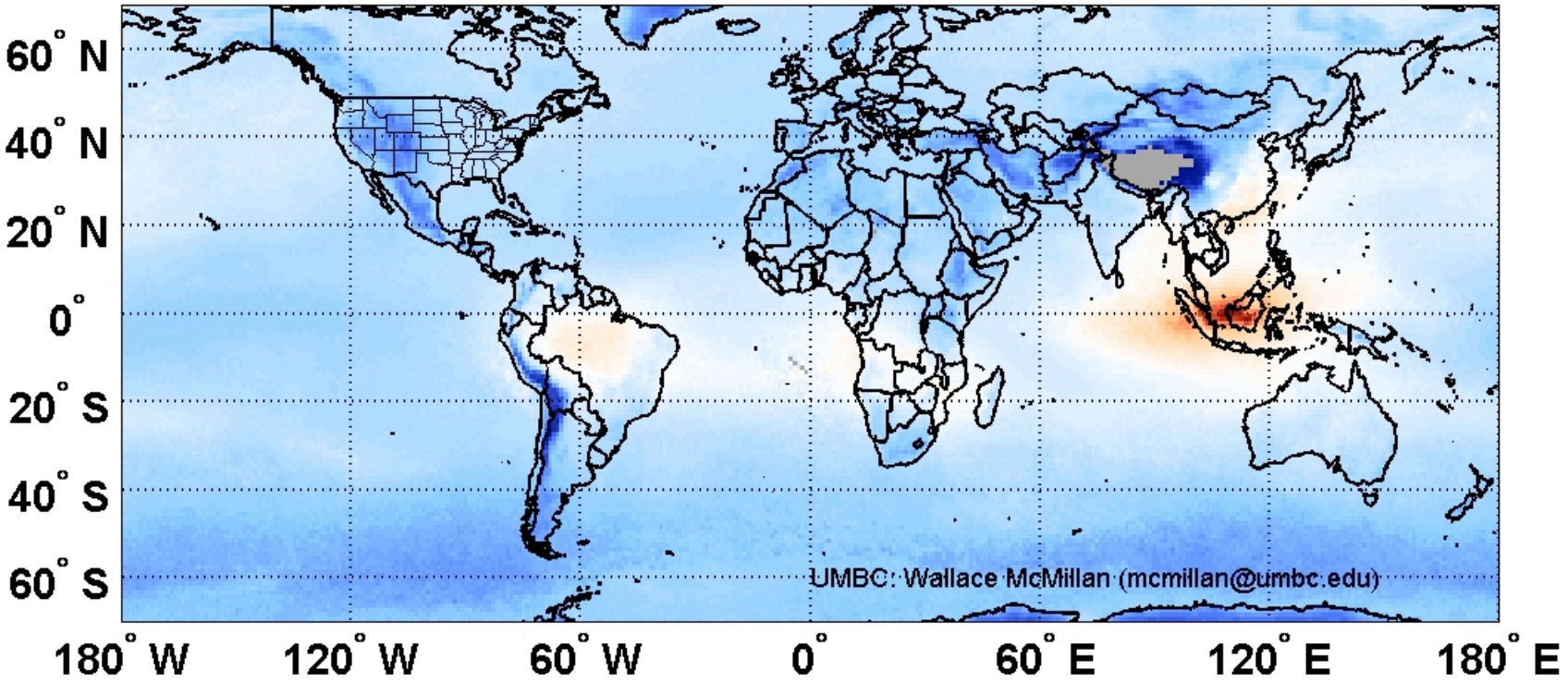
Monthly Average AIRS CO Total Column (v4.0.9.0) 200510

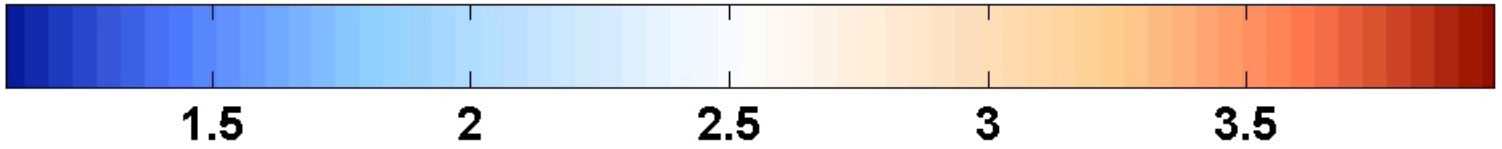




CO Total Column (molecules/cm^2) x 10^{18}

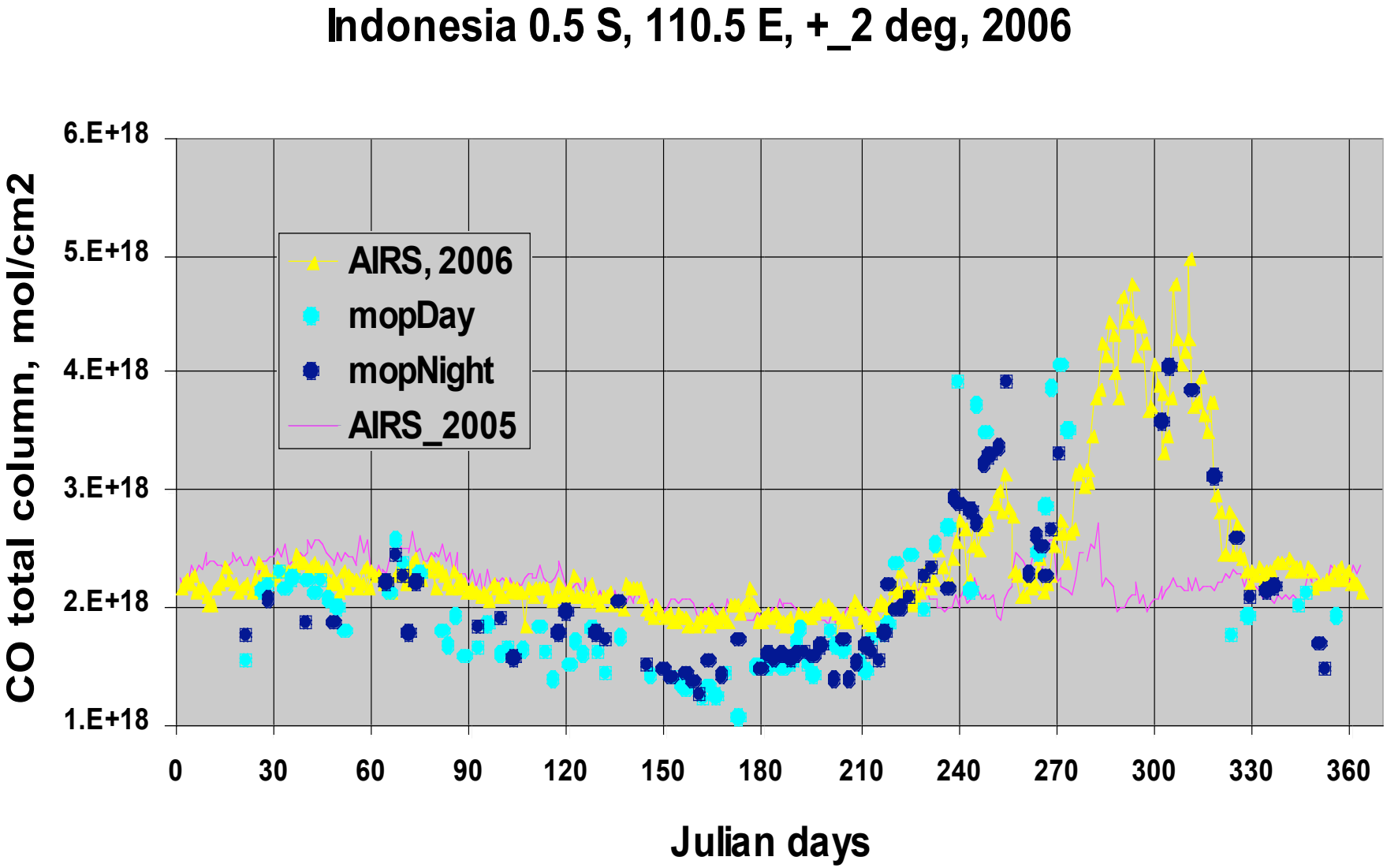
Monthly Average AIRS CO Total Column (v4.0.9.0) 200610





CO Total Column (molecules/cm^2) x 10^{18}

AIRS CO Column: Indonesia



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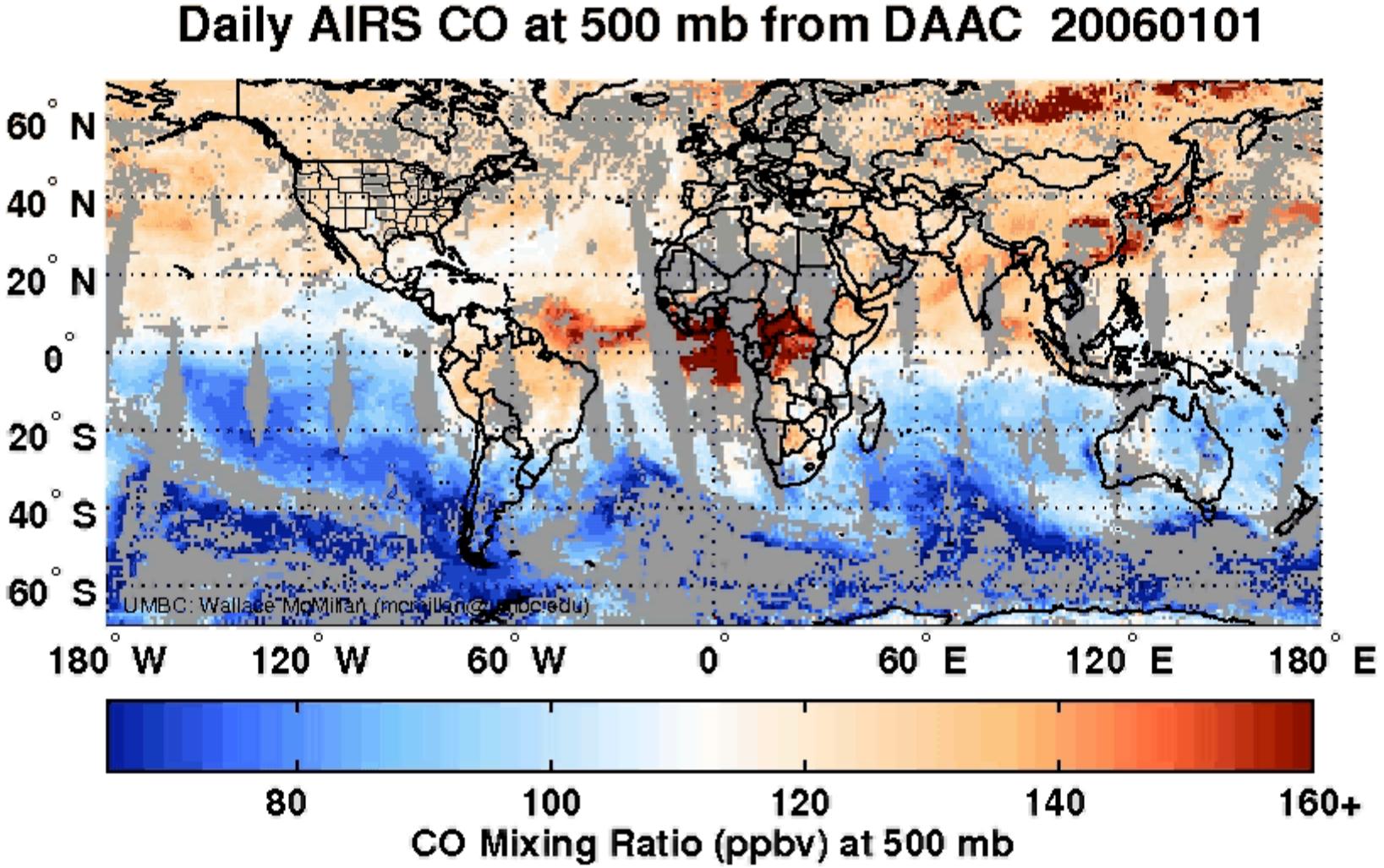
v5…
the best is yet to come…

Okay, better is yet to come…

v4.0.9.0 CO Movie: Jan-Nov 2006

1x1 deg grid



Animation by Stephanie Granger