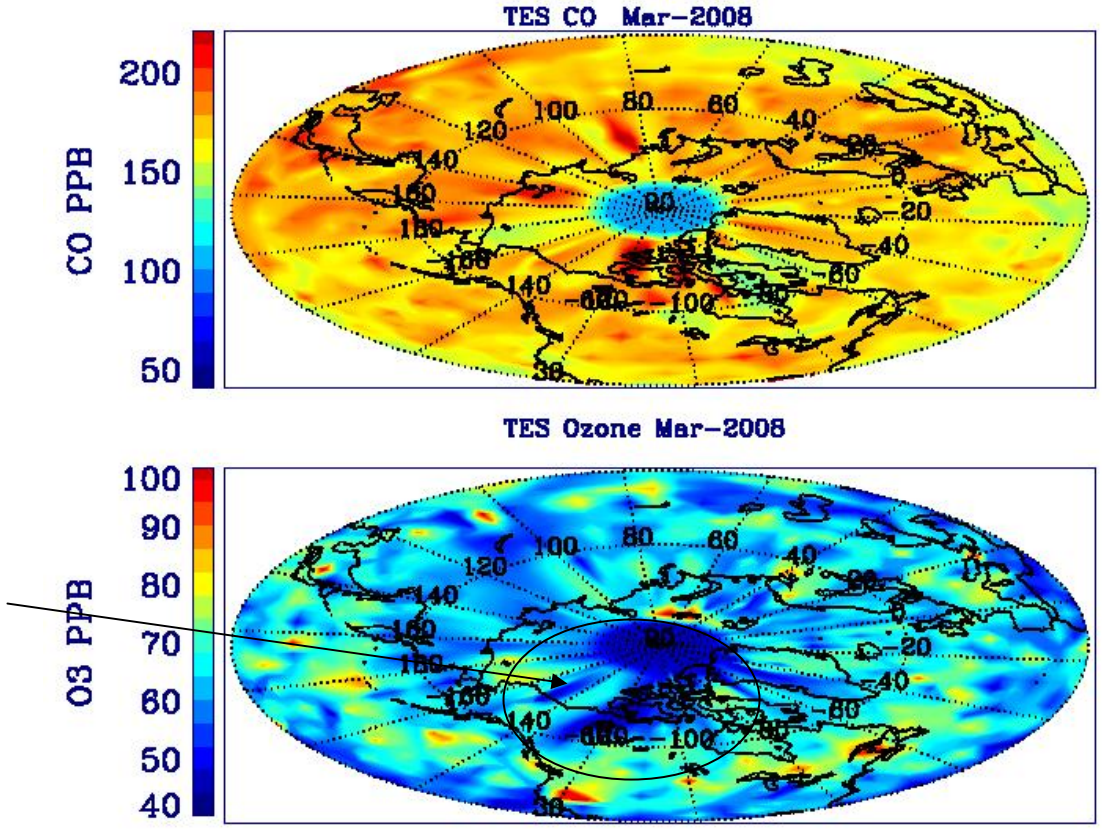
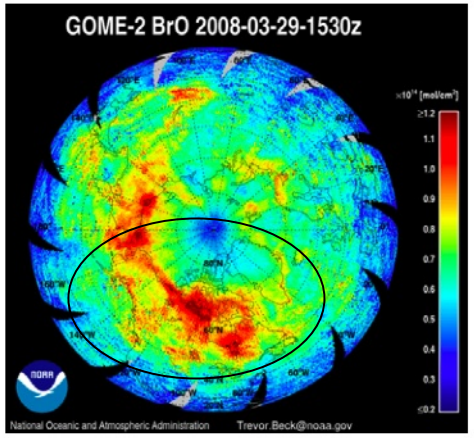
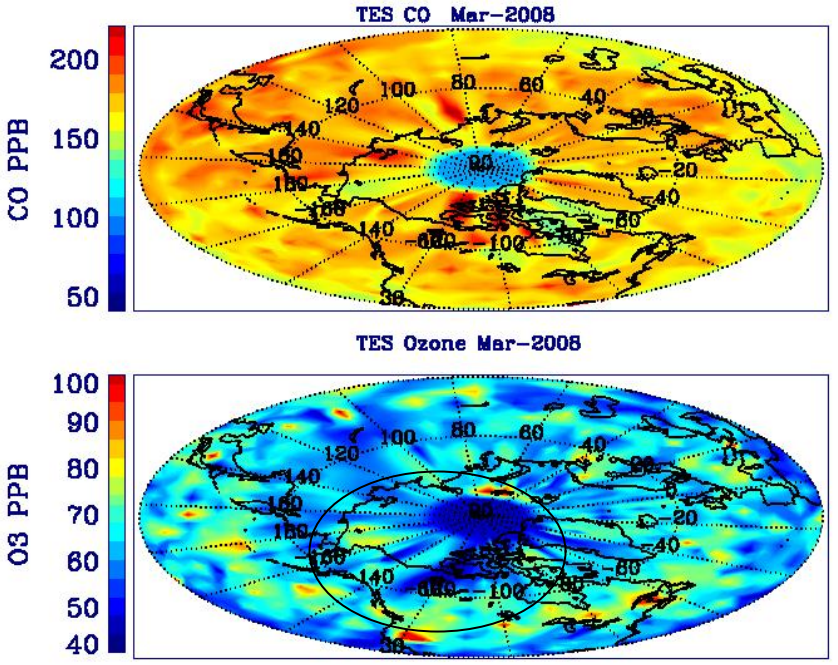
TES Ozone over N. Canada / Canadian Arctic Islands… Interesting Science? Or Useful Validation Target?

Low Ozone over Hudson Bay (about 11 observations total)



TES Ozone over N. Canada / Canadian Arctic Islands… Interesting Science? Or Useful Validation Target?





Is low observed ozone related to high Bromine?

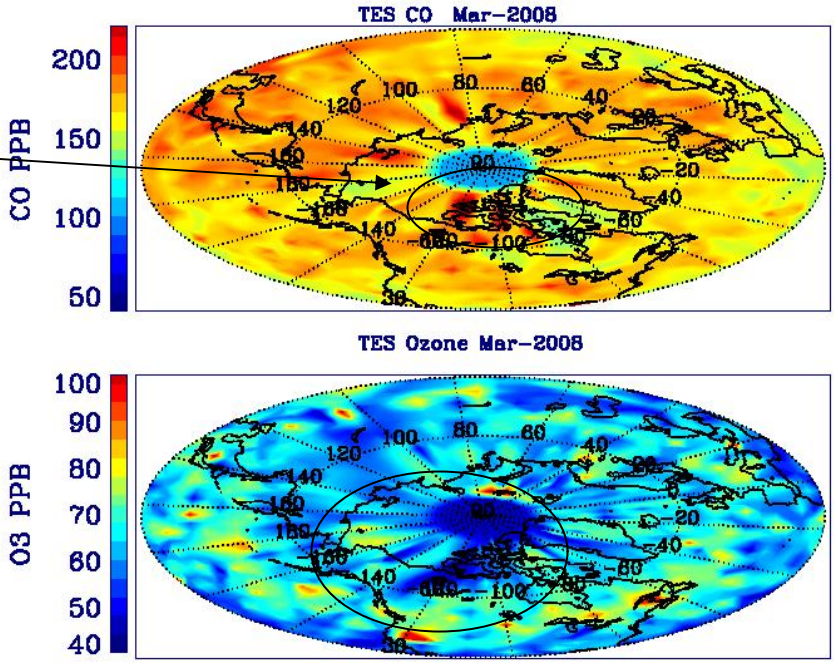
If so.. Then need to explain boundary layer exchange with free troposphere

TES Ozone over N. Canada / Canadian Arctic Islands… Interesting Science? Or Useful Validation Target?

Or are poor retrievals over sea ice confusing ozone and CO estimates (note that CO is high over ocean)

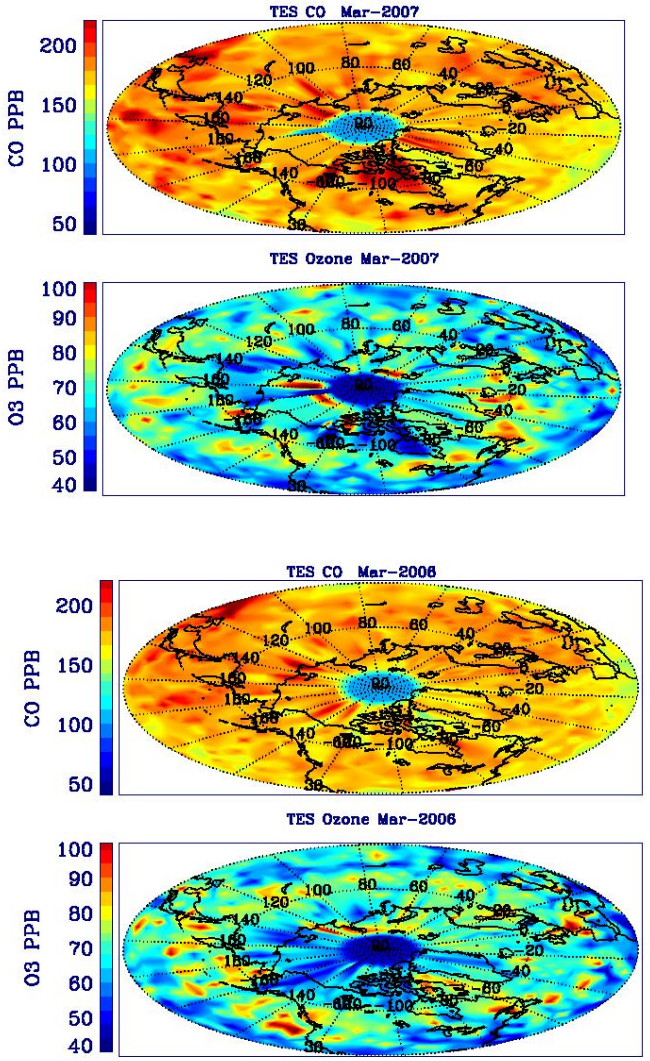
TES does not estimate emissivity over ocean so if surface is actually ice then retrievals might be confused

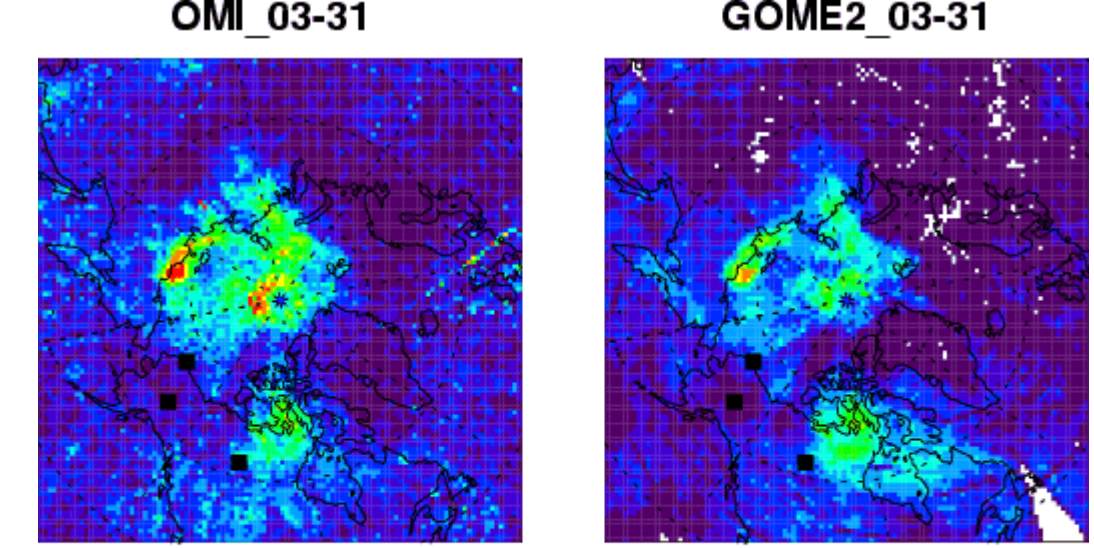
…. Although normally I would expect retrieval to blow up due to unexpected thermal conditions

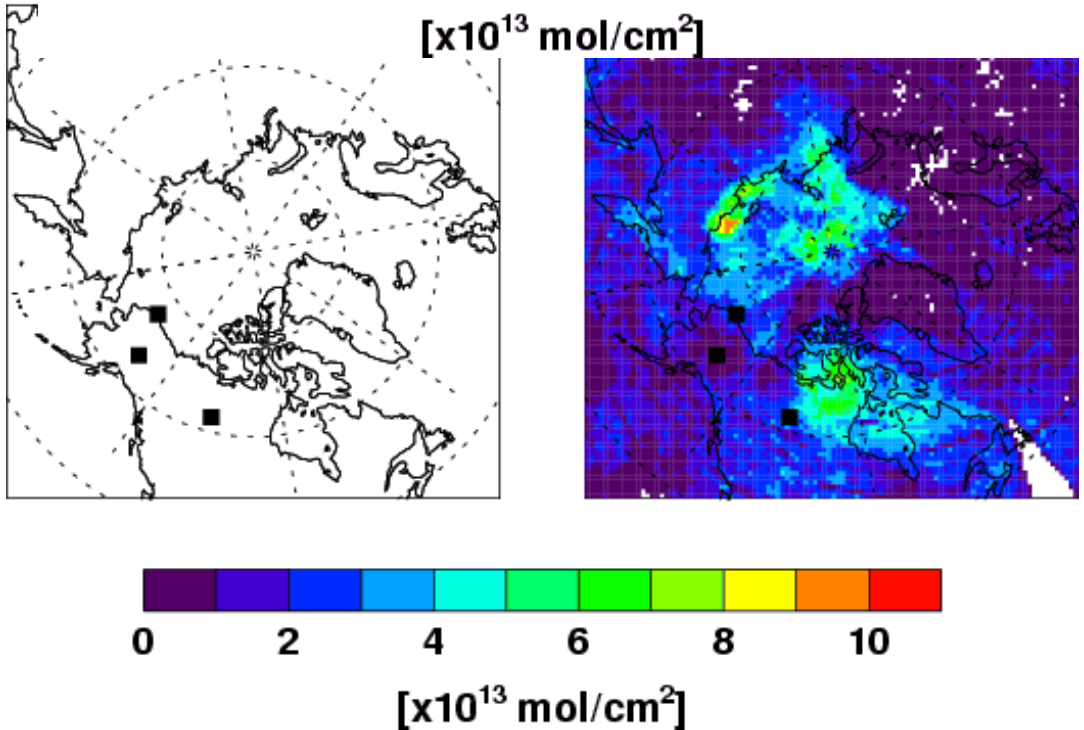


TES Ozone over N. Canada / Canadian Arctic Islands… Interesting Science? Or Useful Validation Target?

Low Ozone over N. Canada region persistent year over year…. But so is high CO… spatial patterns could also be due to poor sampling at high latitudes

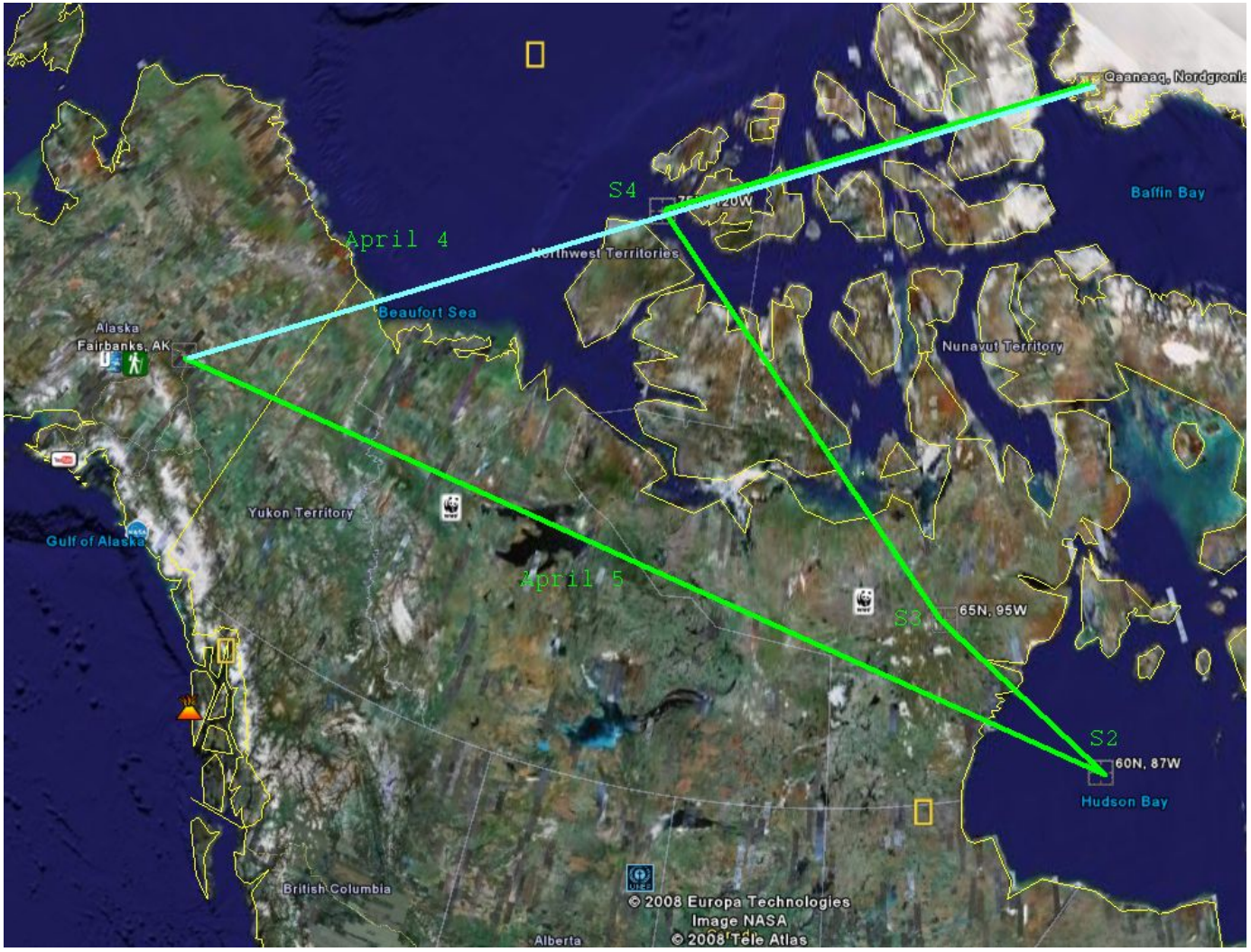


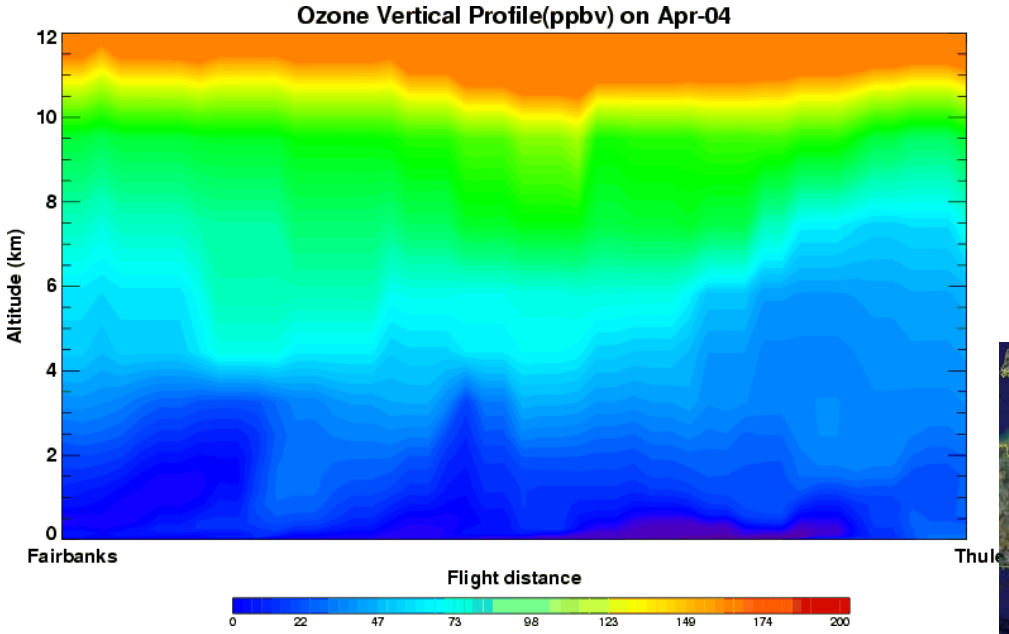


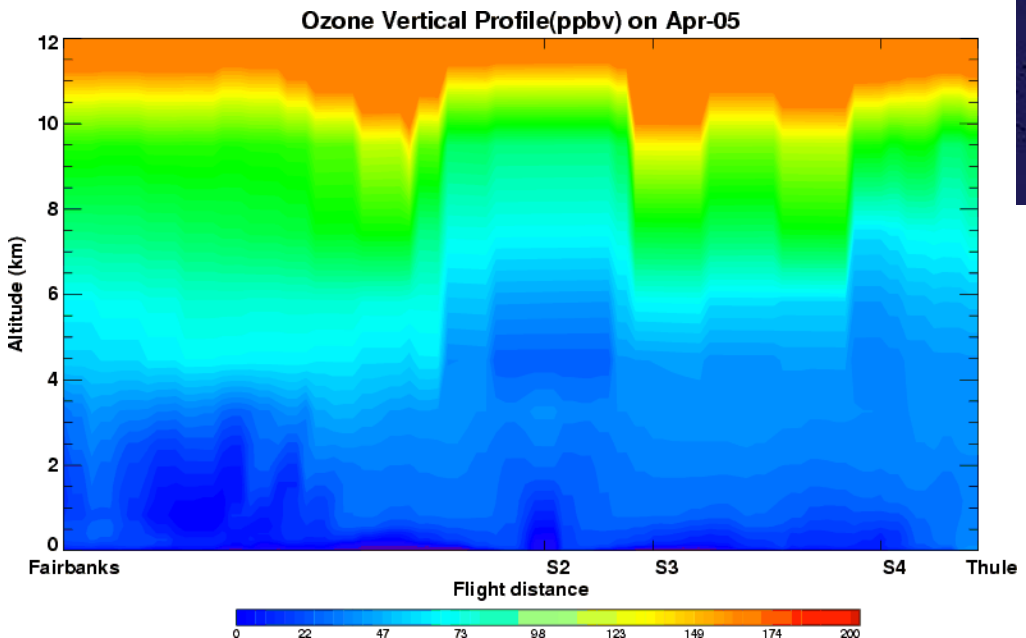


High BrO has been in recent days over NW of Hudson Bay.

Possible flight path for April 4 and 5

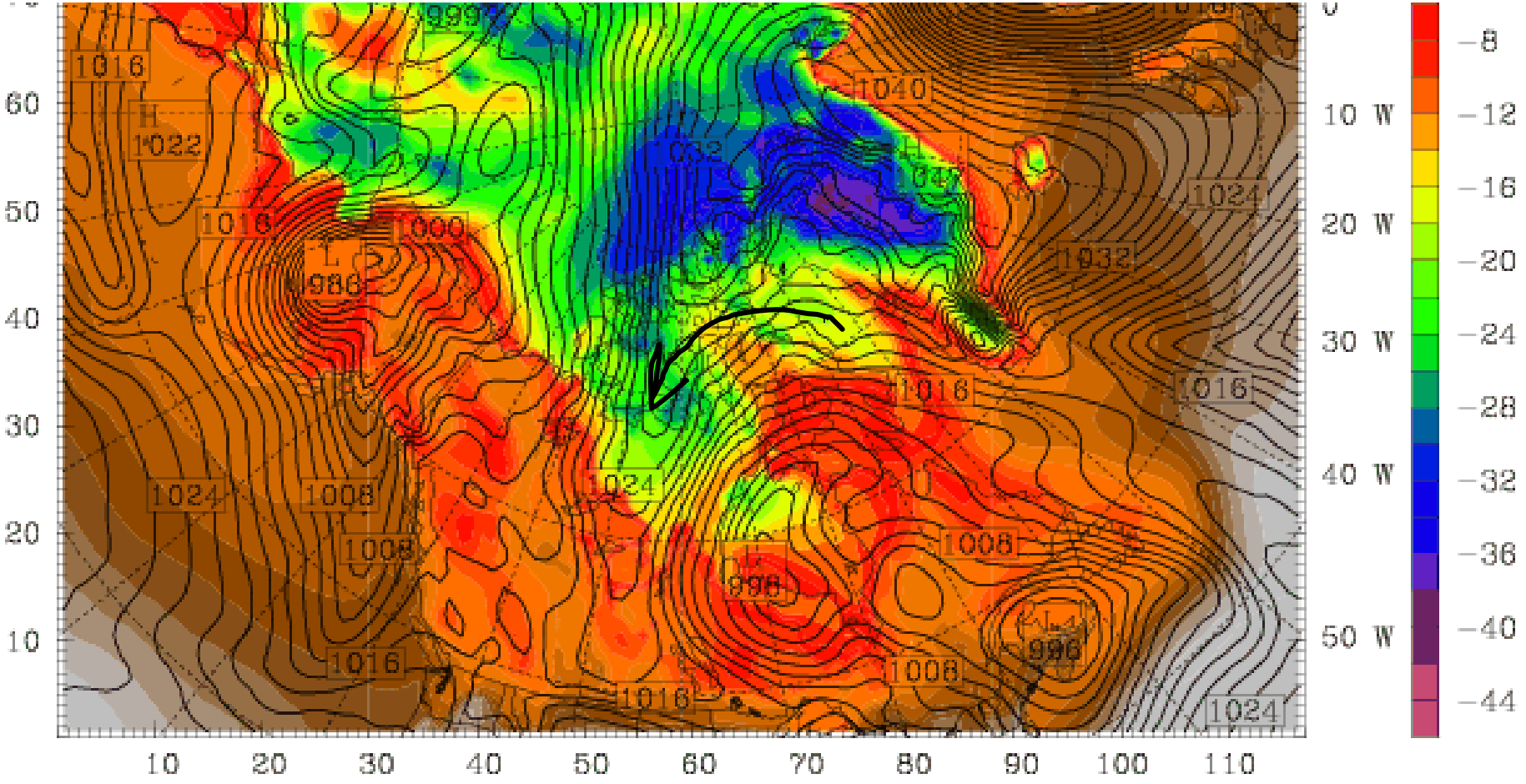




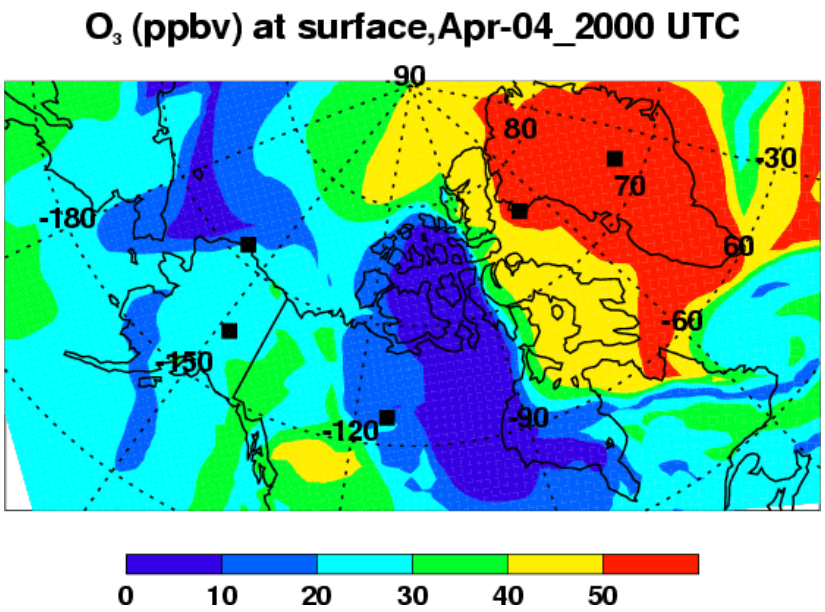


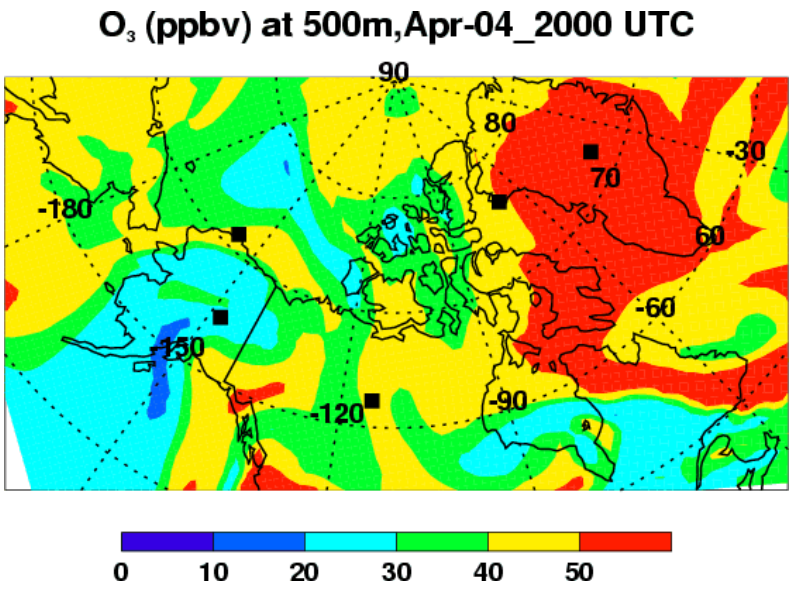
Low O_3 features are near the surface

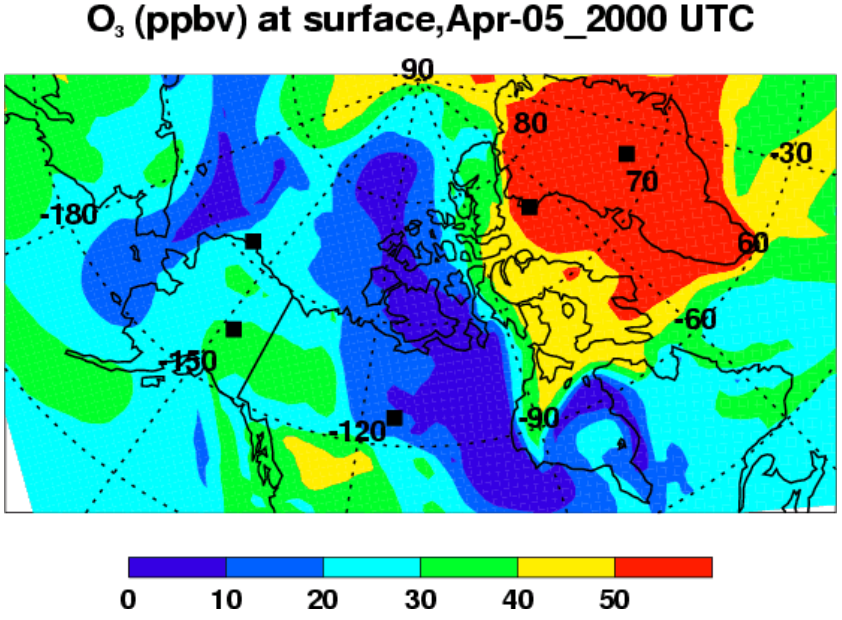
Hudson Bay area is characterized by rapid transport of air mass with high ozone. The cold pool of air in this region is in the process of disappearing, which does not bode well for BrO

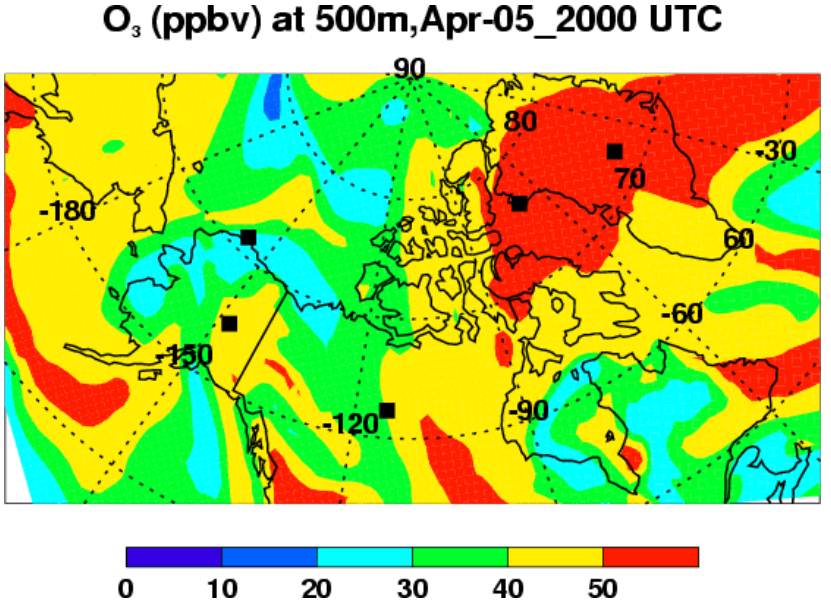


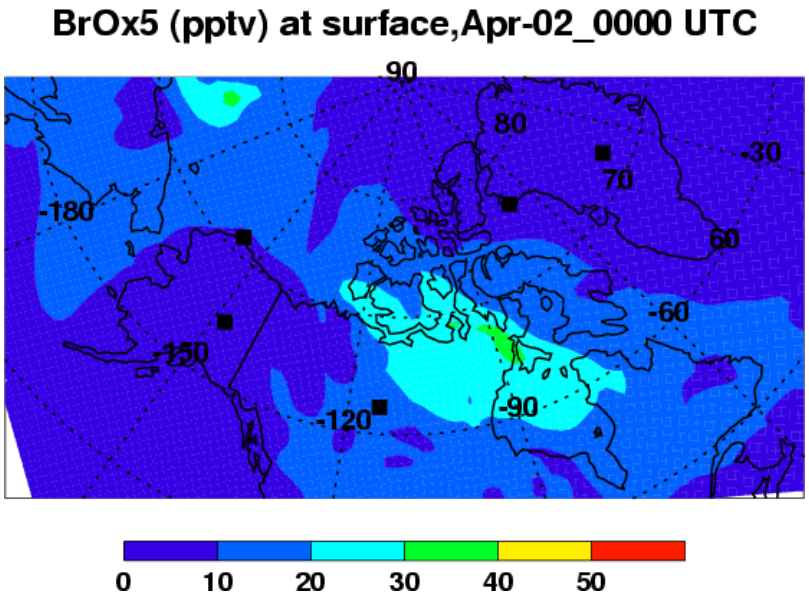
Low O3 air mass is only near surface. Lower trop is affected by transport



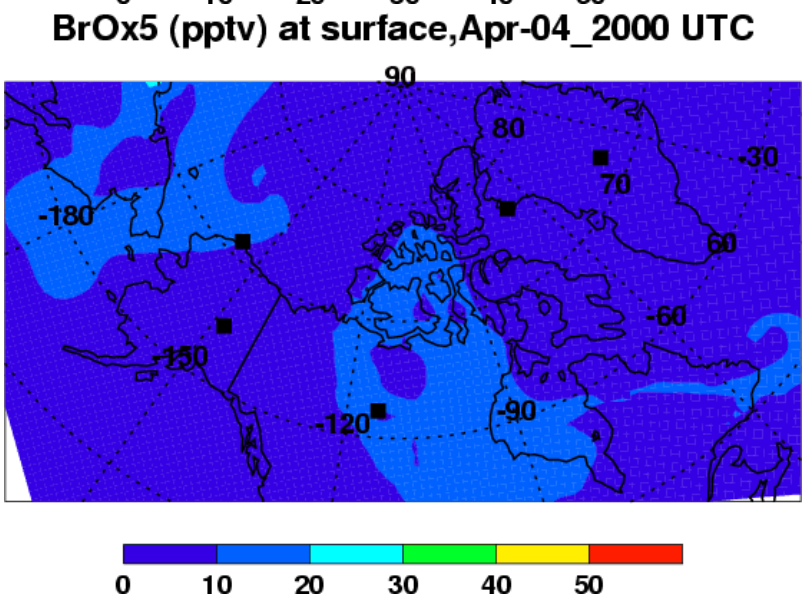


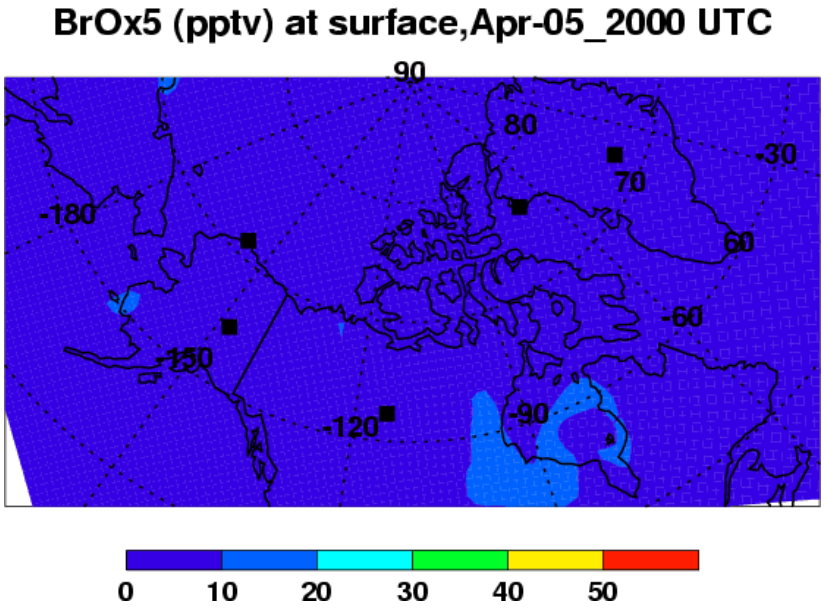






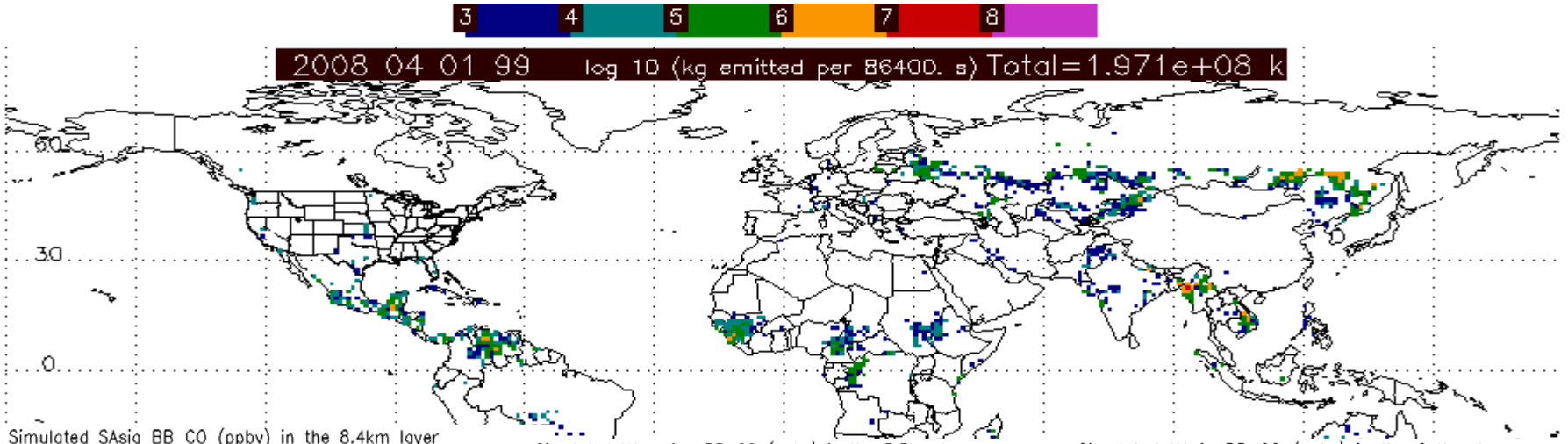
Most of the BrO decrease is due to mixing. If BrO is observed, it'll be from recent emissions



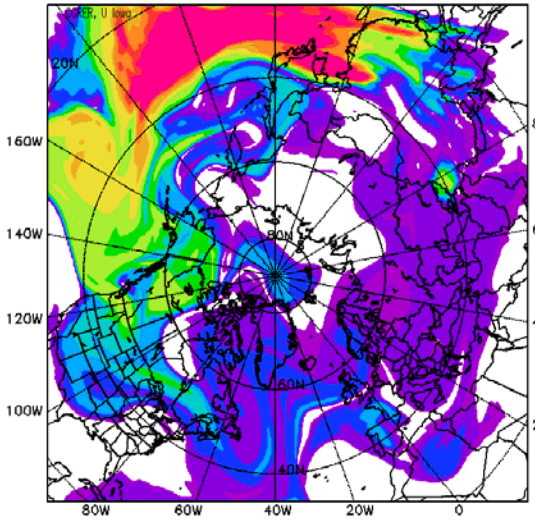


Navy Fire Emissions (FLAMBE) for April 1

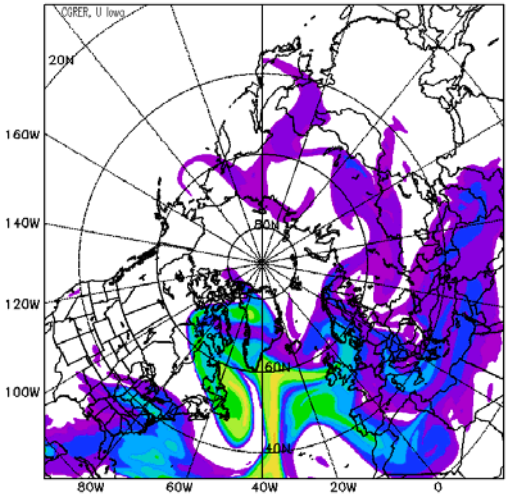
Bottom Slides STEM Forecasts of S. Asia and Africa (<40N); N. Amer.; and N. Asia Biomass CO for April 4 12Z, 8.4km.



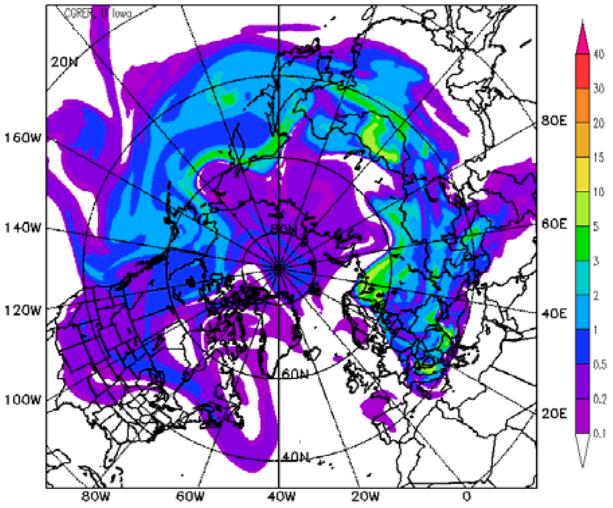
Simulated SAsia_BB_CO_(ppbv) in the 8.4km layer at 12UTC, 04/4/2008

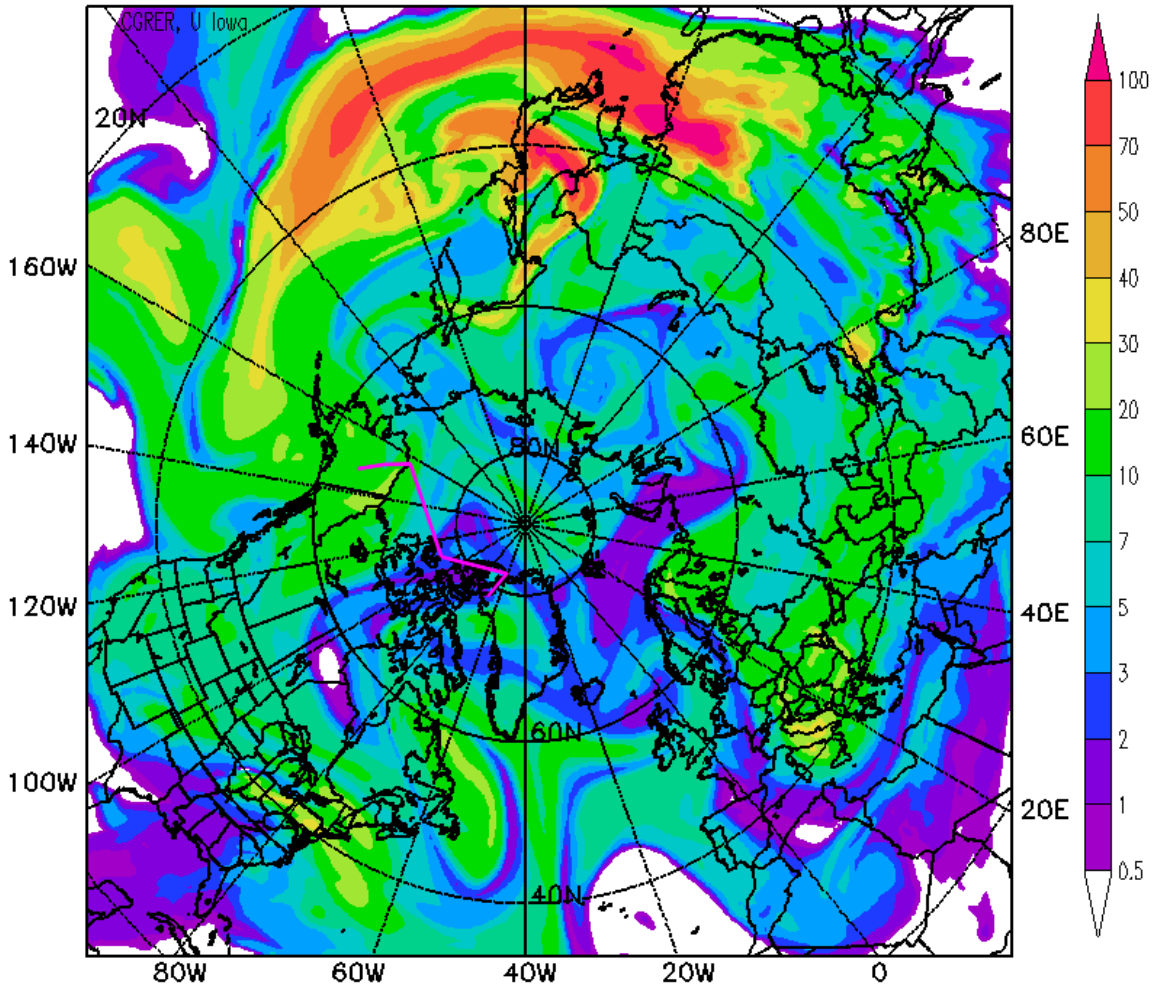


Simulated NAmerica_BB_CO_(ppbv) in the 5.5km lay at 12UTC, 04/4/2008

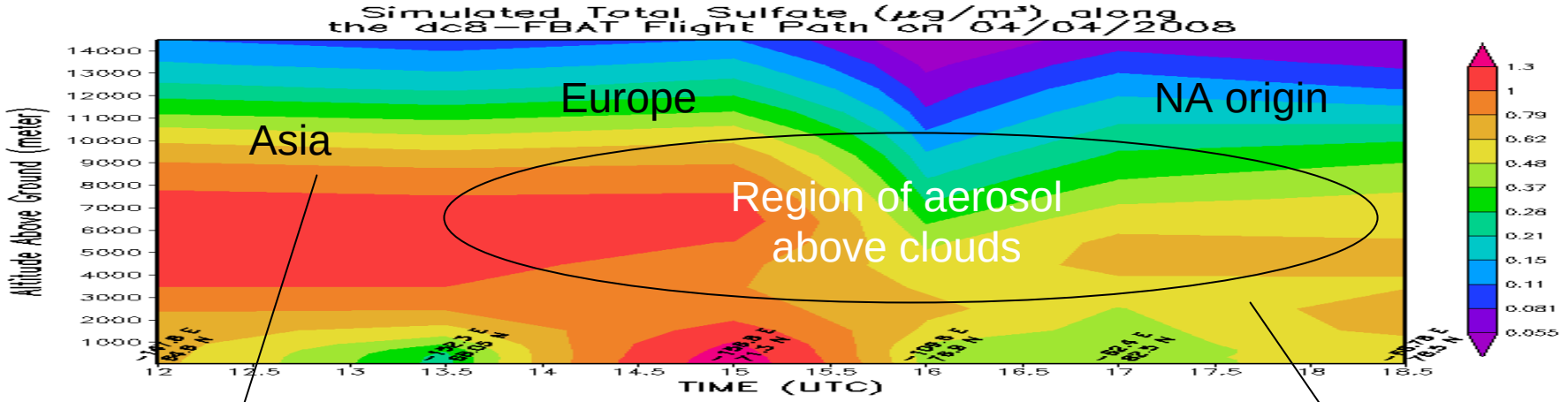


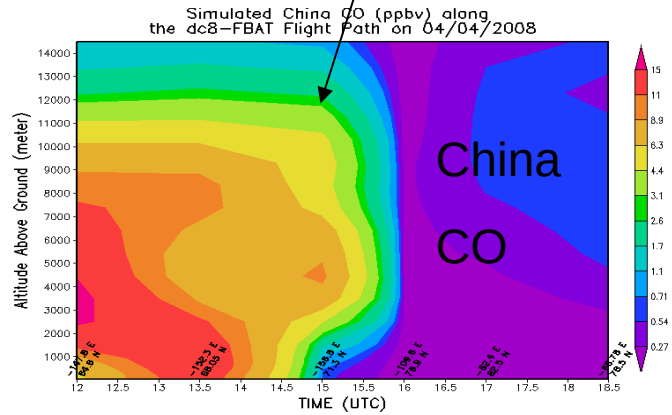
Simulated NAsia_BB_CO_(ppbv) in the 8.4km layer at 12UTC, 04/4/2008

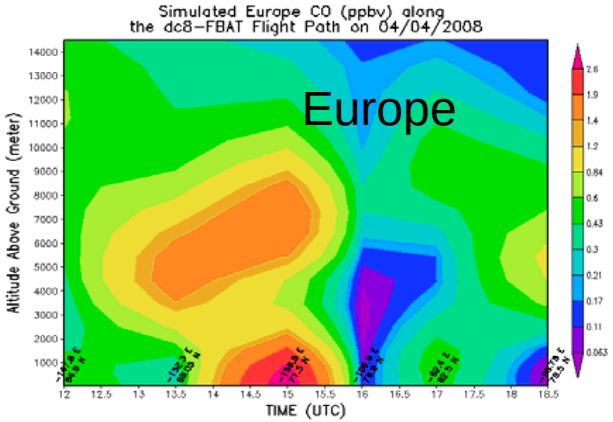


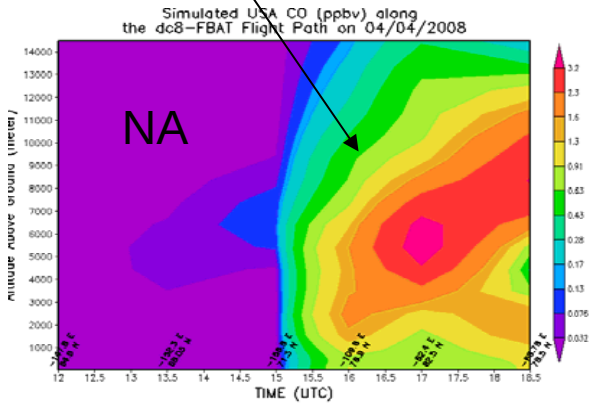

Simulated Anthro_CO (ppbv) in the 5.5km layer
at 12UTC, 04/4/2008
CGRER, U Iowa
20N
160W
140W
120W
100W
80N
60N
40N
80W
60W
40W
20W
0
80E
60E
40E
20E
100
70
50
40
30
20
10
7
5
3
2
1
0.5

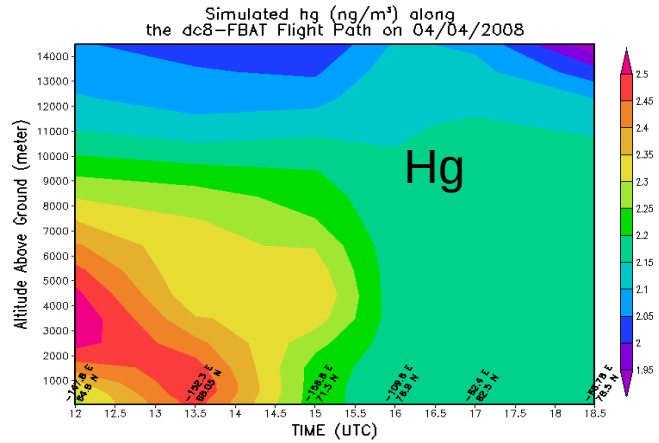
STEM Curtain Plots for F to Th, April 4.

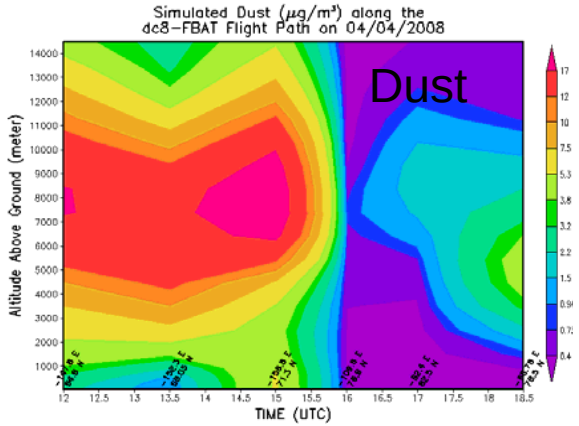


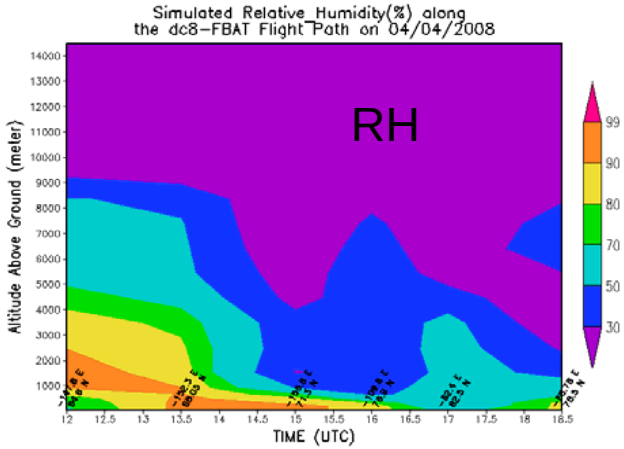




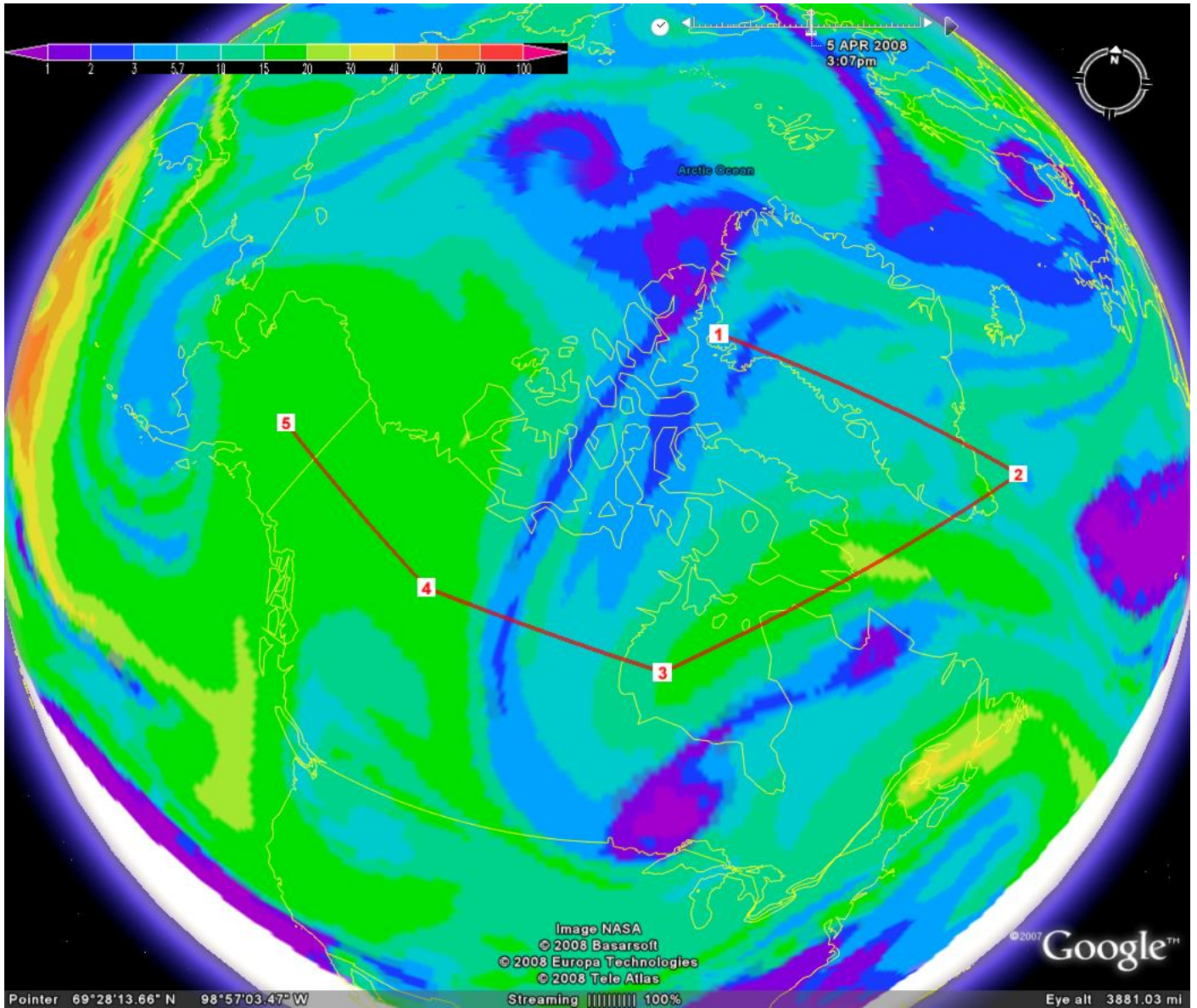




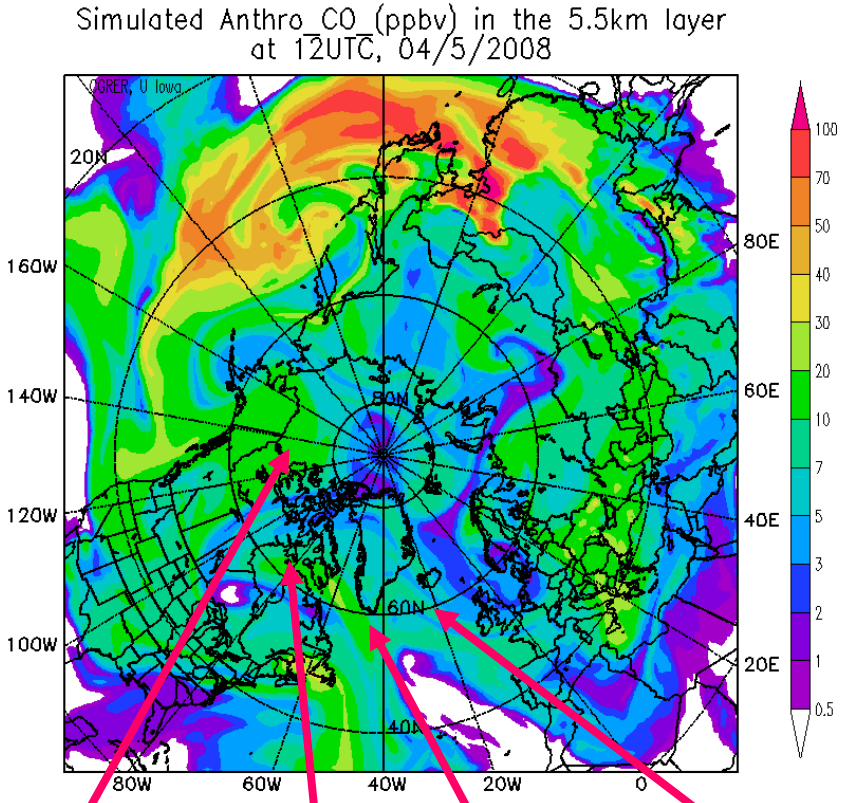


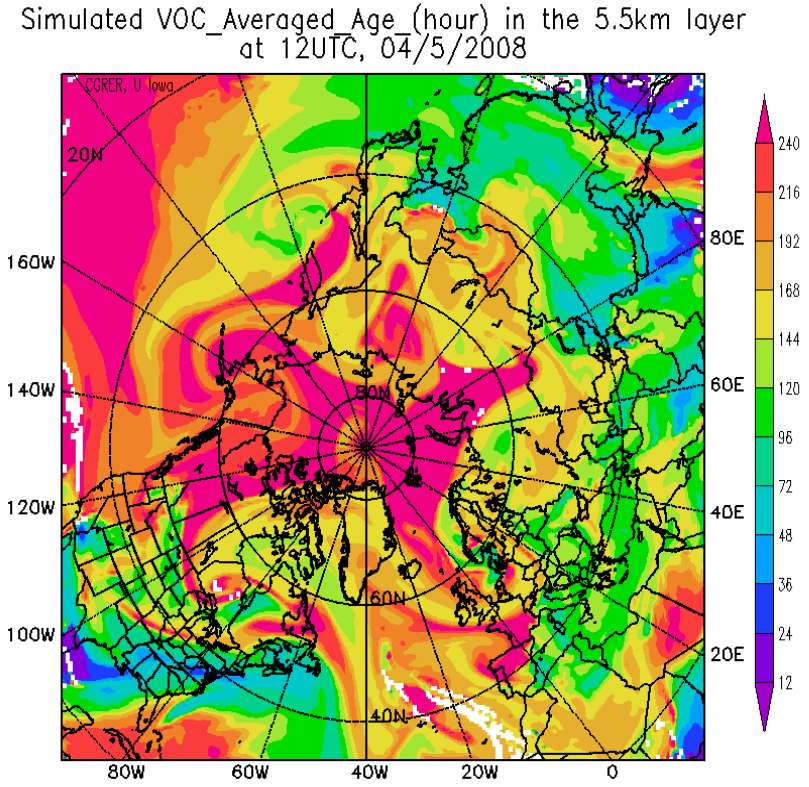


STEM Forecast of CO at 5.5km, April 5 12Z. From pt 2 back contains mixture of many different air masses (see next slide)



STEM Forecast Show Three Distinct Airmasses from East to West





Asia Outflow

Aging US Outflow

Recent US

Mixed Asia

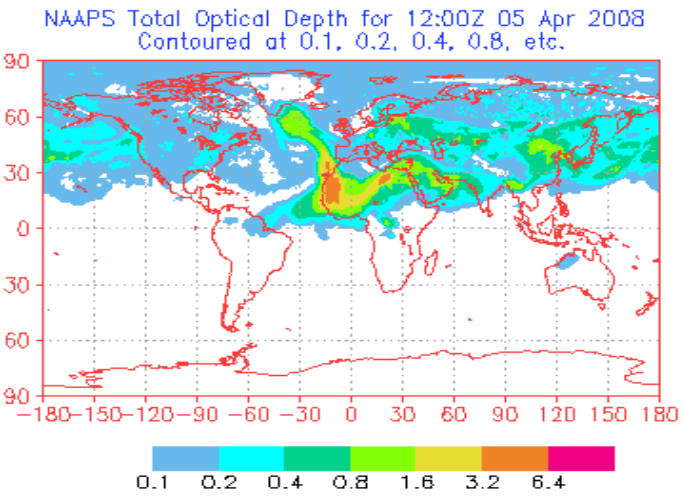
Africa Dust

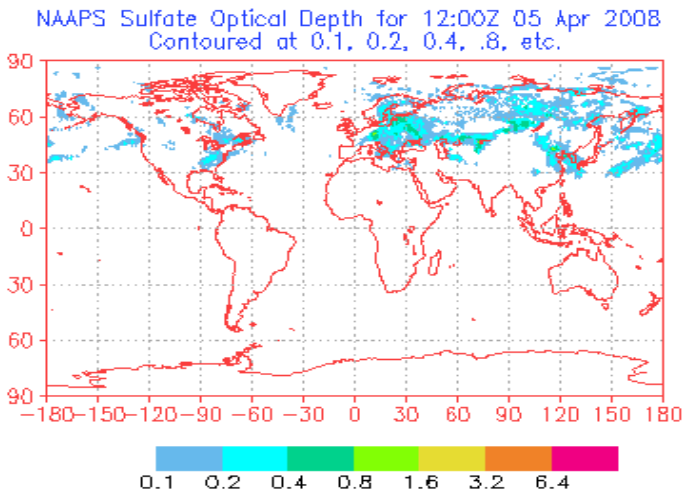
Europe

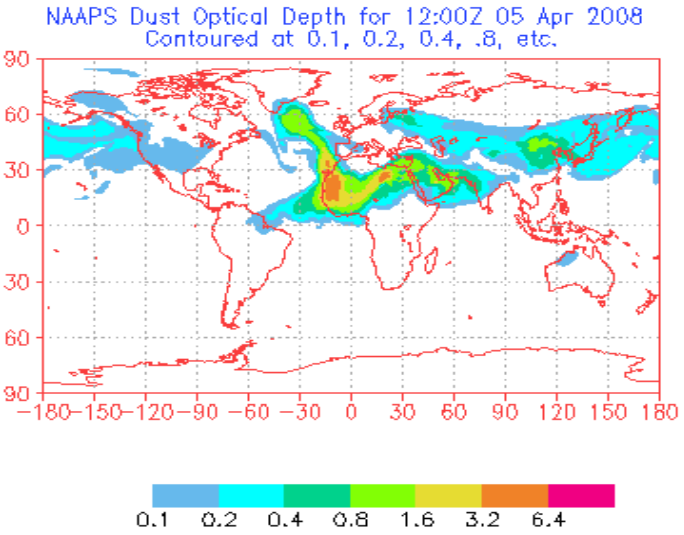
Aged US

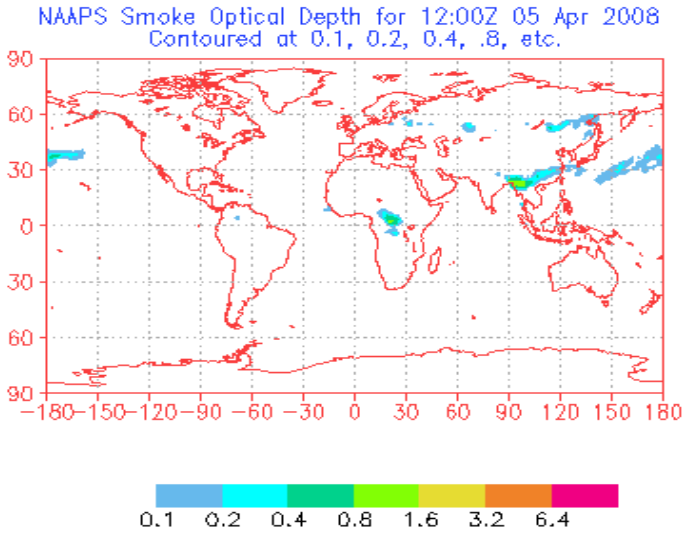
NAAPS Forecast shows Africa dust moving towards Greenland

(STEM model also has)







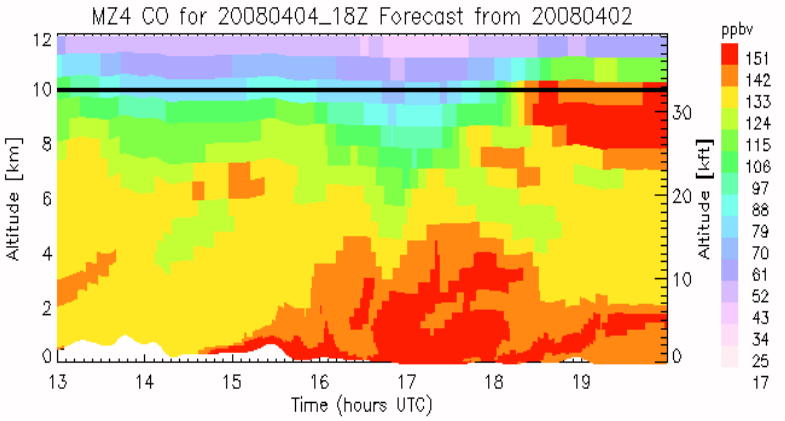


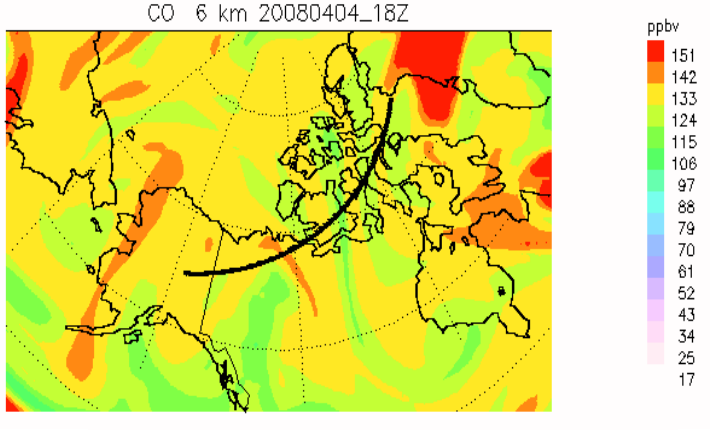
NRL Aerosol Modeling Apr 02 2008

Apr 4 Fairbanks - Thule

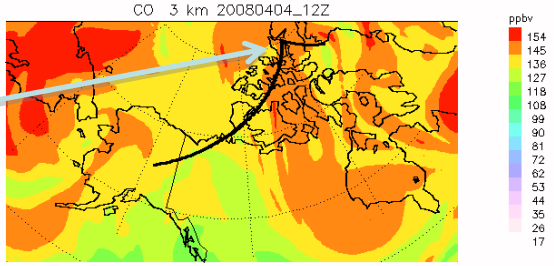
MZ4 forecast from Apr 2 for Apr 4 18Z

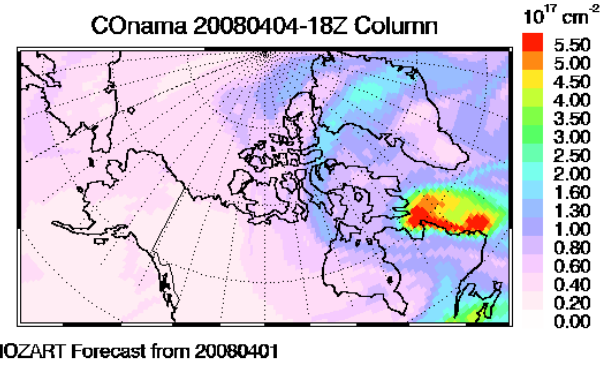
CO along flight track and at 6km





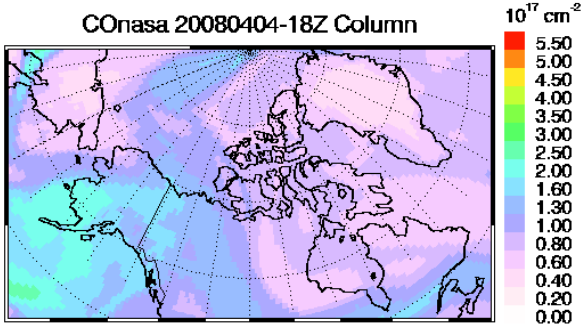
Eureka





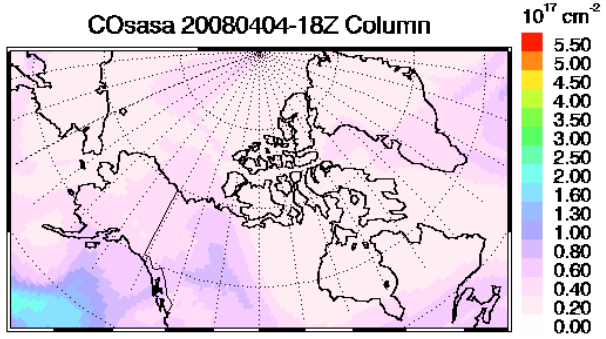
MOZART Forecast from 20080401

N.America Anthro



MOZART Forecast from 20080401

N.Asia Anthro



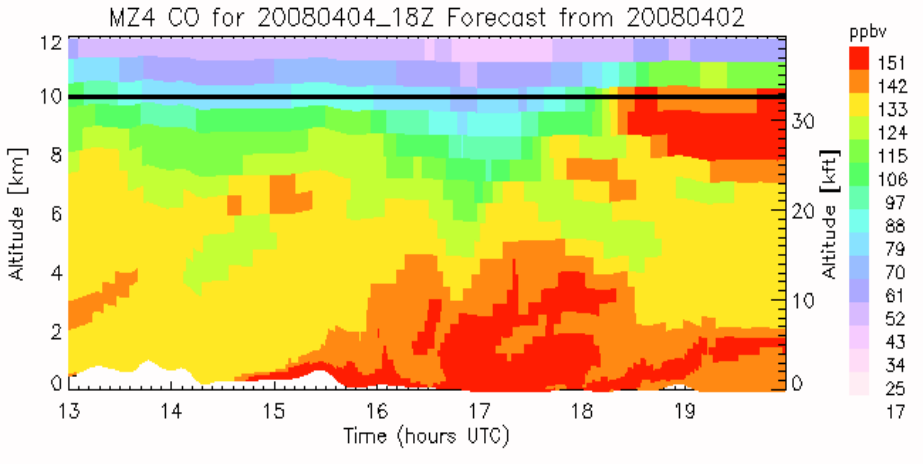
MOZART Forecast from 20080401

S.Asia Anthro

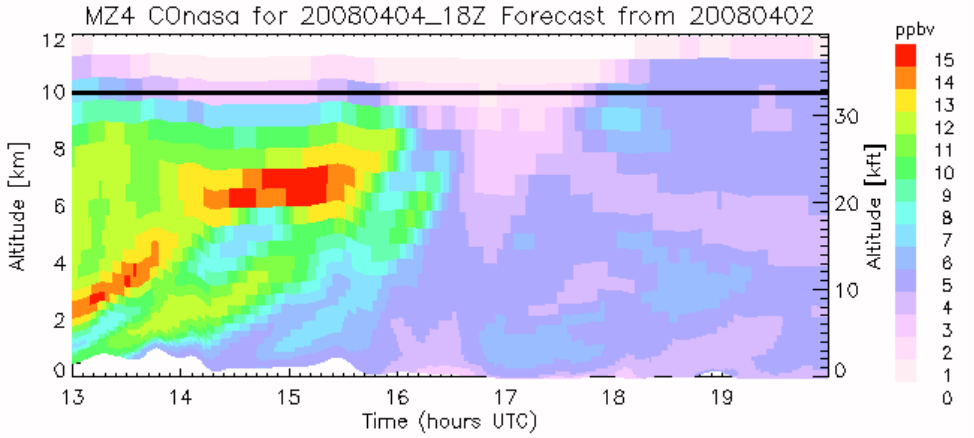
Apr 4 Fairbanks - Thule

MZ4 forecast from Apr 2 for Apr 4 18Z

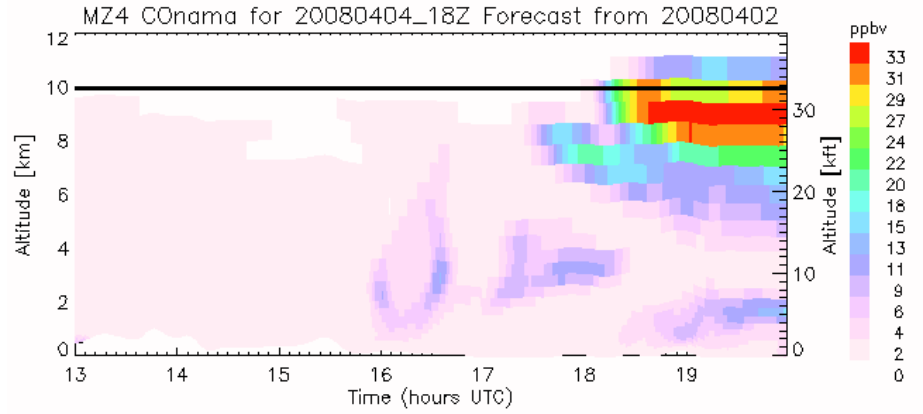
Asian Pollution at beginning of track,
N-American at higher altitudes towards Thule
European Pollution mixed throughout trop



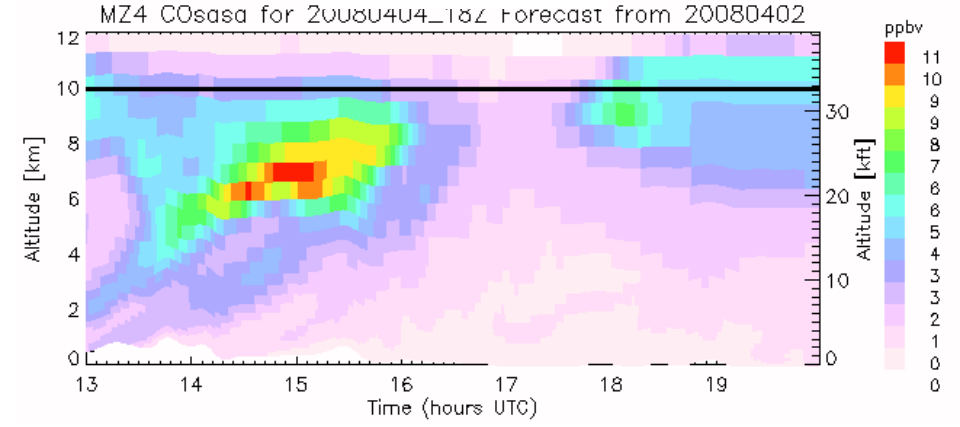
N.Asia Anthro



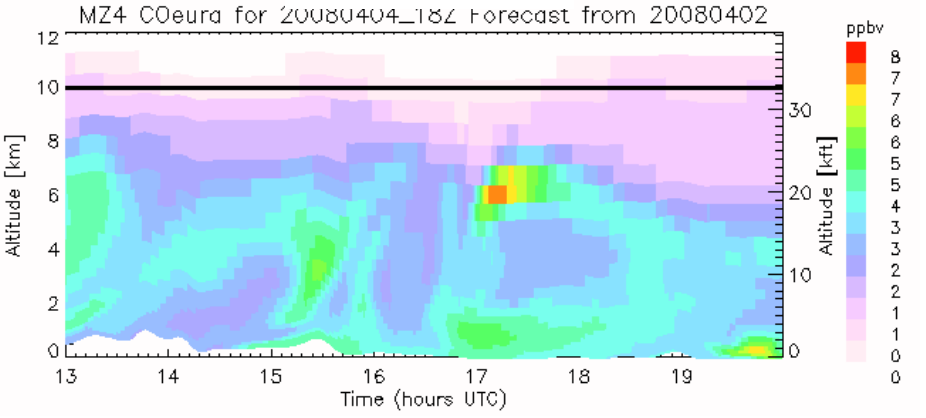
N.America Anthro



S.Asia Anthro



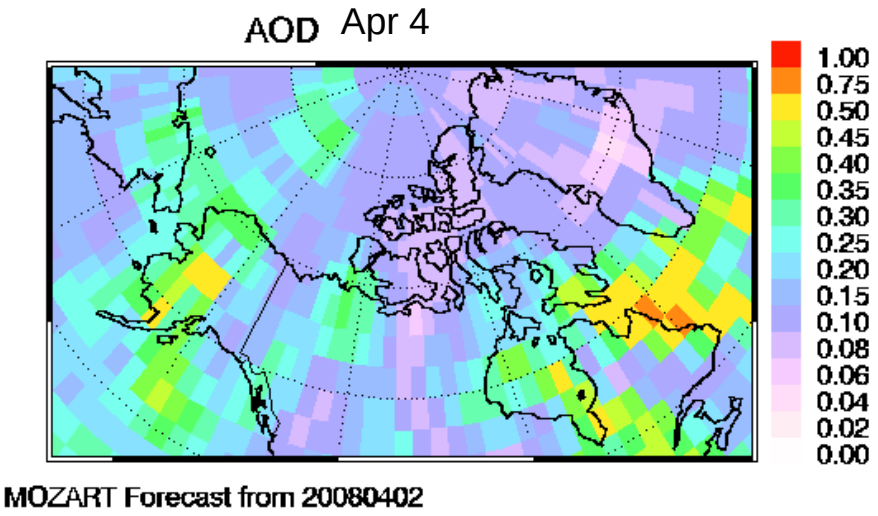
Europe Anthro

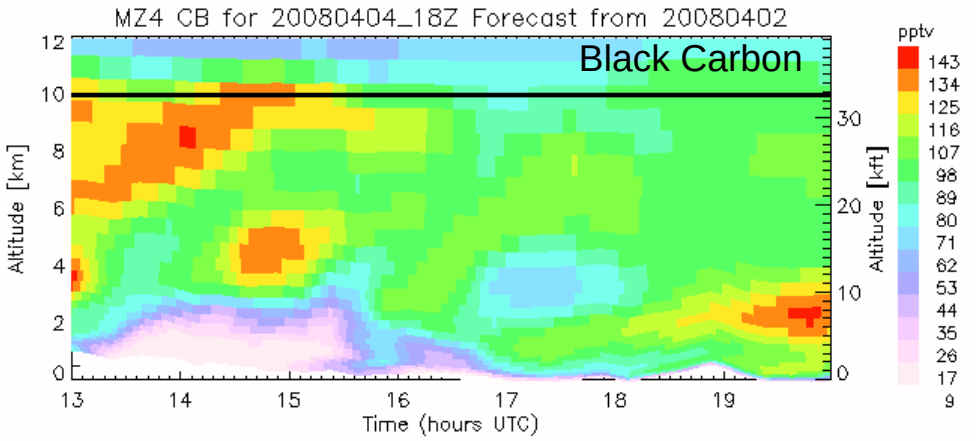


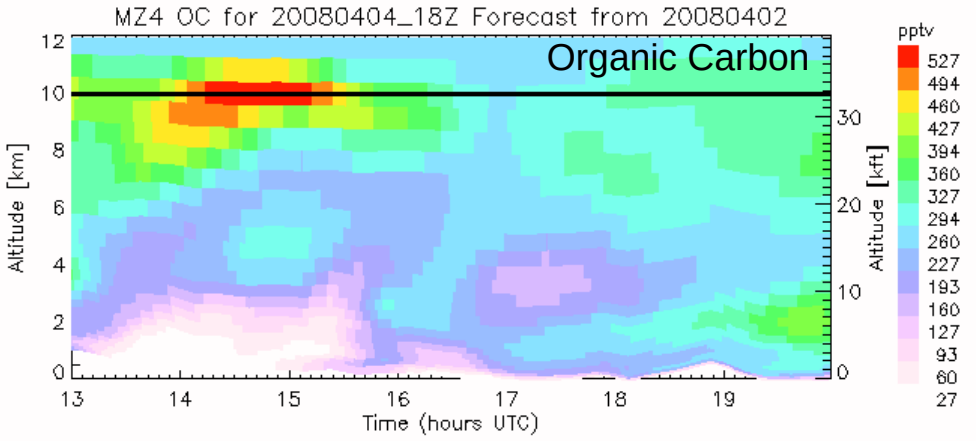
Apr 4 Fairbanks - Thule
MOZART-4 for Apr 4 18Z

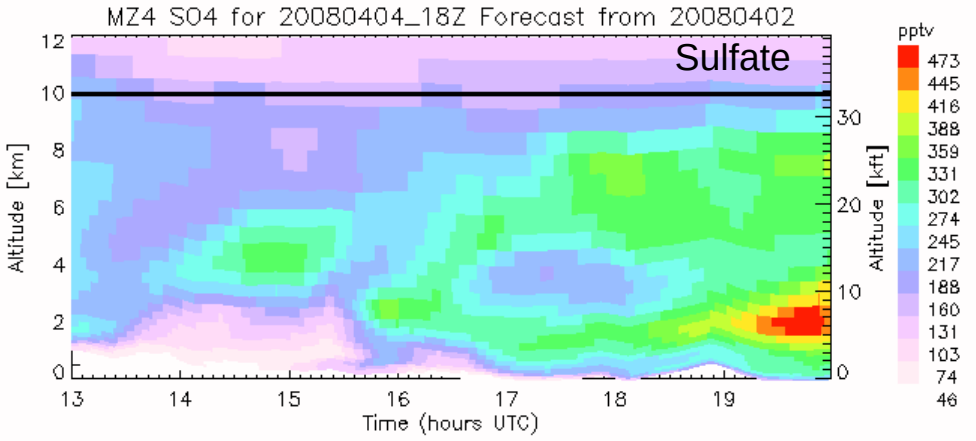
Aerosols from full chemistry, coarser resolution forecasts

Elevated OC at 10km – from fires?
High aerosols at low alt near Thule







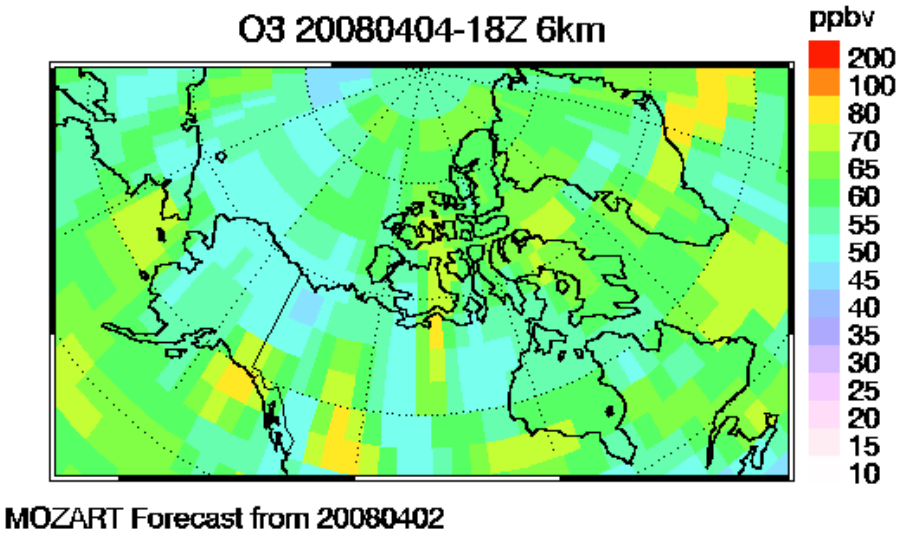


Apr 4 Fairbanks - Thule

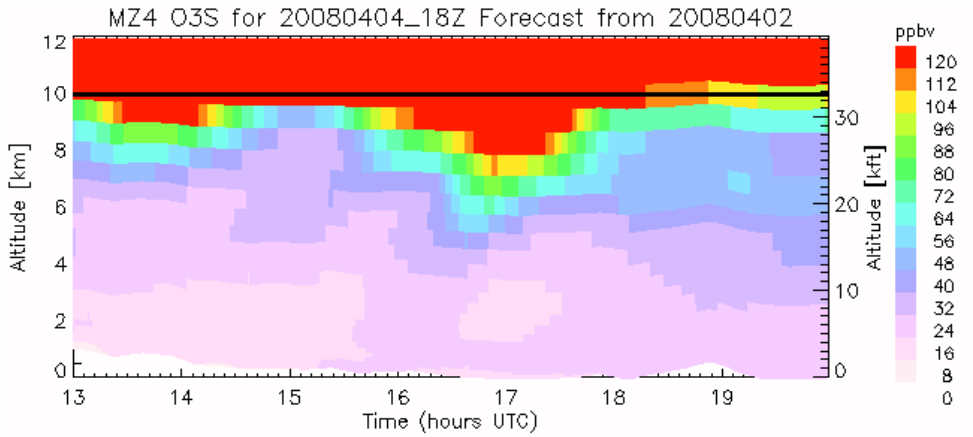
MZ4 forecast from Apr 2 for Apr 4 18Z

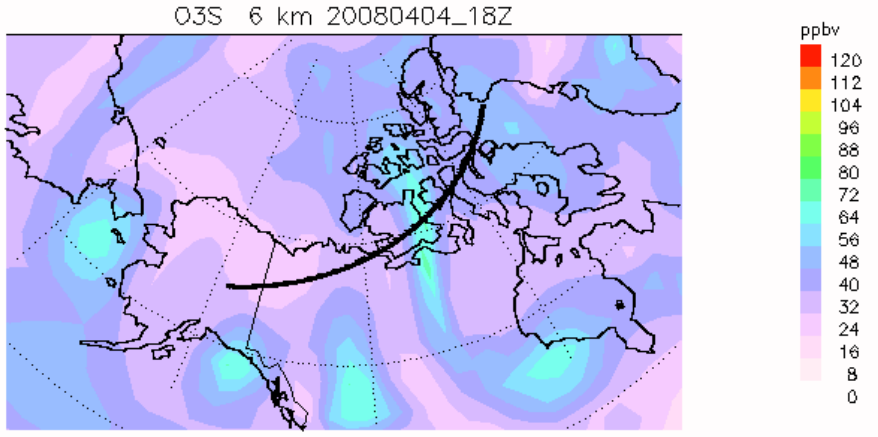
Also expect stratospheric influence

Ozone at 6km



Fairbanks to Thule



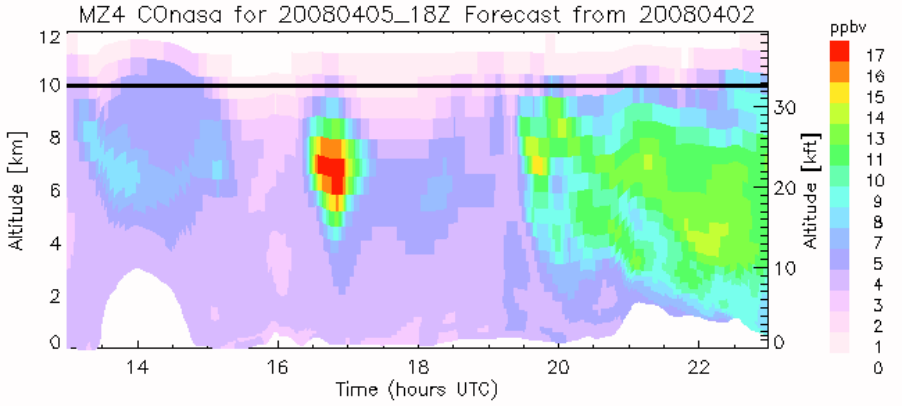


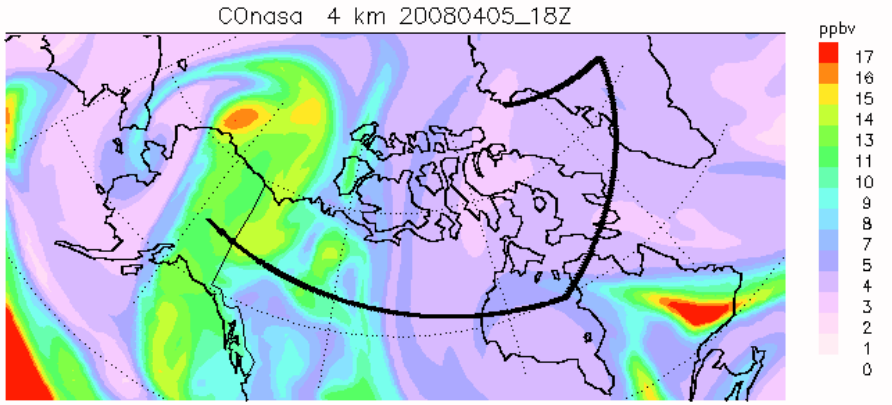
Apr 5 Thule - Fairbanks

MZ4 and CAM forecasts from Apr 2 (1) for Apr 4 18Z

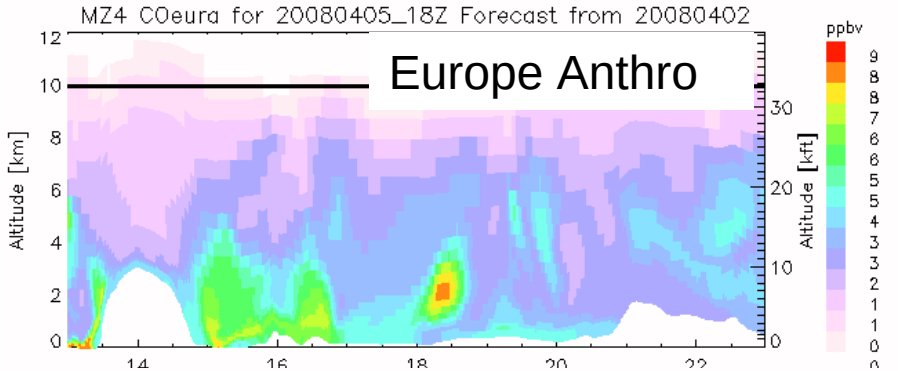
MOZART CO Col.

N. Asia Anthro

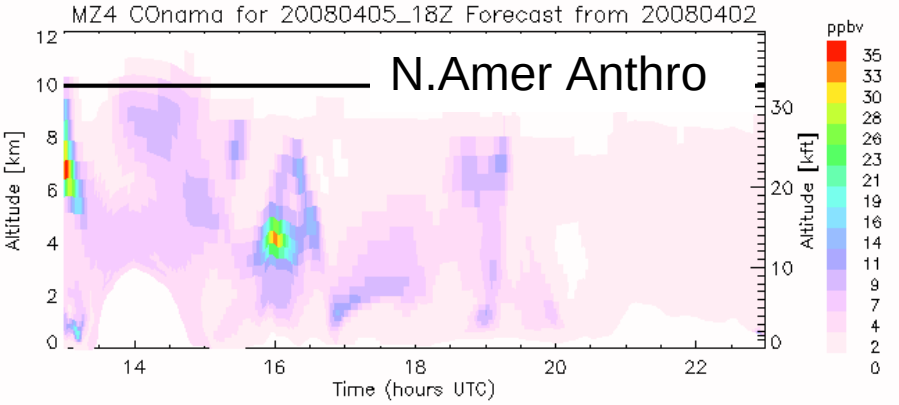




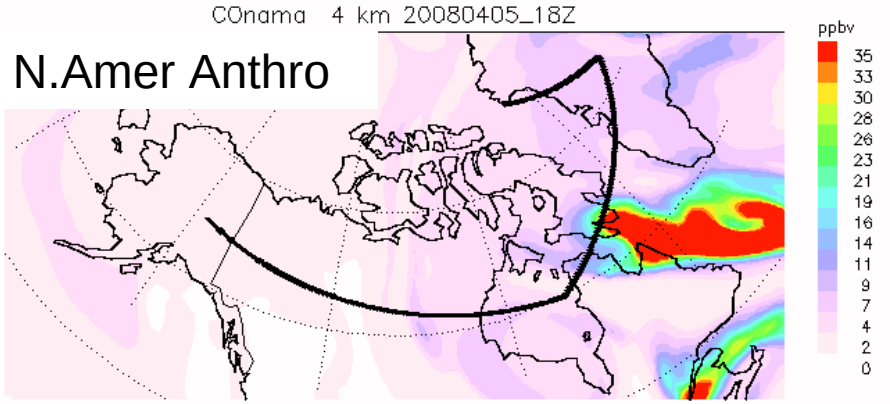
Europe Anthro



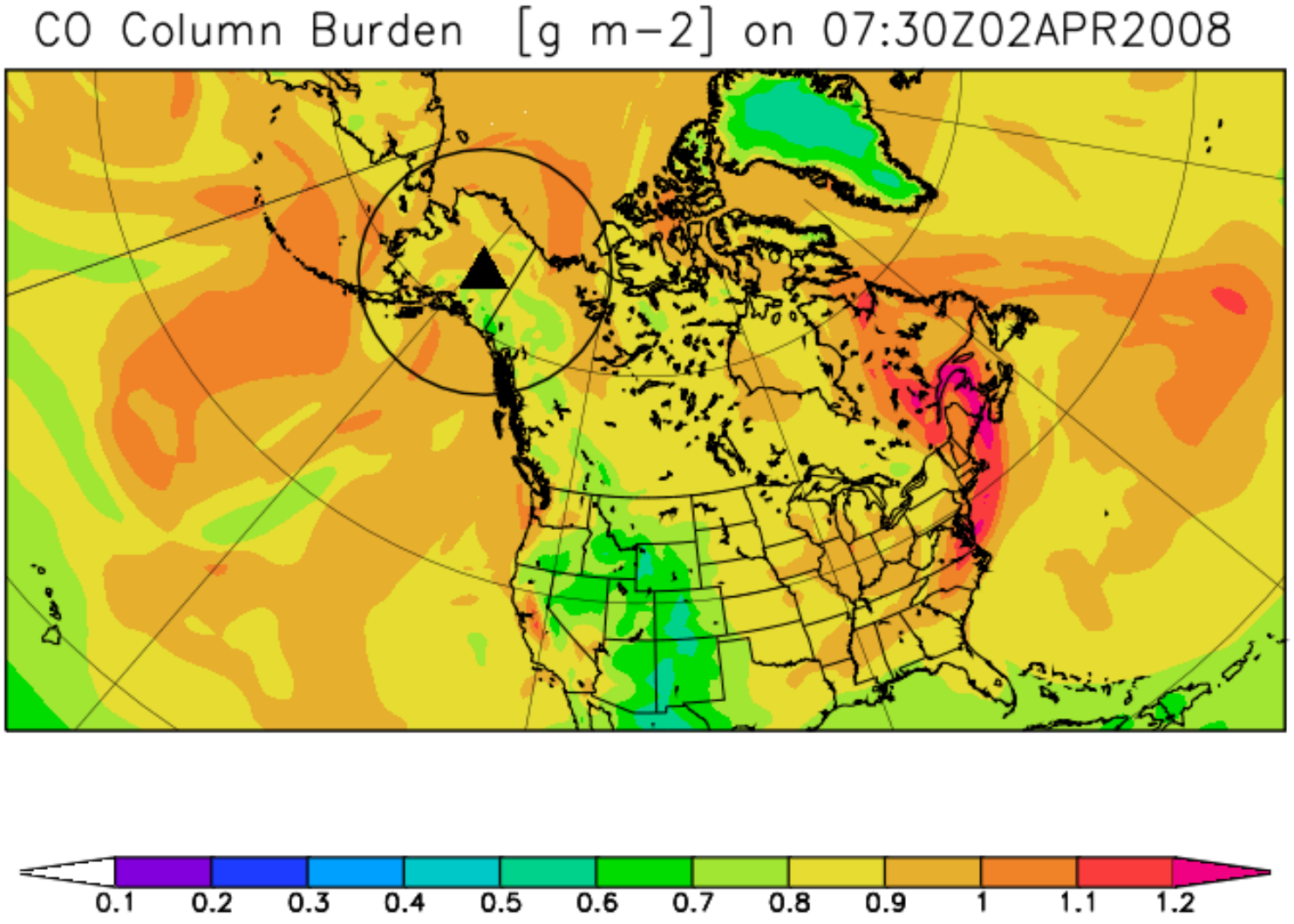
N.Amer Anthro



N.Amer Anthro

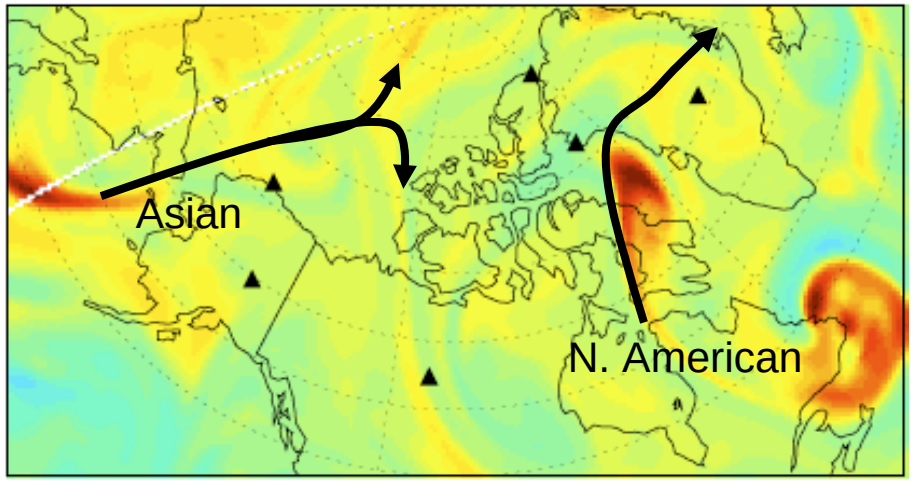


GMAO 04/02 06Z Fx CO evolution: Apr 2 – Apr 7

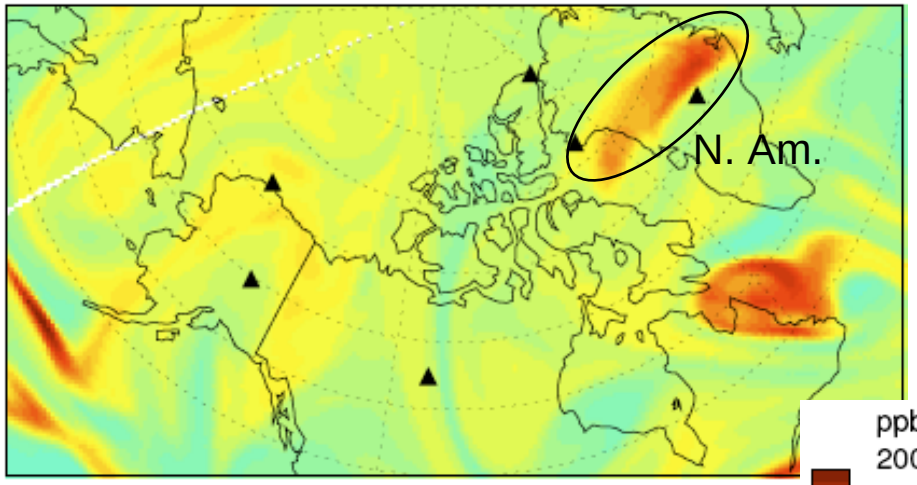


GEOS Total CO 500 hPa

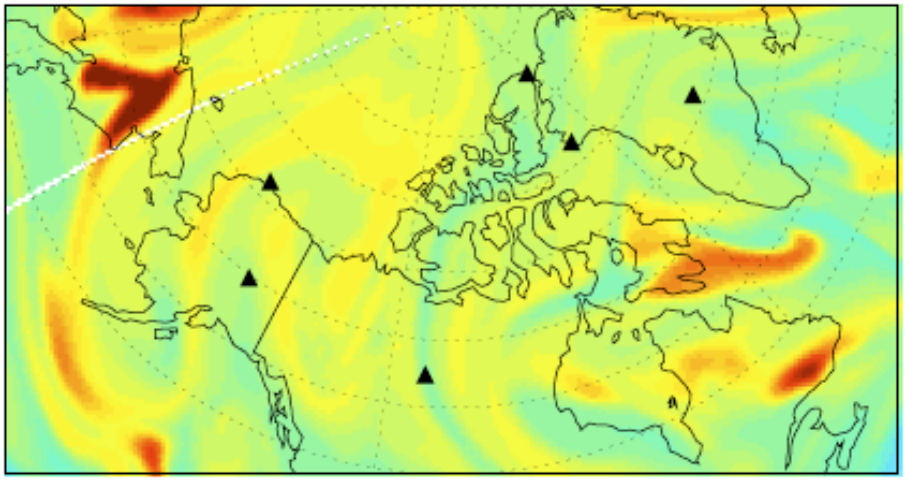
4/3



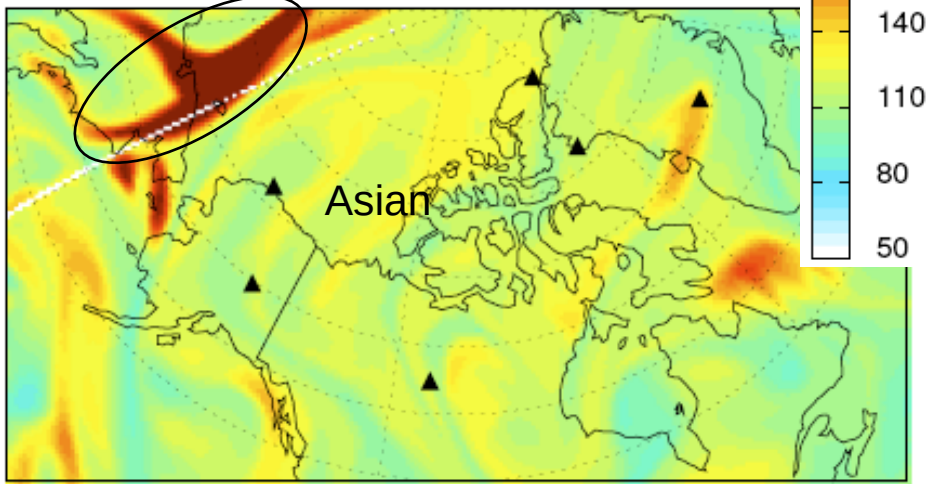
4/4 DC-8 Flight Opportunity

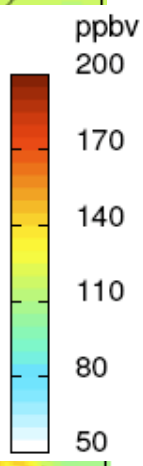


4/5 DC-8 Flight Opportunity



4/6

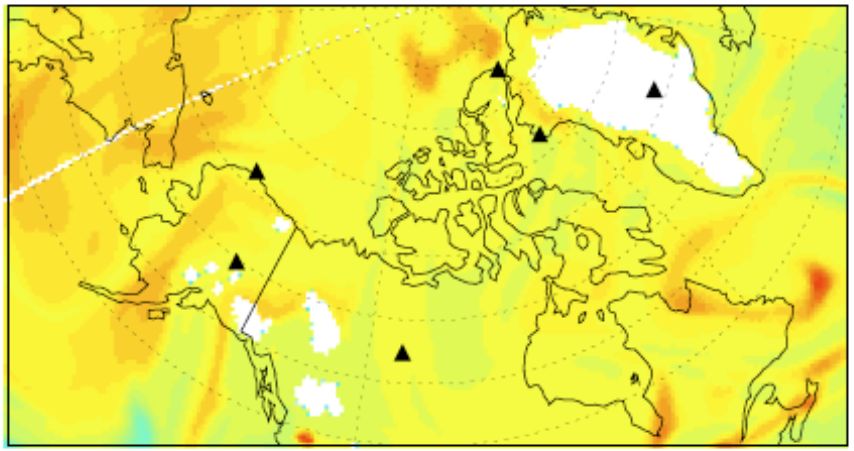




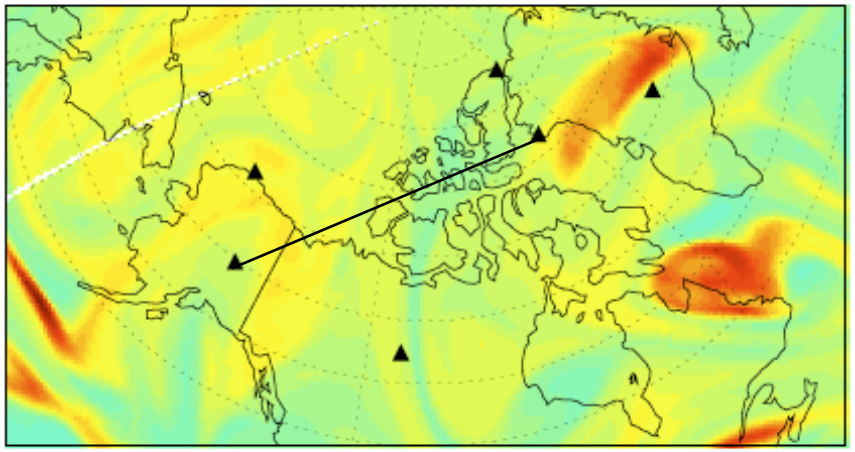
Initialized 04/02/2008 – 00z

4/4 DC-8 Flight
Total CO

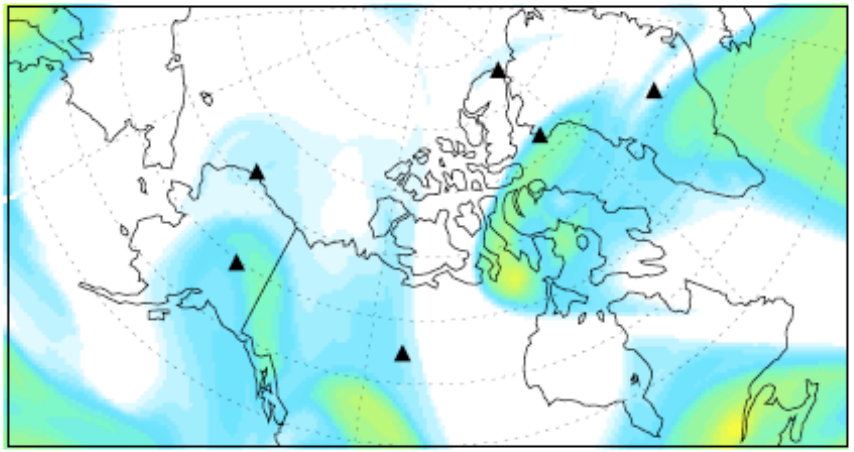
850 hPa (1.5 km)



500 hPa (5.6 km)

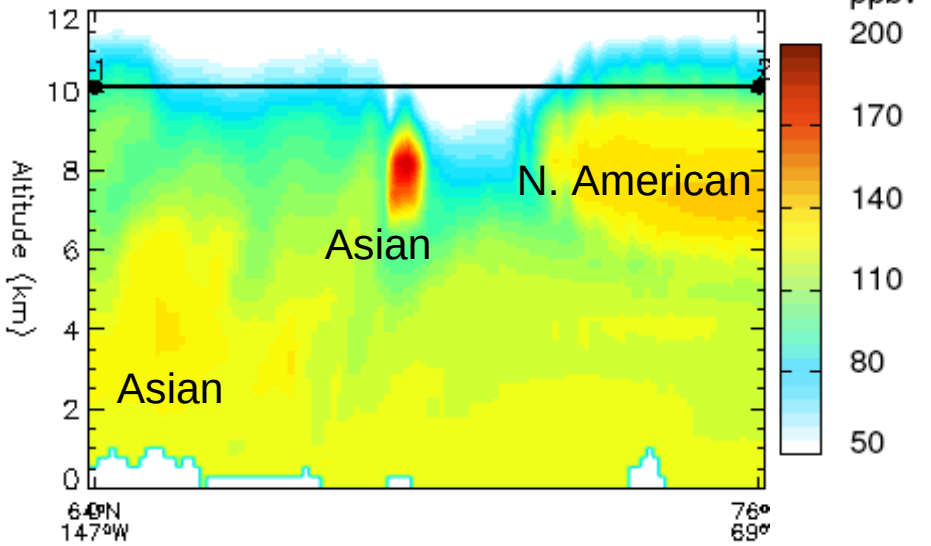


250 hPa (10.4 km)



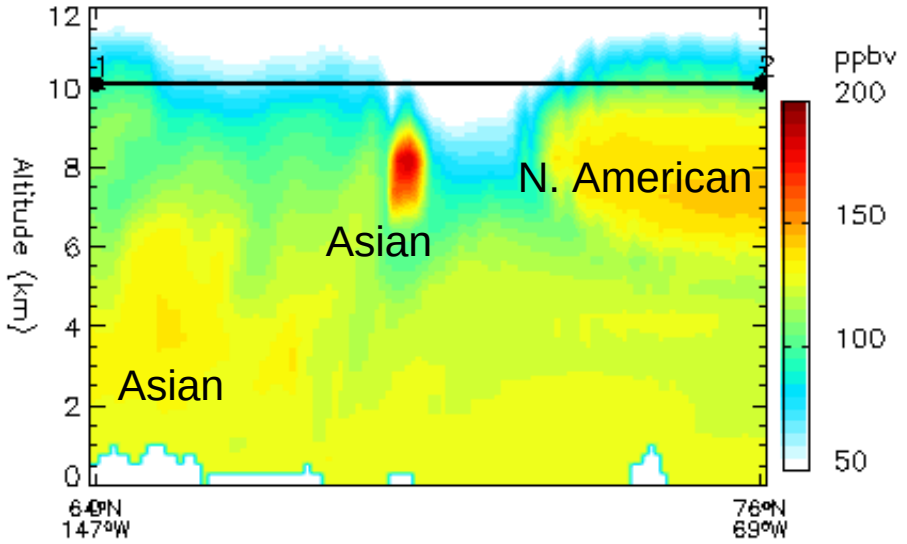
Initialized 04/02/2008 – 00z

Fairbanks → Thule

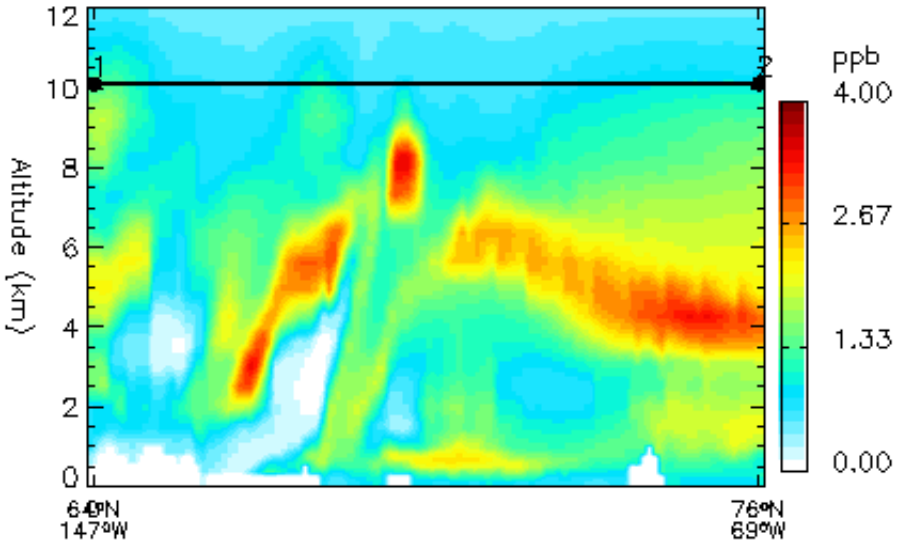


4/4 DC-8 Flight
Fairbanks → Thule Curtains

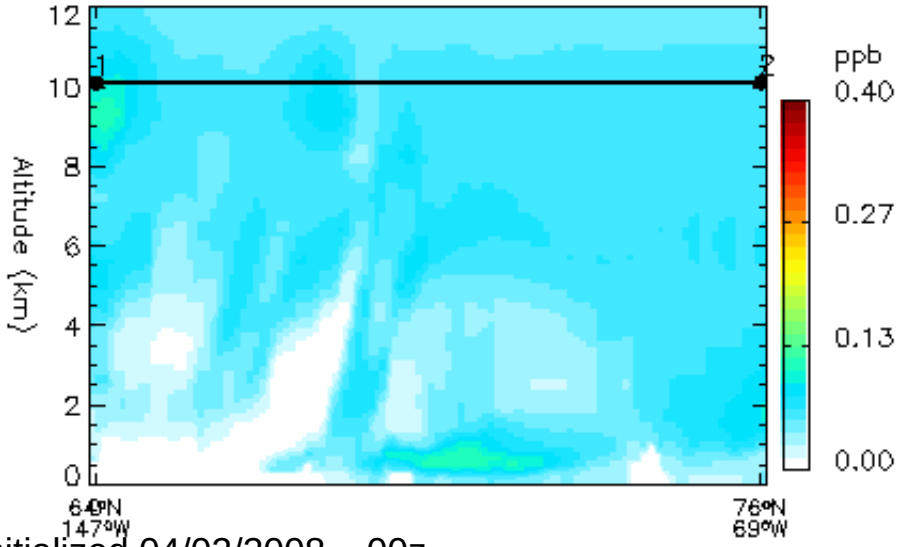
Total CO



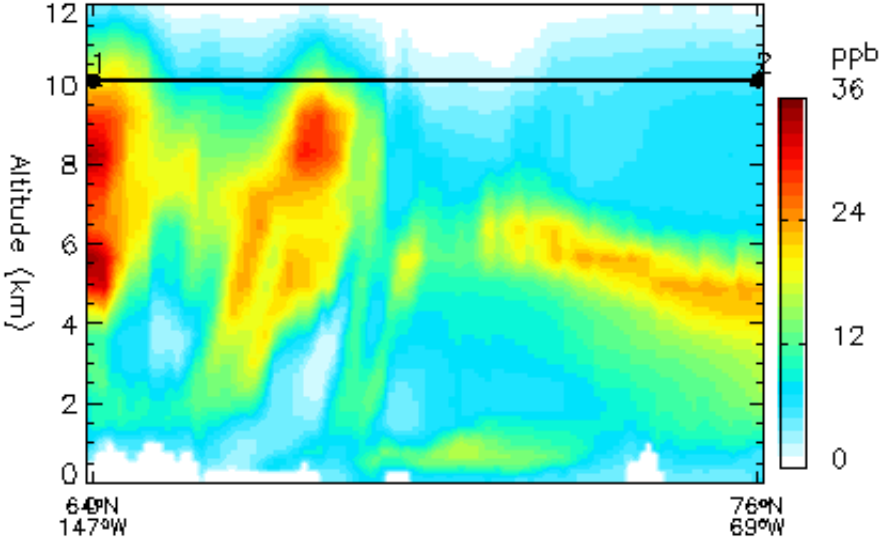
Sulfate



BC

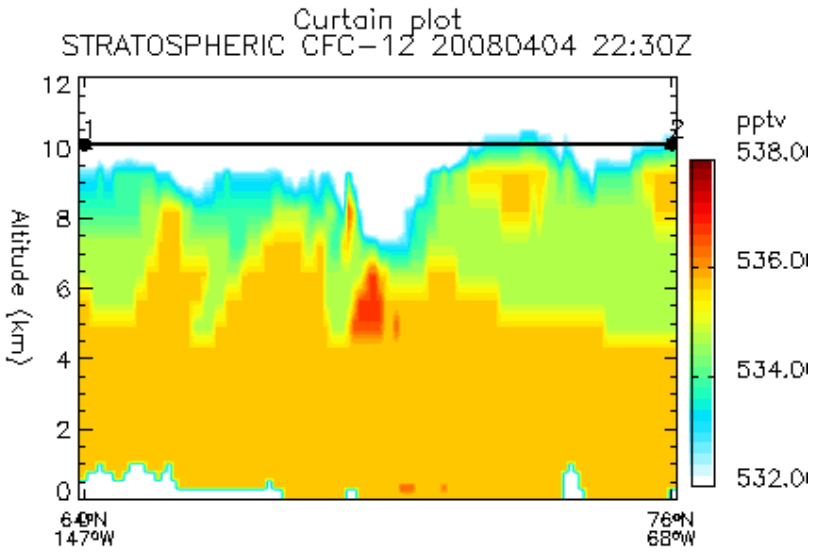


Dust

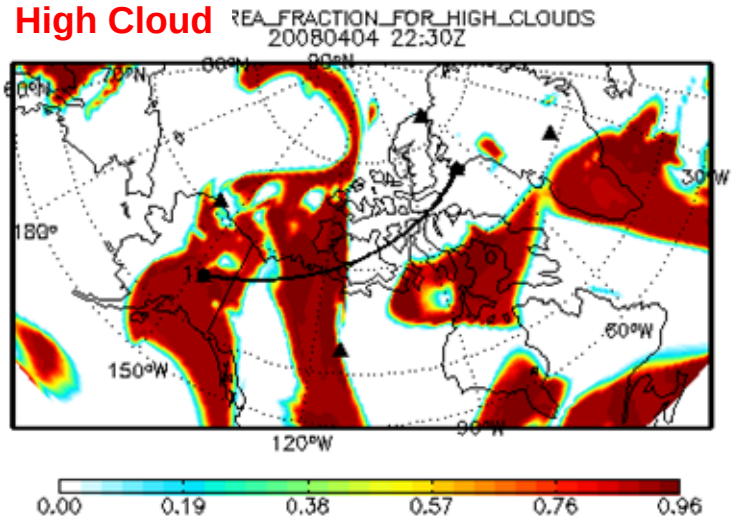


Initialized 04/02/2008 – 00z

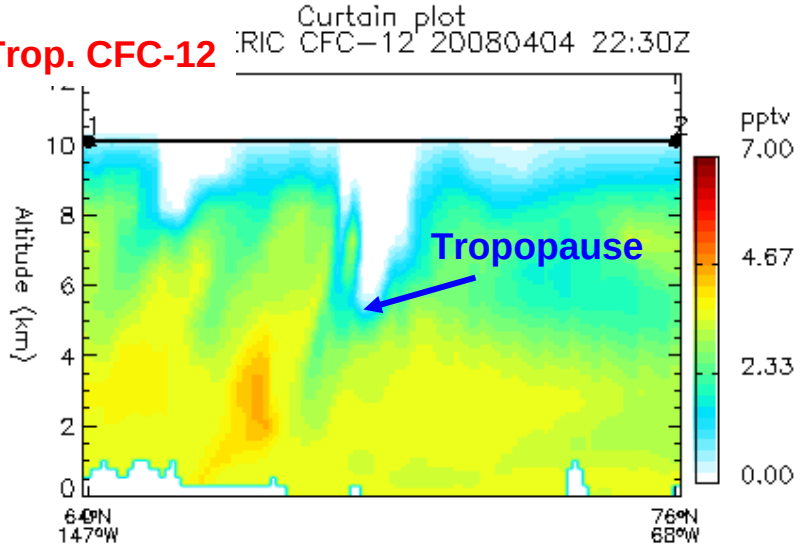
GMAO 04/02 06Z Fx - 04/04 500 mb



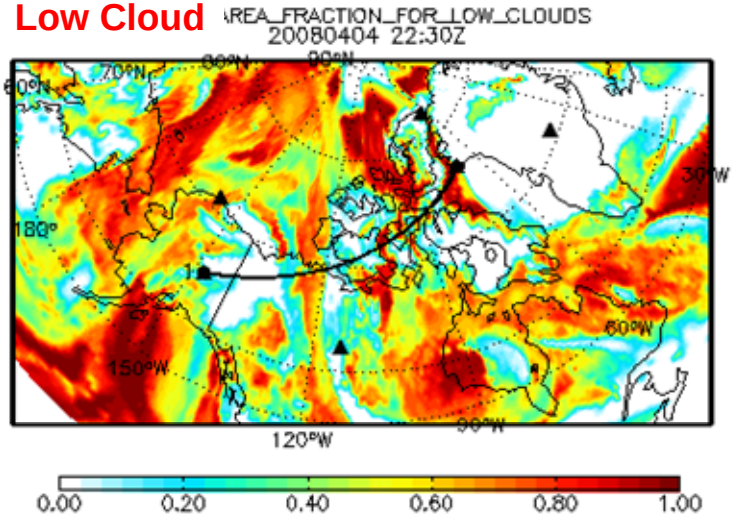
High Cloud



Trop. CFC-12

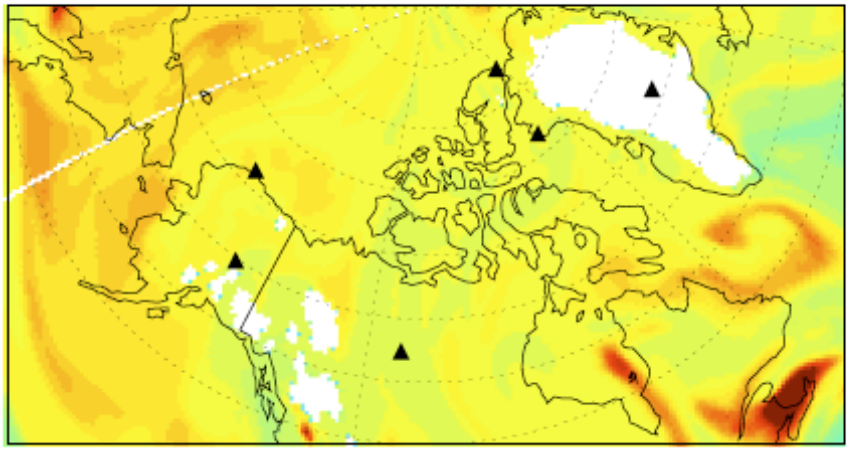


Low Cloud

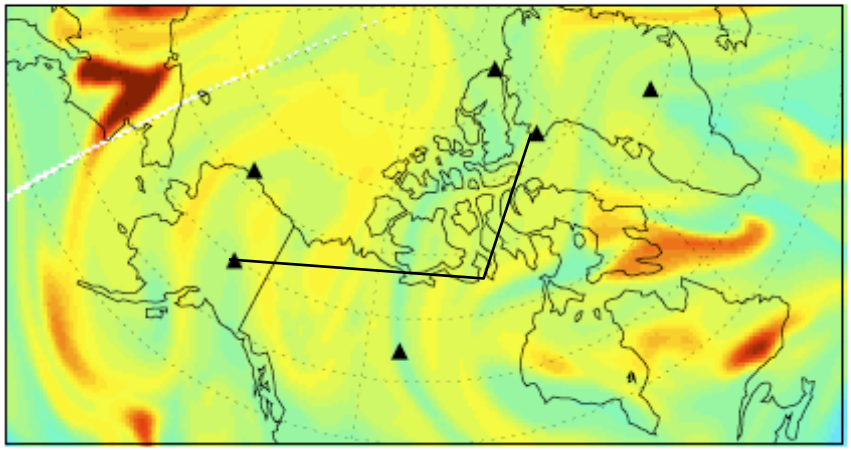


4/5 DC-8 Flight
Total CO

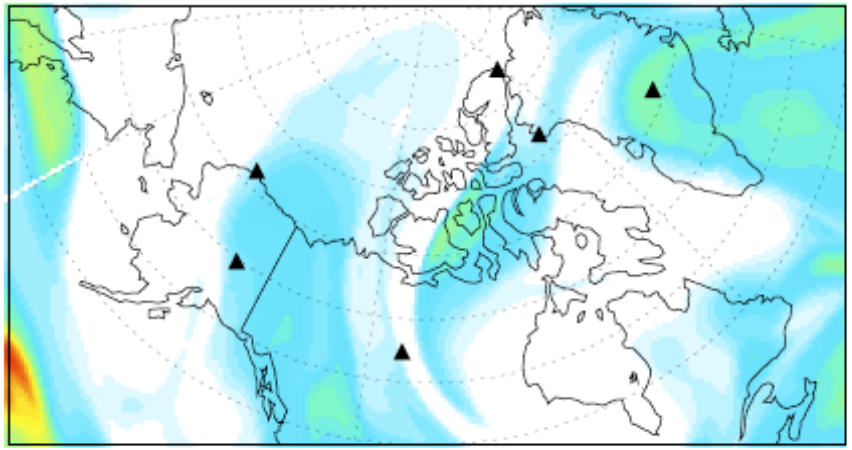
850 hPa (1.5 km)



500 hPa (5.6 km)

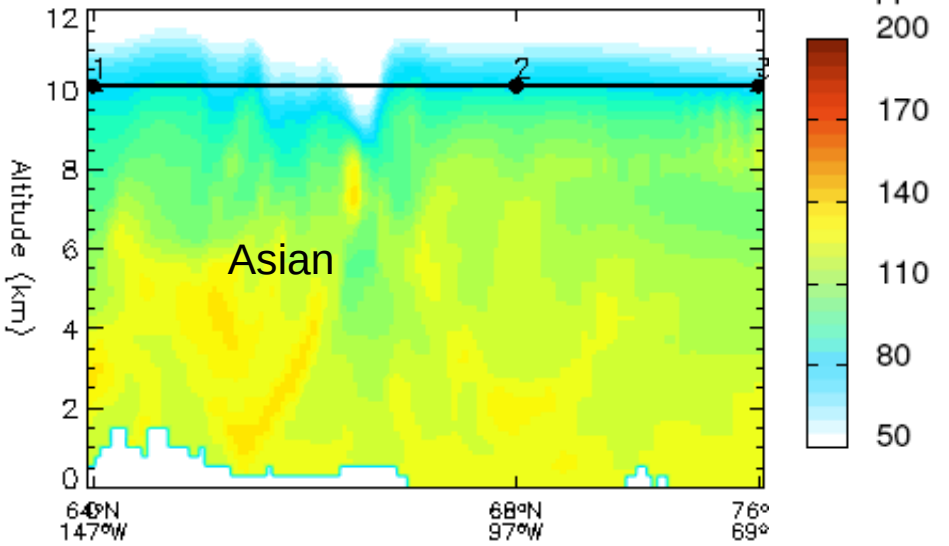


250 hPa (10.4 km)



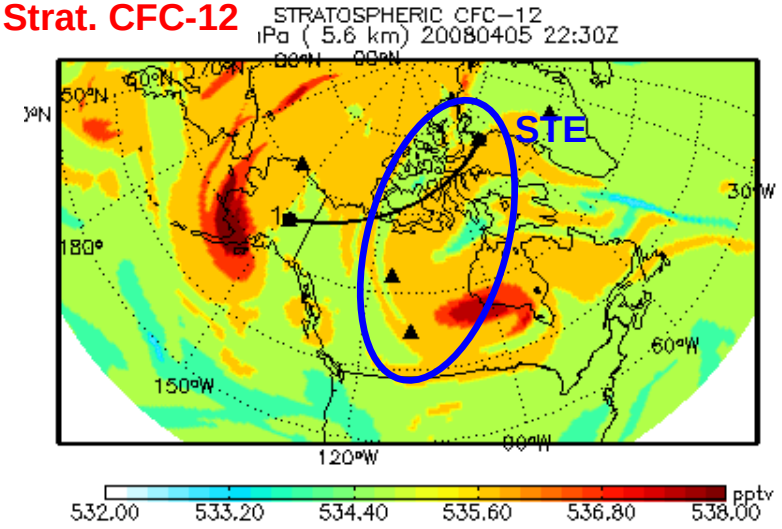
Initialized 04/02/2008 – 00z

Fairbanks ← Thule

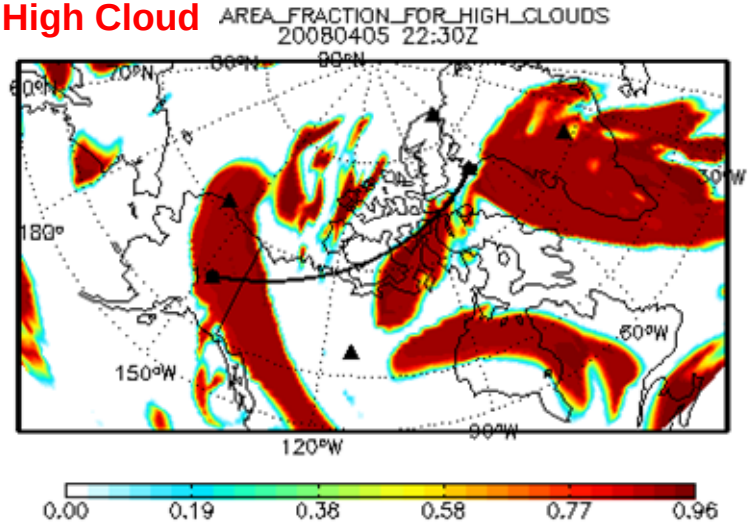


GMAO 04/02 06Z Fx - 04/05 500 mb

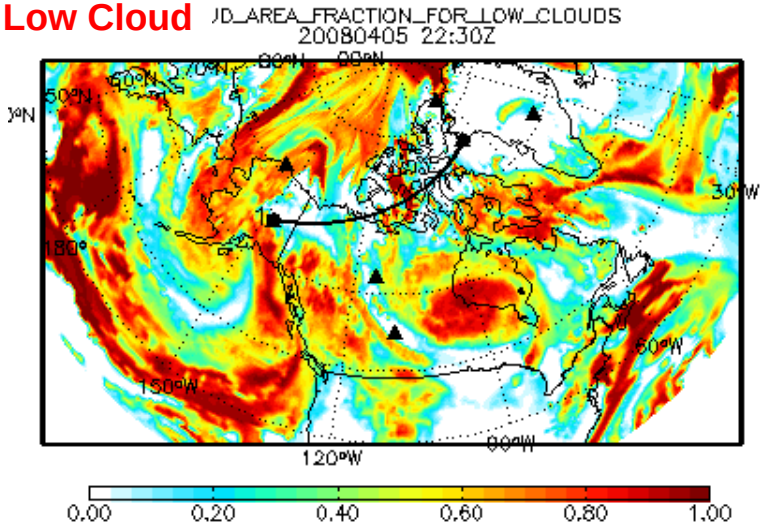
Strat. CFC-12



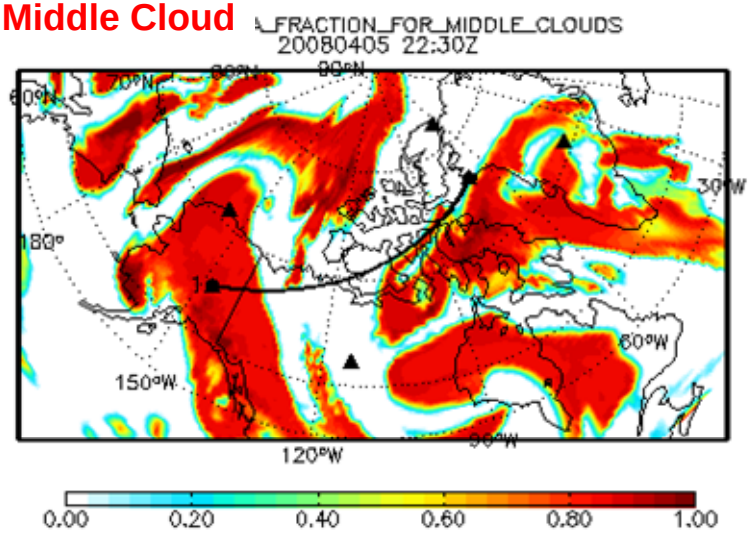
High Cloud



Low Cloud

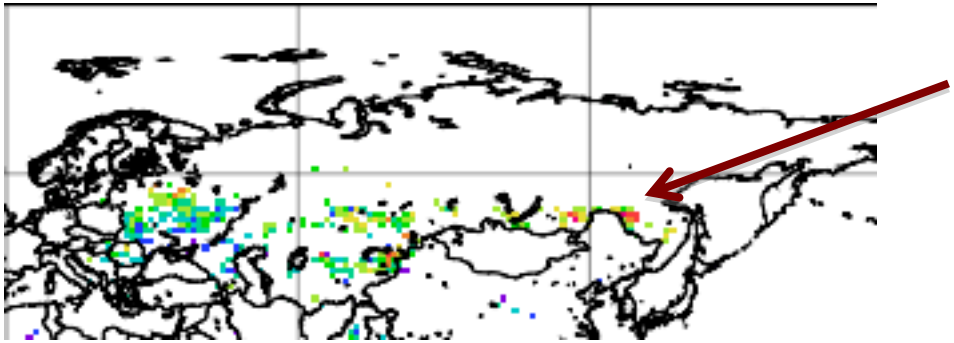


Middle Cloud

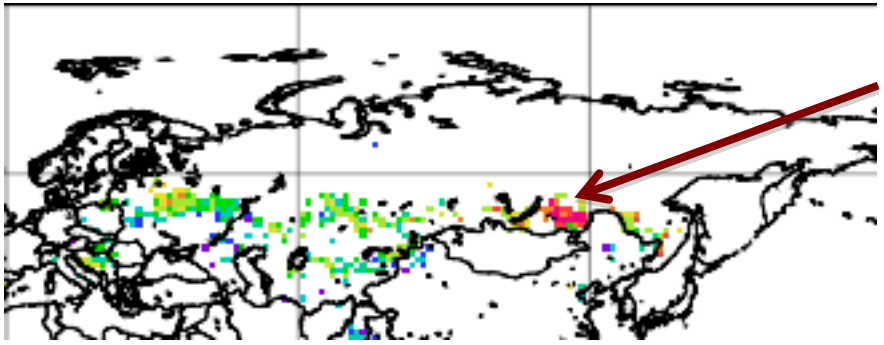


Recent fires detected by MODIS/Terra/Aqua in southern Siberia

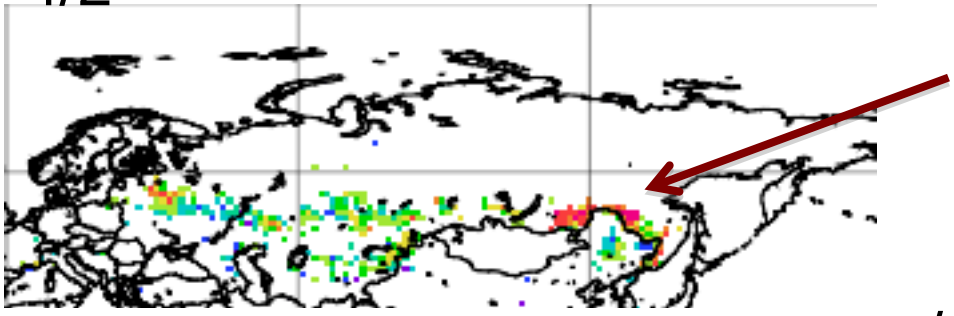
3/30

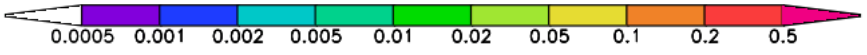


3/31



4/2

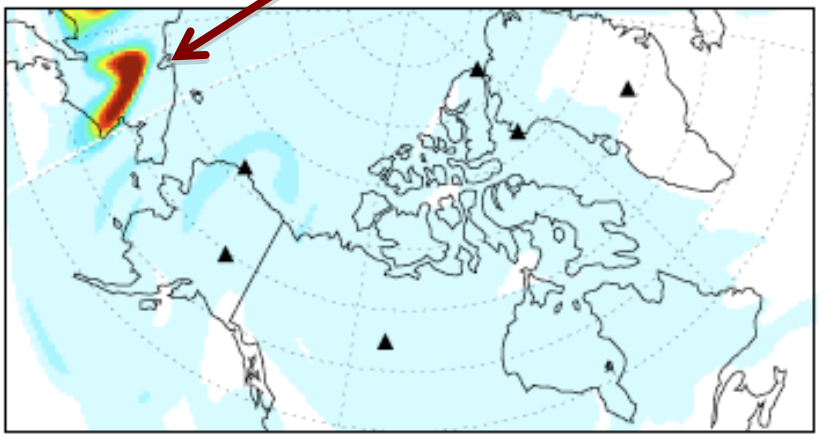




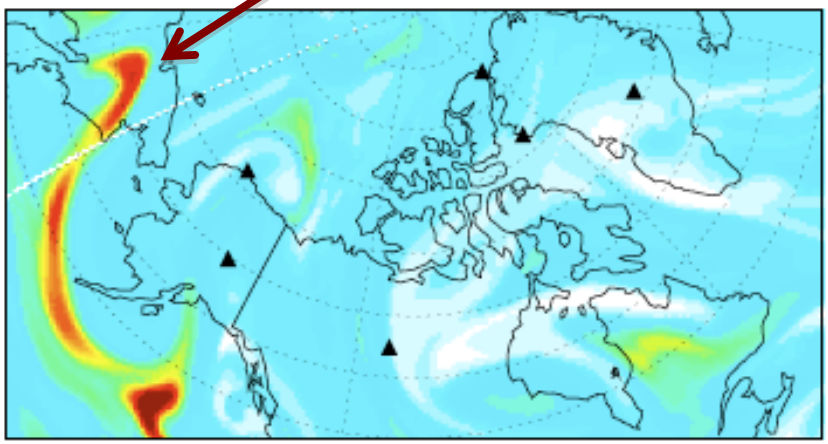
$g/m^2/day$

Fires on Mar 31 – Apr 2 associated with collocated biomass burning CO and black carbon on Apr 5-6

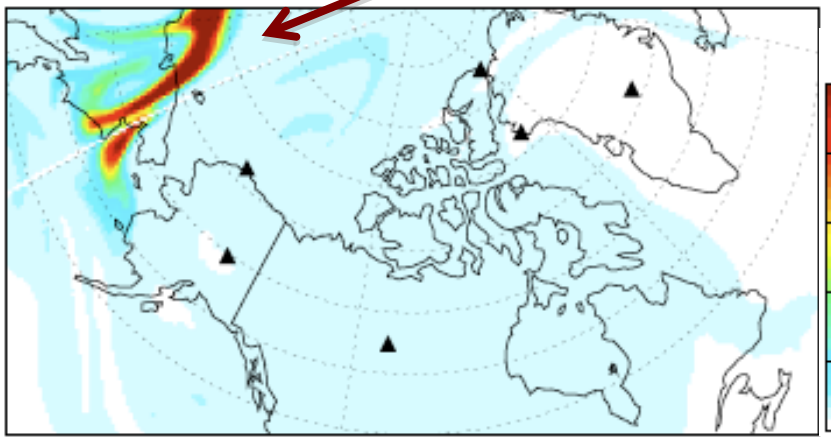
4/5



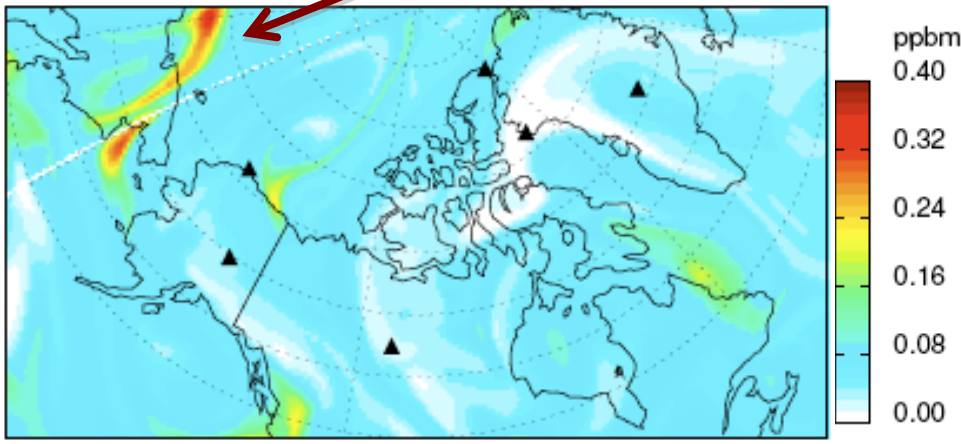
4/5 All at 500 hPa



4/6



4/6

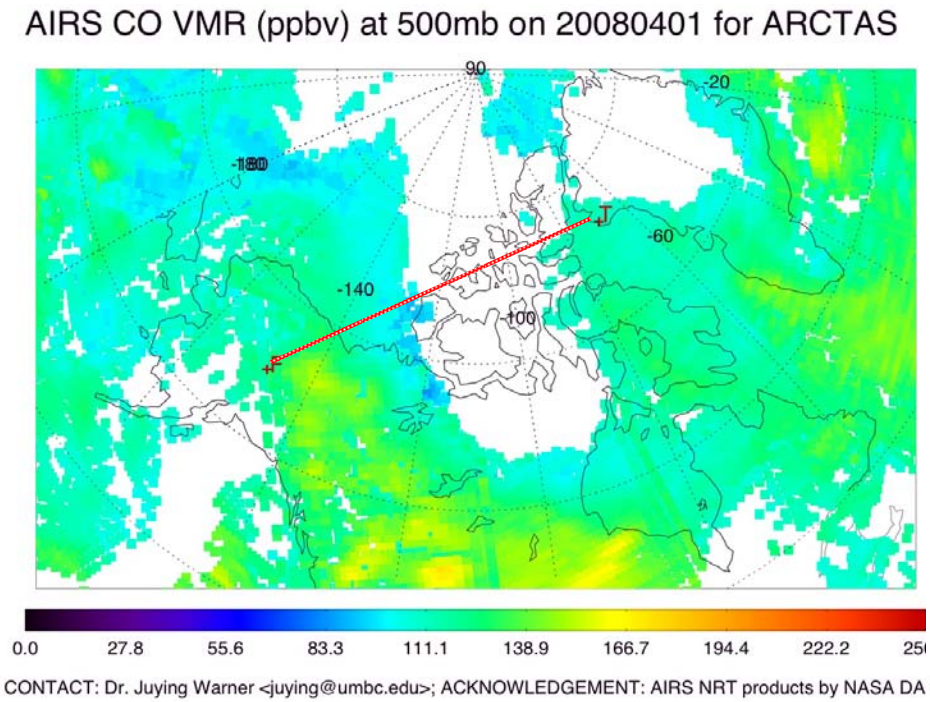


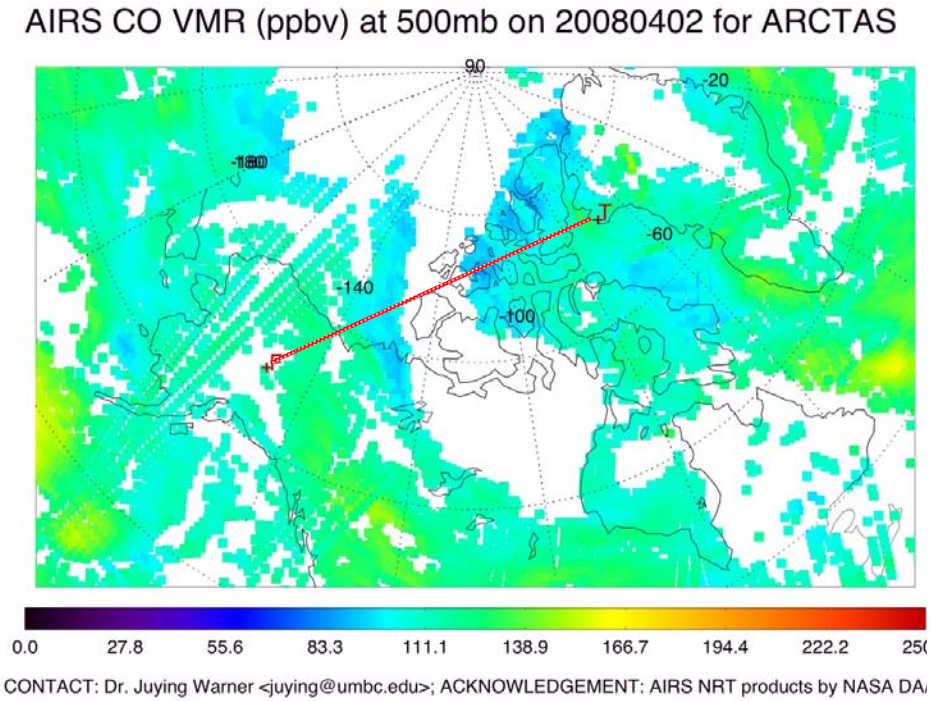
Uncertain future trajectory – possibility for future flight after 4/5

Initialized 04/02/2008 – 06z

AIRS NRT ARCTAS Support:

CO Fairbanks - Thule



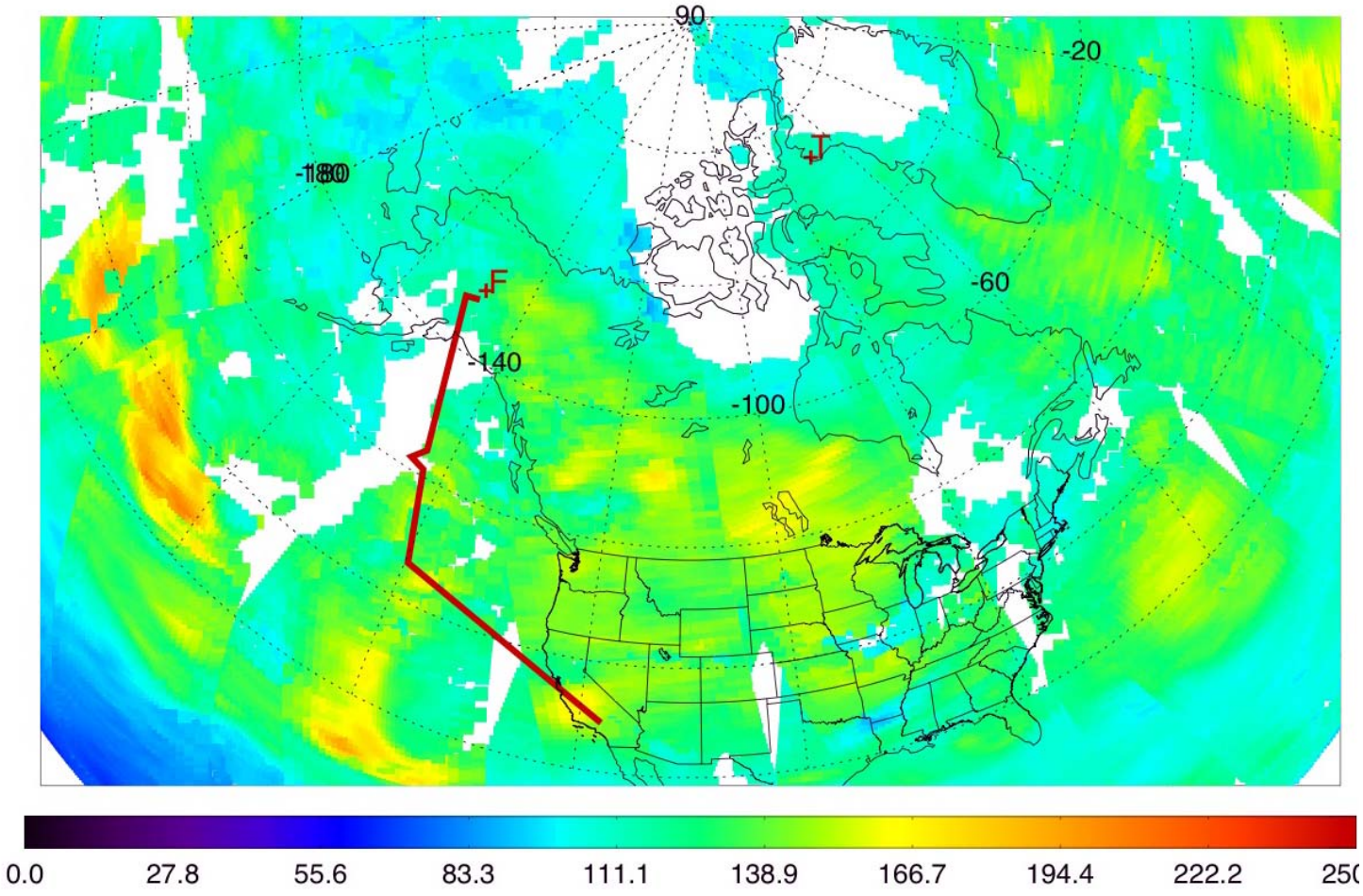


- AIRS CO on 20080401 (left) reflect daytime measurements, while 20080402 (right) reflect nighttime measurements between Fairbanks and Thule.
- Data missing due to clouds and surface complications.

AIRS NRT ARCTAS Support:

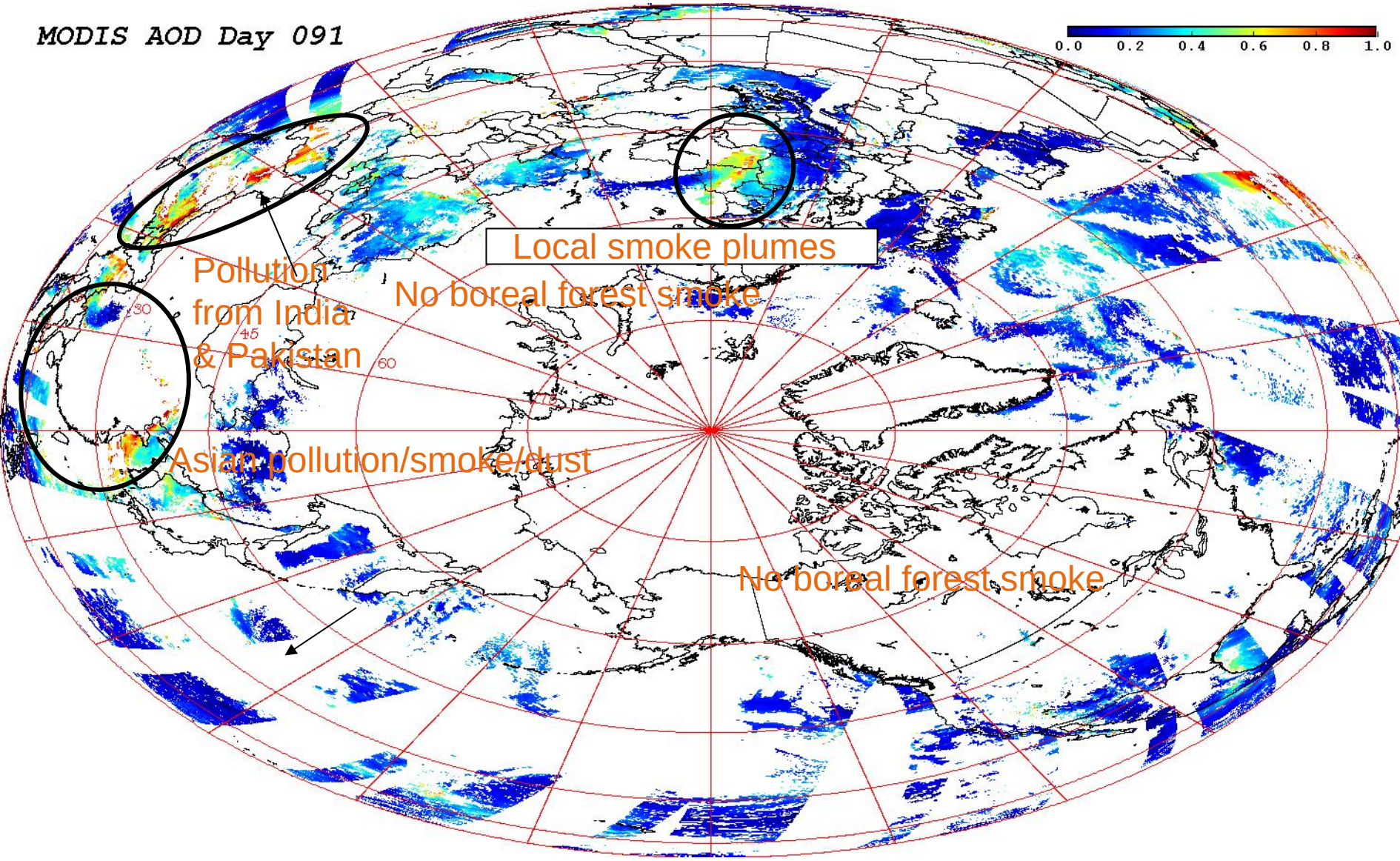
AIRS CO along DC-8 flight path April 1, 08

AIRS CO VMR (ppbv) at 500mb on 20080401 for ARCTAS

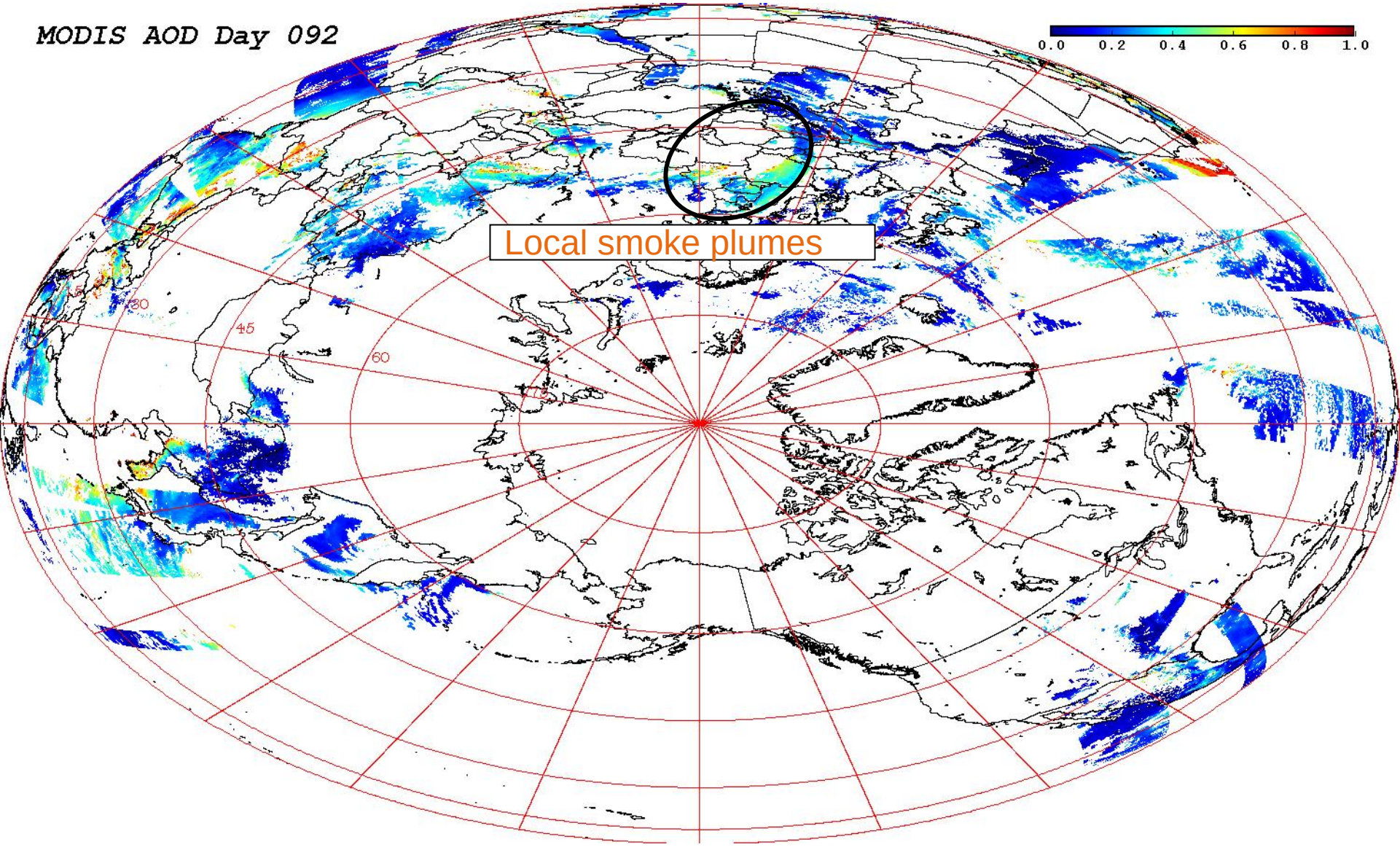


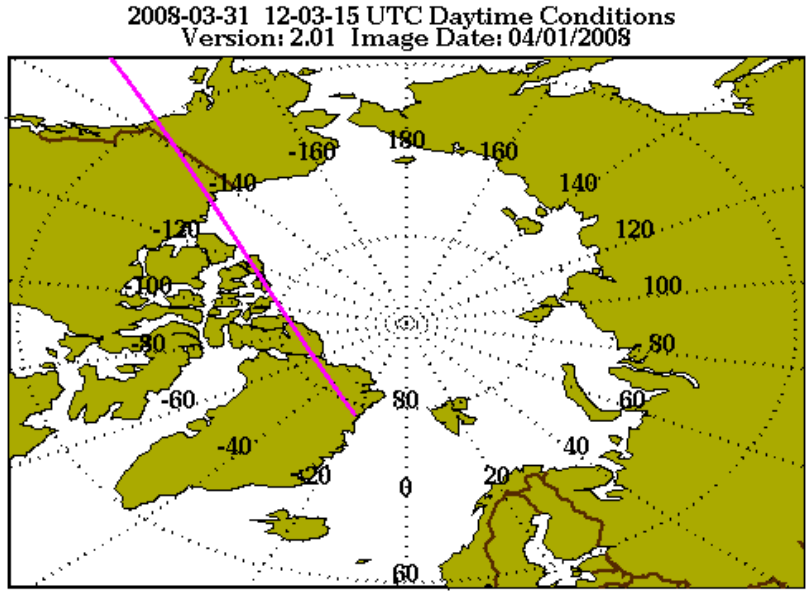
CONTACT: Dr. Juying Warner <juying@umbc.edu>; ACKNOWLEDGEMENT: AIRS NRT products by NASA DA

MODIS AOD Hot Spots in Northern Hemisphere (0° - 90° N)



MODIS AOD Hot Spots in Northern Hemisphere (0° - 90° N)



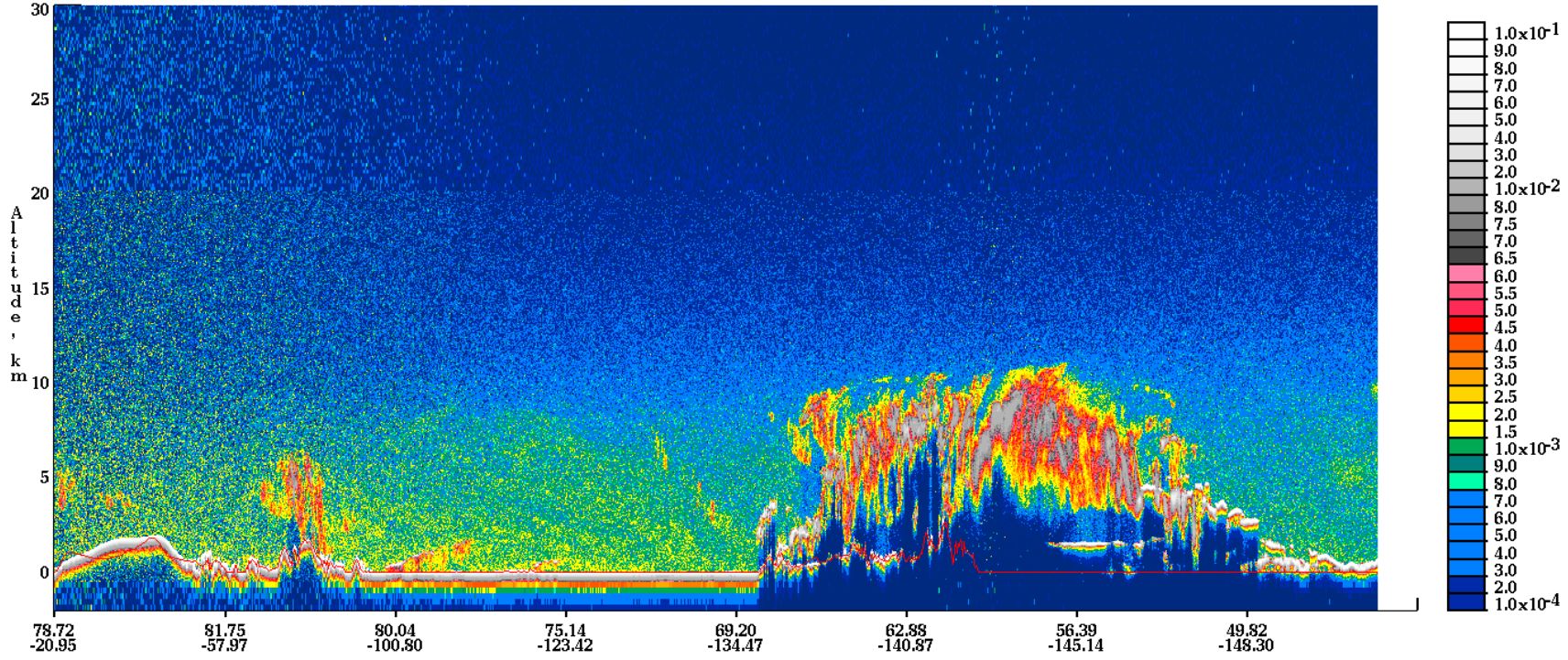


CALIPSO Browse Image

March 31, 2008

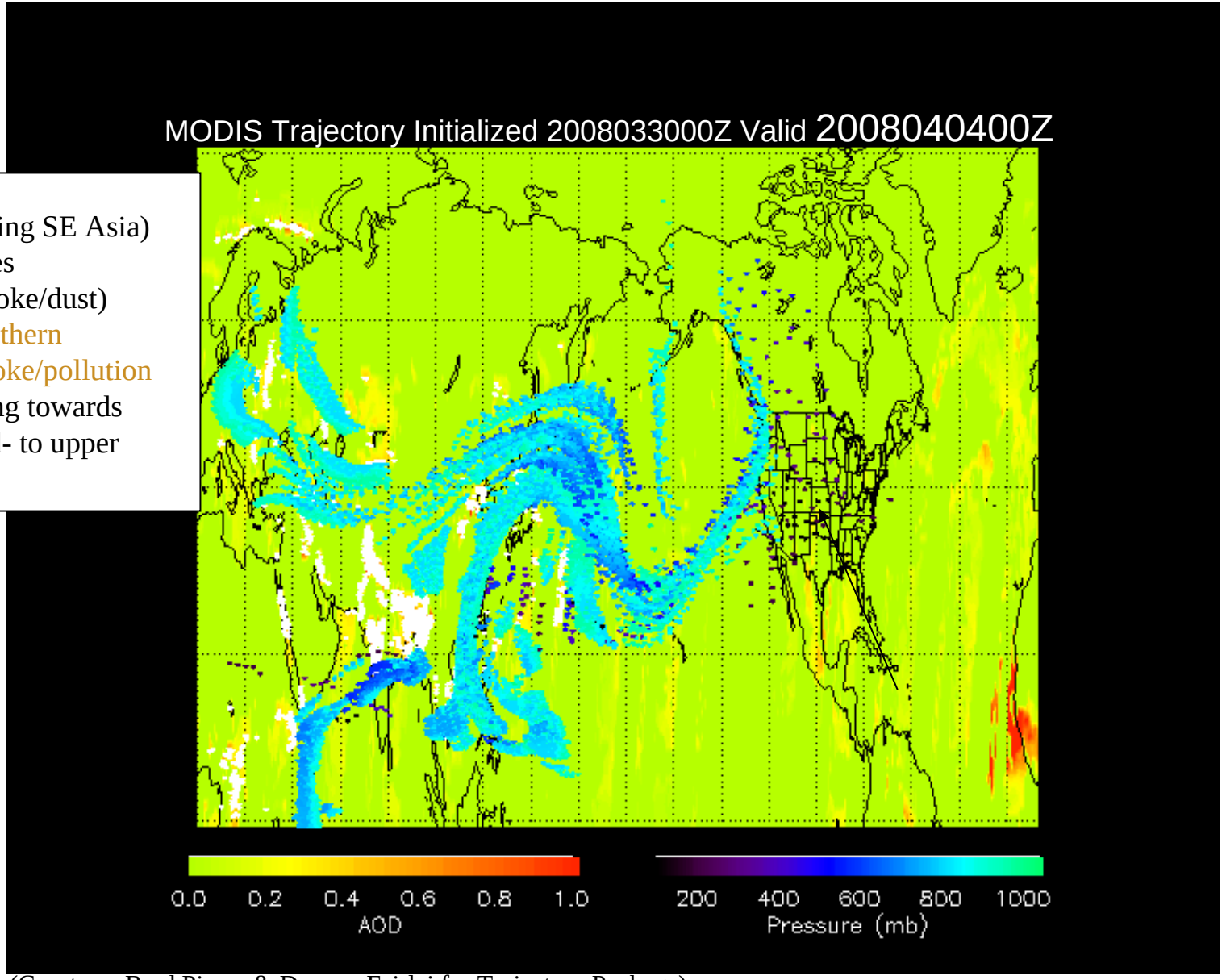
532 nm Total Attenuated Backscatter, /km /sr Begin UTC: 2008-03-31 12:03:23.2131 End UTC: 2008-03-31 12:17:49.9231

Version: 2.01 Image Date: 04/01/2008



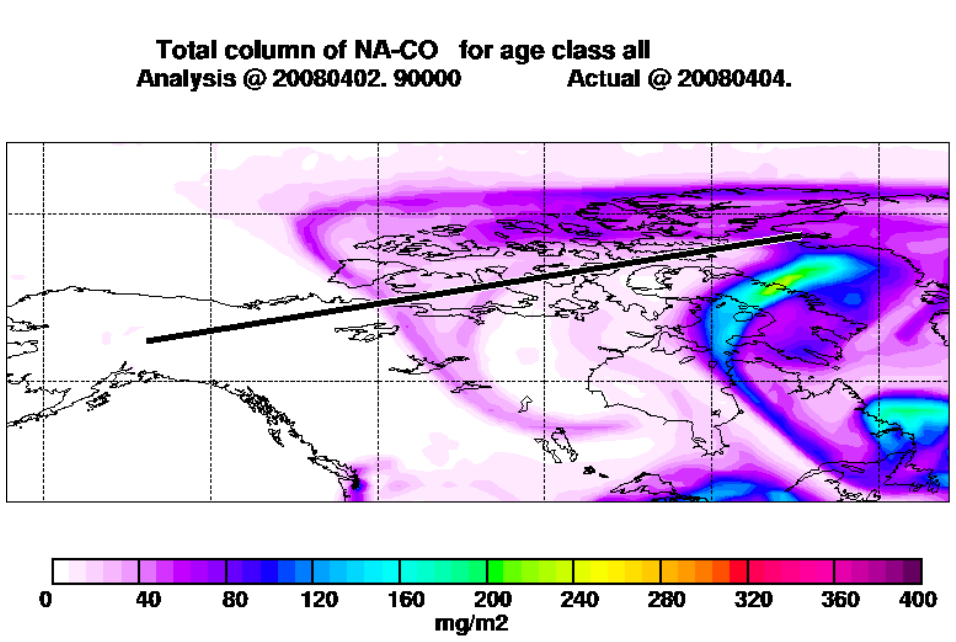
Aerosol Trajectory Based Upon MODIS AOD and GEOS-5 Winds

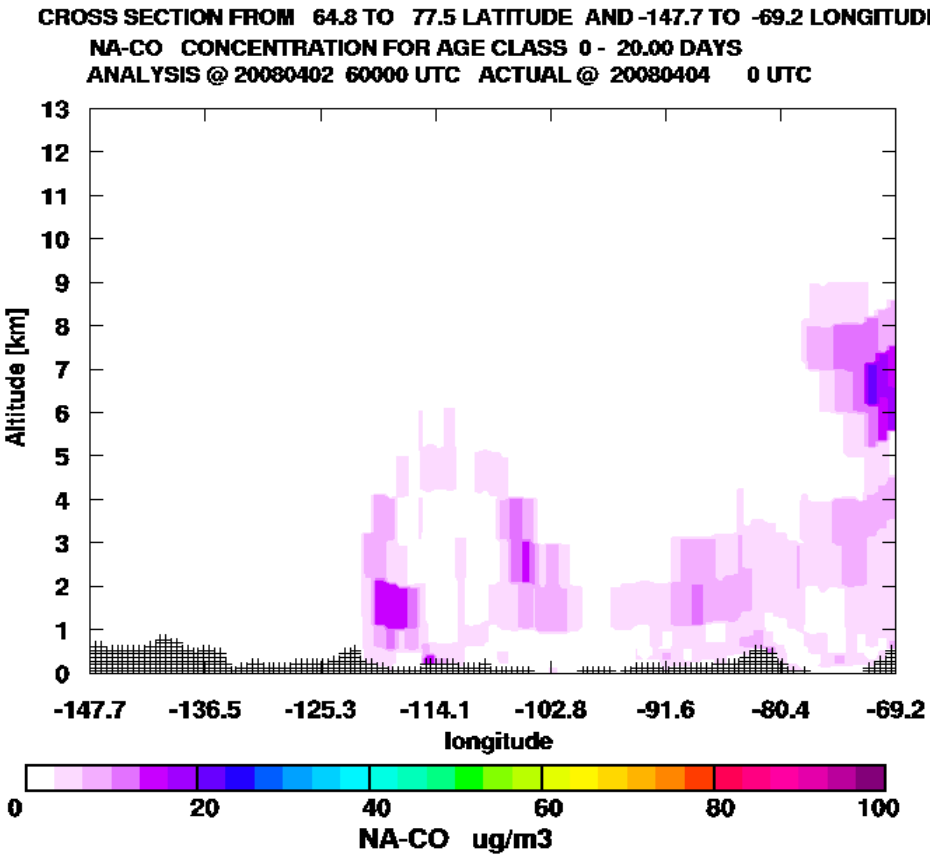
Asian (including SE Asia) aerosol plumes (pollution/smoke/dust) joined by Southern European smoke/pollution aerosol moving towards Alaska in mid- to upper troposphere.



(Courtesy: Brad Pierce & Duncan Fairlei for Trajectory Package)

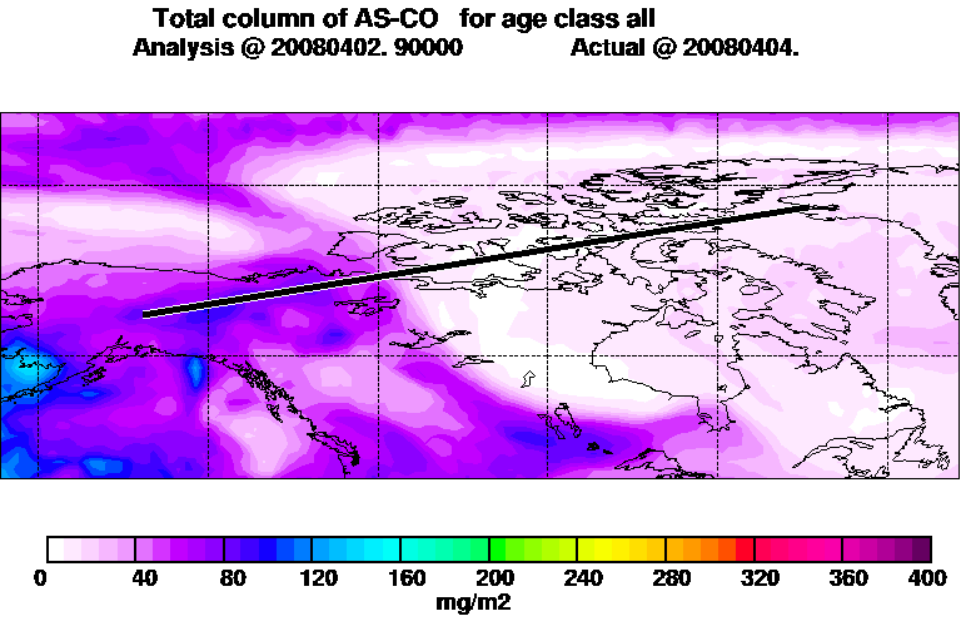
FLEXPART FC, 00-21 UTC 4 Mar, N. American plume

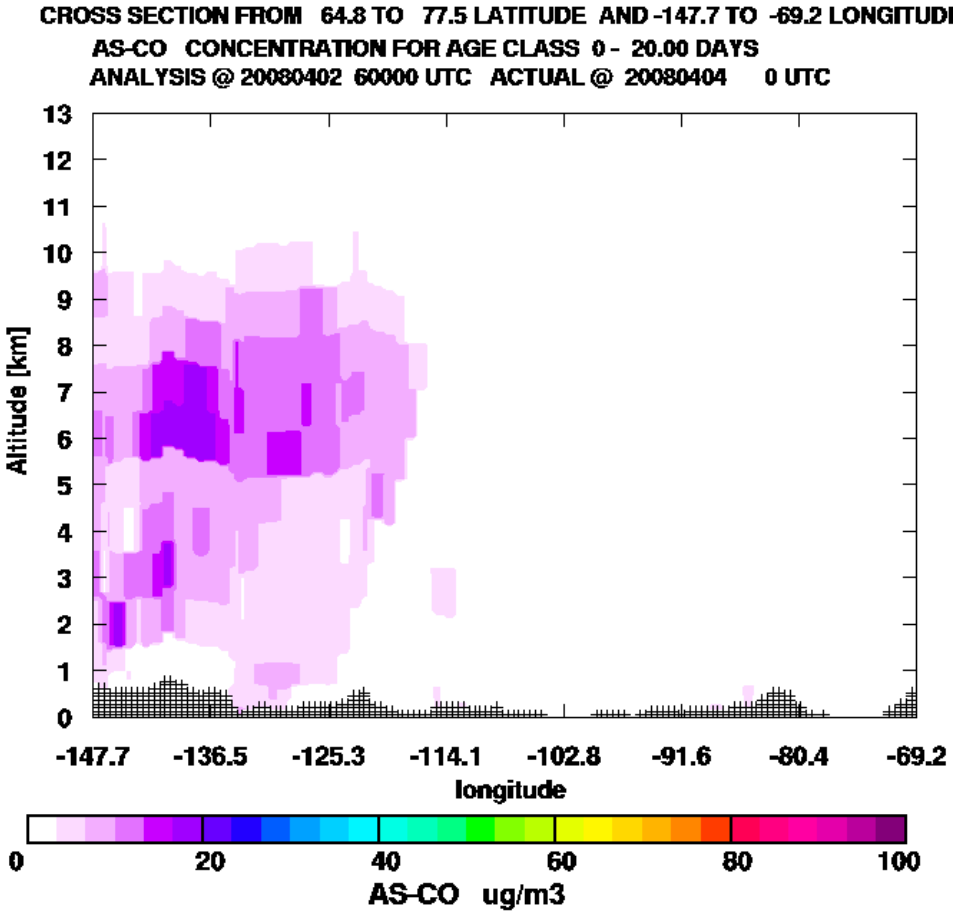




Possible plume encounter towards Thule at about 7-9 km altitude, slightly southerly deviation required

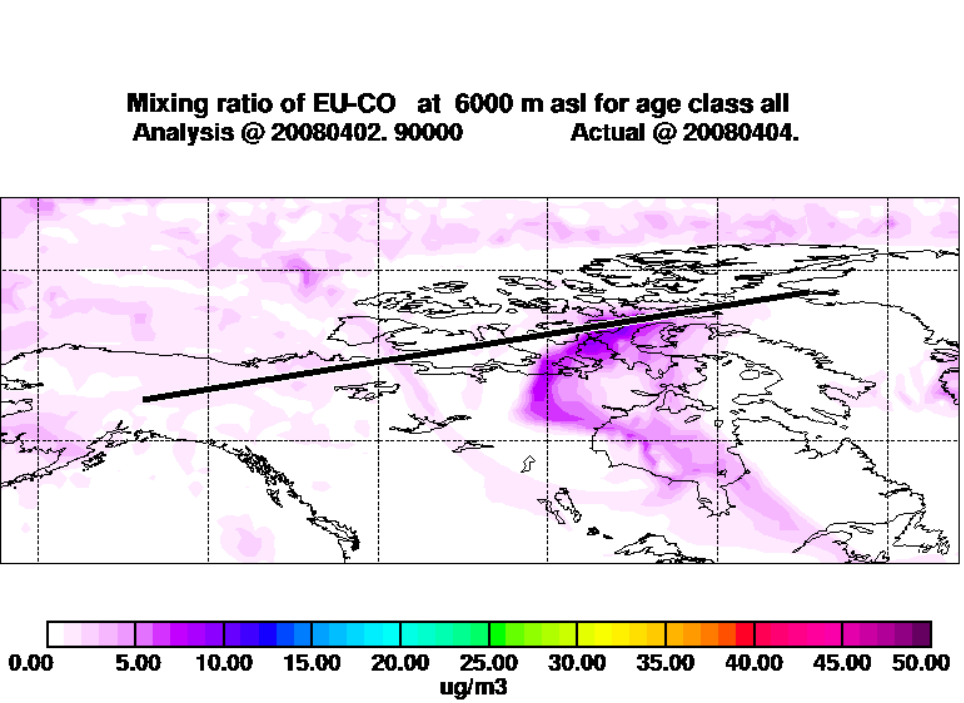
FLEXPART FC, 00-21 UTC 4 Apr, Asian plume

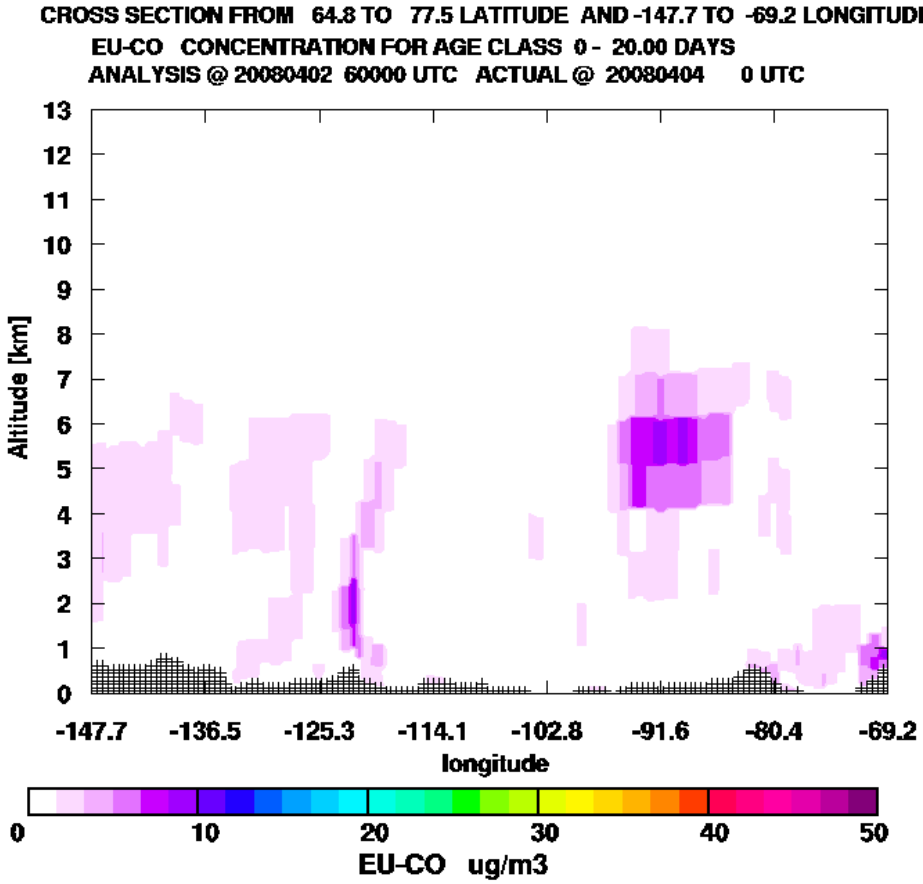




Cossing a large Asian plume on the way out from Faribanks until 115E. Plume moving to ESE. Maximum at 6-7km, extending to the surface. No strong BC tracer predicted in flight area, but some might be present in the column.

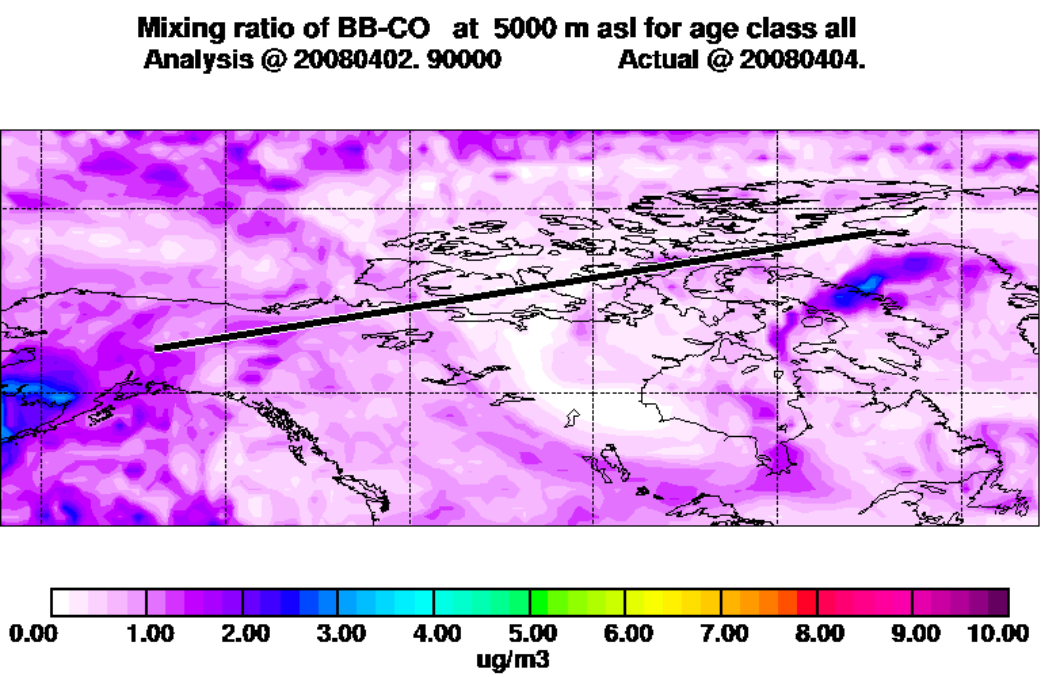
FLEXPART FC, 00-21 UTC 4 Apr, EU plume

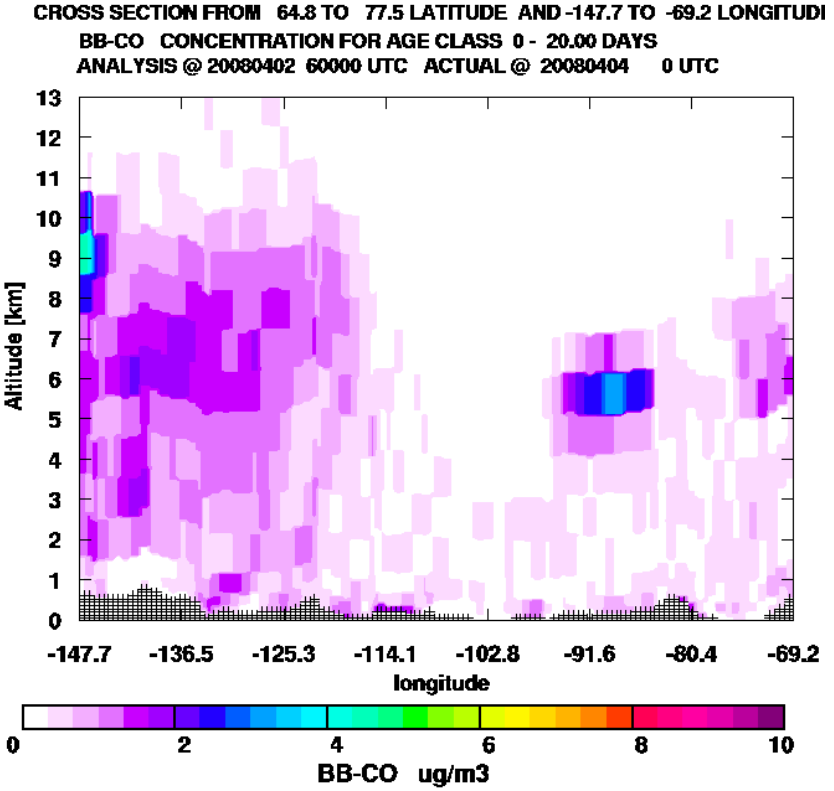




lower-magnitude elevated plume at 5-6km altitude near 95E, plume moving to NW across flight track

FLEXPART FC, 00-21 UTC 4 Apr, biomasss burning plume





some CO throughout the track, W of 115W max around 6-7km, partly up to 10km. E of 100E max at 5-6km