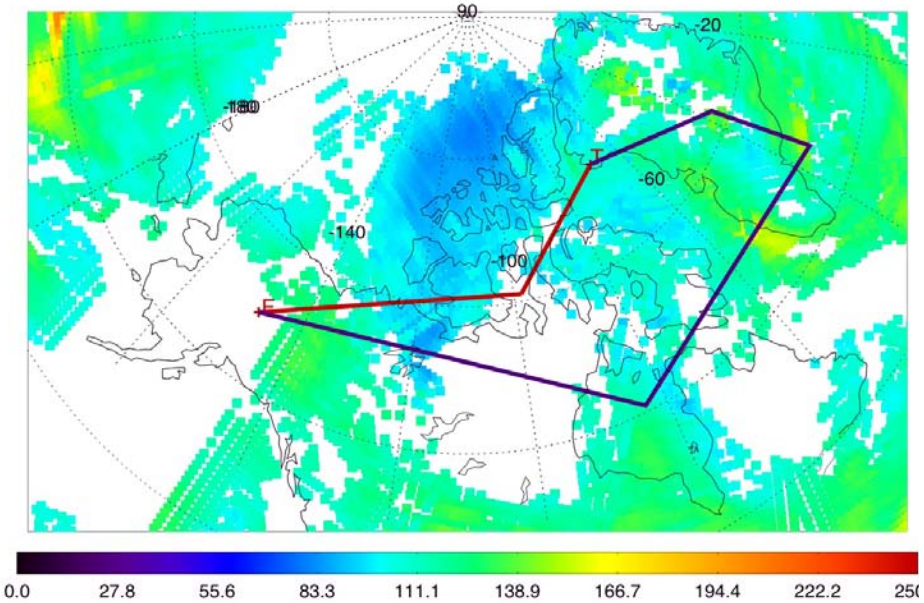
AIRS NRT ARCTAS Support:

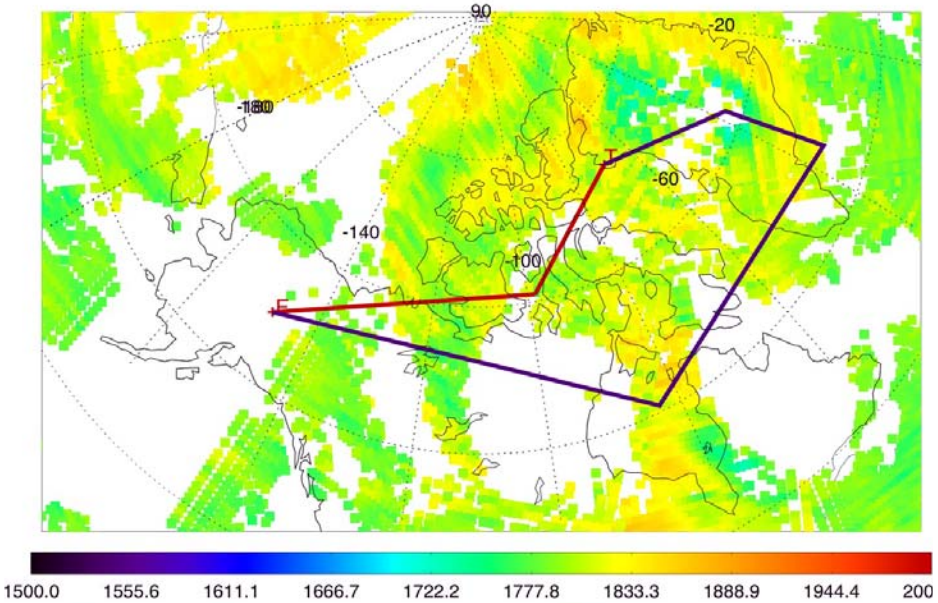
Latest CO and CH_4

AIRS CO VMR (ppbv) at 500mb on 20080403 for ARCTAS

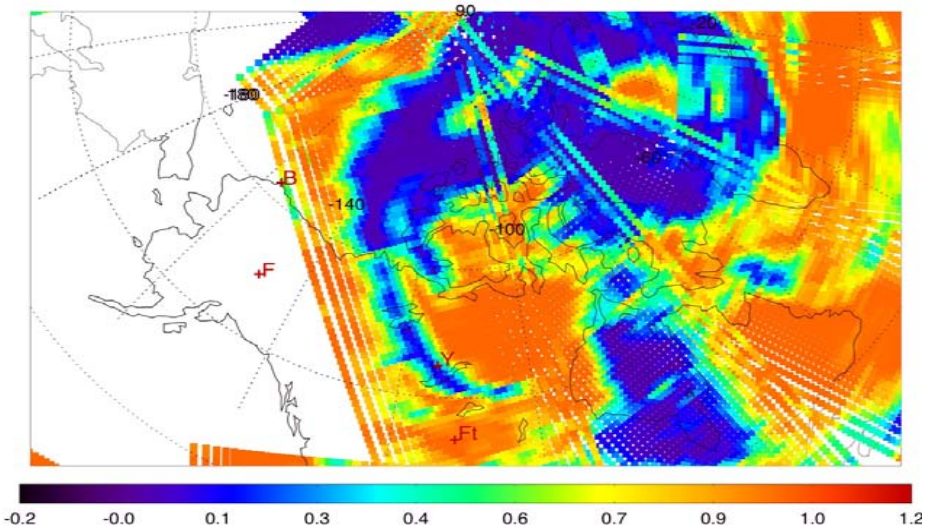


CONTACT: Dr. Juying Warner <juying@umbc.edu>; ACKNOWLEDGEMENT: AIRS NRT products by NASA DA

AIRS CH4 VMR (ppbv) at 300mb on 20080403 for ARCTAS



AIRS Cloud Ratio 20080402 for ARCTAS

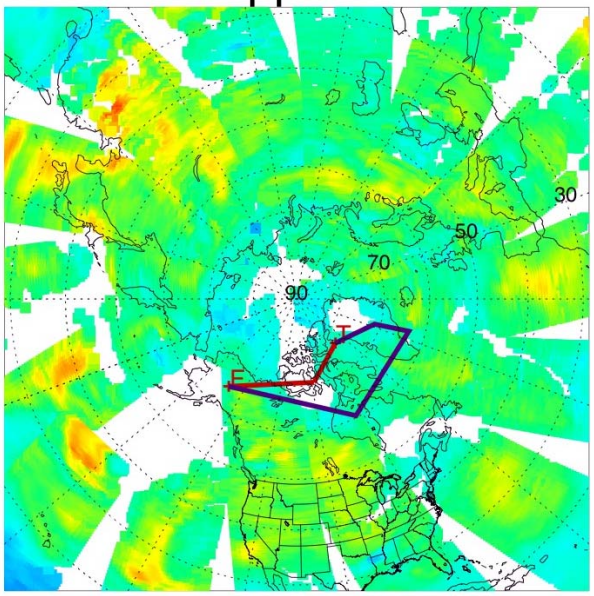


- Areas of data missing due to continuous cloud covers as shown on collocated MODIS Cloud Mask.

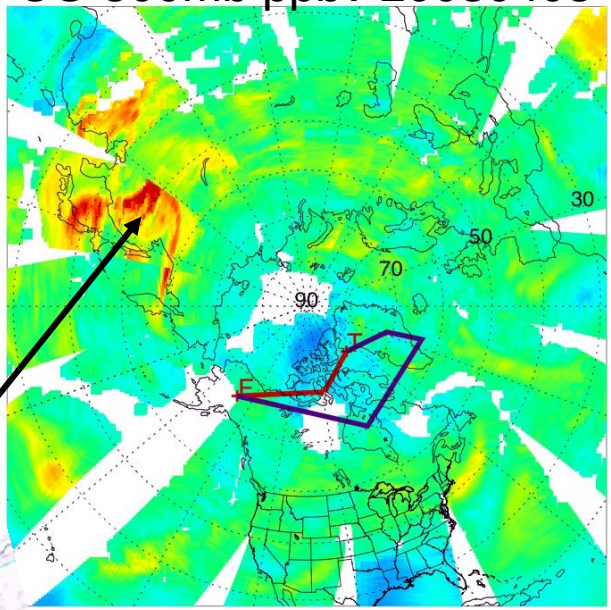
AIRS NRT ARCTAS Support:

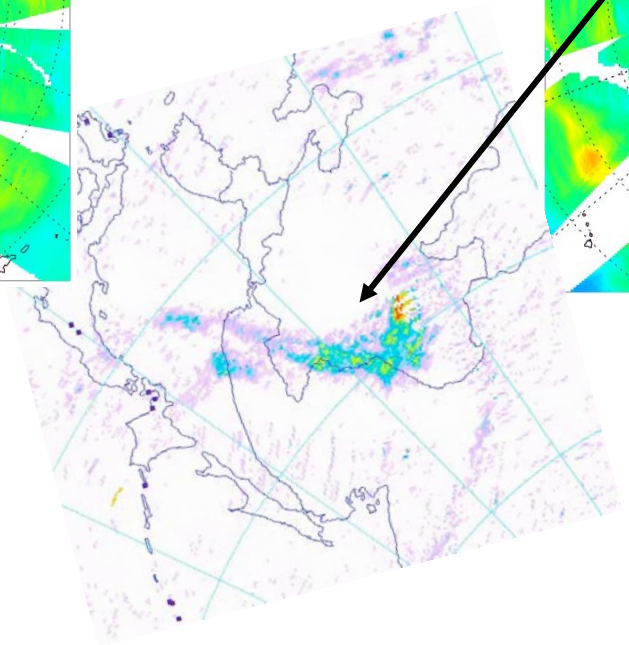
CO New Features to Watch

CO 500mb ppbv 20080401



CO 500mb ppbv 20080403



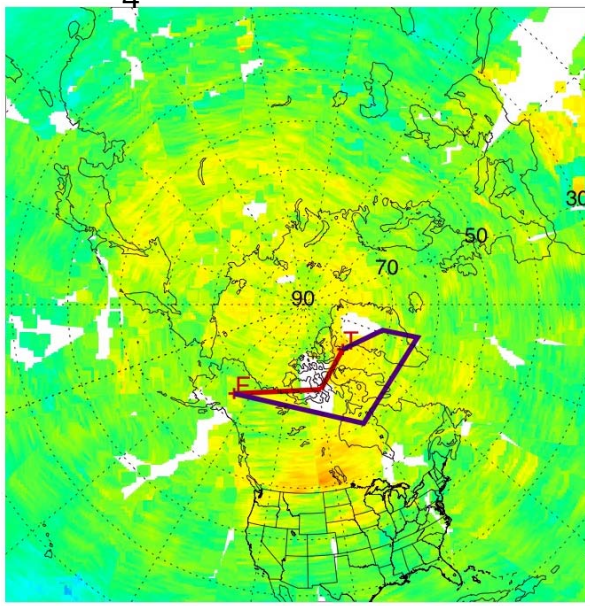


•OMI SO_2
Provided by
Dr. Krueger (UMBC)

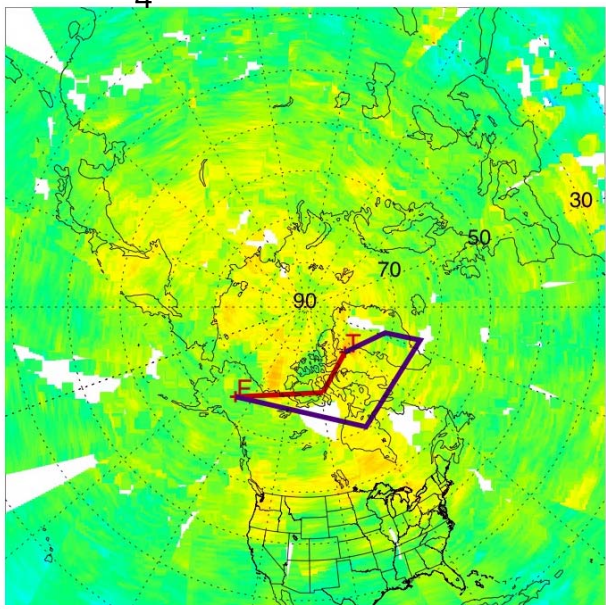
AIRS NRT ARCTAS Support:

CH_4 April 1-3, 08

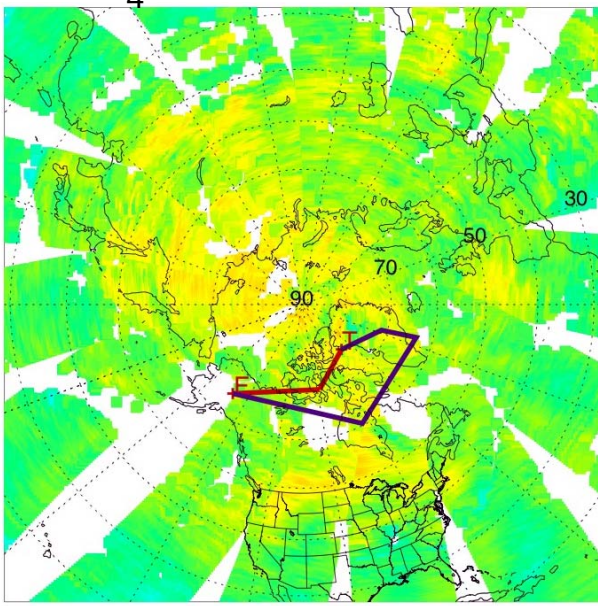
CH_4 300mb 20080401



CH_4 300mb 20080402

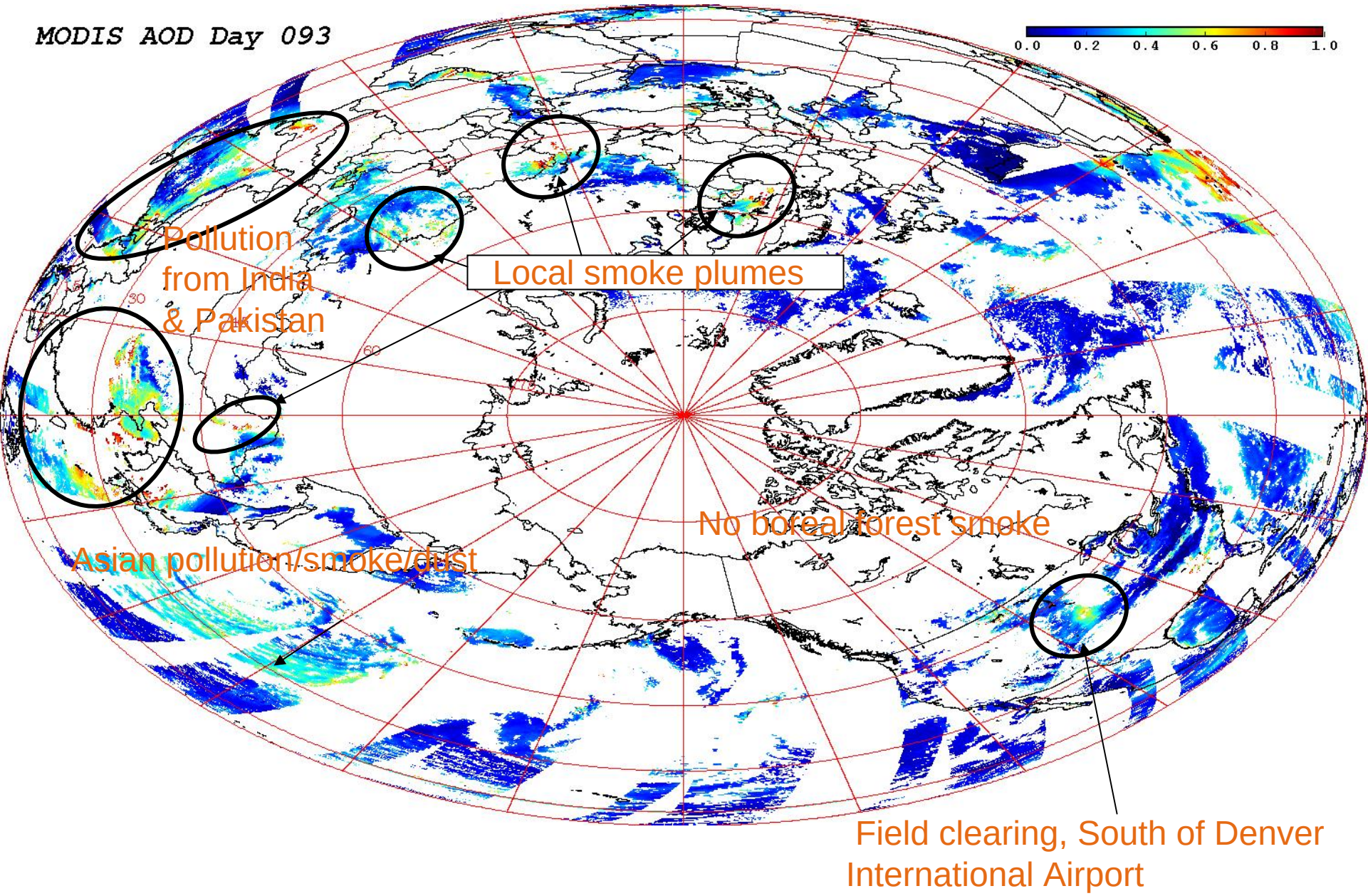


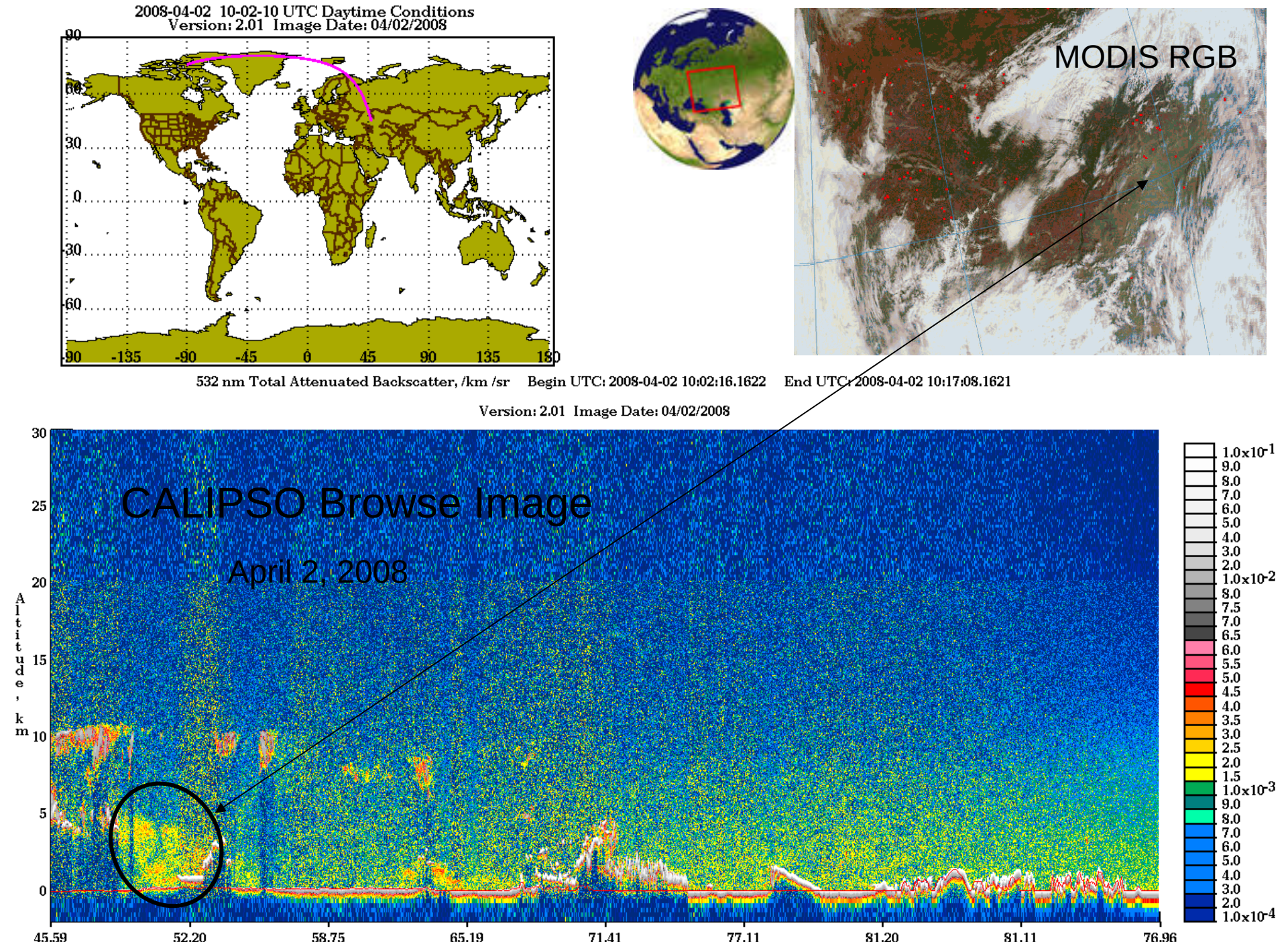
CH_4 300mb 20080403



CH4 concentrations decreased slightly over Alaska and Western Canada compared with last week.

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




2008-04-02 10-02-10 UTC Daytime Conditions
Version: 2.01 Image Date: 04/02/2008
90
60
30
0
-30
-60
-90 -135 -90 -45 0 45 90 135 180
MODIS RGB
532 nm Total Attenuated Backscatter, /km /sr Begin UTC: 2008-04-02 10:02:16.1622 End UTC: 2008-04-02 10:17:08.1621
Version: 2.01 Image Date: 04/02/2008
CALIPSO Browse Image
April 2, 2008
Altitude, km
30
25
20
15
10
5
0
45.59 52.20 58.75 65.19 71.41 77.11 81.20 81.11 76.96
1.0x10-1
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0x10-2
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0x10-3
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8.0
7.0
6.0
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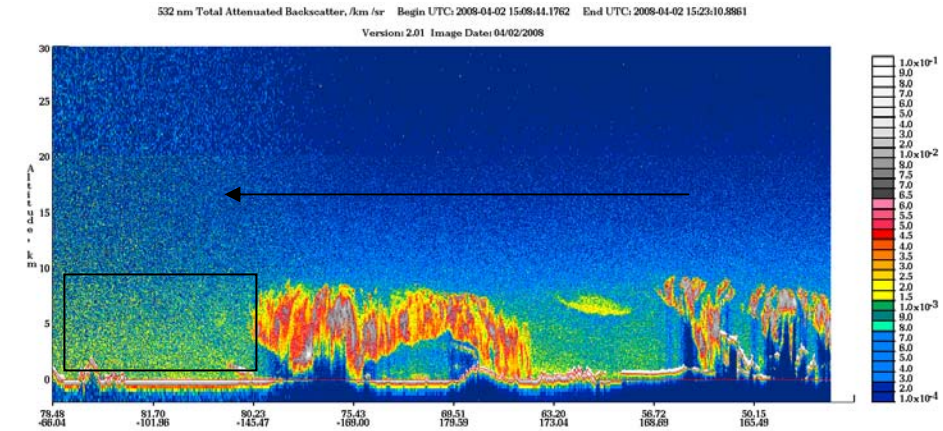
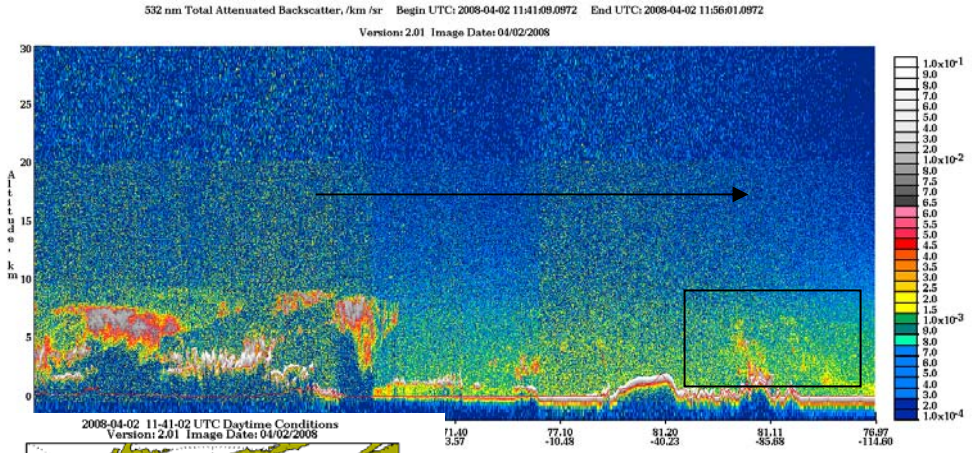
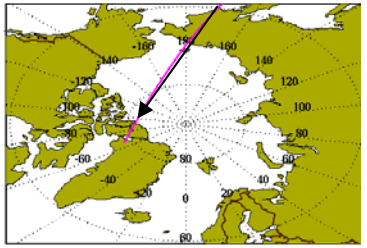
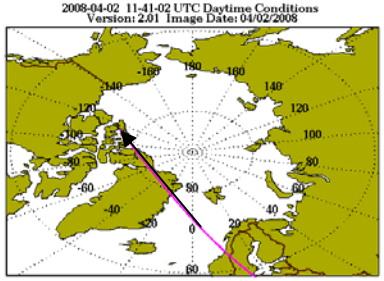
4.0
3.0
2.0
1.0x10-4



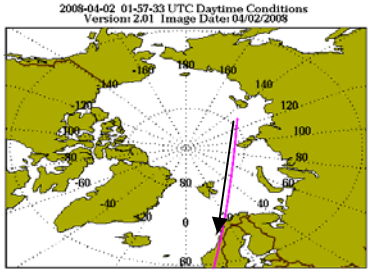


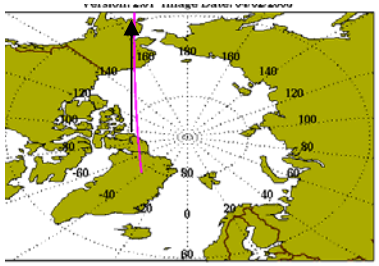
April 2, 2008

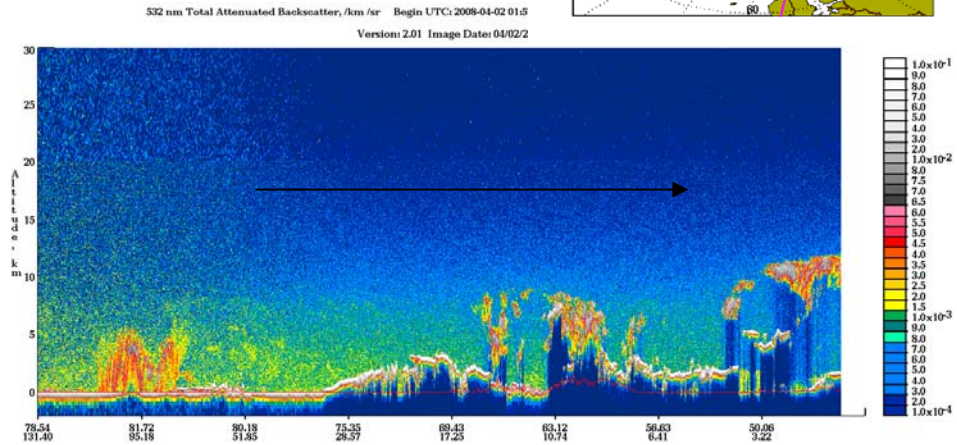


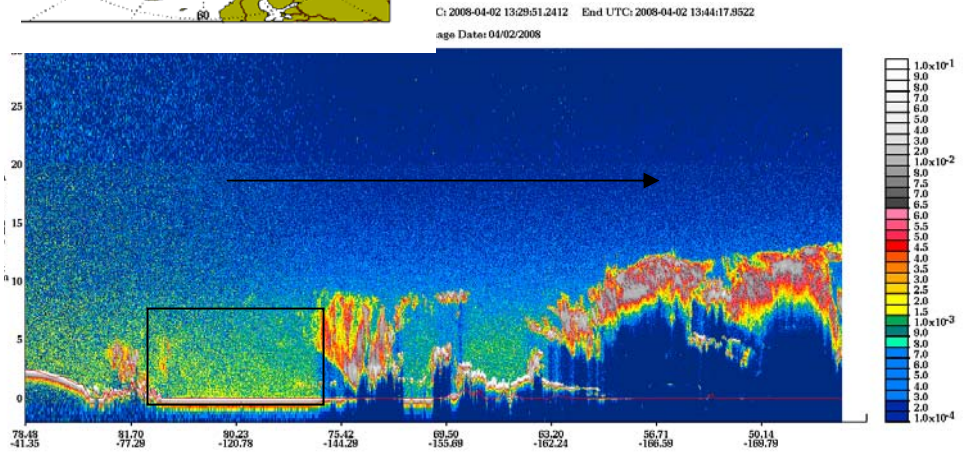


Arctic Haze?





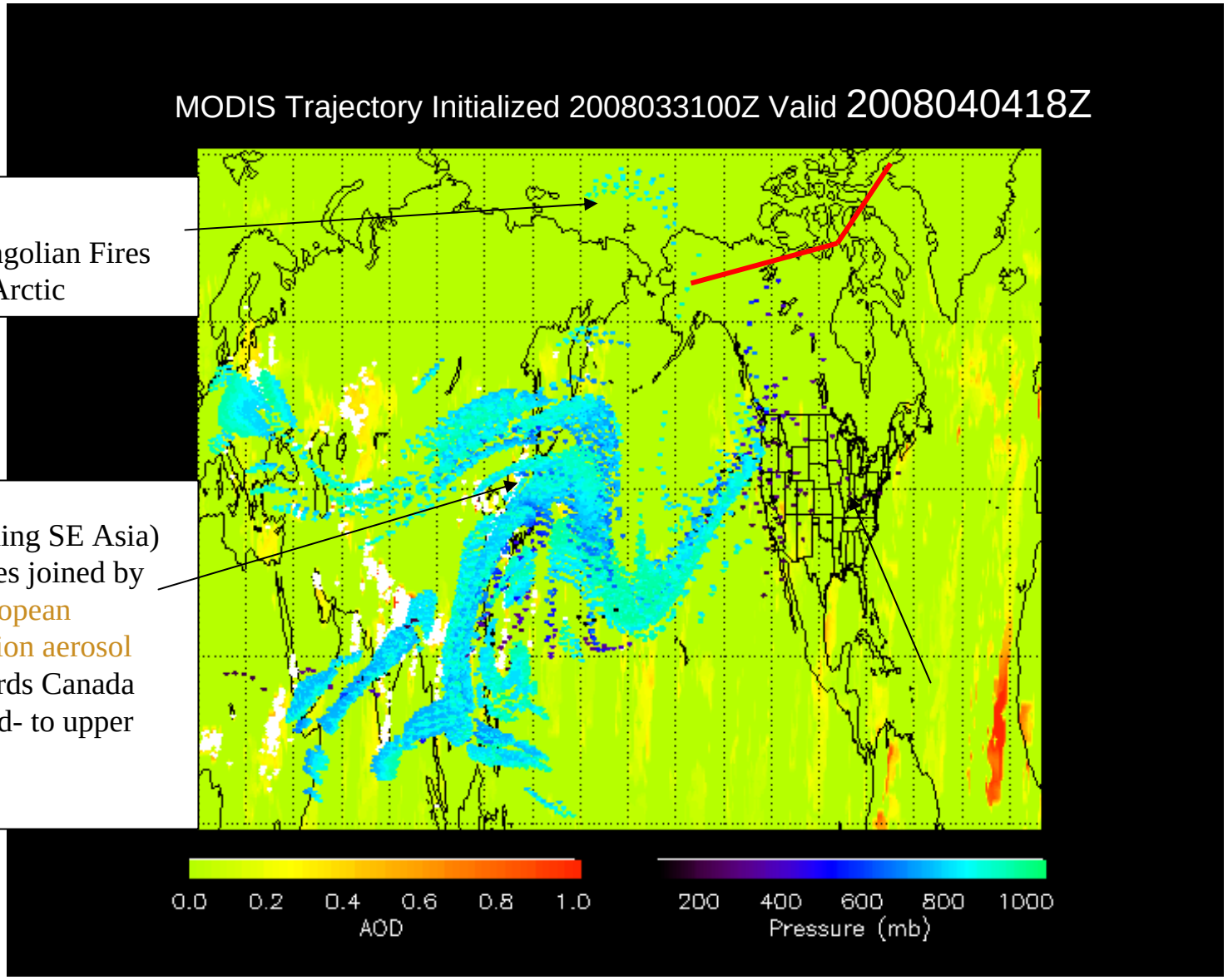




Aerosol Trajectory Based Upon MODIS AOD and GEOS-5 Winds

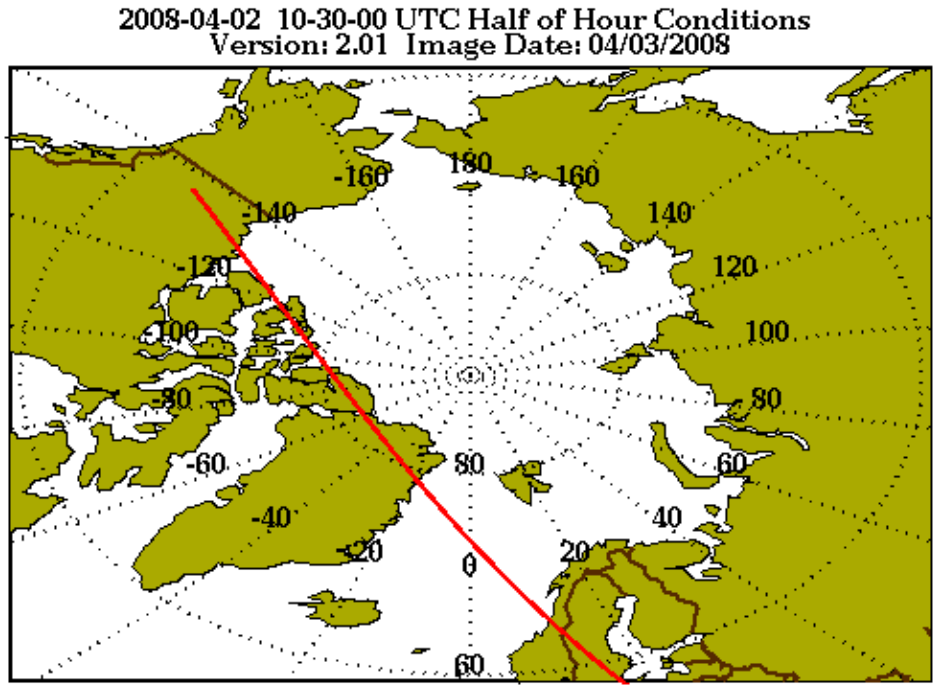
Smoke from Siberian/Mongolian Fires entering the Arctic

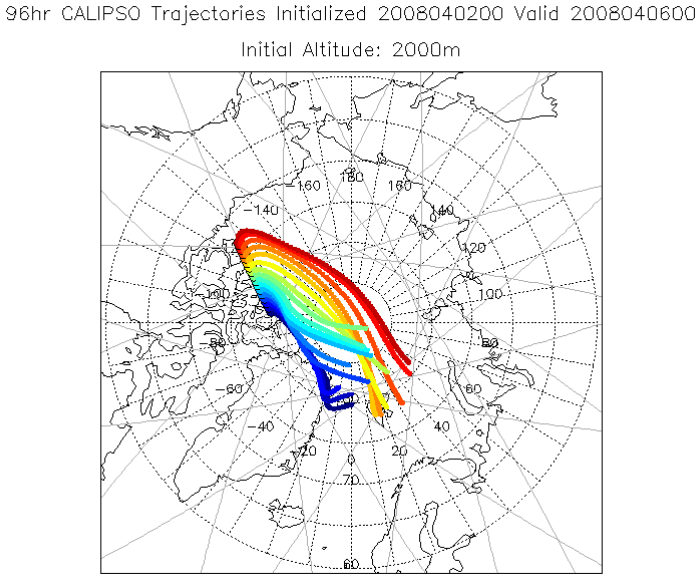
Asian (including SE Asia) aerosol plumes joined by Southern European smoke/pollution aerosol moving towards Canada and US in mid- to upper troposphere.



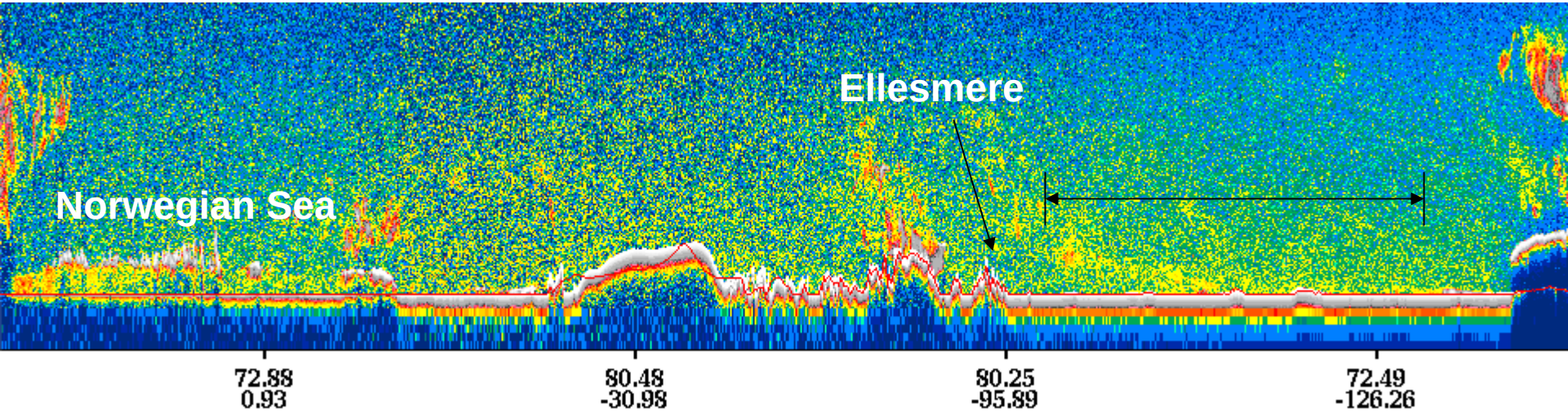
(Courtesy: Brad Pierce & Duncan Fairlei for Trajectory Package)

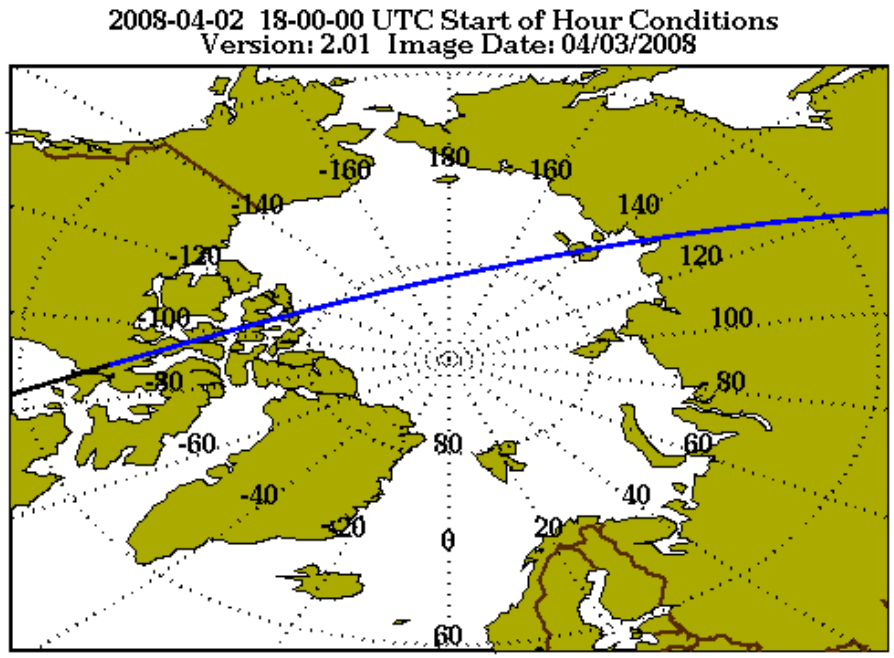
CALIPSO Observations
2 April 2008

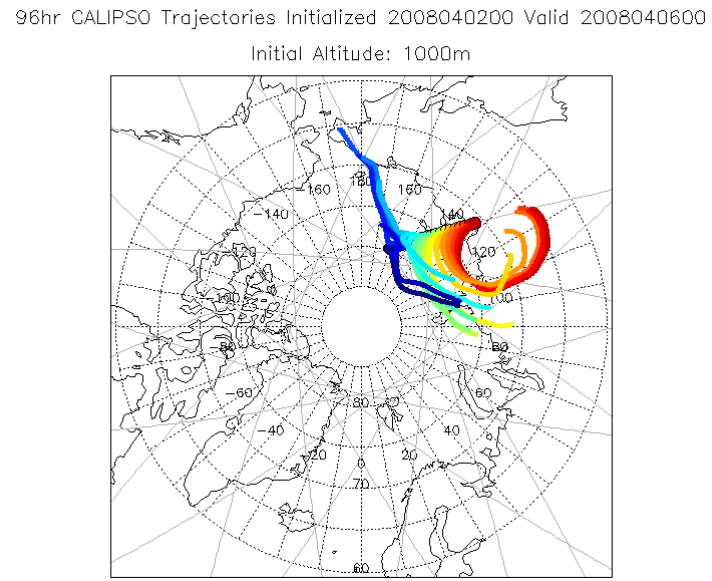




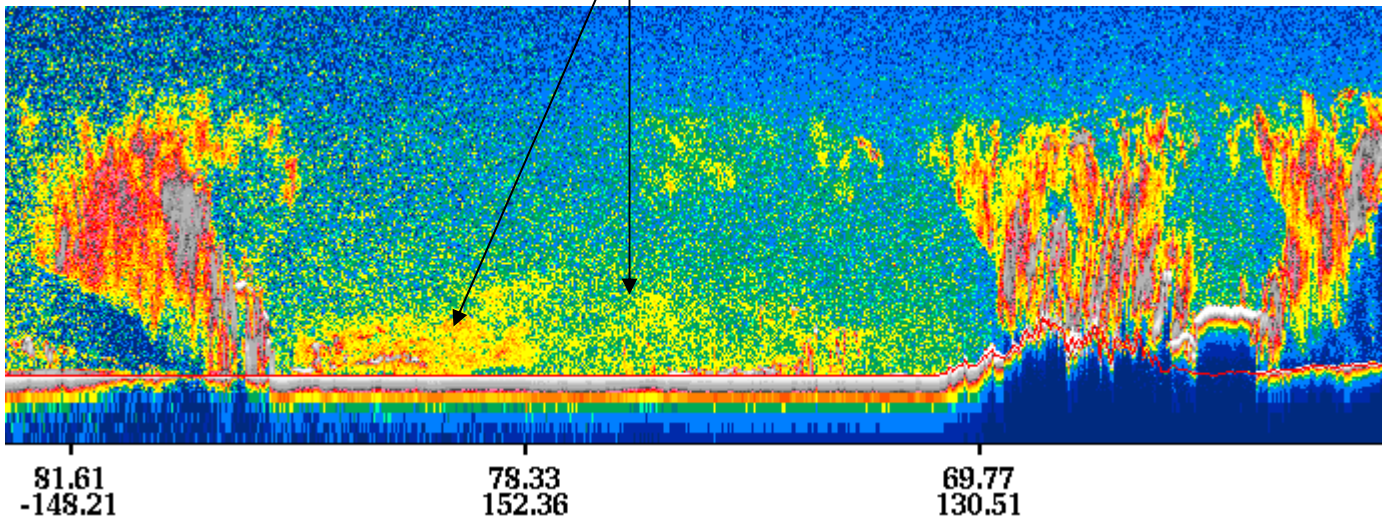
Canadian sector: aerosol concentrated near Ellesmere/Baffin/Bathurst Islands

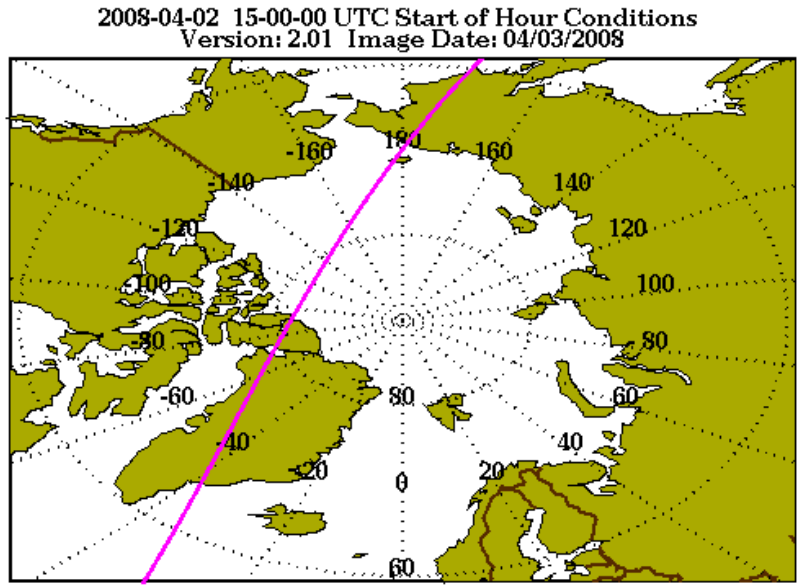






Typical aerosol seen in Russian sector of Arctic (80-180E)

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160
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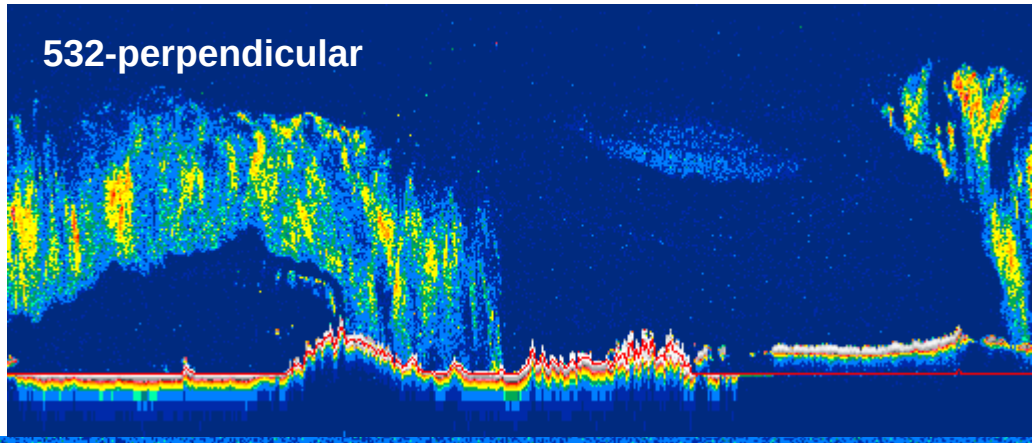
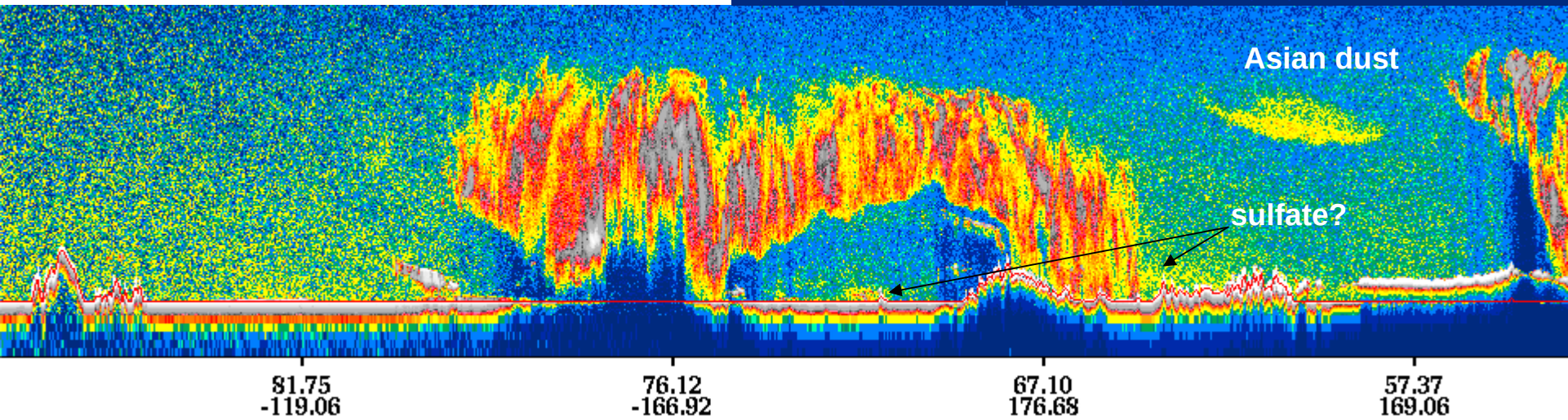
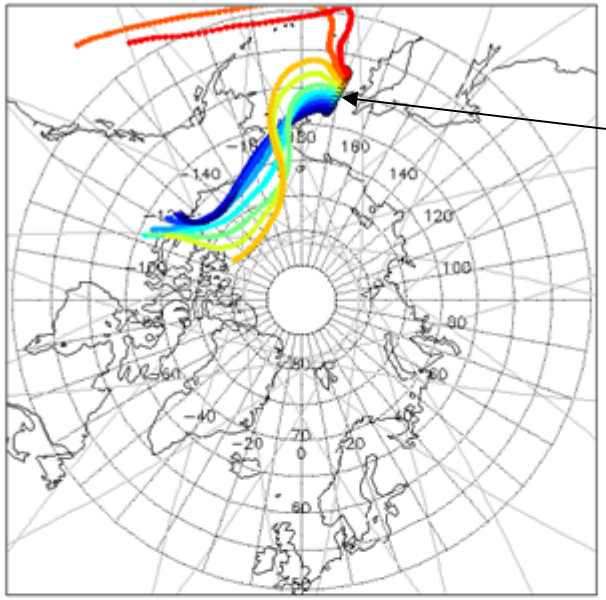
140
-120
120
-100
100
-80
80
-60
60
-40
40
-20
20
0
60


532-perpendicular

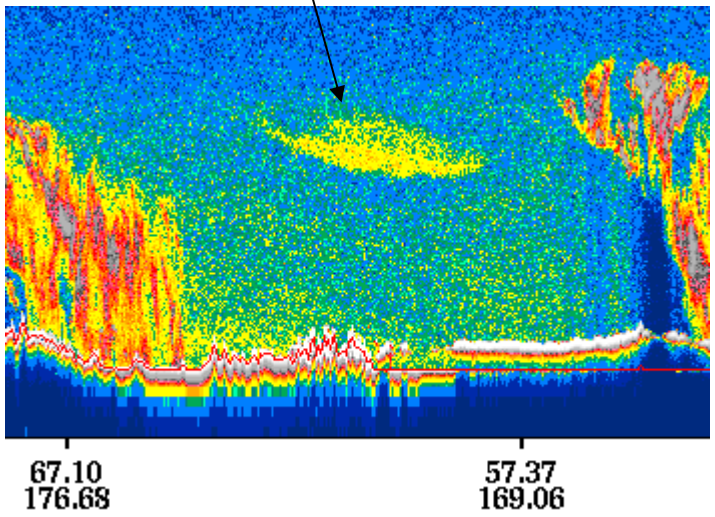

Asian dust
sulfate?
81.75
-119.06
76.12
-166.92
67.10
176.68
57.37
169.06

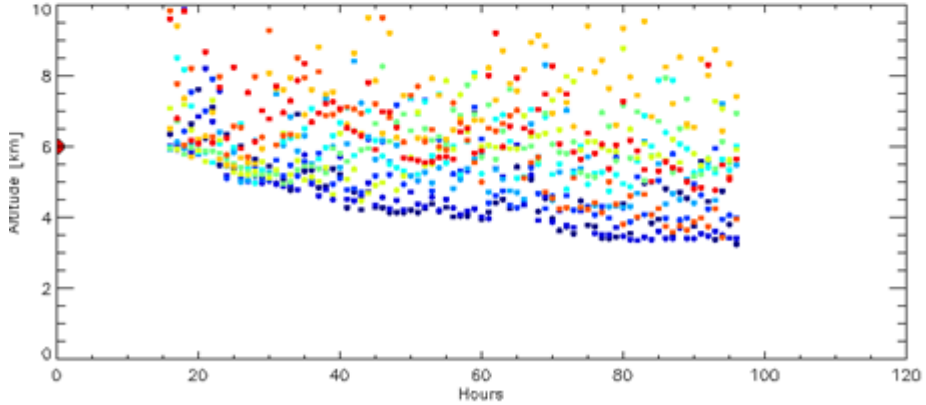
96hr CALIPSO Trajectories Initialized 2008040200 Valid 2008040600

Initial Altitude: 6000m



Dust Plume





CALIPSO Expedited Products Available during ARCTAS

URL: http://www-calipso.larc.nasa.gov/products/

Click on ‘EXPEDITED BROWSE IMAGES’ and select V2.01.

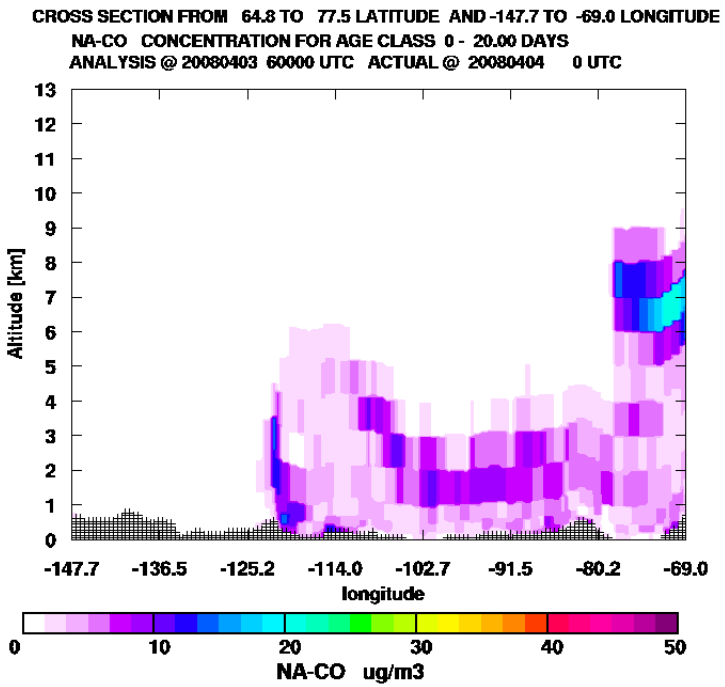
Data Latency: 12 – 48 hours

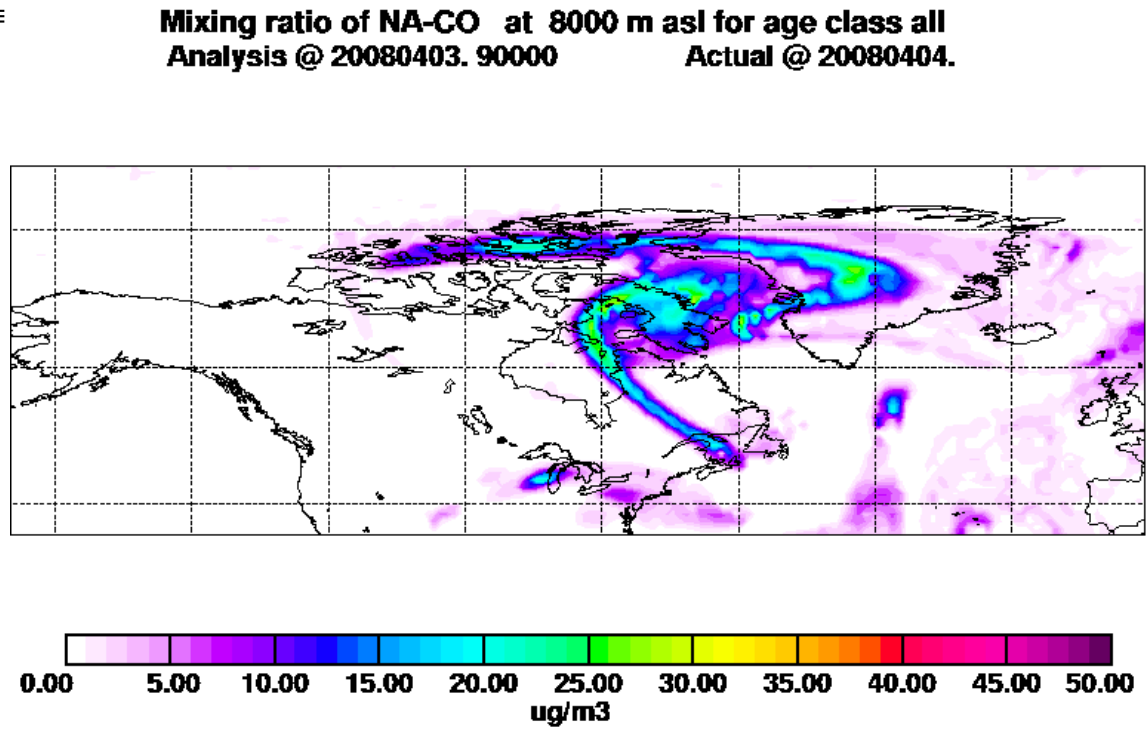
Products available: L1 - Attenuated Backscatter 532nm and 1064nm
- Depolarization ratio
- Color ratio

L2 - Vertical Feature Mask (Cloud-Aerosol discrimination)

Contact: Dave Winker (dmwinker@gmail.com)
Chieko Kittaka (chieko.kittaka-1@nasa.gov)

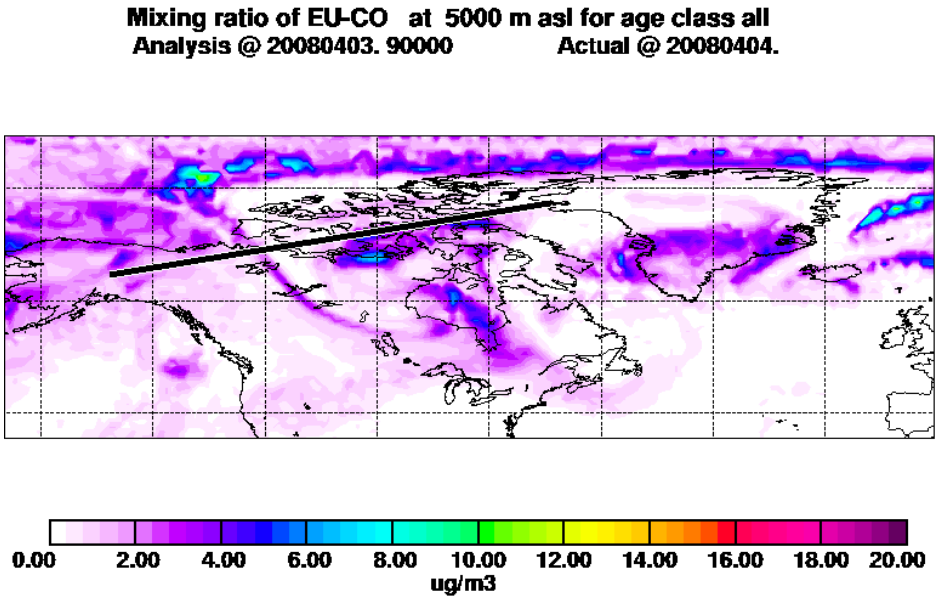
FLEXPART FC, 00-21 UTC 4 Mar, N. American plume





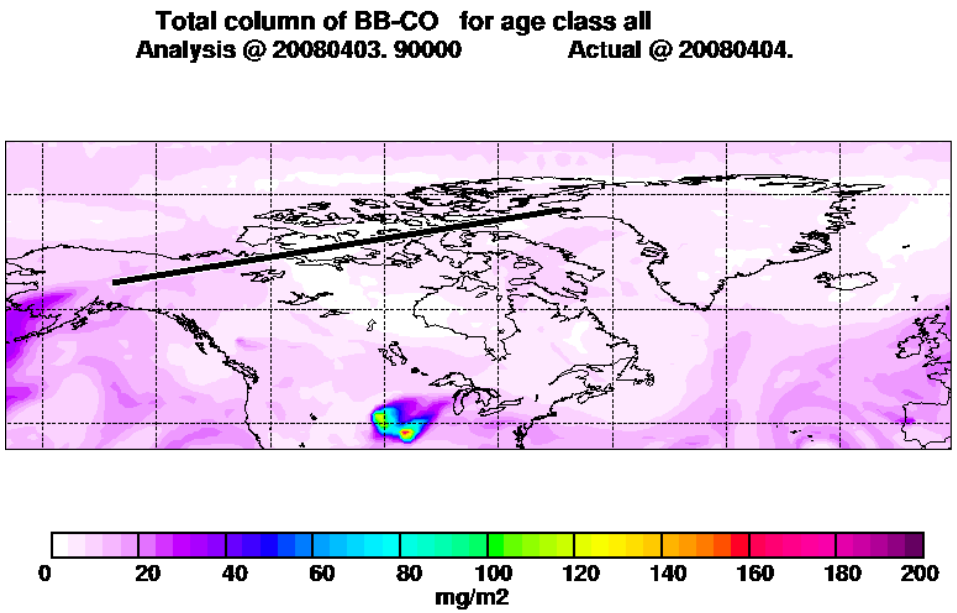
Elevated plume max at 8km altitude E of 80E

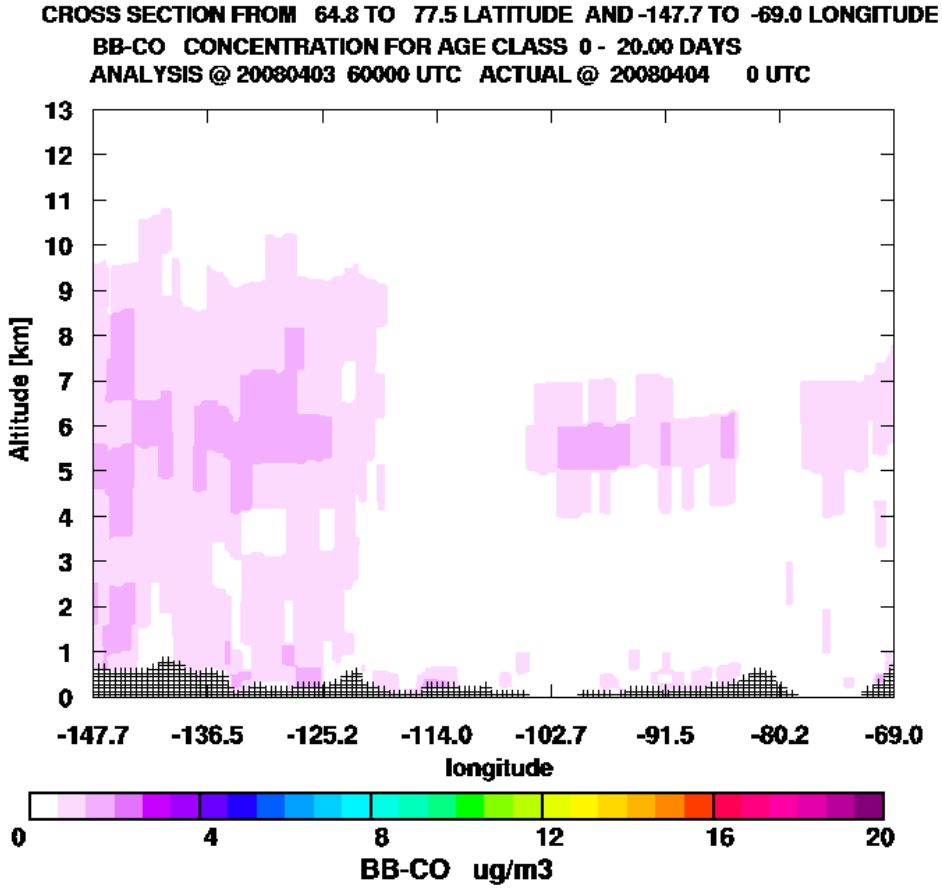
FLEXPART FC, 00-21 UTC 4 Apr, EU plume



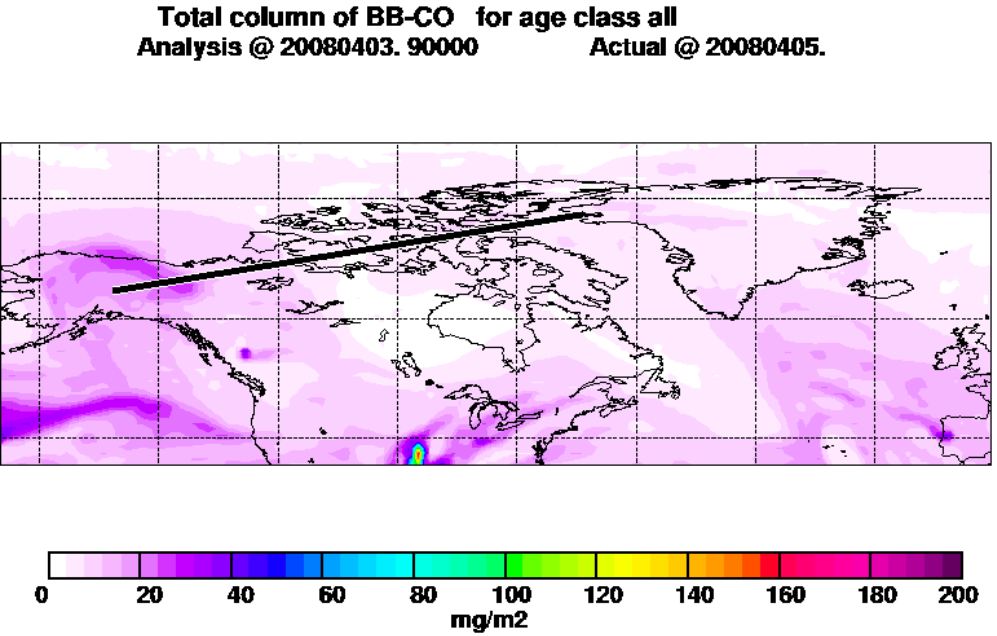
NW moving plume E of 100W at 5-6km altitude

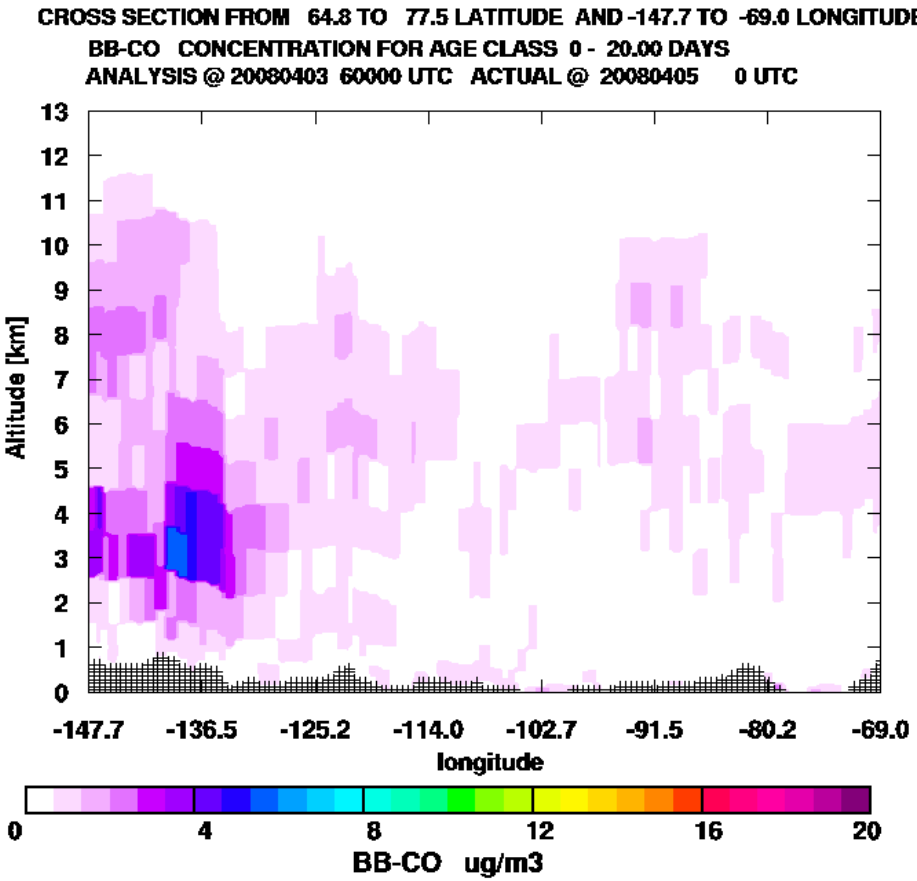
FLEXPART FC, 00-21 UTC 4 Apr, biomass burning plume



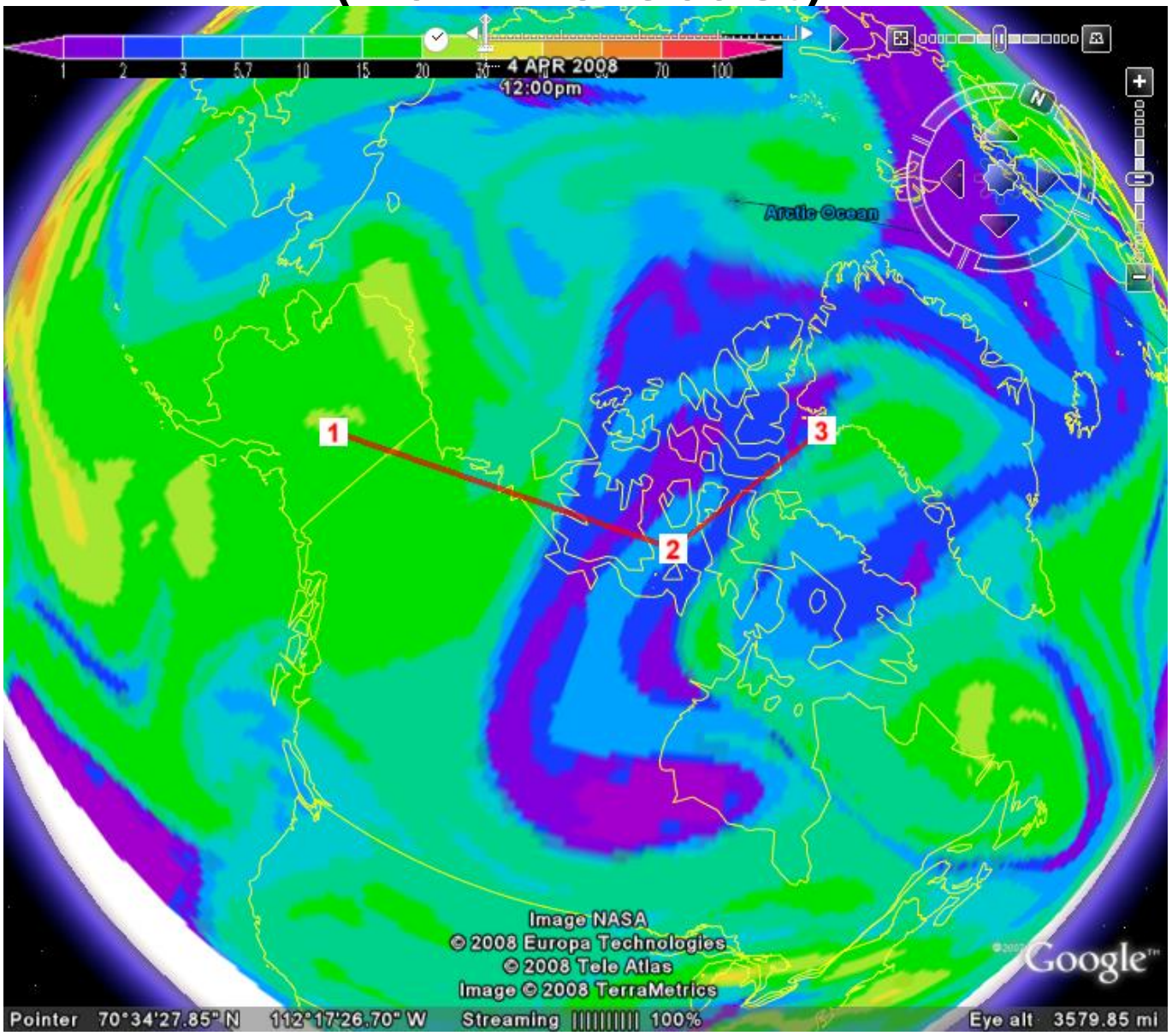


FLEXPART FC, 00-21 UTC 5 Apr, biomass burning plume

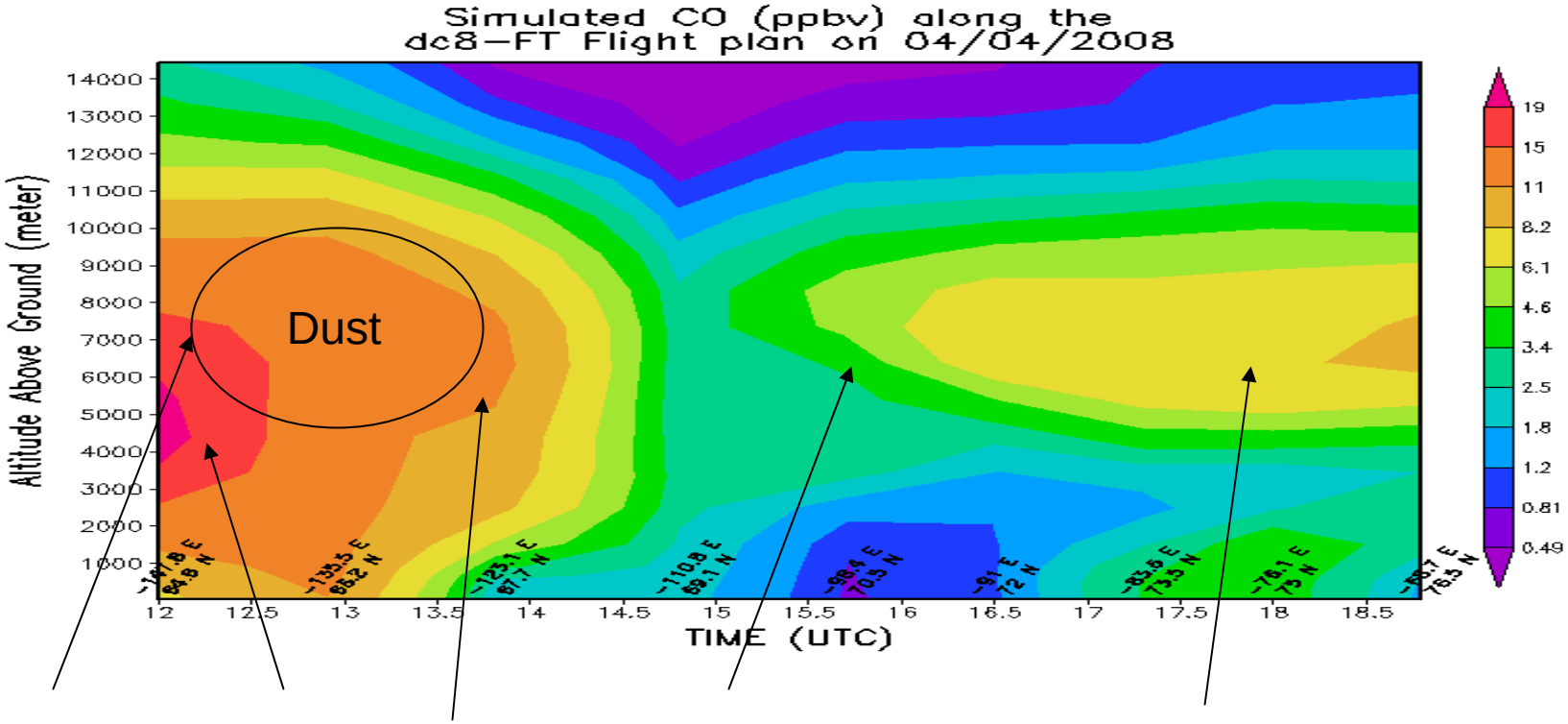




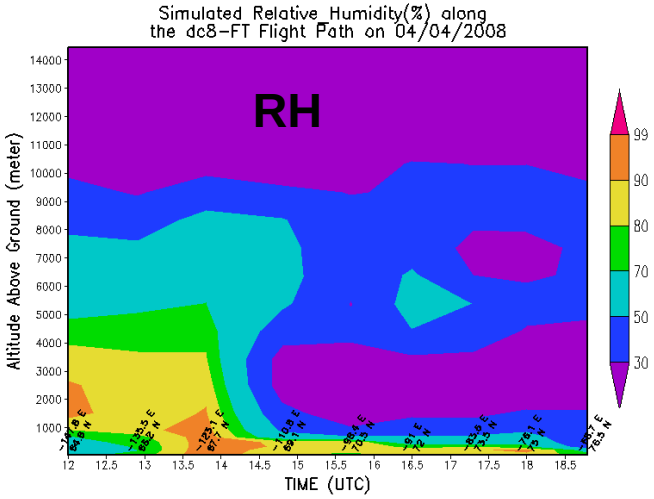
STEM CO at 5.5km for April 4 12Z (40 hr forecast)

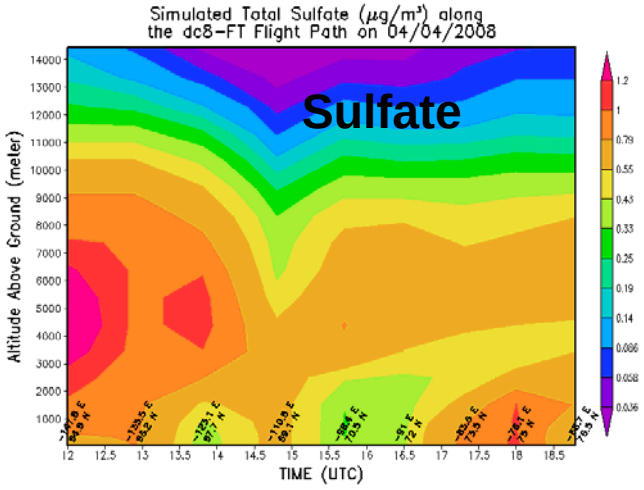


STEM Curtain Plots for April 4 FTh (40hr forecast)

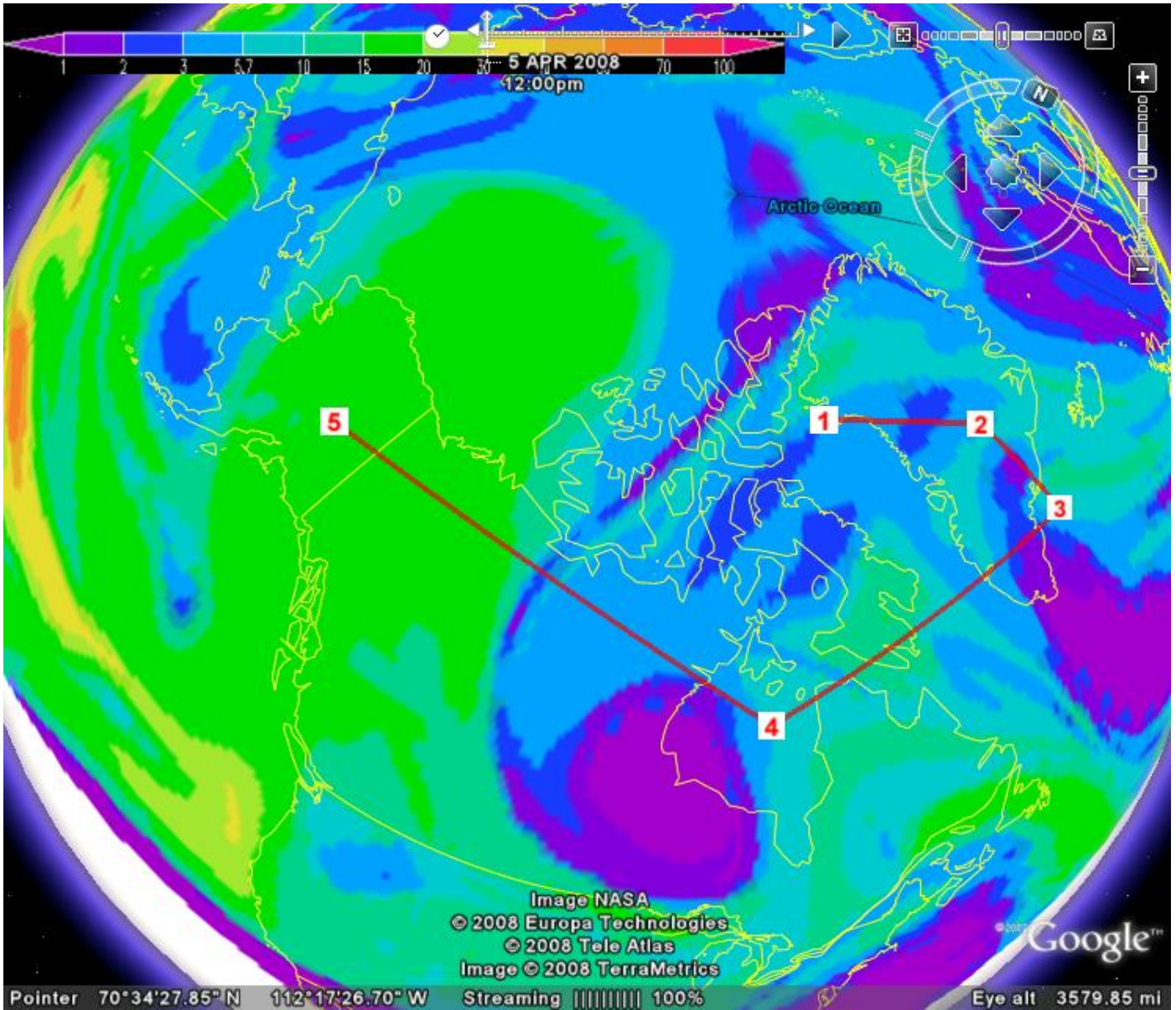


BB SA China BB NAsia EU USA

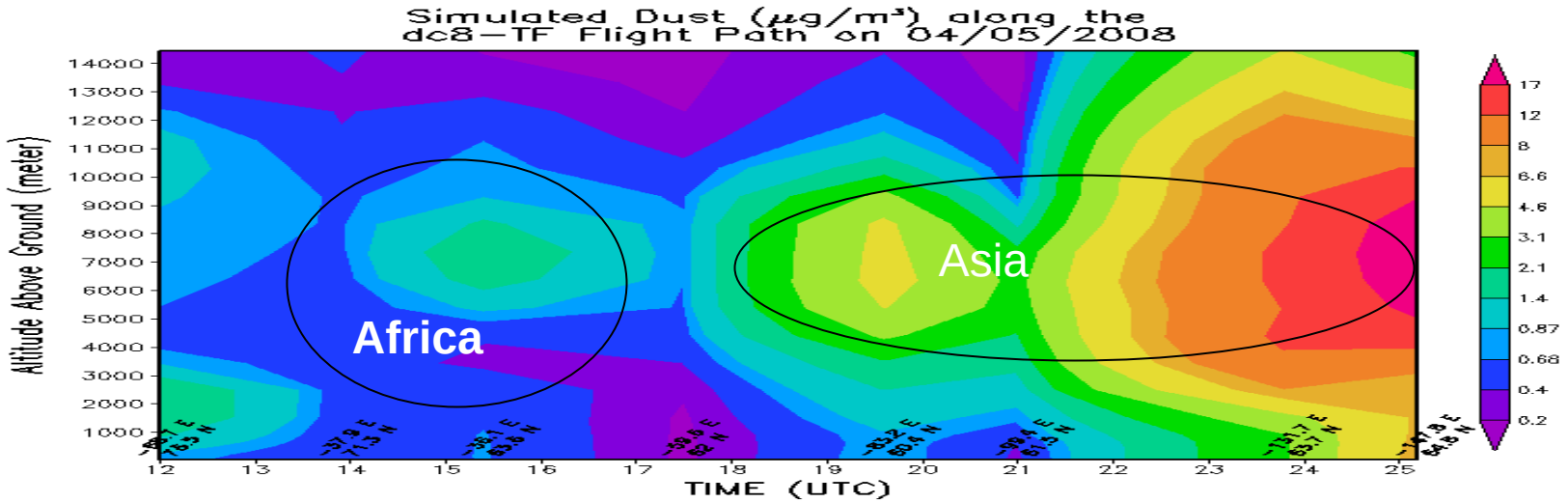


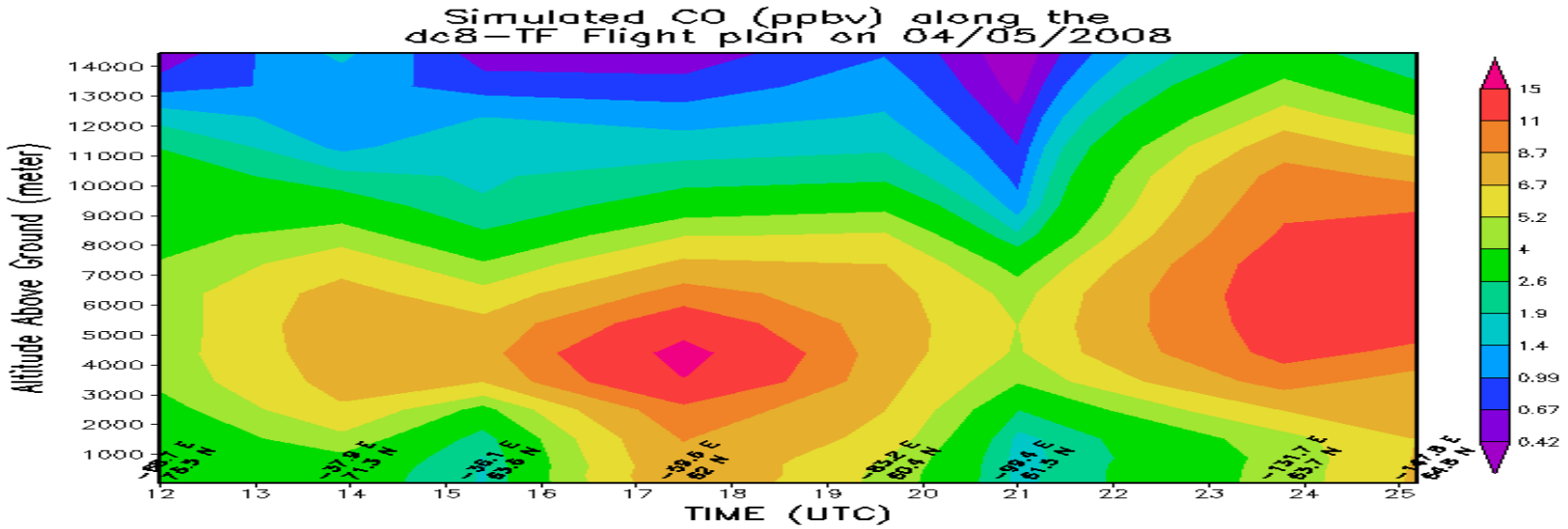


STEM CO at 5.5km for April 5 12Z (60 hr forecast)

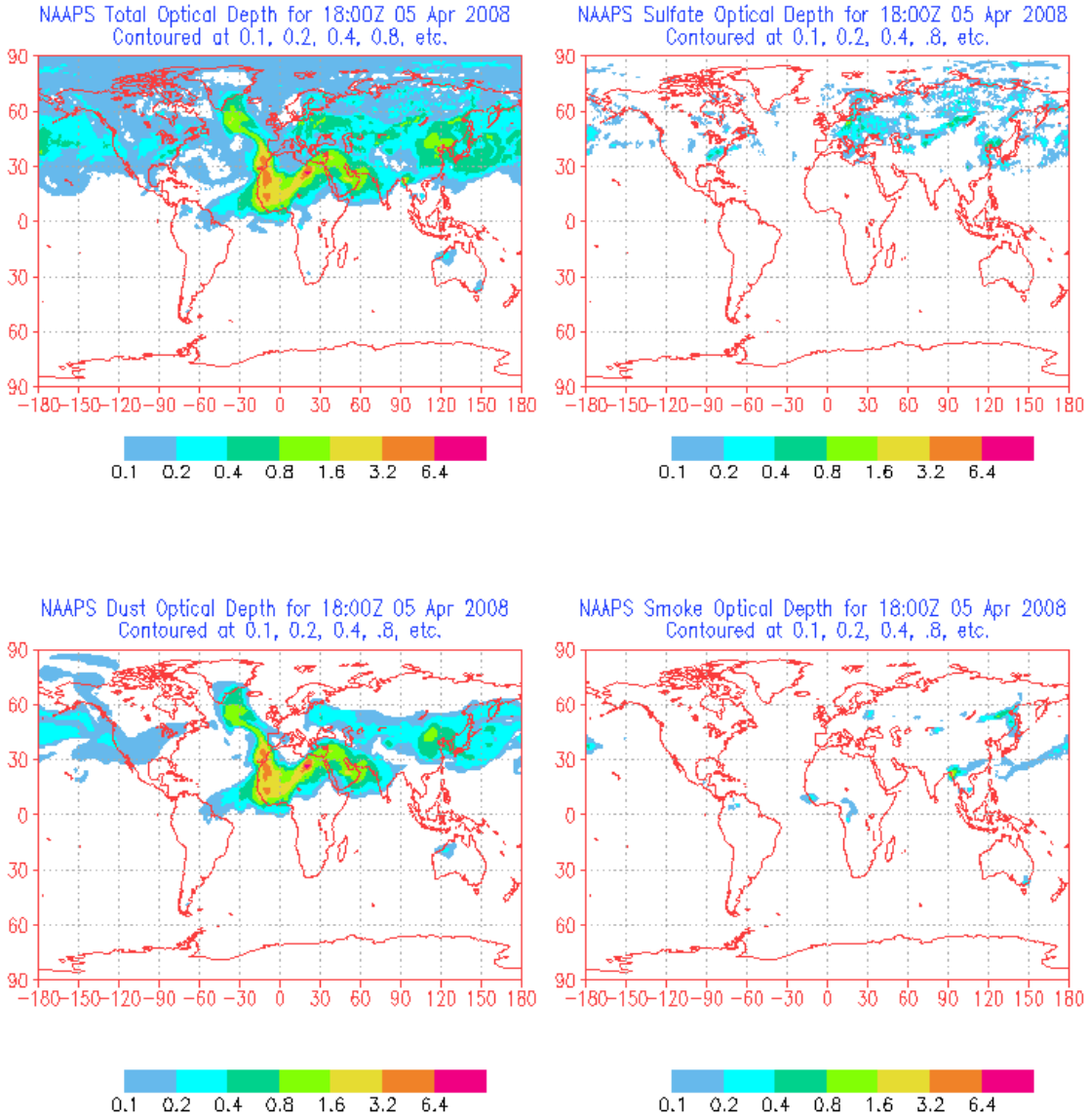


STEM Curtain Plots for April 5 ThF (60hr forecast)

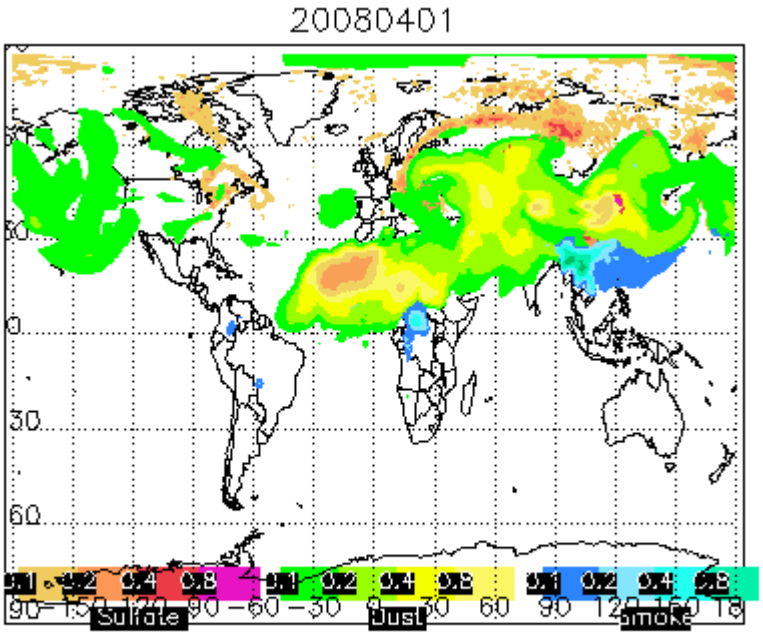




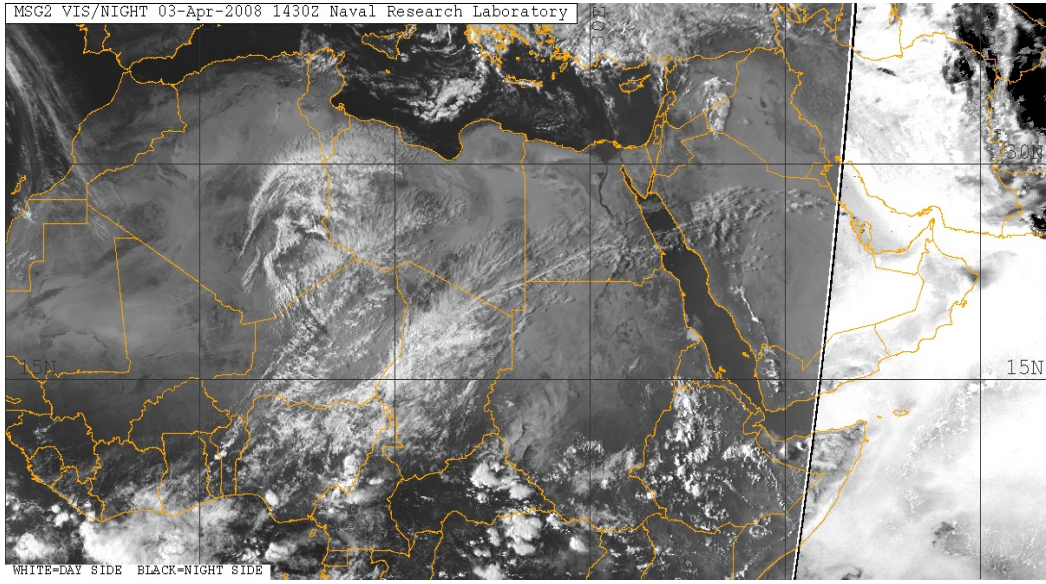
NAAPS Dust AOD Forecast for April 5 18Z



Dust Events in Africa are Occuring

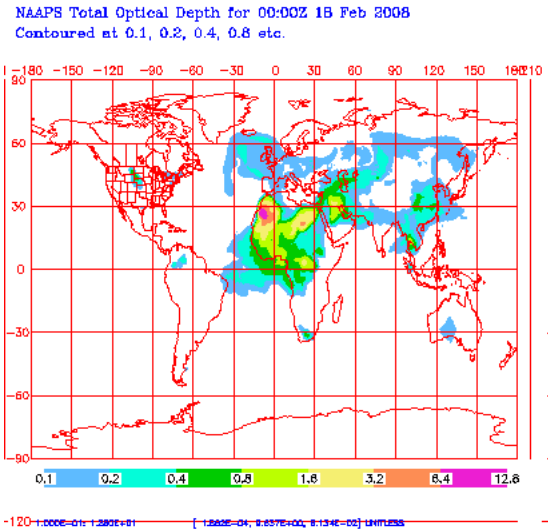


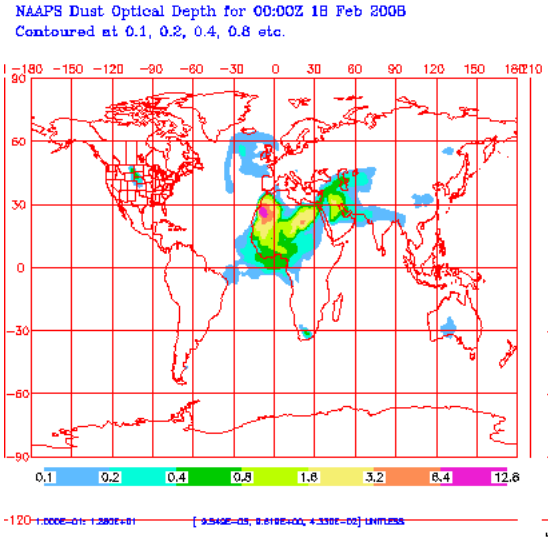
TOMS April 1

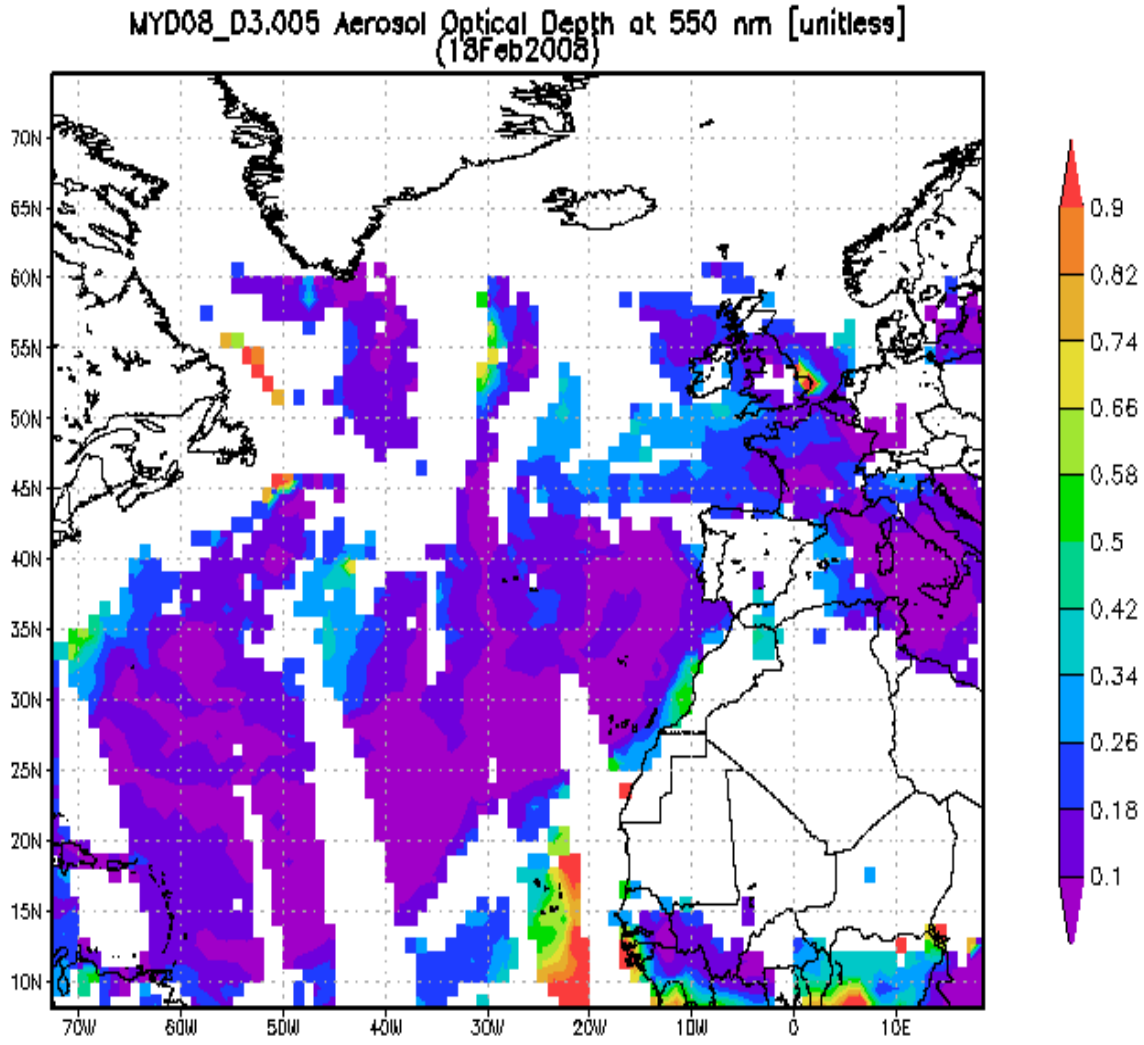


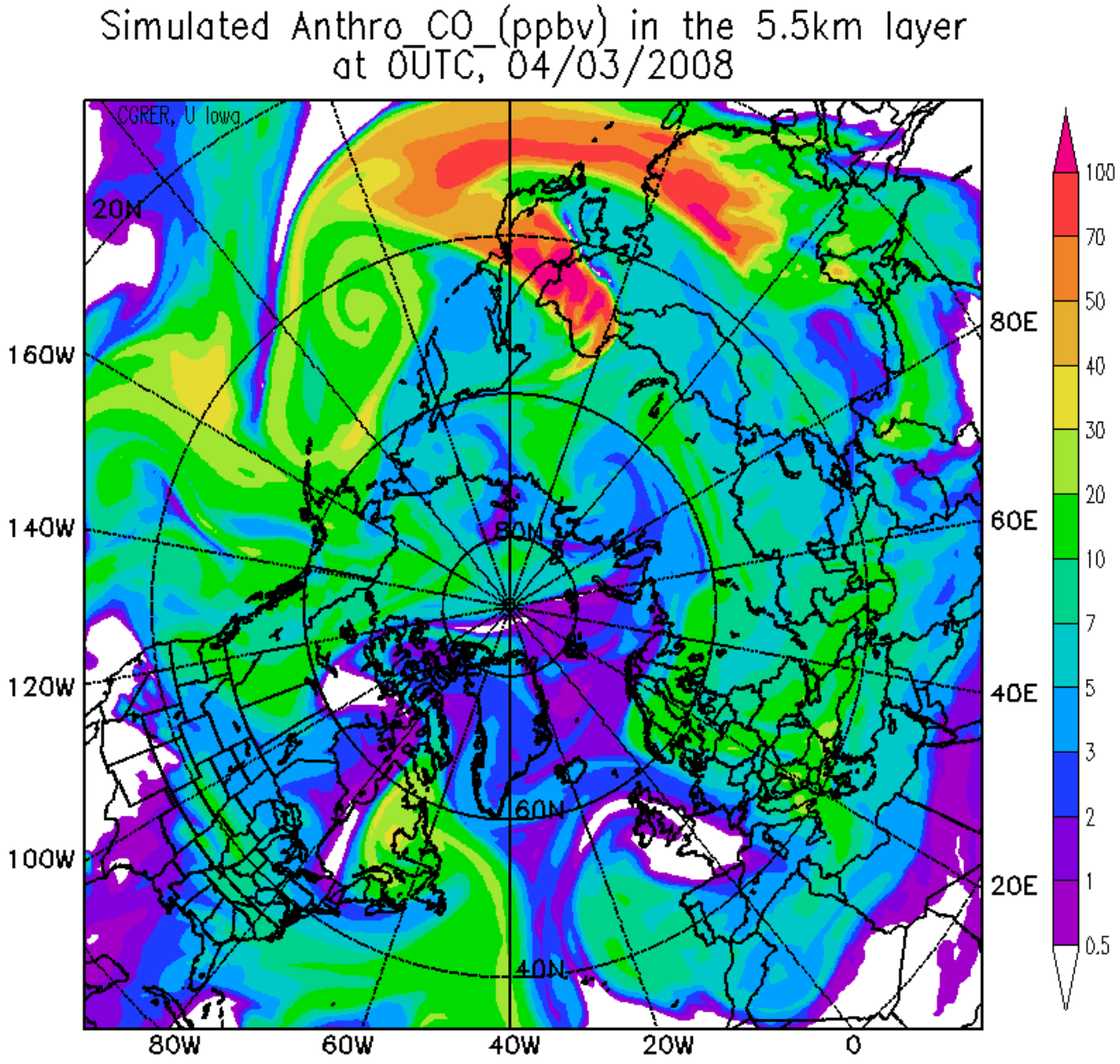
MSG2 Vis/Night April 3

NAAPS Forecasted “correctly” a similar dust event Feb 18. 2008



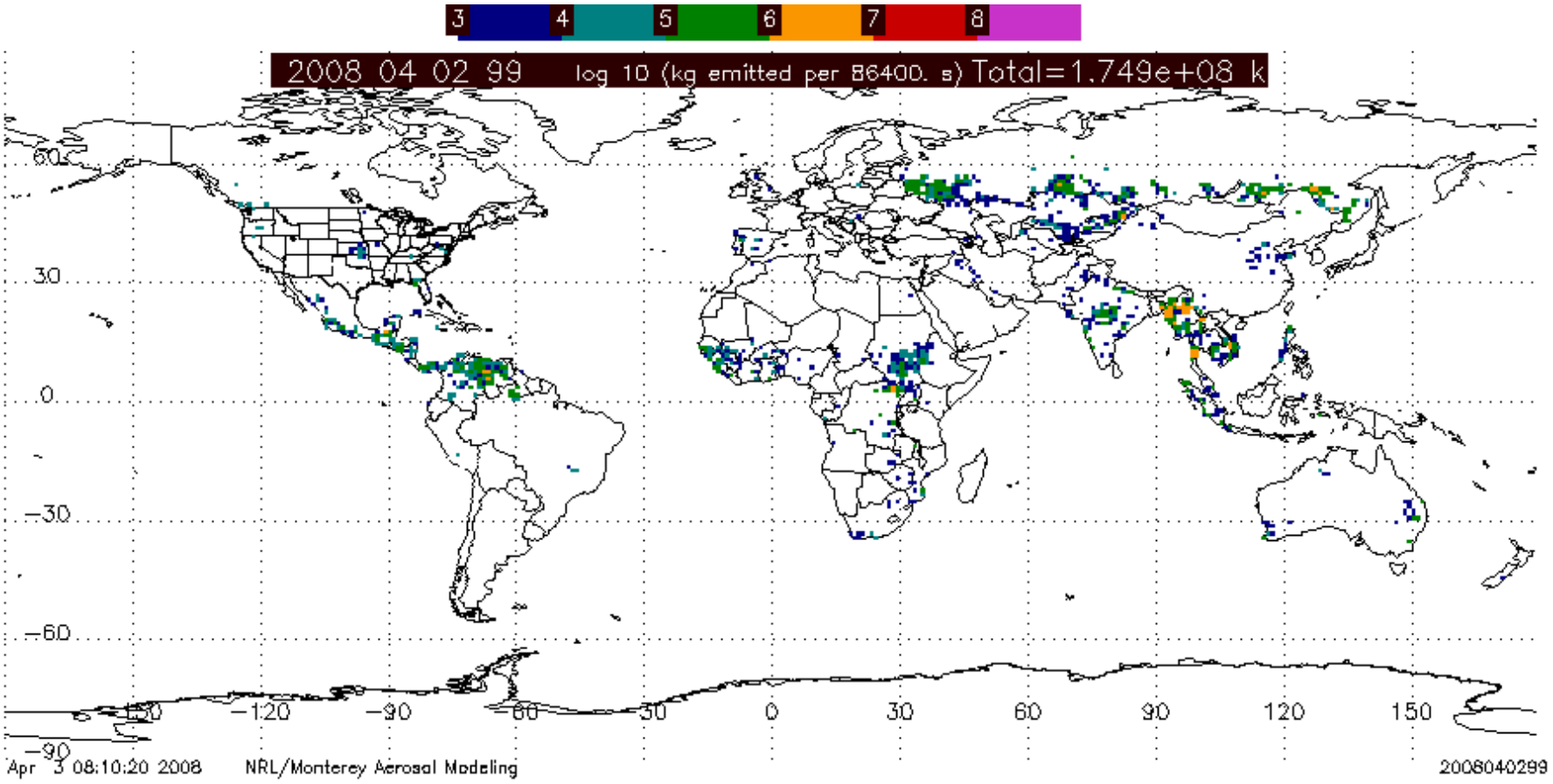




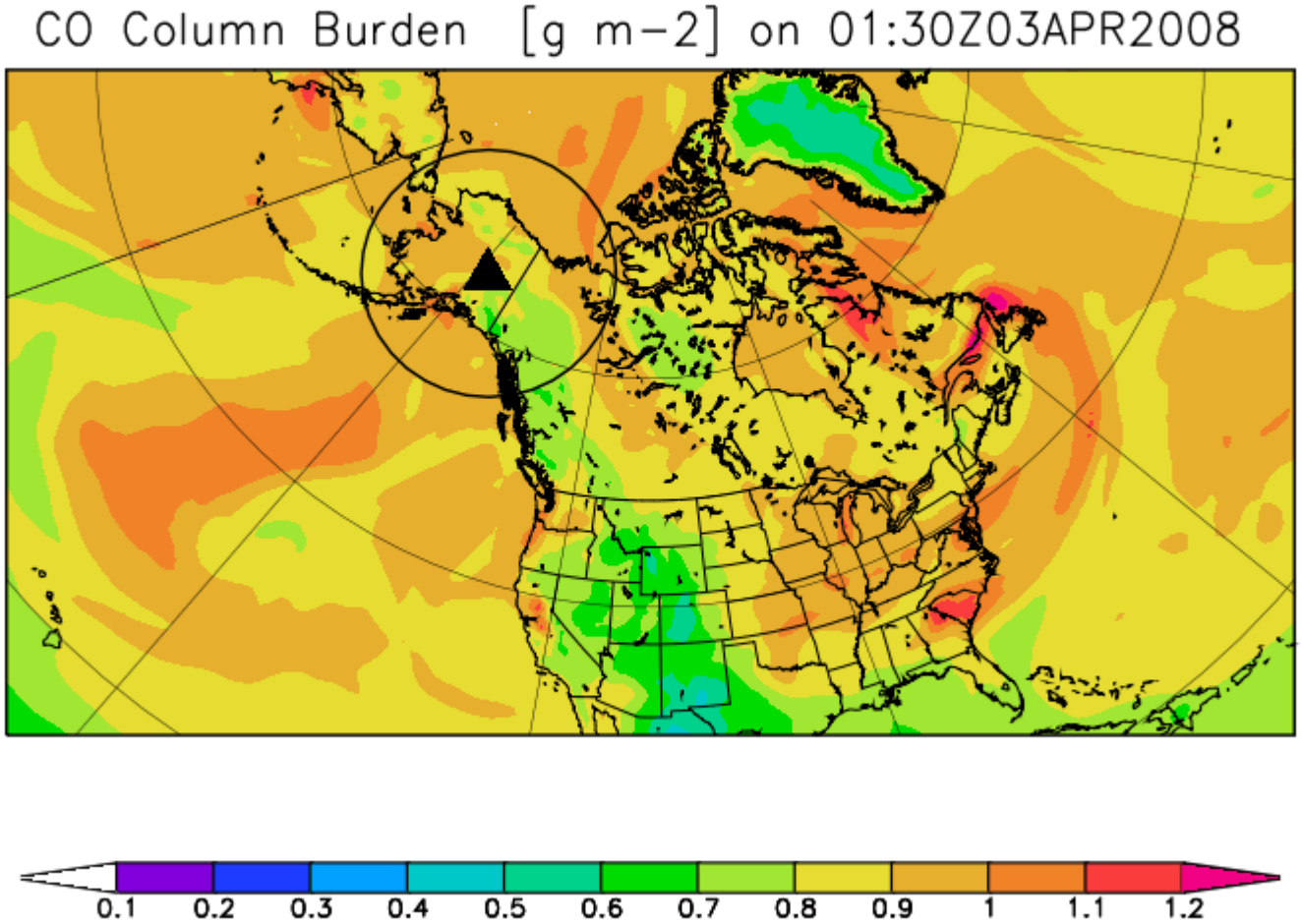


Poleward Transport of Asia Air

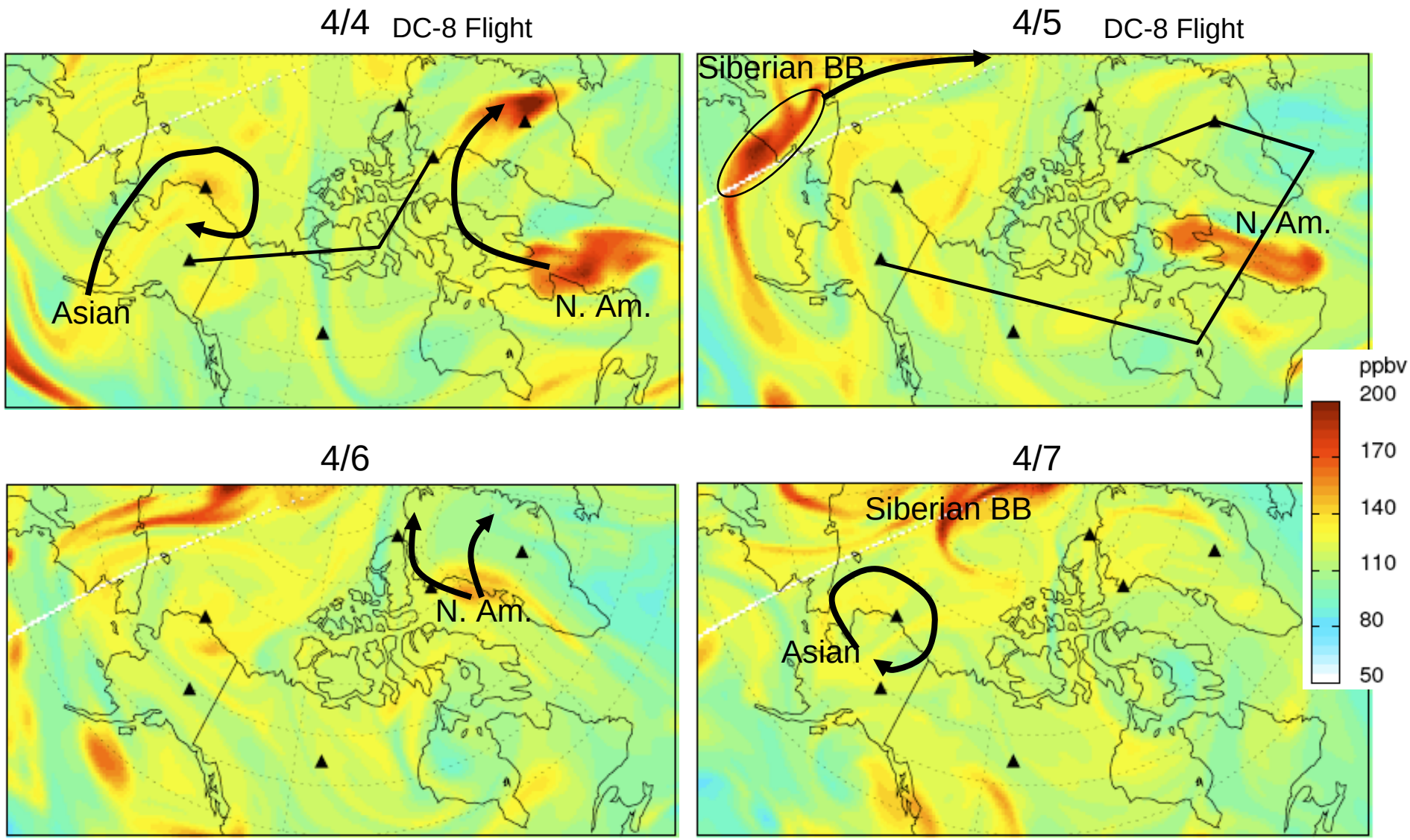
NAAPS Biomass Burning



GMAO 04/03 00Z Fx CO evolution: Apr 3 – Apr 7



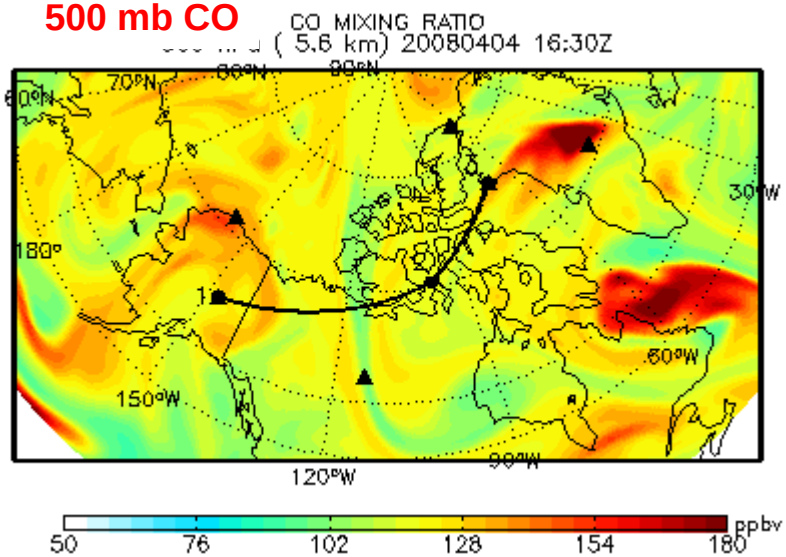
GEOS Total CO 500 hPa



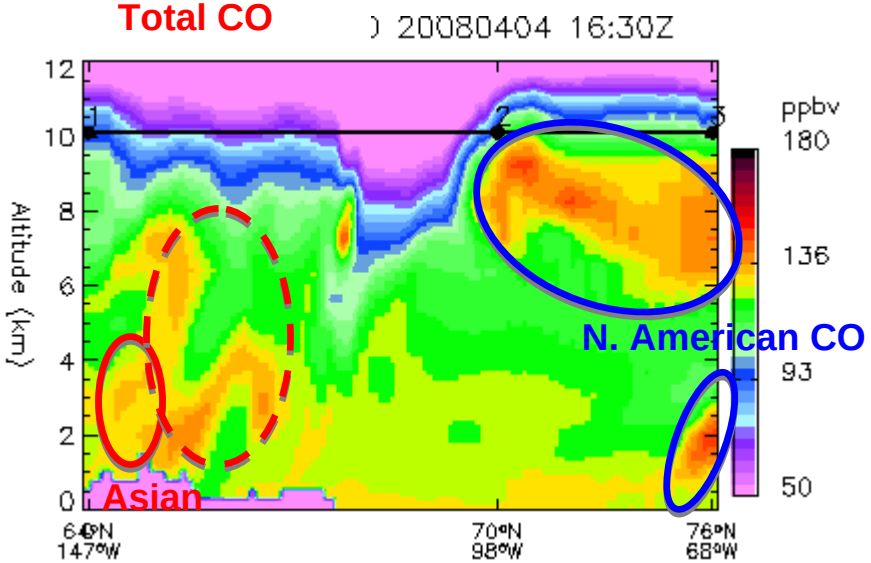
Initialized 04/03/2008 – 00z

GMAO 04/03 00Z Fx - 04/04 500 mb

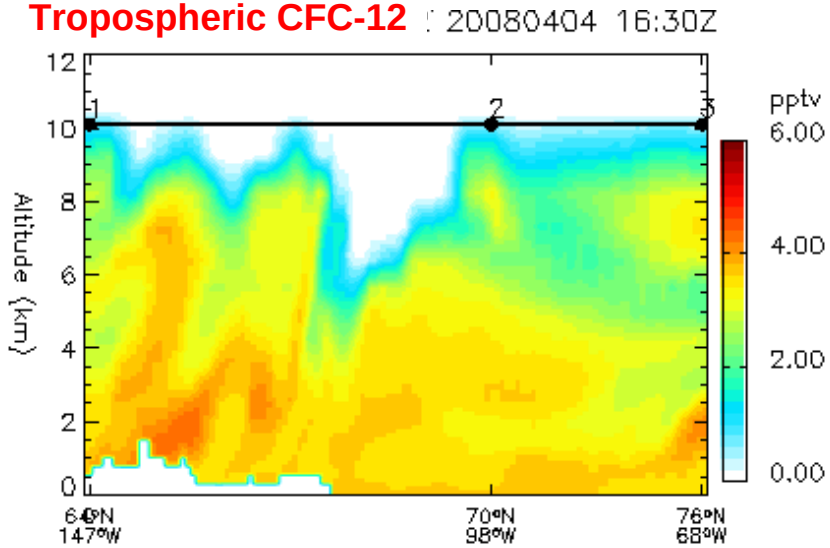
500 mb CO



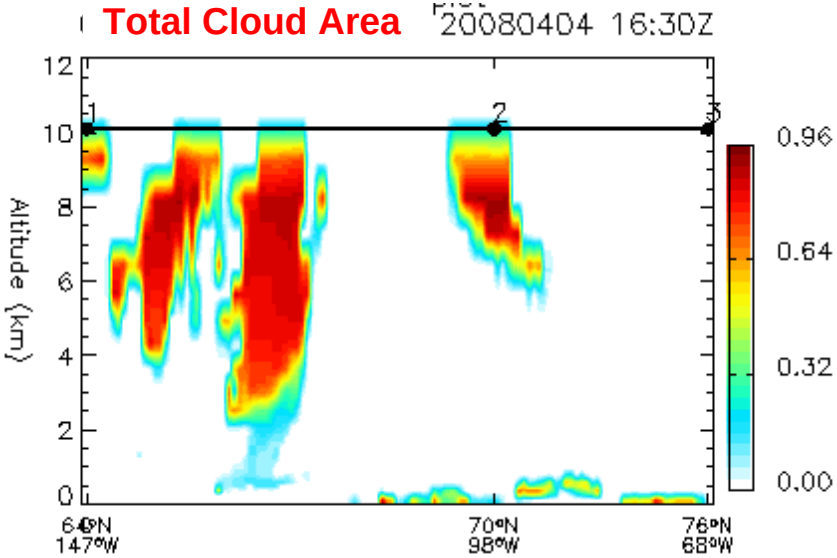
Total CO



Tropospheric CFC-12

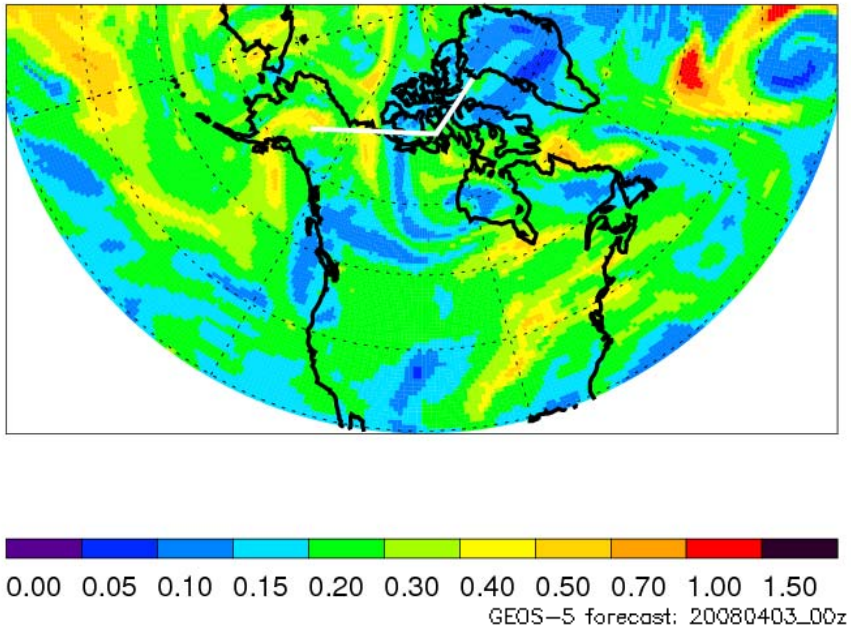


Total Cloud Area

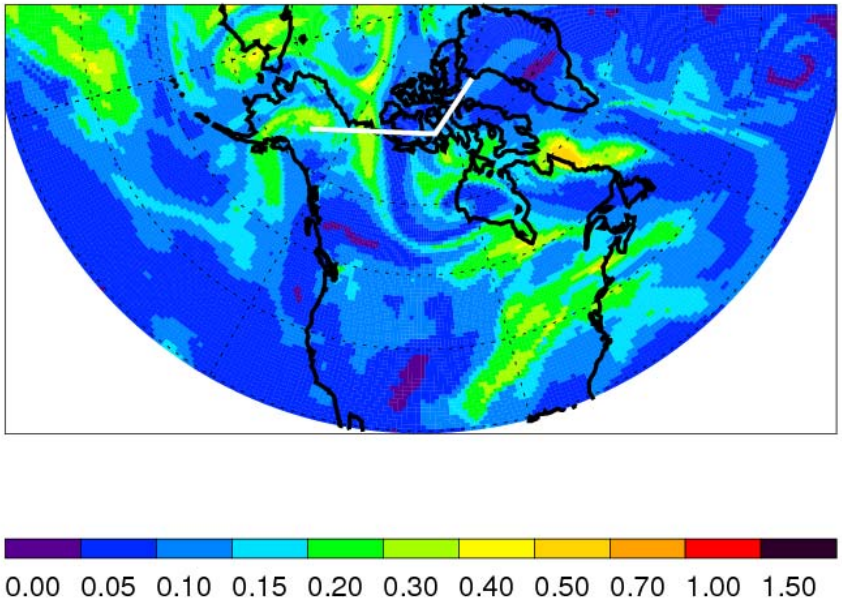


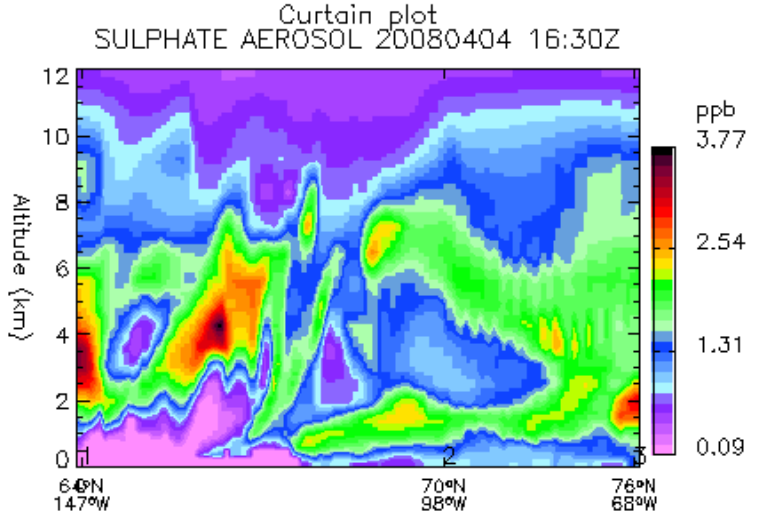
GEOS-5 Forecasts: 20080403_00Z valid @ 20080404 16:30Z

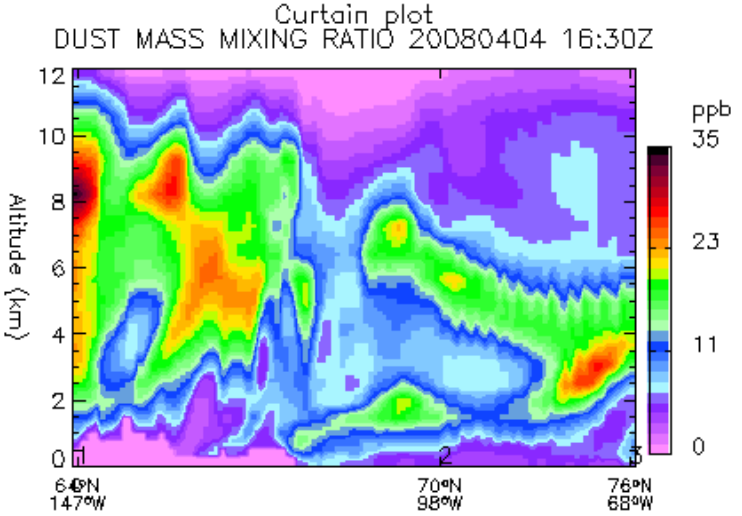
Total AOT



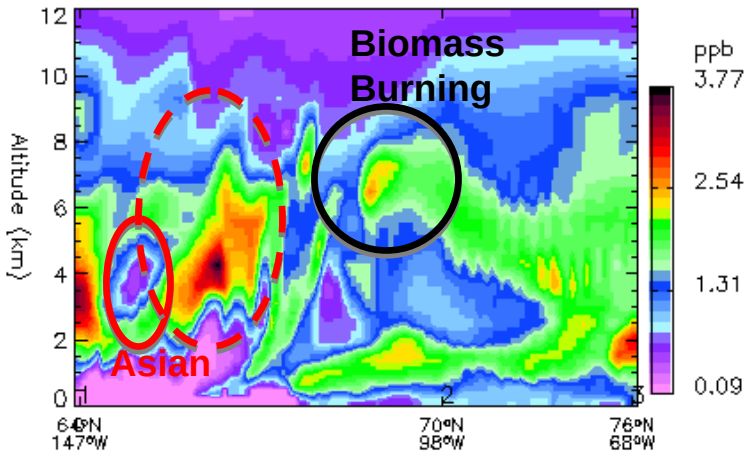
Sulfate AOT



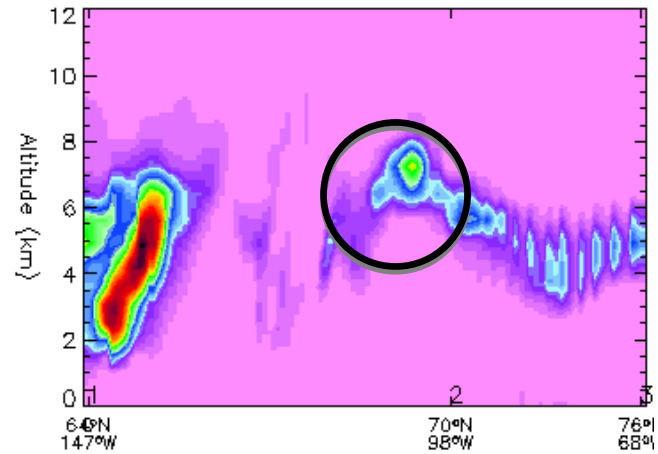




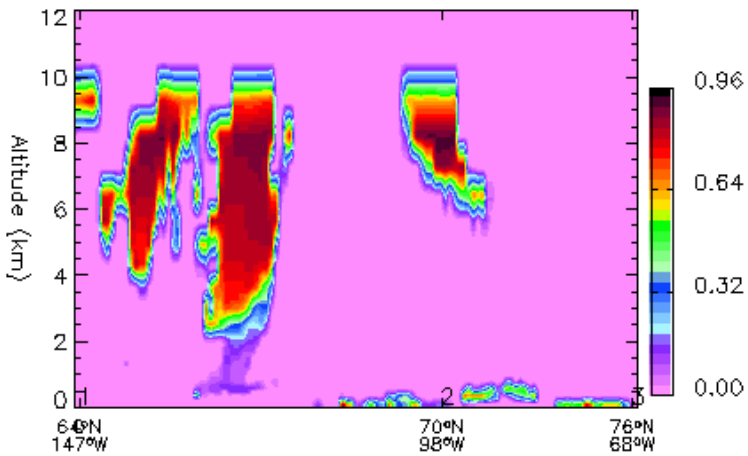
Sulfate Aerosol mmr [ppbv]



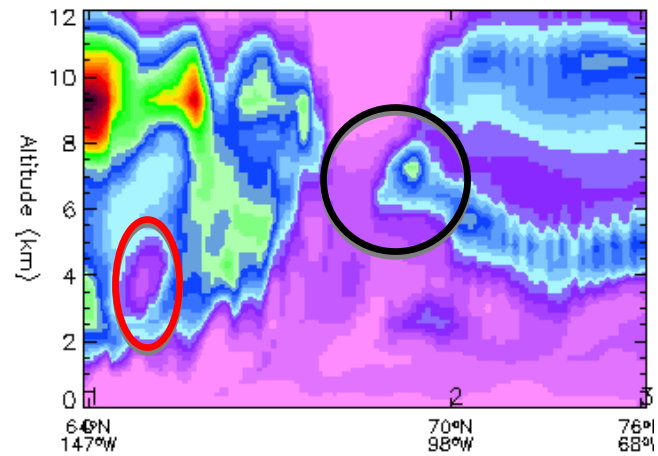
Boreal Biomass Burning OC mmr



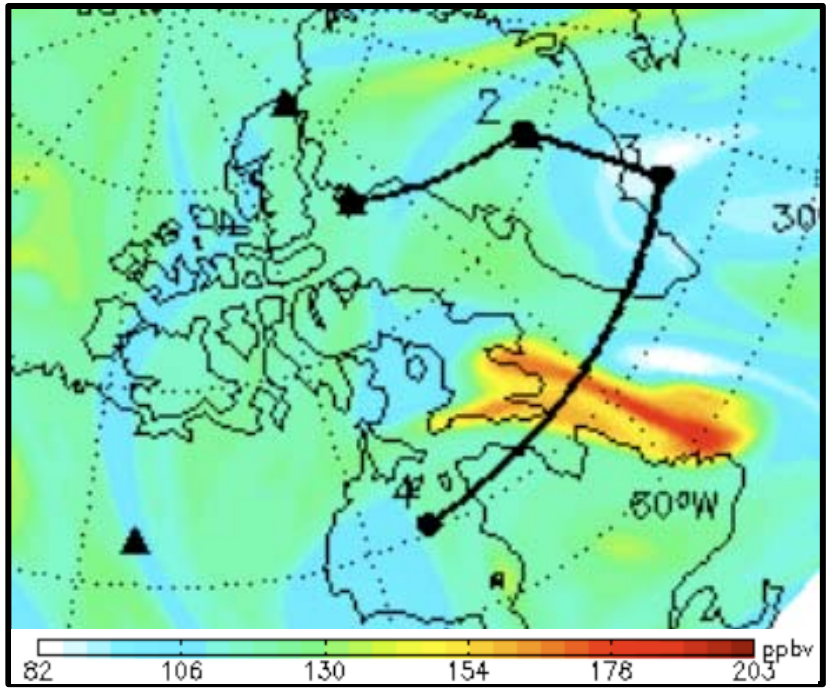
3-D Cloud Fraction



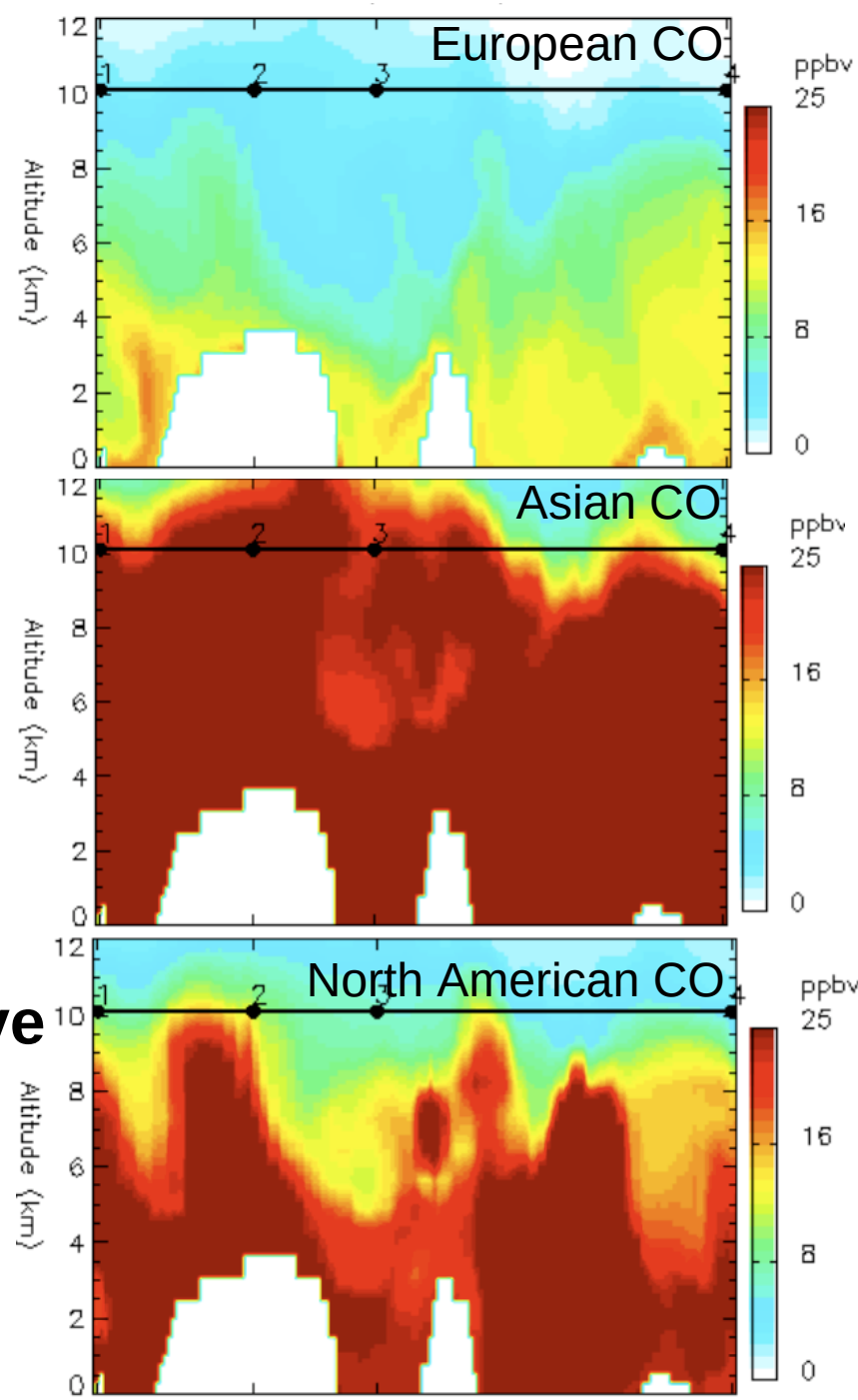
Non-boreal Biomass Burning OC mmr



Will we observe European influence by flying over Greenland on 4/5?

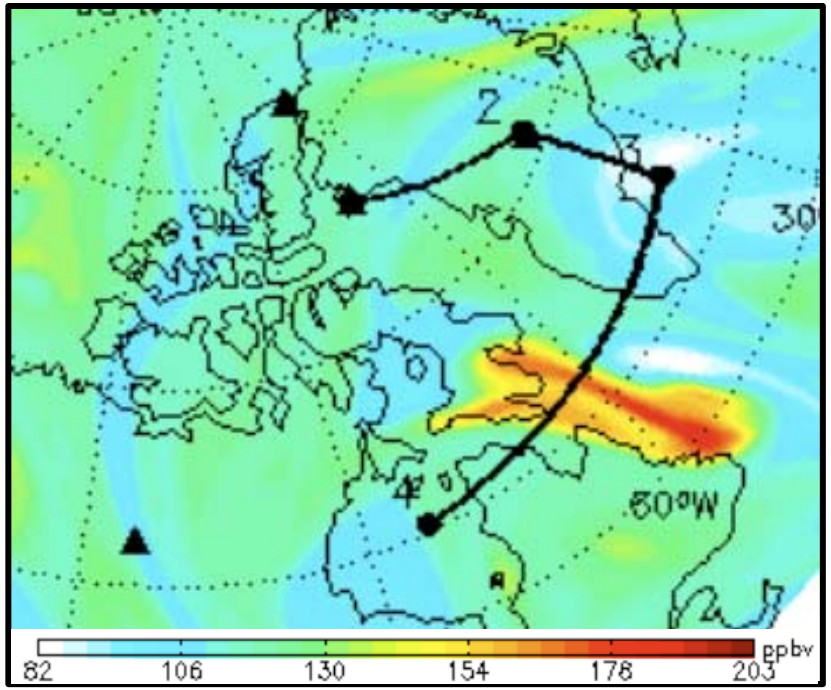


500 hPa Total CO

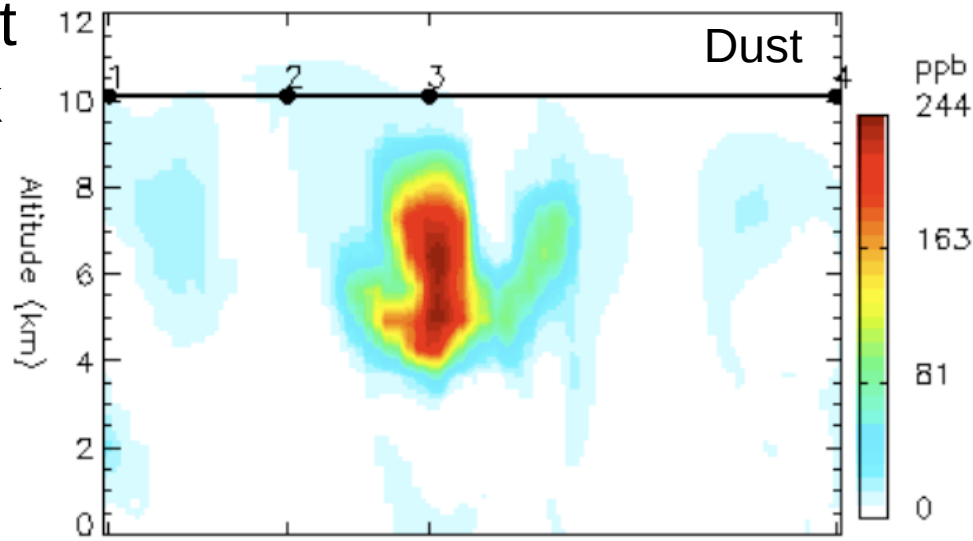


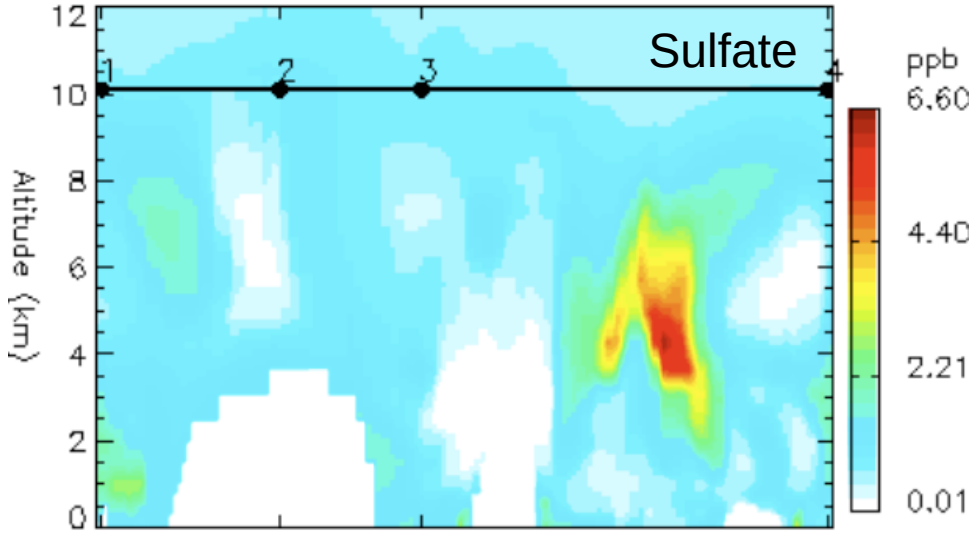
European influence is small relative to Asian and North American CO

But we do observe elevated dust and sulfate along this flight track

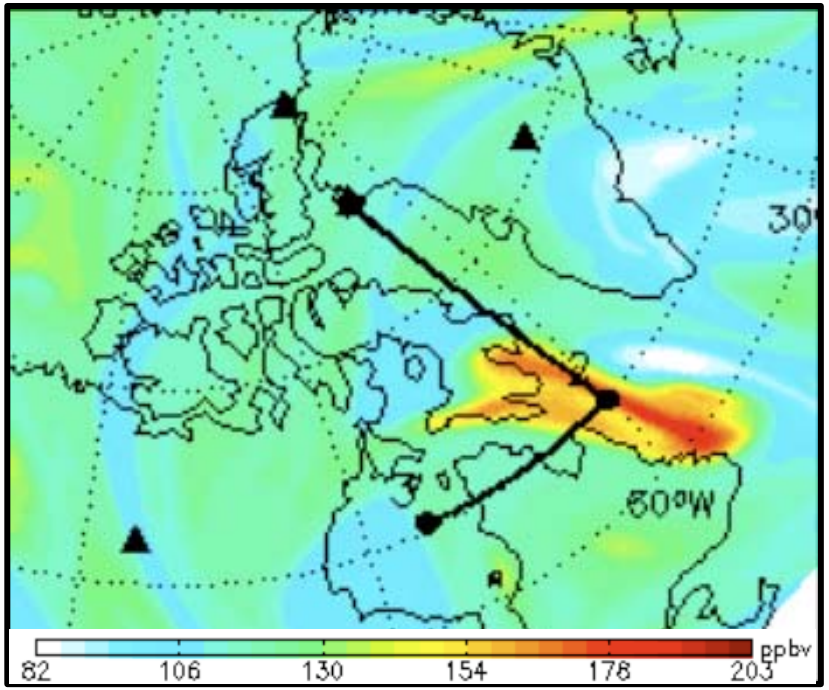


500 hPa Total CO

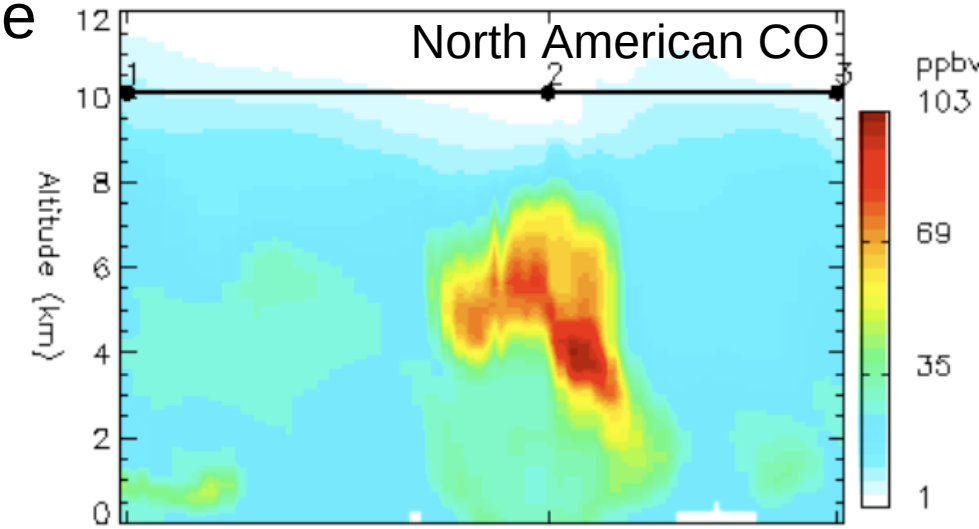


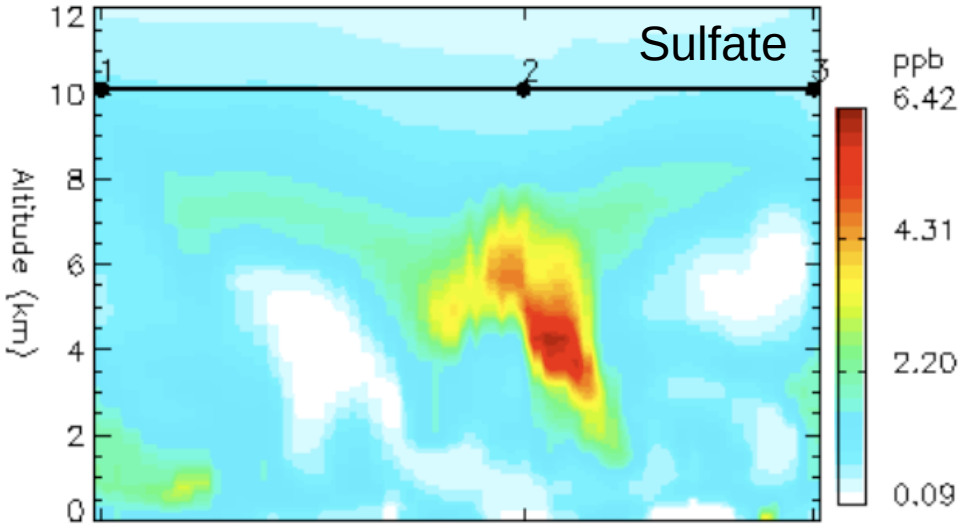


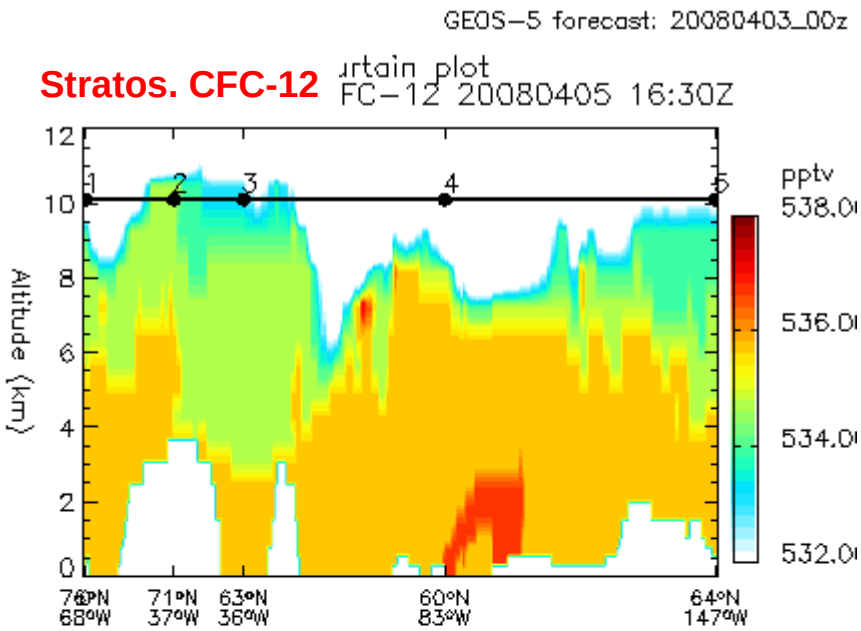
We could instead intersect plume of North American pollution

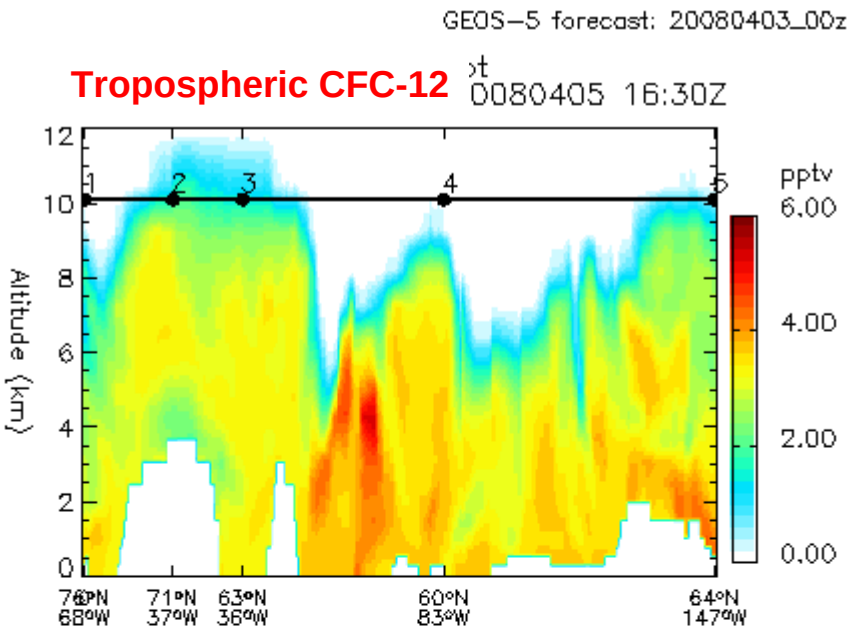


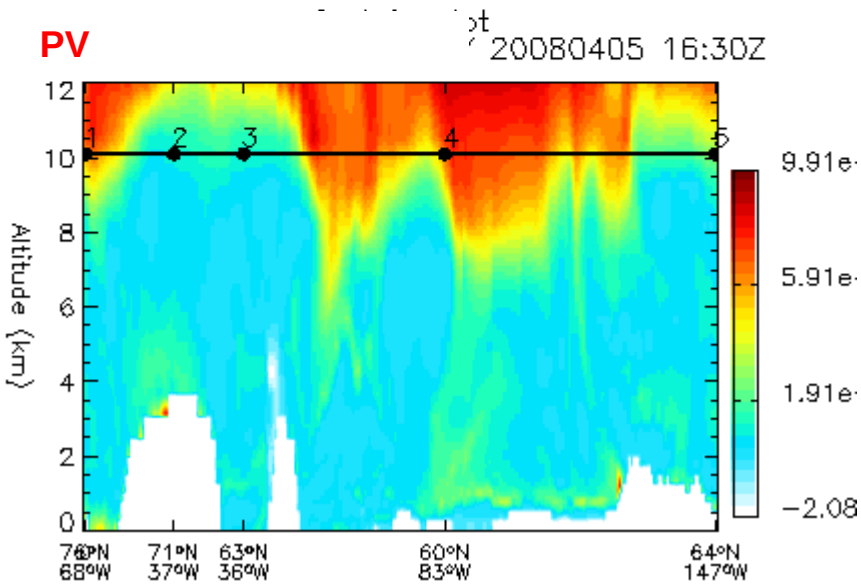
500 hPa Total CO

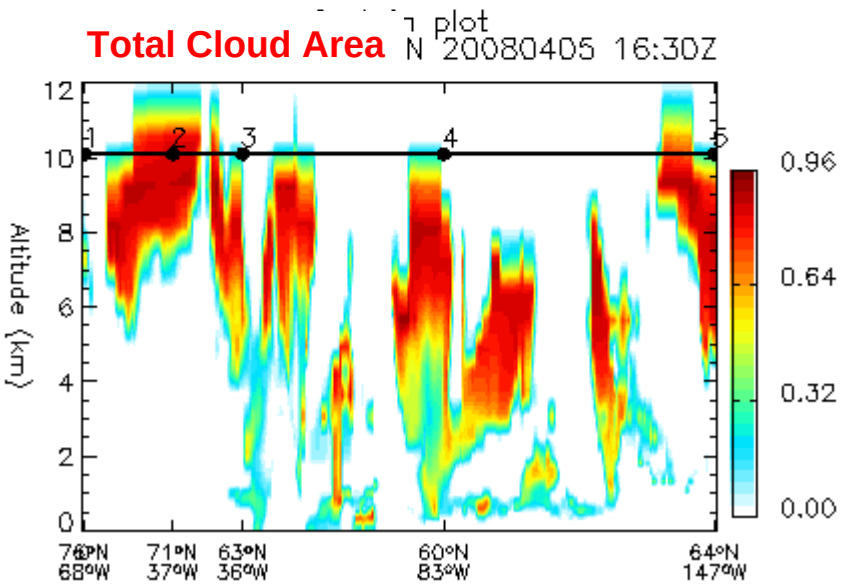





GEOS-5 forecast: 20080403_00z
Stratos. CFC-12
FC-12 20080405 16:30Z
pptv
538.0
536.0
534.0
532.0
Altitude (km)
76°N 68°W
71°N 37°W
63°N 36°W
60°N 83°W
64°N 147°W

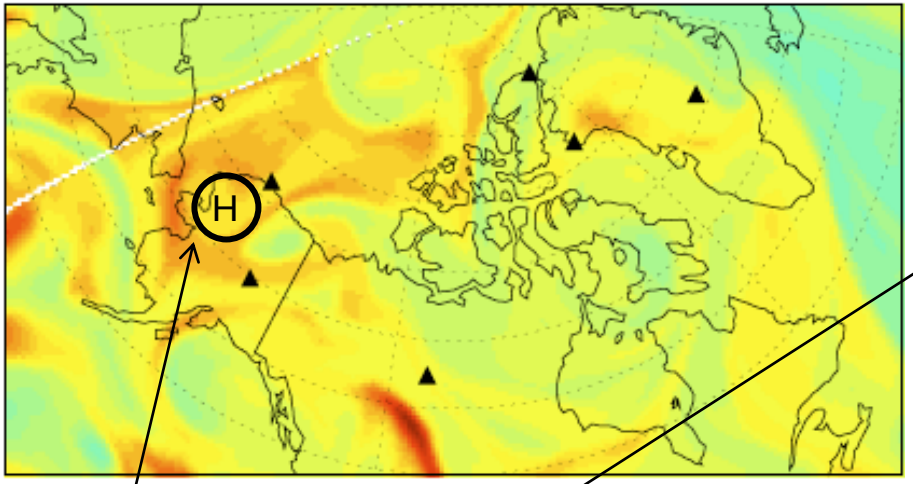

GEOS-5 forecast: 20080403_00z
Tropospheric CFC-12
0080405 16:30Z
pptv
6.00
4.00
2.00
0.00
Altitude (km)
76°N 68°W
71°N 37°W
63°N 36°W
60°N 83°W
64°N 147°W


PV
20080405 16:30Z
9.91e
5.91e
1.91e
−2.08
Altitude (km)
76°N 68°W
71°N 37°W
63°N 36°W
60°N 83°W
64°N 147°W

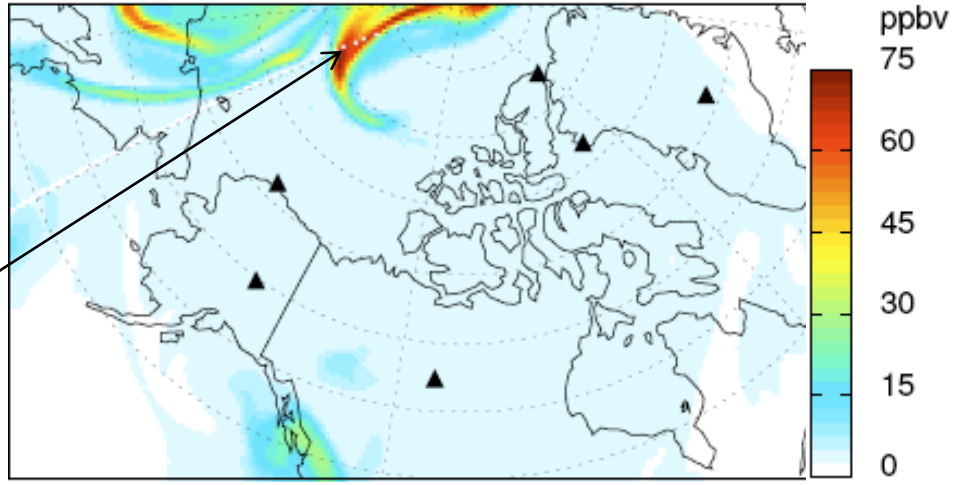

Total Cloud Area
20080405 16:30Z
0.96
0.64
0.32
0.00
Altitude (km)
76°N 68°W
71°N 37°W
63°N 36°W
60°N 83°W
64°N 147°W

DC-8 Flight Opportunity: 4/7

Asian CO 500 hPa



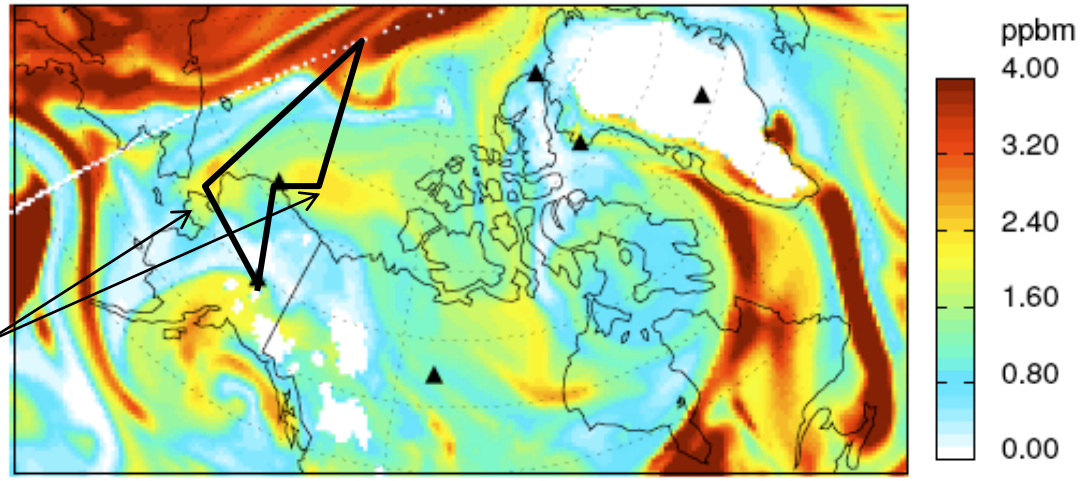
Boreal BB CO 500 hPa



Sulfate 850 hPa

Low altitude,
direct transport

Subsiding pathway

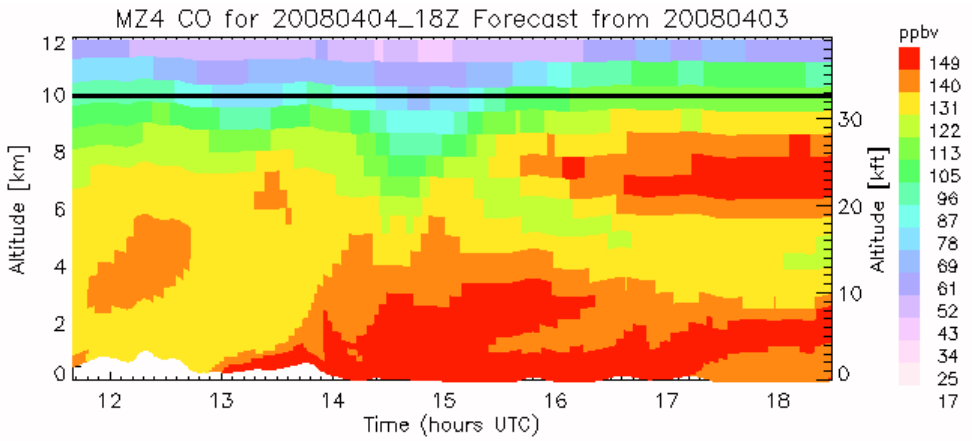


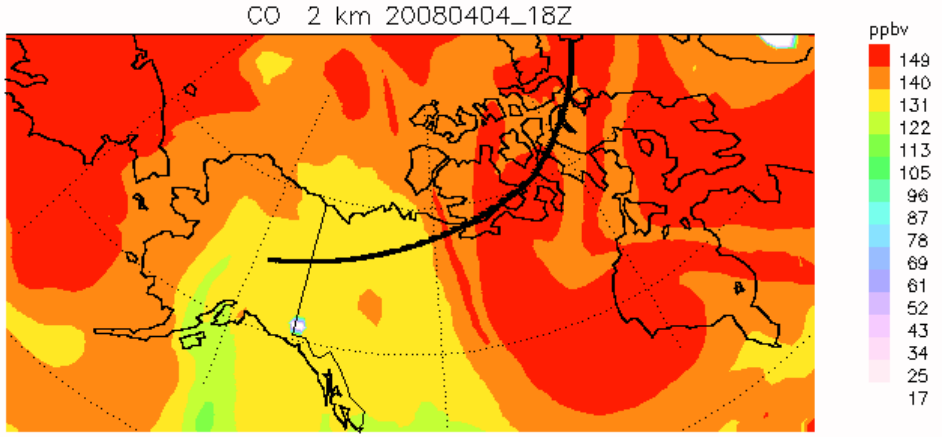
Initialized 04/03/2008 – 00z

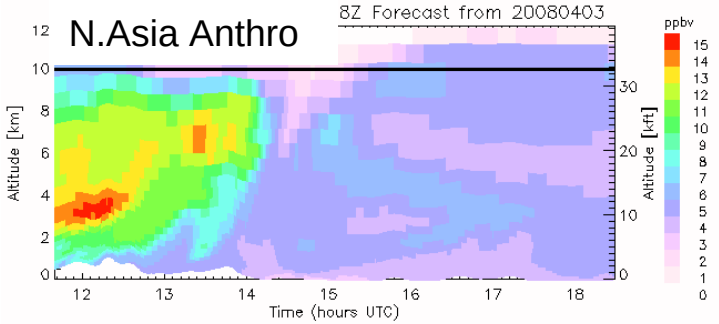
Apr 4 Fairbanks - Thule

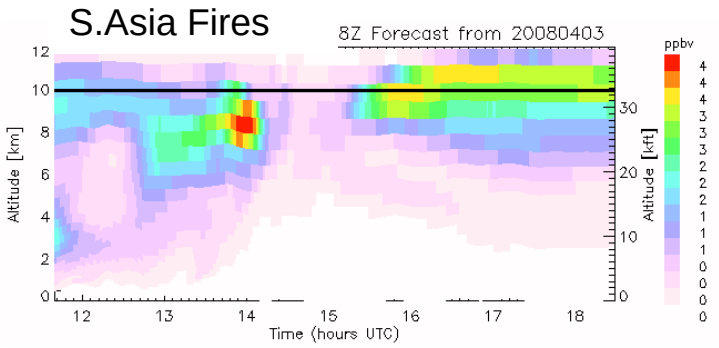
MZ4 forecast from Apr 3 for Apr 4 18Z

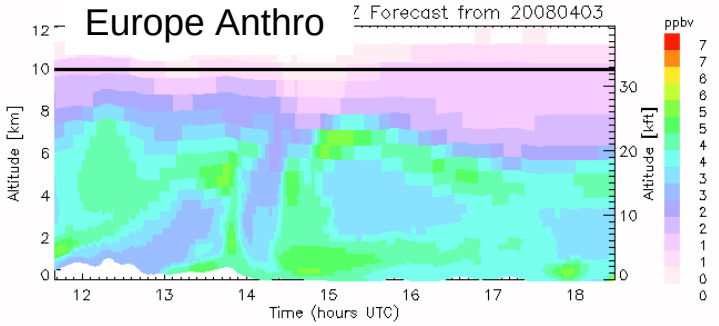
Asian Pollution at beginning of track
Weak SE Asia biomass burning at 8 km
N-American at 8km and 2 km towards Thule
European Pollution mixed throughout trop

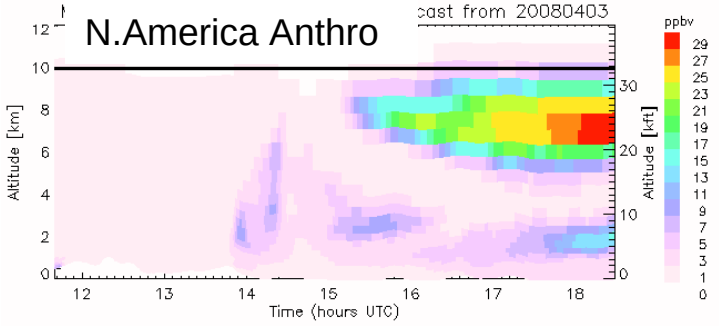










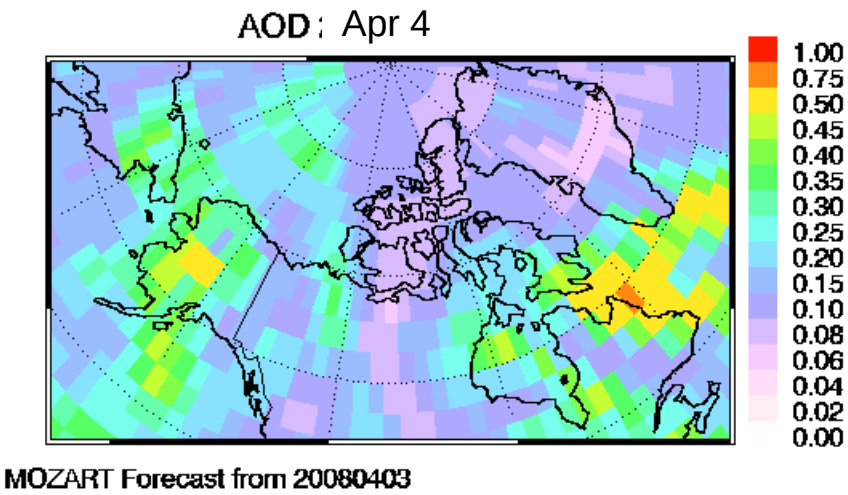


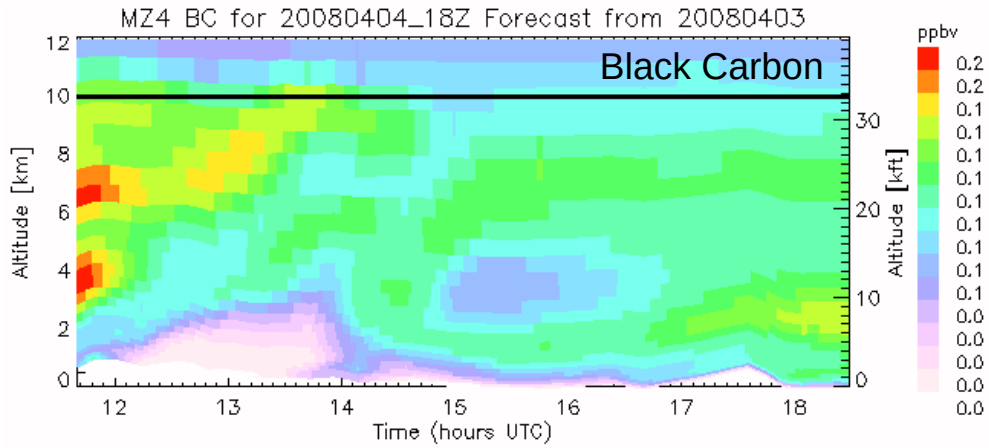
Apr 4 Fairbanks - Thule

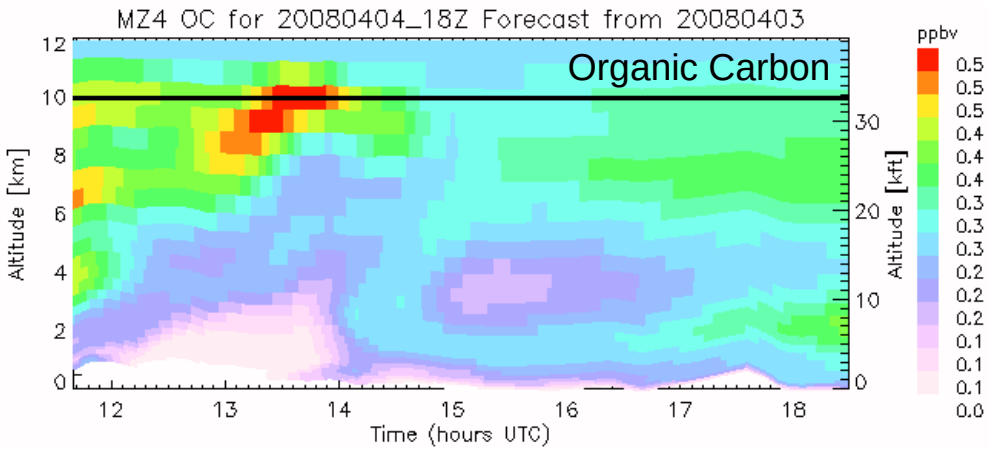
MOZART-4 for Apr 4 18Z

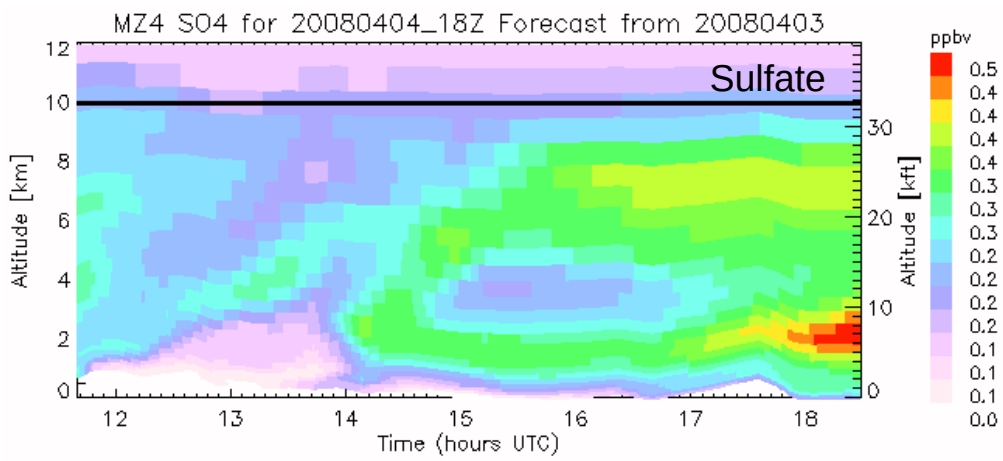
Aerosols from full chemistry, coarser resolution forecasts

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







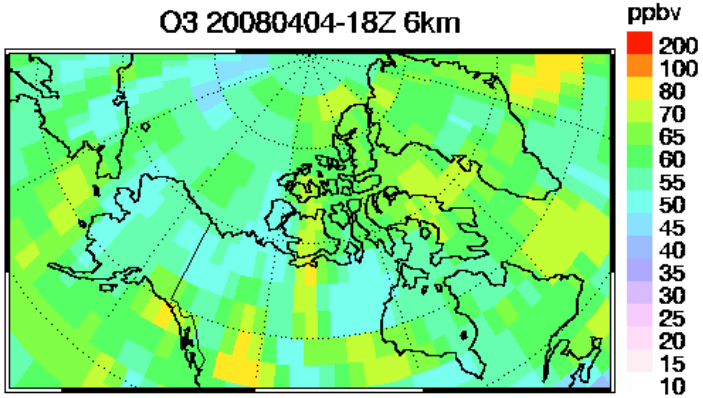


Apr 4 Fairbanks - Thule

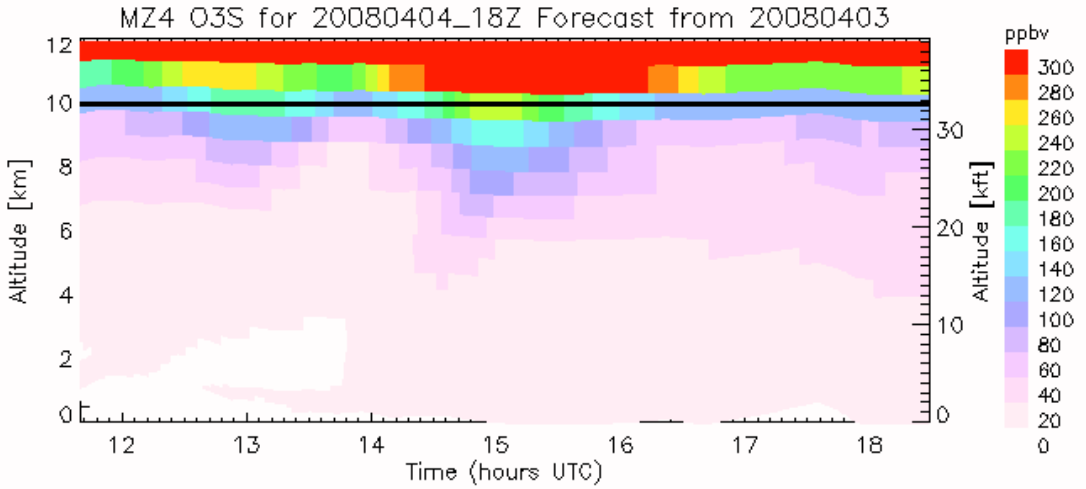
MZ4 forecast from Apr 3 for Apr 4 18Z

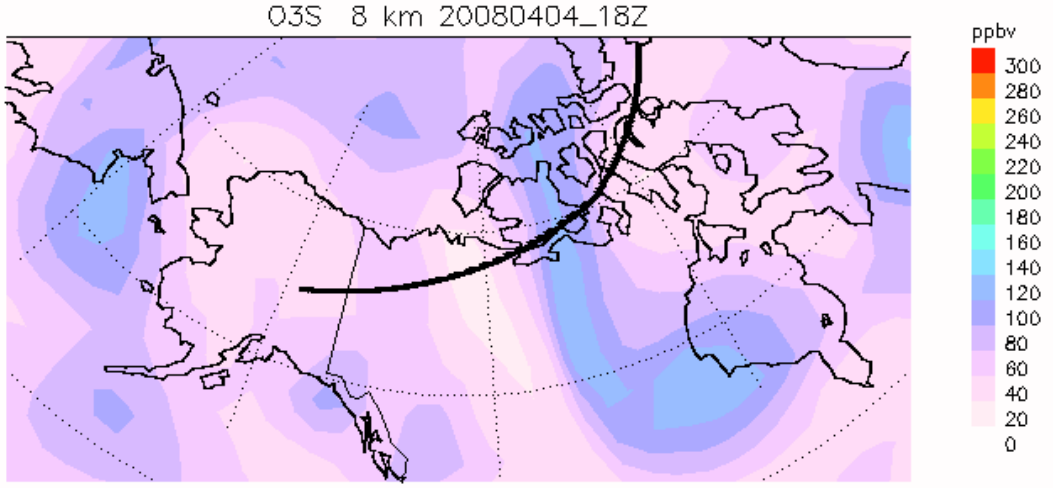
Also expect stratospheric influence

Ozone at 6km



MOZART Forecast from 20080403



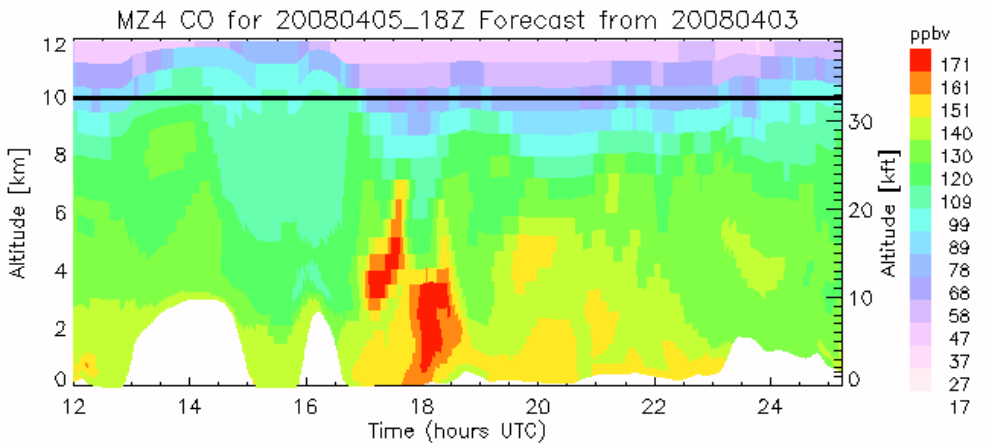


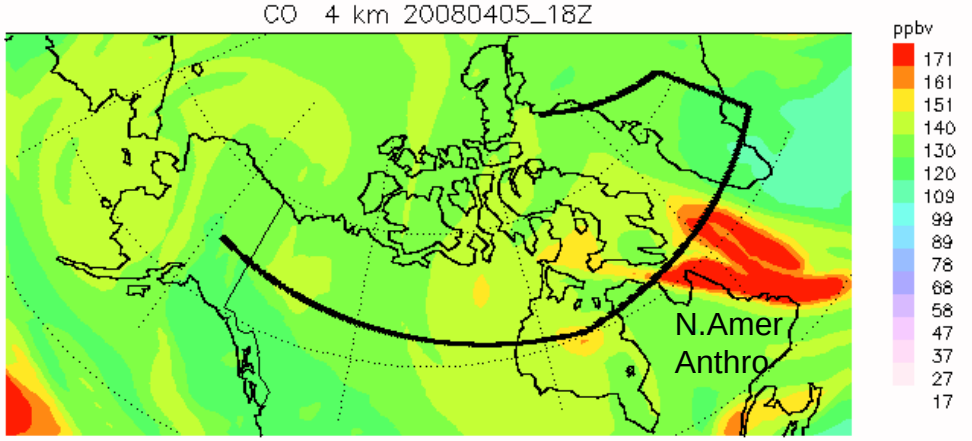
Apr 5 Thule - Fairbanks

MZ4 forecast from Apr 3 for Apr 5 18Z

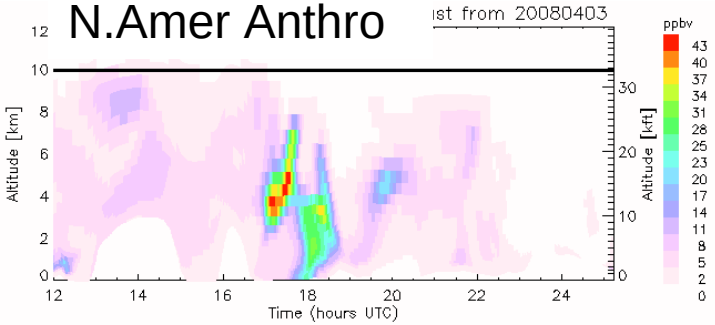
Asian, with some European pollution over Greenland
Freshest N.Amer. Pollution S of Ellesmere I

MOZART CO

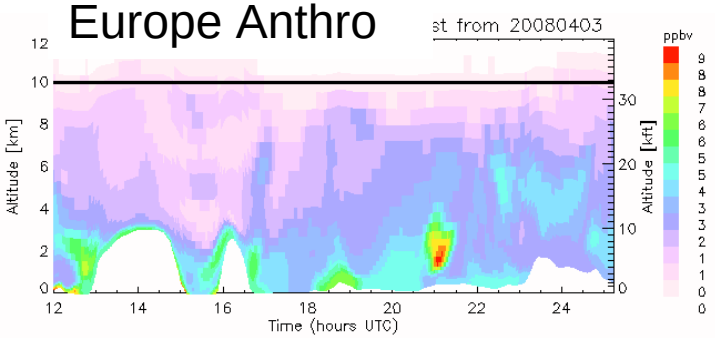




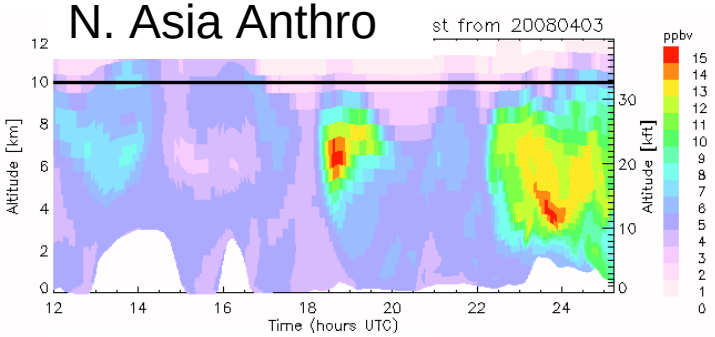
N.Amer Anthro



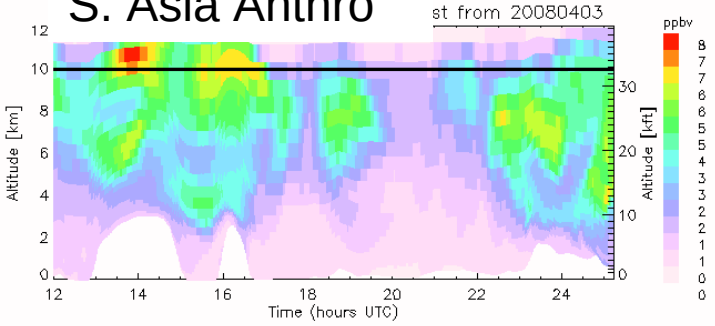
Europe Anthro



N. Asia Anthro

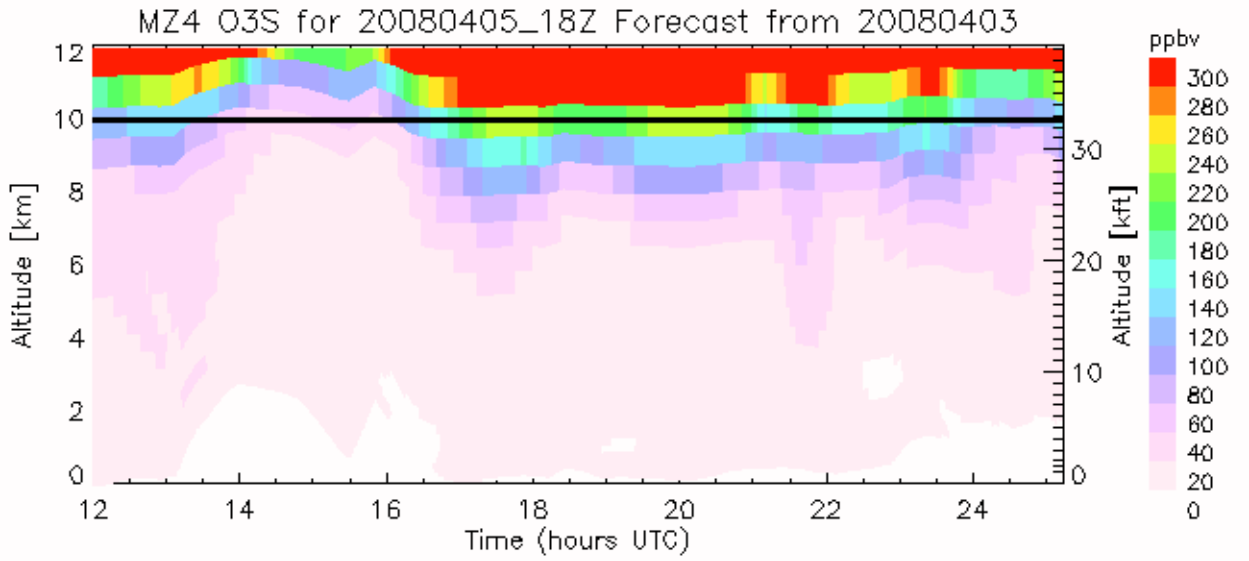


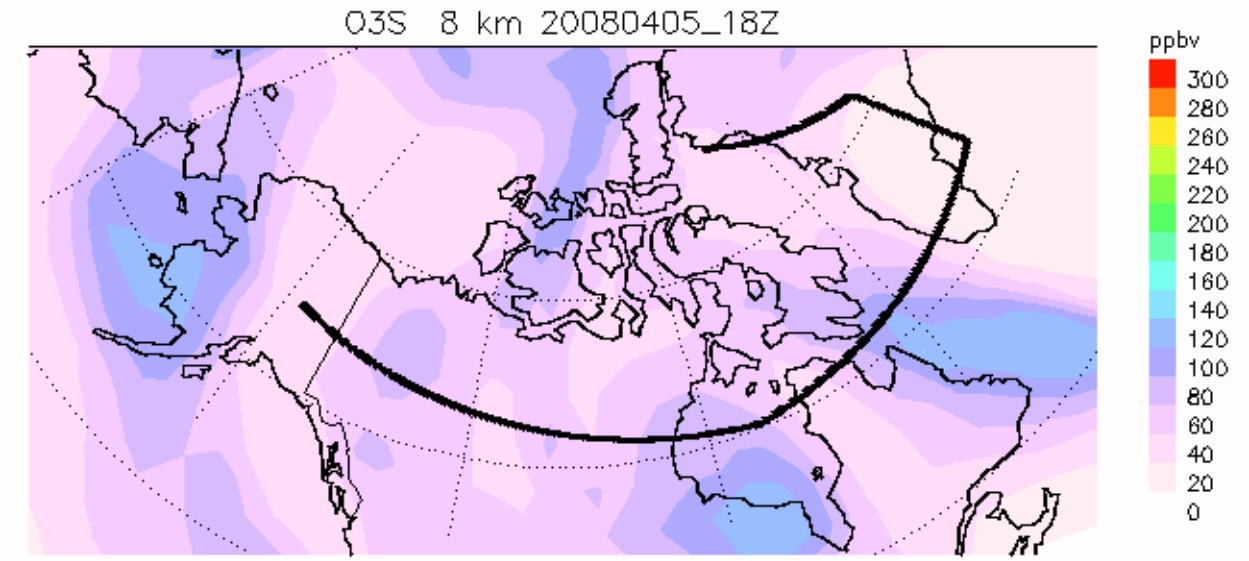
S. Asia Anthro



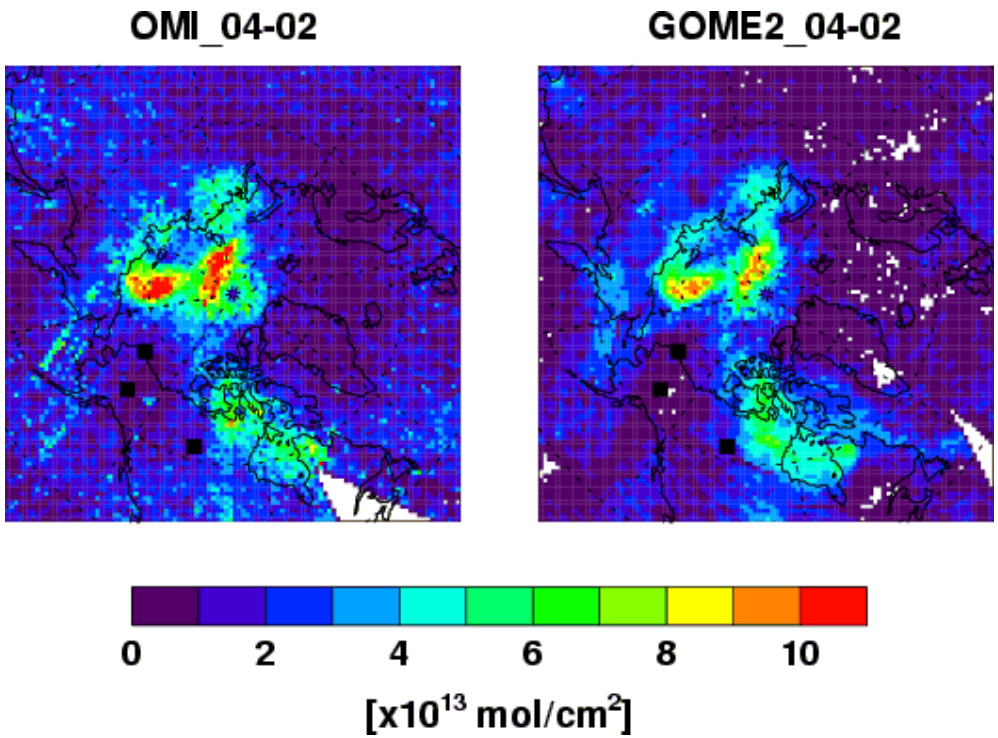
Apr 5 Thule - Fairbanks

MZ4 forecast for Apr 5 18Z

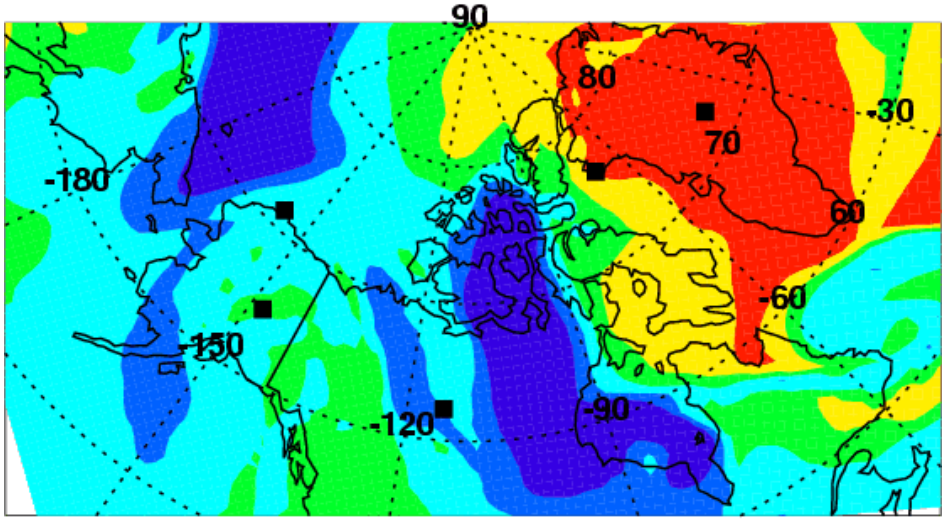




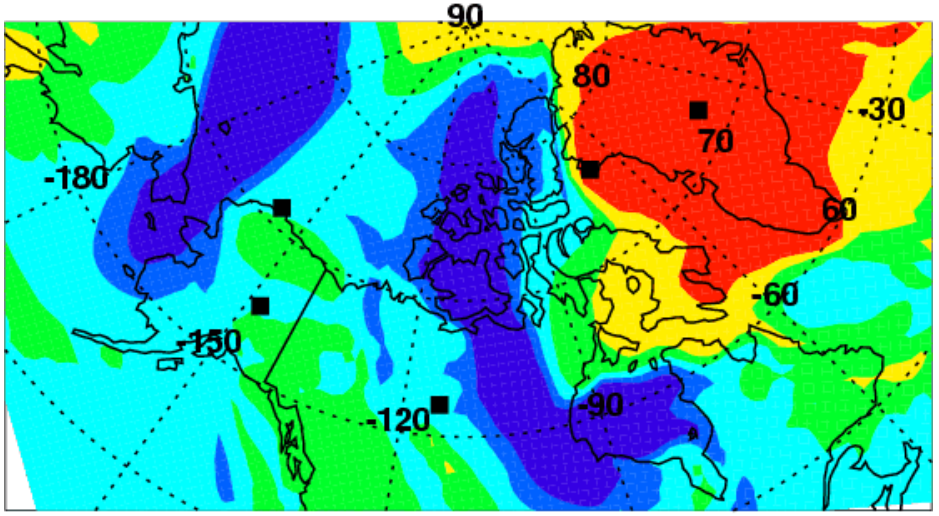
Boundary BrO

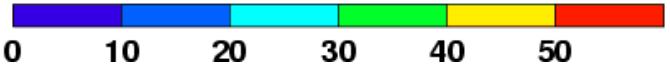


O_3 (ppbv) at surface,Apr-04_2000 UTC

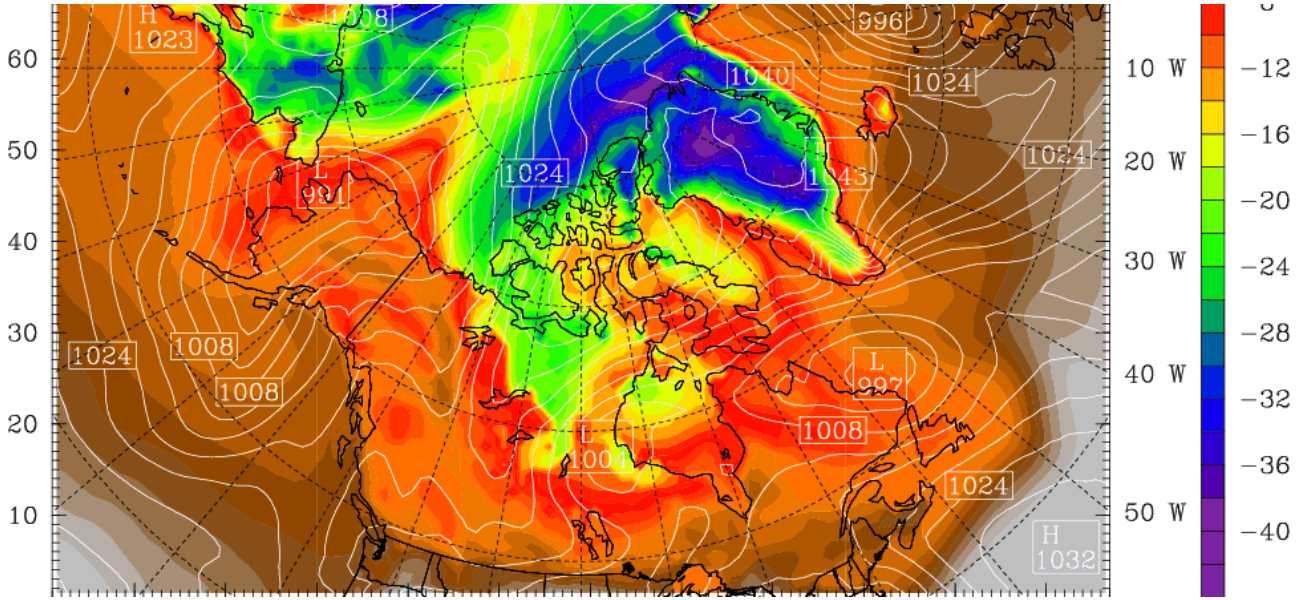


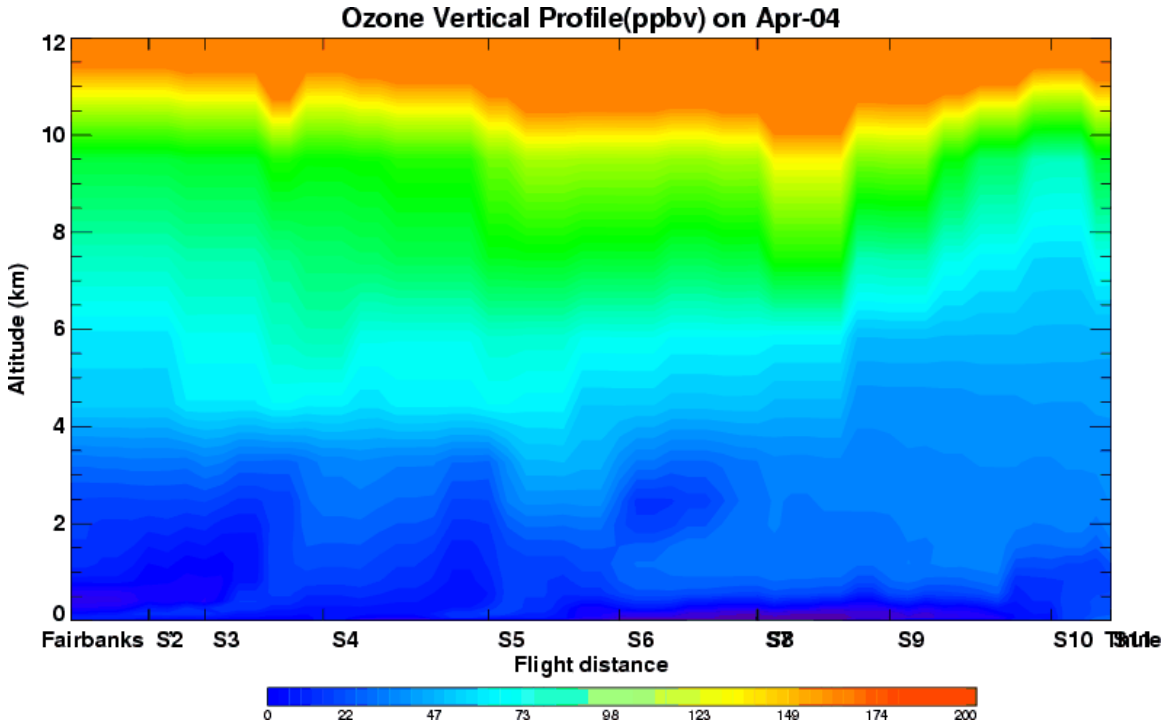
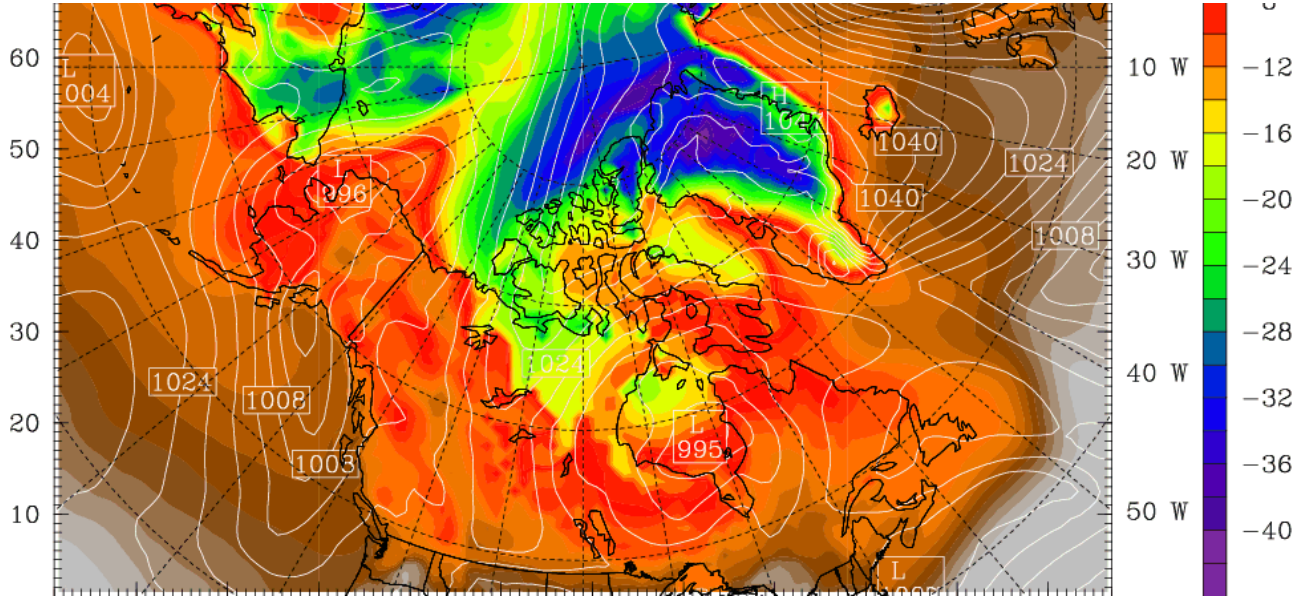
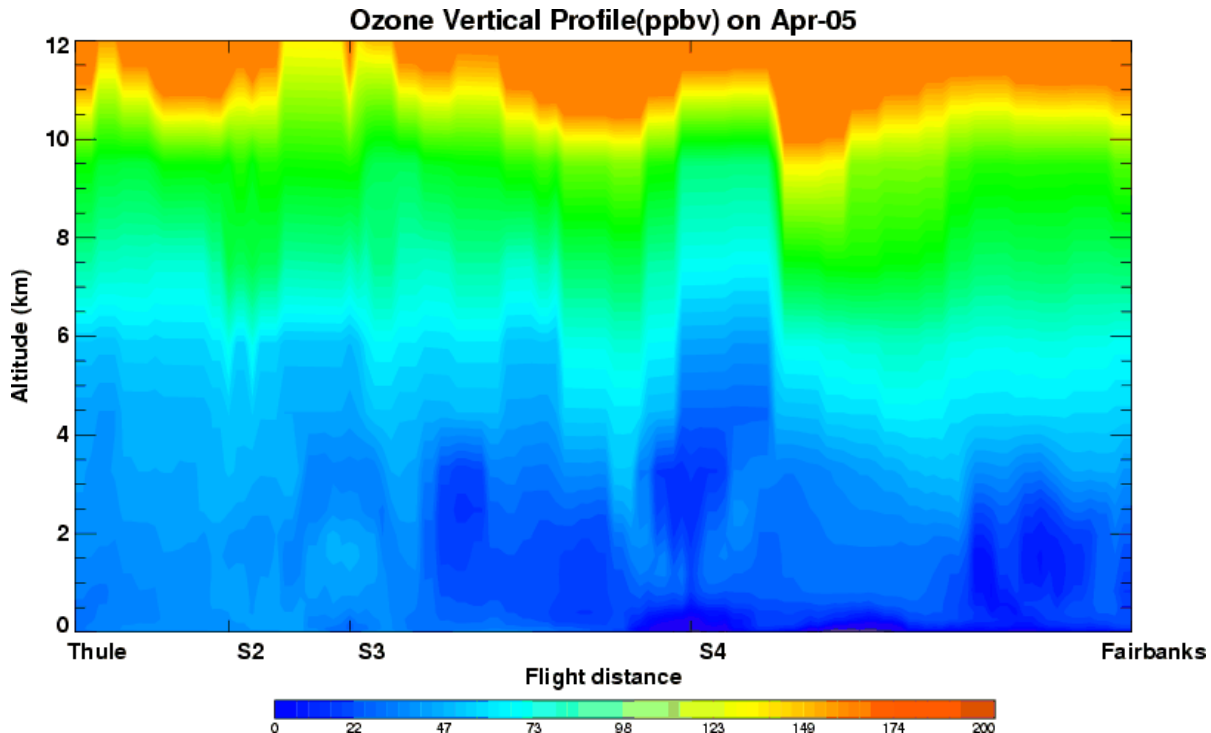
O_3 (ppbv) at surface,Apr-05_2000 UTC





O_3 and met profiles from Fairbanks - Thule on 4/4





O_3 and met profiles from Fairbanks - Thule on 4/5