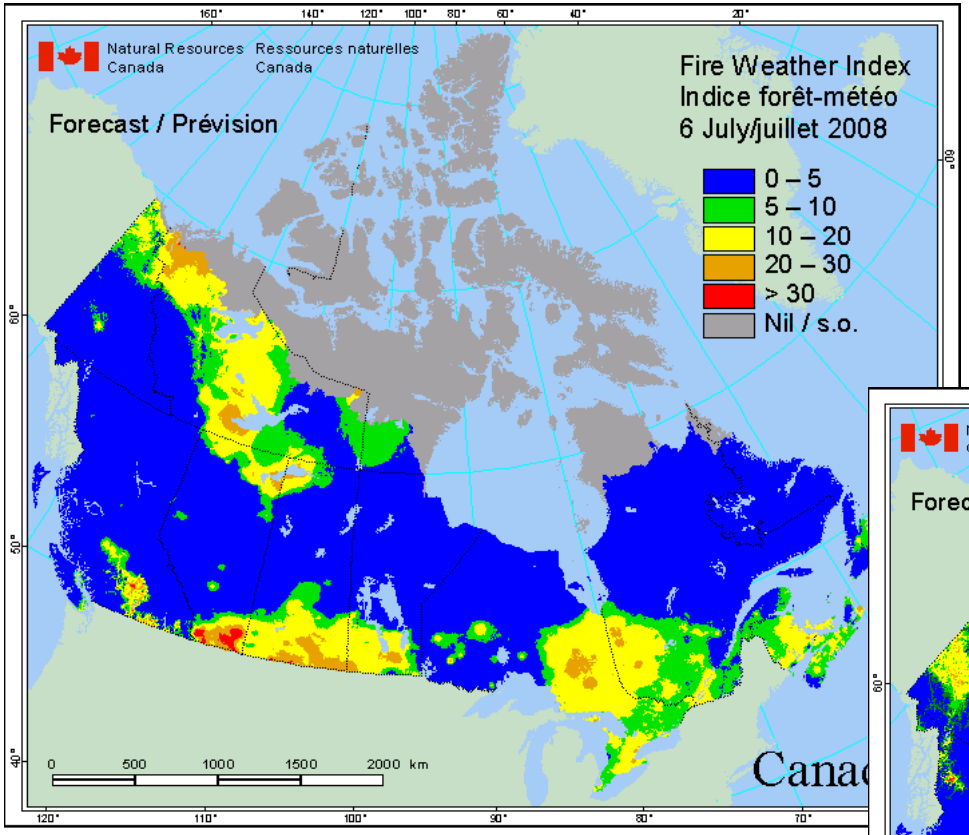
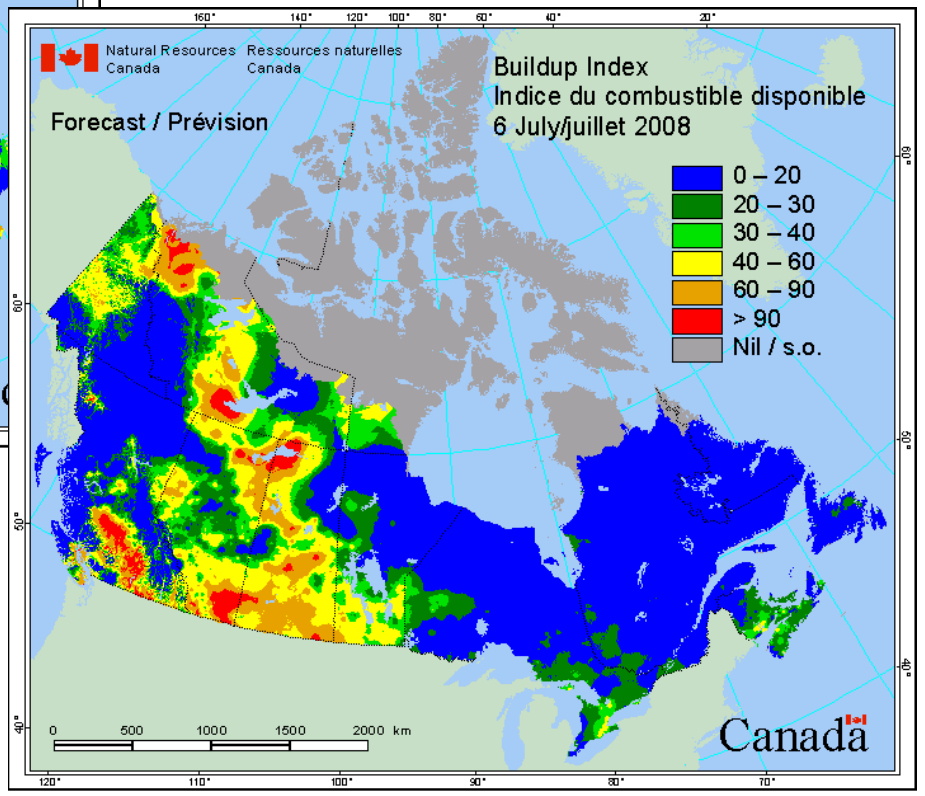
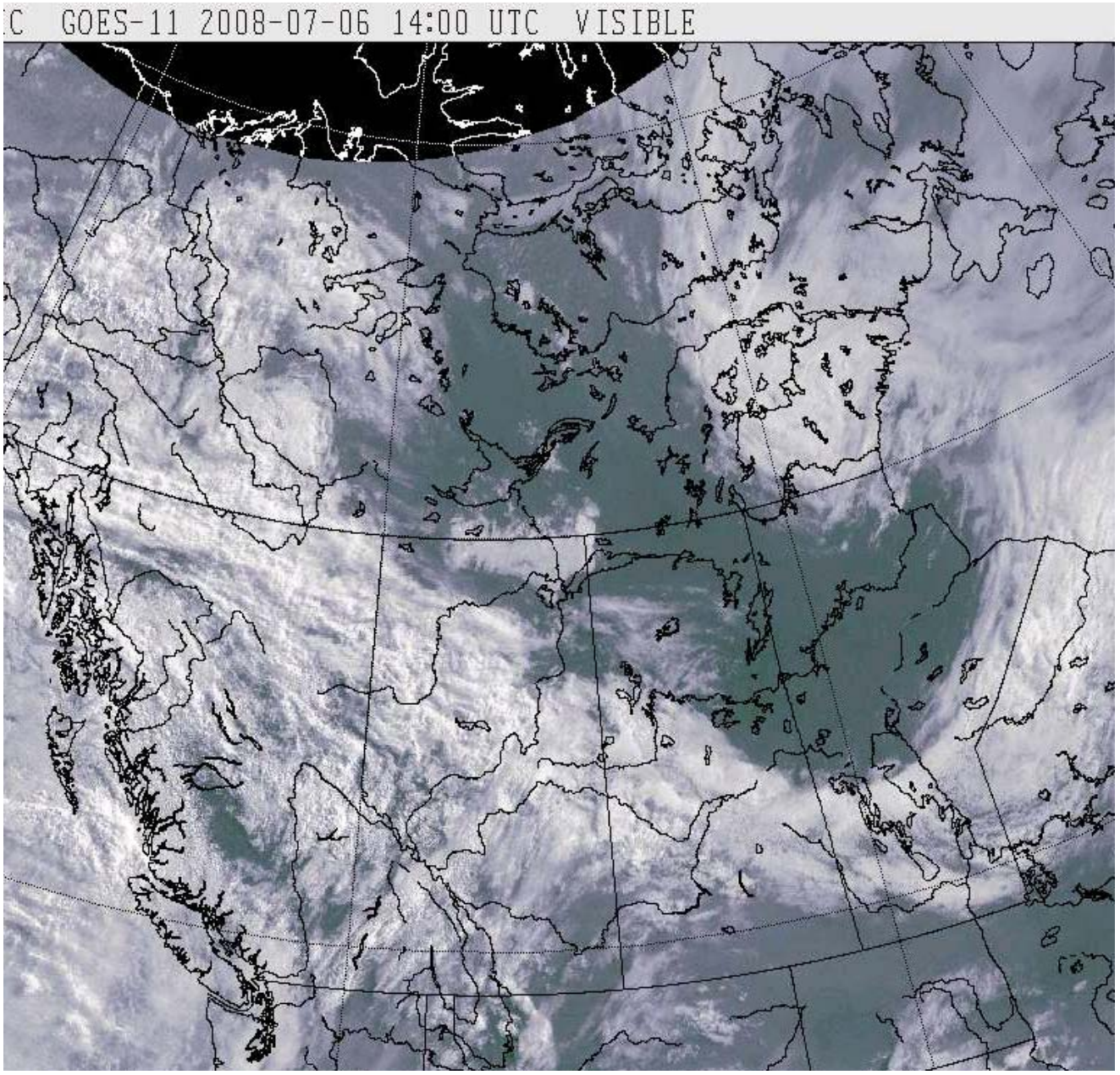
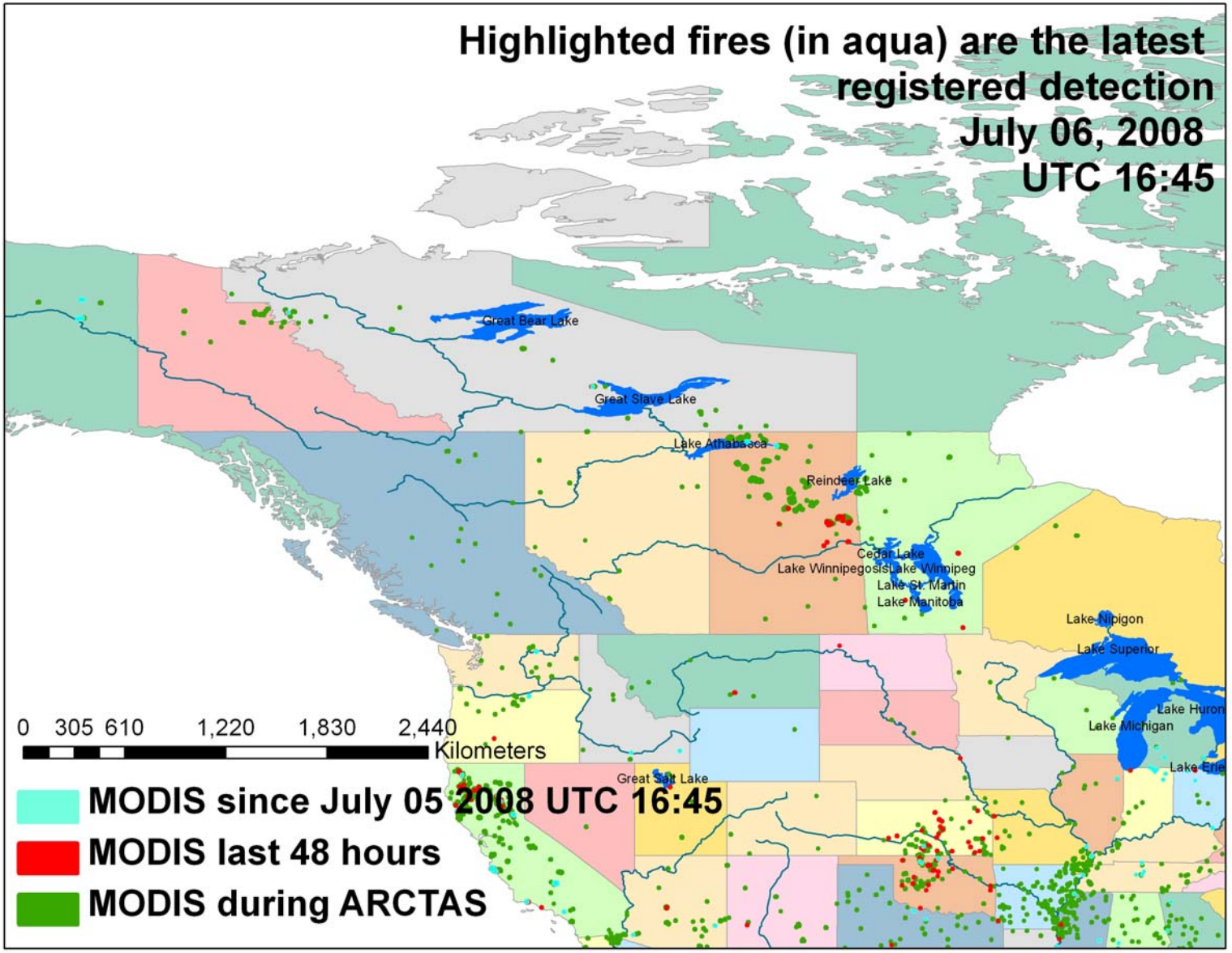
July 6 Fire Activity/Potential

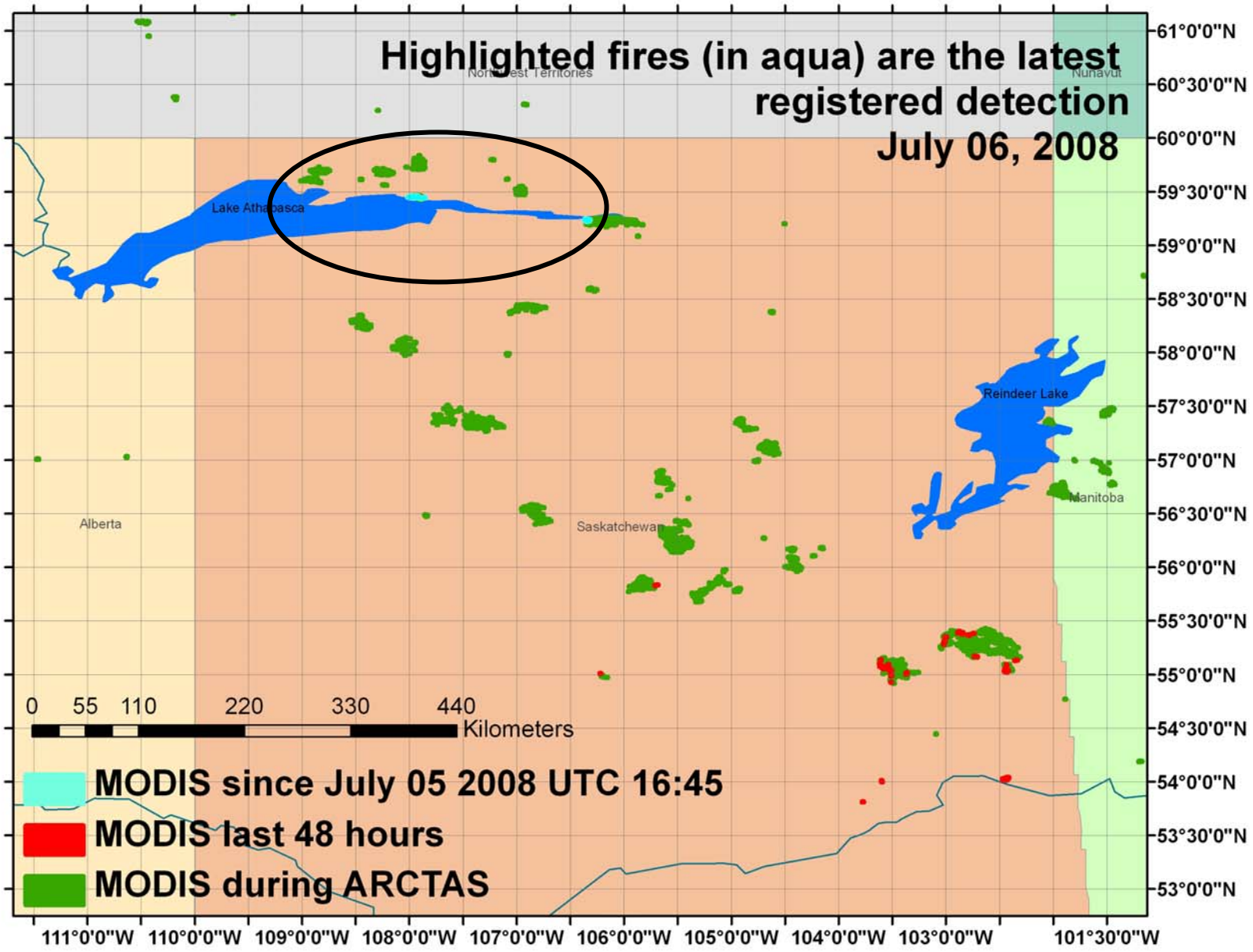
- All SK fires quiet due to rain except in Lake Athabasca region
- P3 and B200 likely working in that area and on a few small fires in NWT
- Some suppression action – communicate with fire agencies on 122.85
- Weather forecast good in that area
- SK will assess fires for future potential
- May be opportunity for more smoke work but not pyroCb (other locations?)

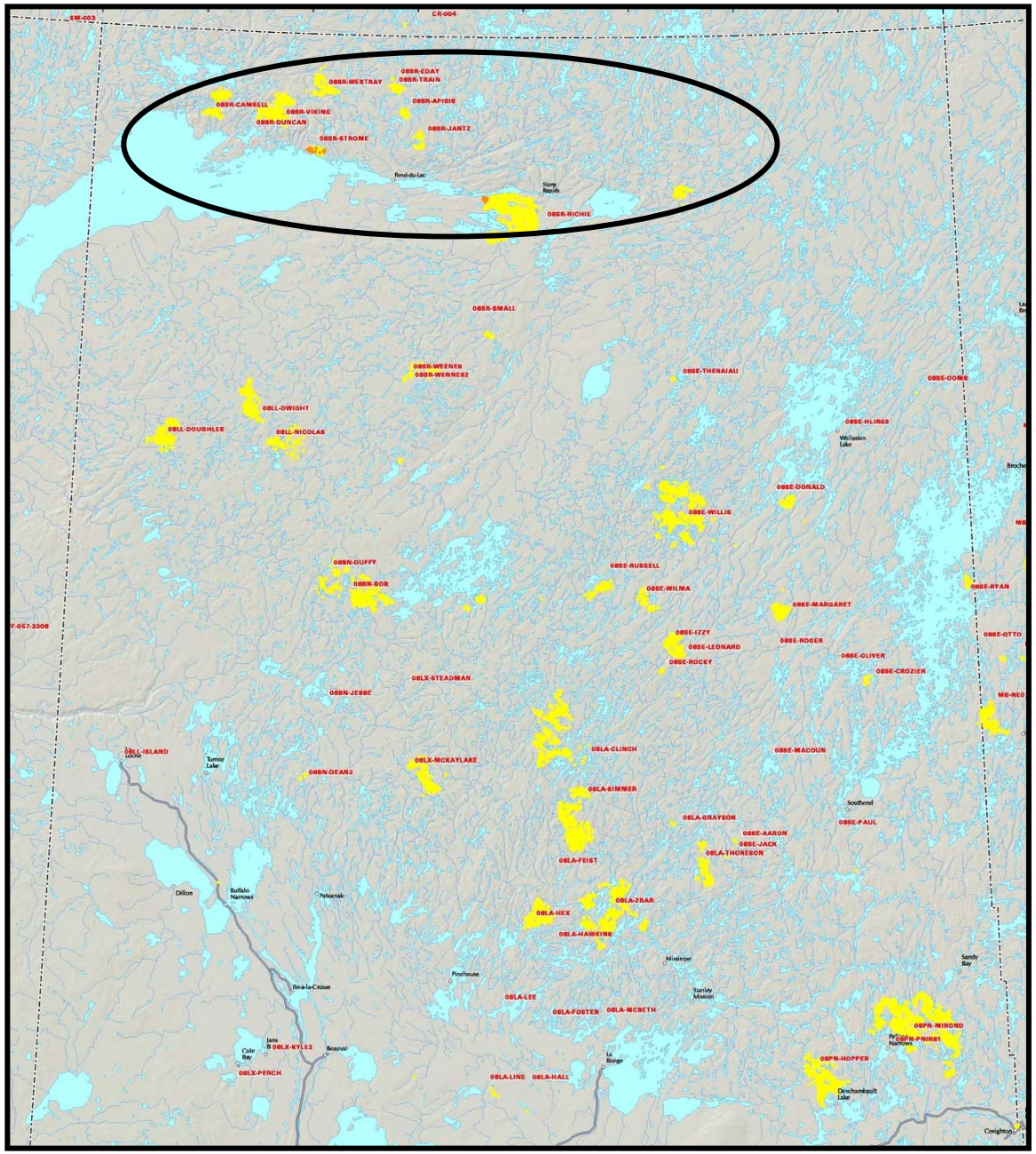

Natural Resources Canada
Ressources naturelles Canada
Forecast / Prévision
Fire Weather Index
Indice forêt-météo
6 July/juillet 2008
0 – 5
5 – 10
10 – 20
20 – 30
> 30
Nil / s.o.
0 500 1000 1500 2000 km


Natural Resources Canada
Ressources naturelles Canada
Forecast / Prévision
Buildup Index
Indice du combustible disponible
6 July/juillet 2008
0 – 20
20 – 30
30 – 40
40 – 60
60 – 90
> 90
Nil / s.o.
0 500 1000 1500 2000 km
Canada


C GOES-11 2008-07-06 14:00 UTC VISIBLE

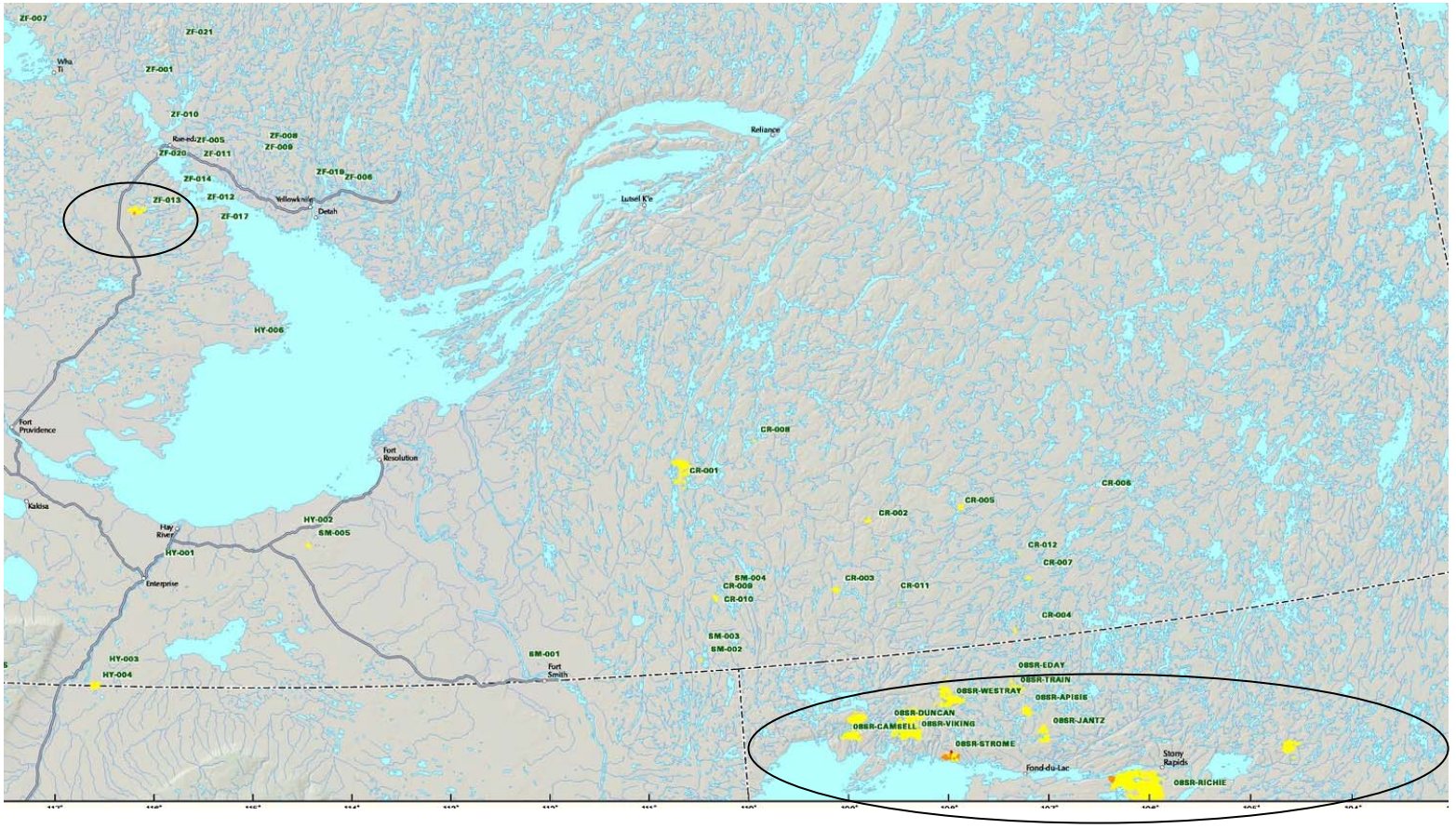

Highlighted fires (in aqua) are the latest registered detection
July 06, 2008
UTC 16:45
Great Bear Lake
Great Slave Lake
Lake Athabasca
Reindeer Lake
Cedar Lake
Lake Winnipegosis
Lake Winnipeg
Lake St. Martin
Lake Manitoba
Lake Nipigon
Lake Superior
Lake Huron
Lake Michigan
Lake Erie
Great Salt Lake
0 305 610 1,220 1,830 2,440
Kilometers
MODIS since July 05 2008 UTC 16:45
MODIS last 48 hours
MODIS during ARCTAS


Highlighted fires (in aqua) are the latest registered detection
July 06, 2008
Lake Athabasca
Reindeer Lake
Alberta
Saskatchewan
Manitoba
Nunavut
0 55 110 220 330 440
Kilometers
MODIS since July 05 2008 UTC 16:45
MODIS last 48 hours
MODIS during ARCTAS
61°0'0"N
60°30'0"N
60°0'0"N
59°30'0"N
59°0'0"N
58°30'0"N
58°0'0"N
57°30'0"N
57°0'0"N
56°30'0"N
56°0'0"N
55°30'0"N
55°0'0"N
54°30'0"N
54°0'0"N
53°30'0"N
53°0'0"N
111°0'0"W
110°0'0"W
109°0'0"W
108°0'0"W
107°0'0"W
106°0'0"W
105°0'0"W
104°0'0"W
103°0'0"W
101°30'0"W

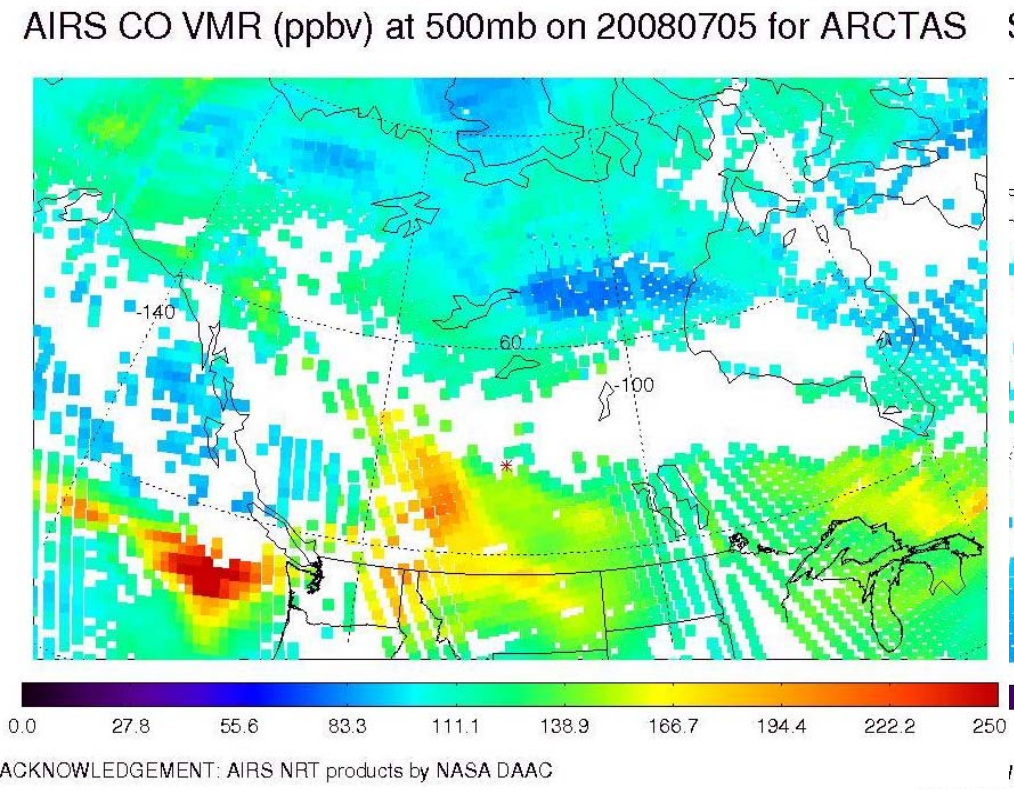


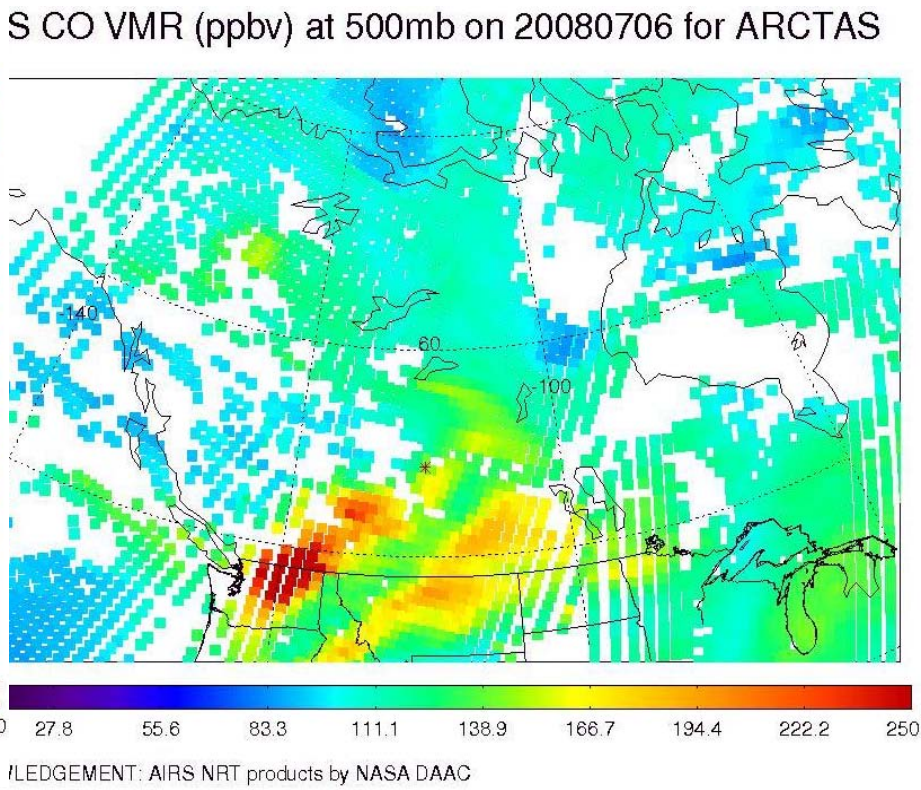
July 6 targets are in Lake Athabasca area

Other fires received rain in variable amounts & will assessed as later targets


ZF-007
ZF-021
Wha Ti
ZF-001
ZF-010
Rae-ed:ZF-005
ZF-008
ZF-009
ZF-020
ZF-011
ZF-014
ZF-019
ZF-006
ZF-013
ZF-012
Yellowknife
Detah
ZF-017
Reliance
Lutsel K'e
HY-006
Fort Providence
Fort Resolution
CR-008
CR-001
CR-006
CR-005
CR-002
Kakisa
HY-002
SM-005
Hay River
HY-001
CR-012
CR-007
SM-004
CR-009
CR-003
CR-011
Enterprise
CR-010
CR-004
SM-003
SM-002
HY-003
SM-001
HY-004
Fort Smith
08SR-EDAY
08SR-TRAIN
08SR-WESTRAY
08SR-APISIS
08SR-DUNCAN
08SR-CAMSELL
08SR-VIKING
08SR-JANTZ
08SR-STROME
Fond-du-Lac
Stony Rapids
08SR-RICHIE

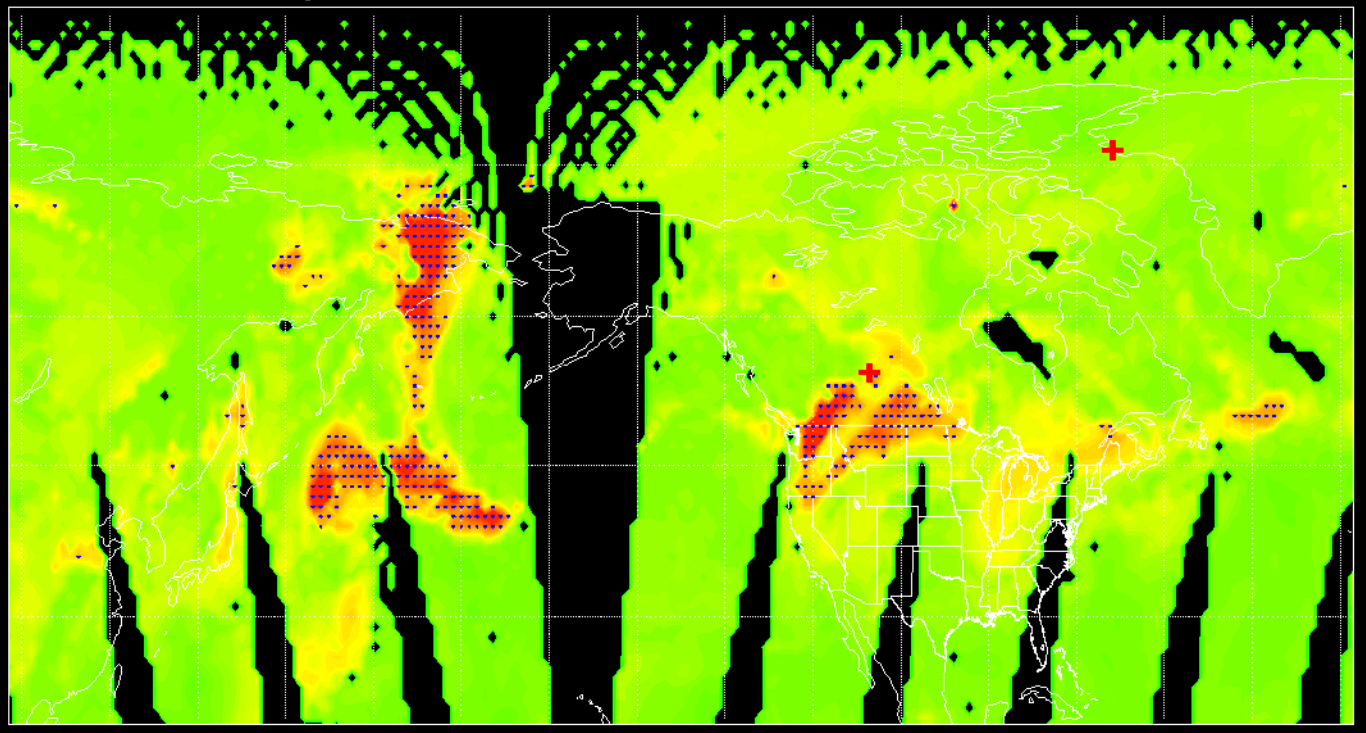
AIRS Support for ARCTAS





- Long-range transported plumes show high CO.
- Canadian fire emissions transported eastward.

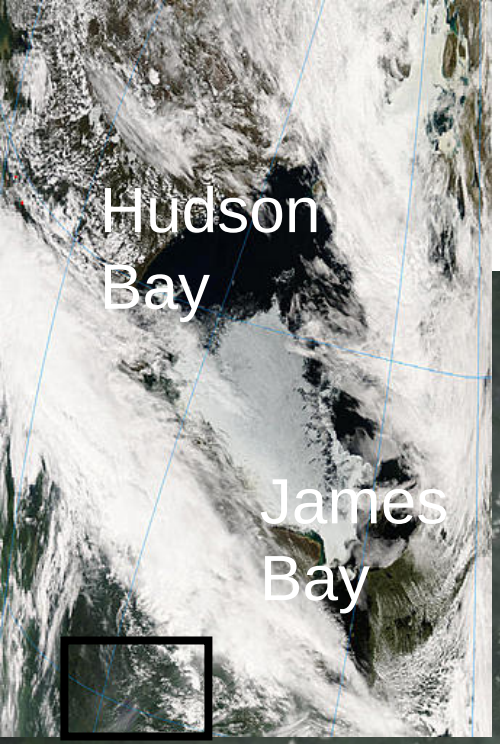
AIRS 500mb Trajectories initialized 2008070600 Valid 2008070600



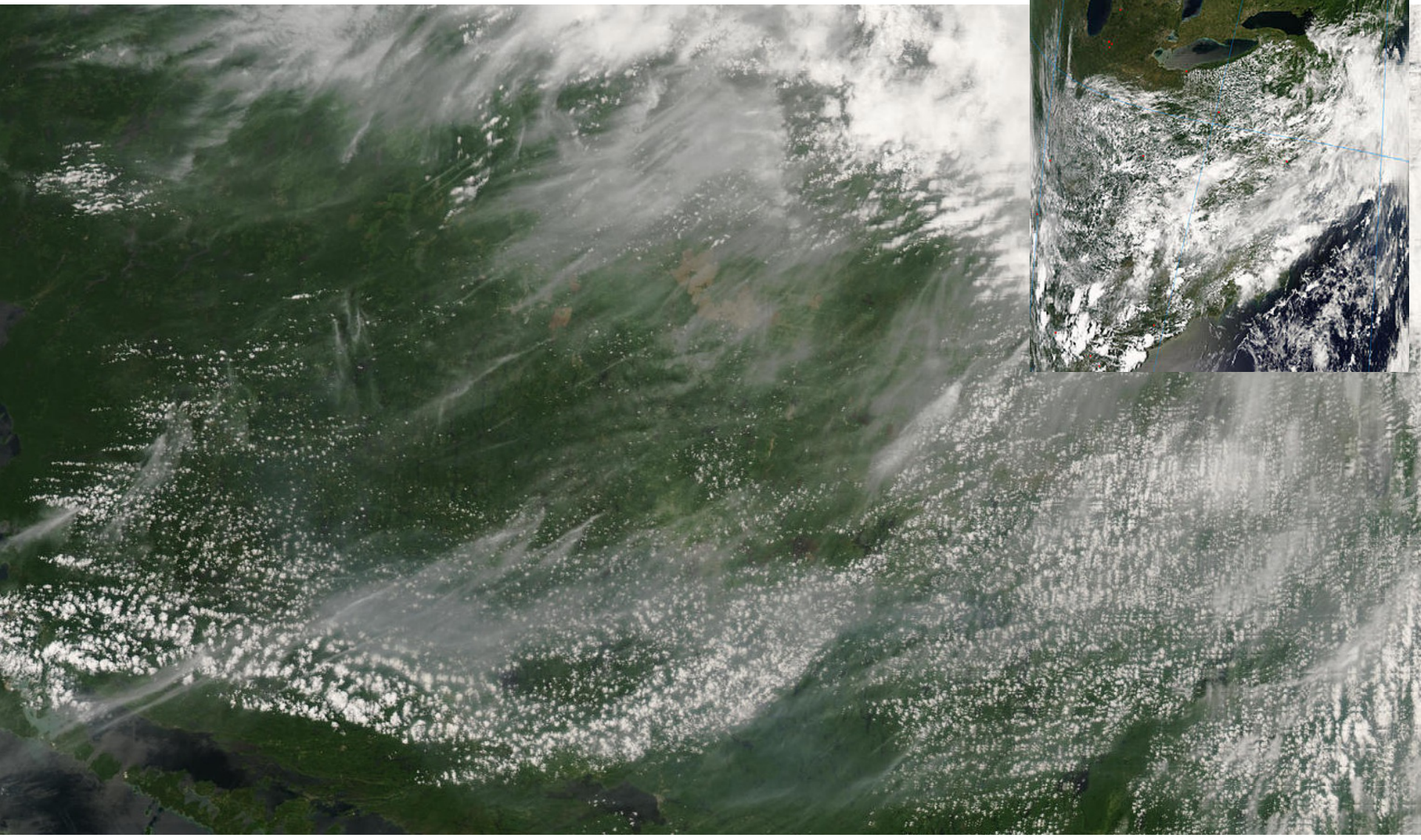
60 80 100 120 140 160 180 200
CO (ppbv)

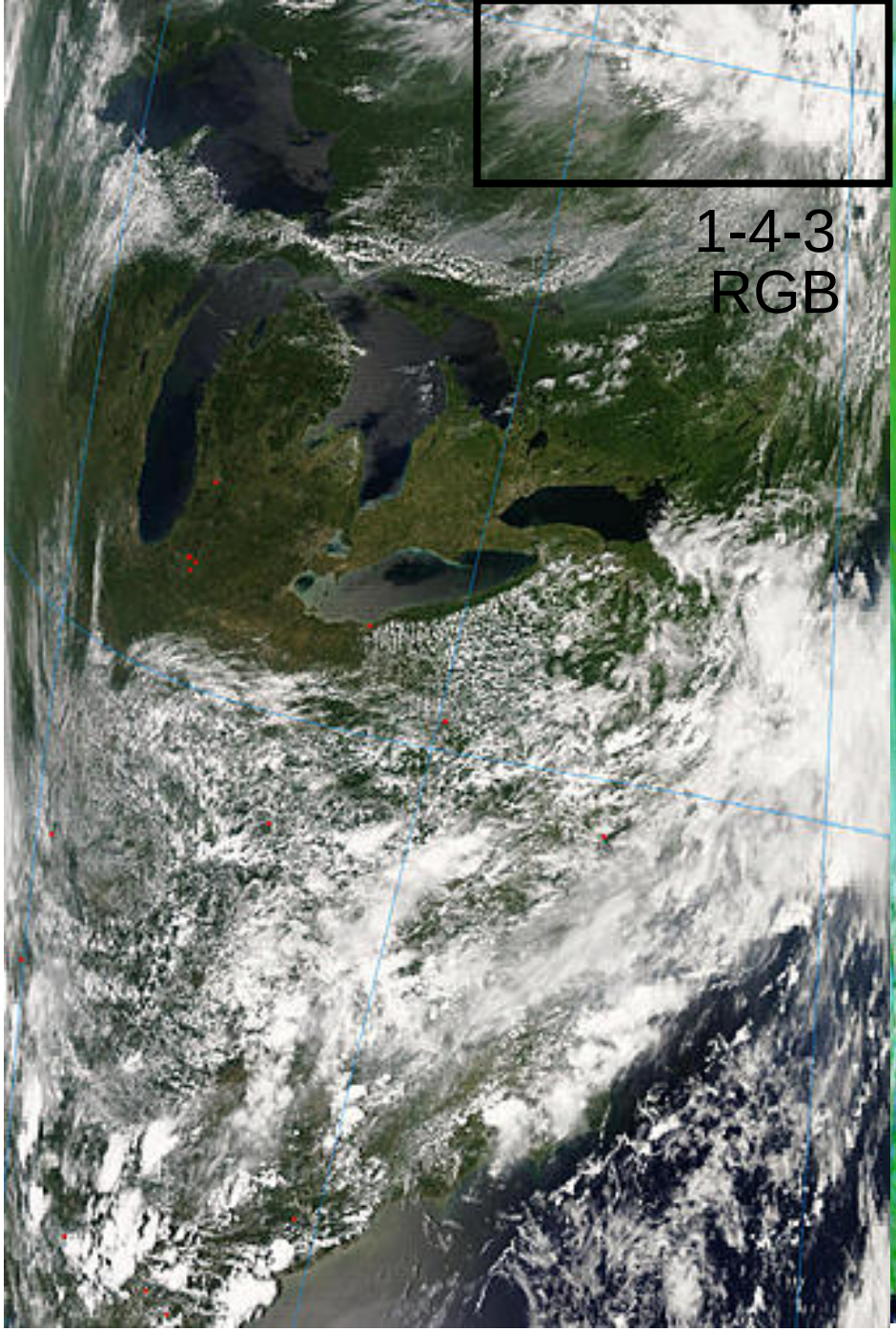
200 400 600 800 1000
Pressure (mb)

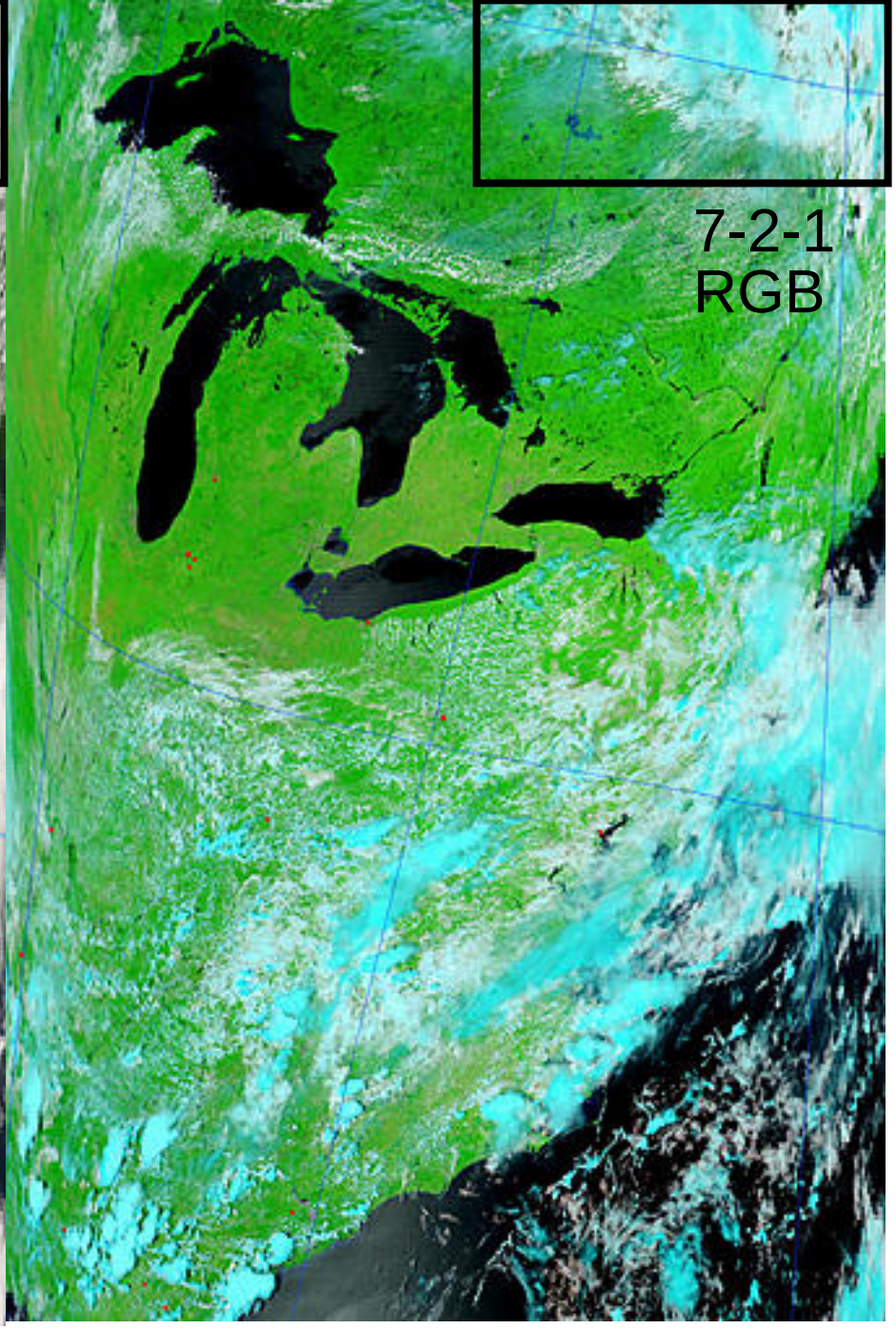
Smoke plumes transported to Manitoba and Ontario yesterday (JULY 5) afternoon



Smoke plumes transported to S. Ontario yesterday (JULY 5) afternoon

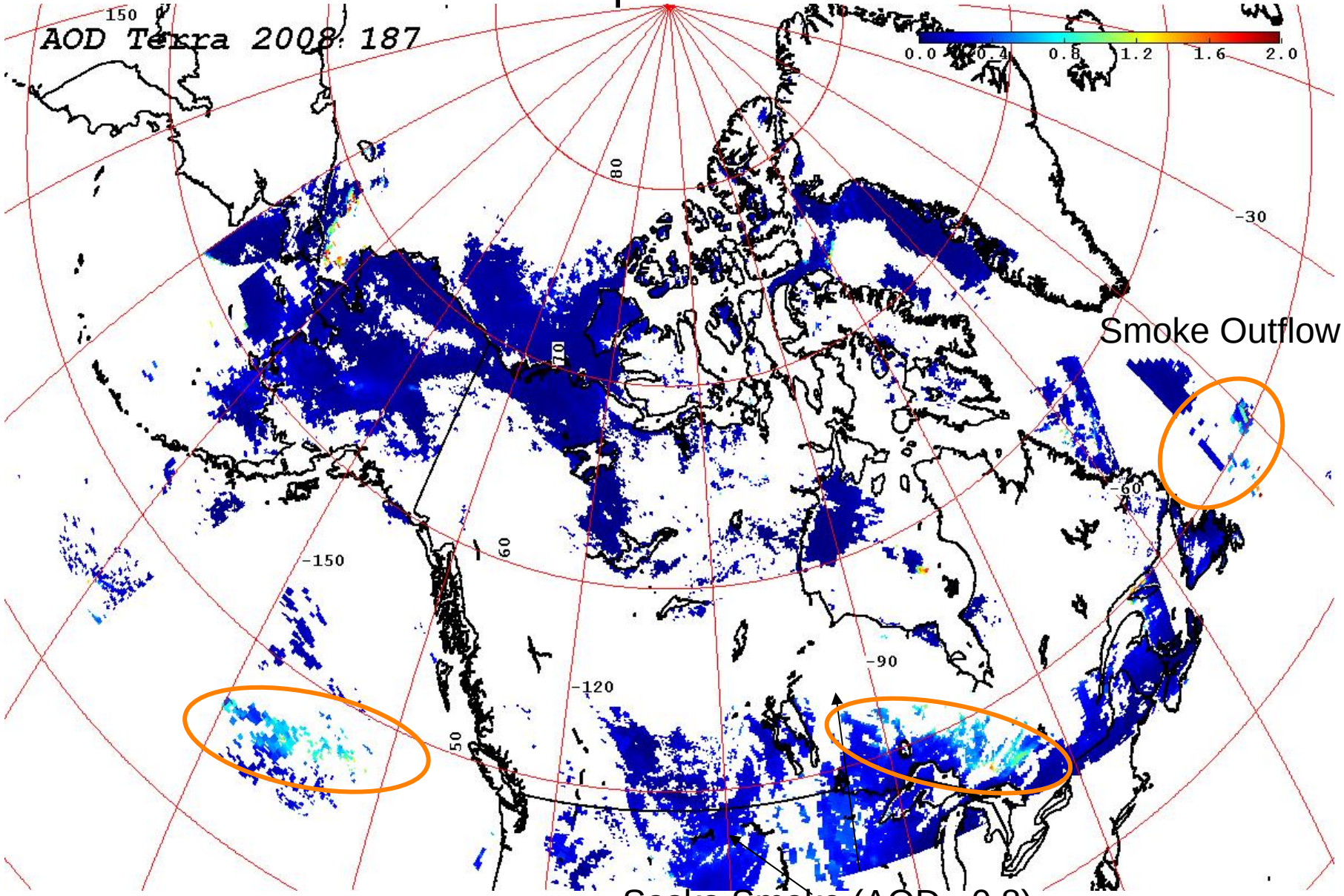



1-4-3
RGB


7-2-1
RGB

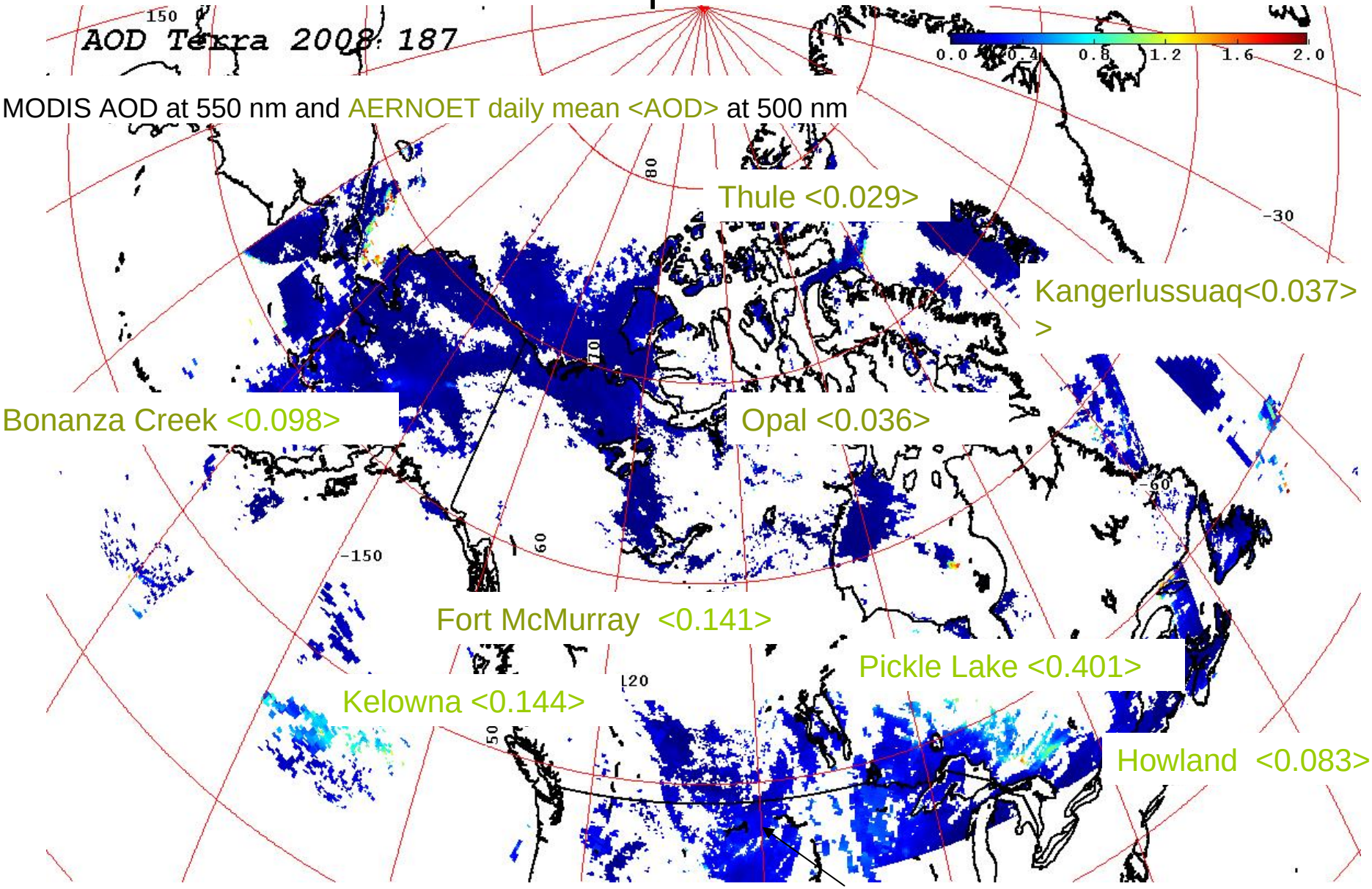
Day 187 (July 5) Saturday

MODIS AOD Hot Spots in Northern America



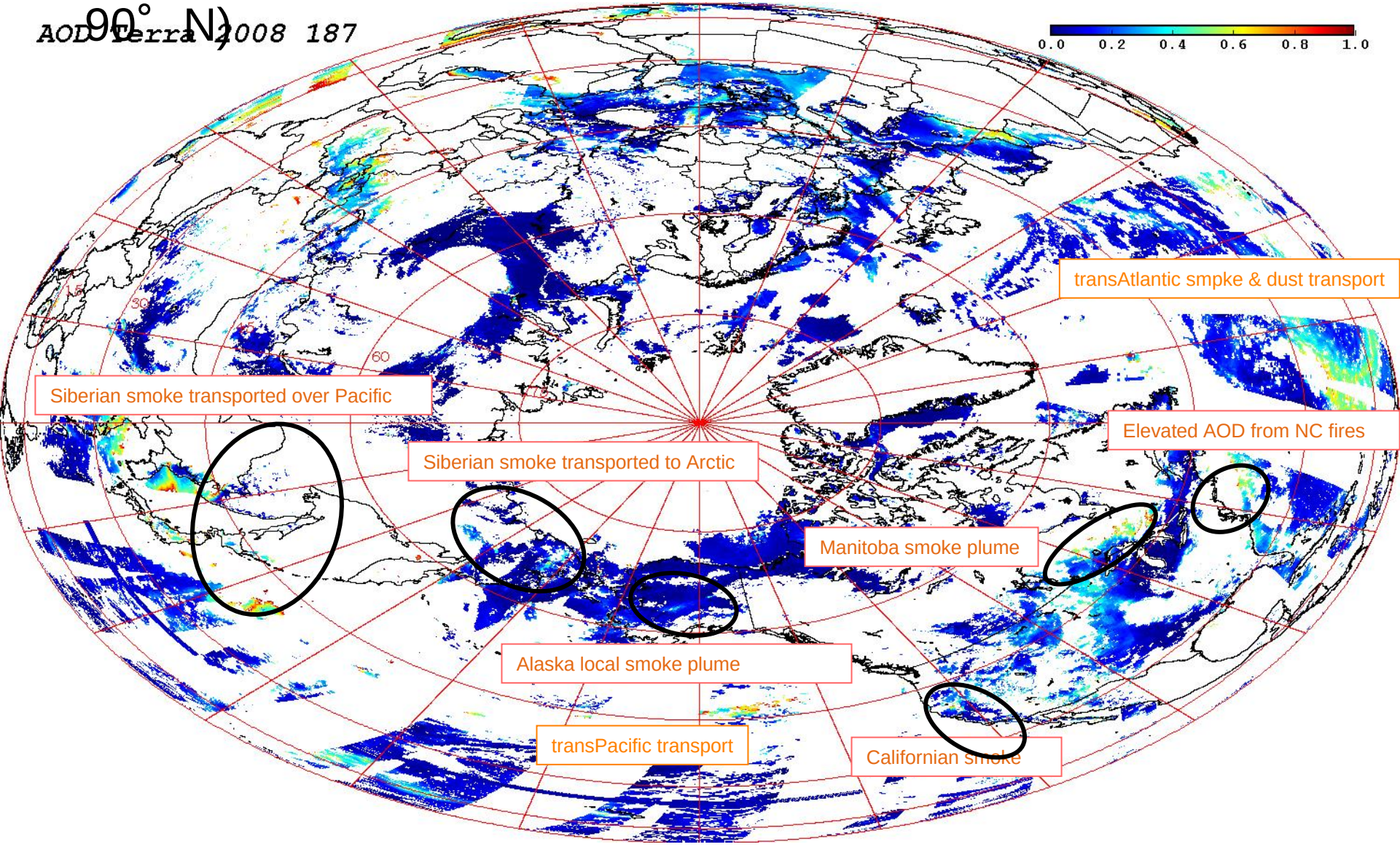
Day 187 (July 5) Saturday

MODIS AOD Hot Spots in Northern America

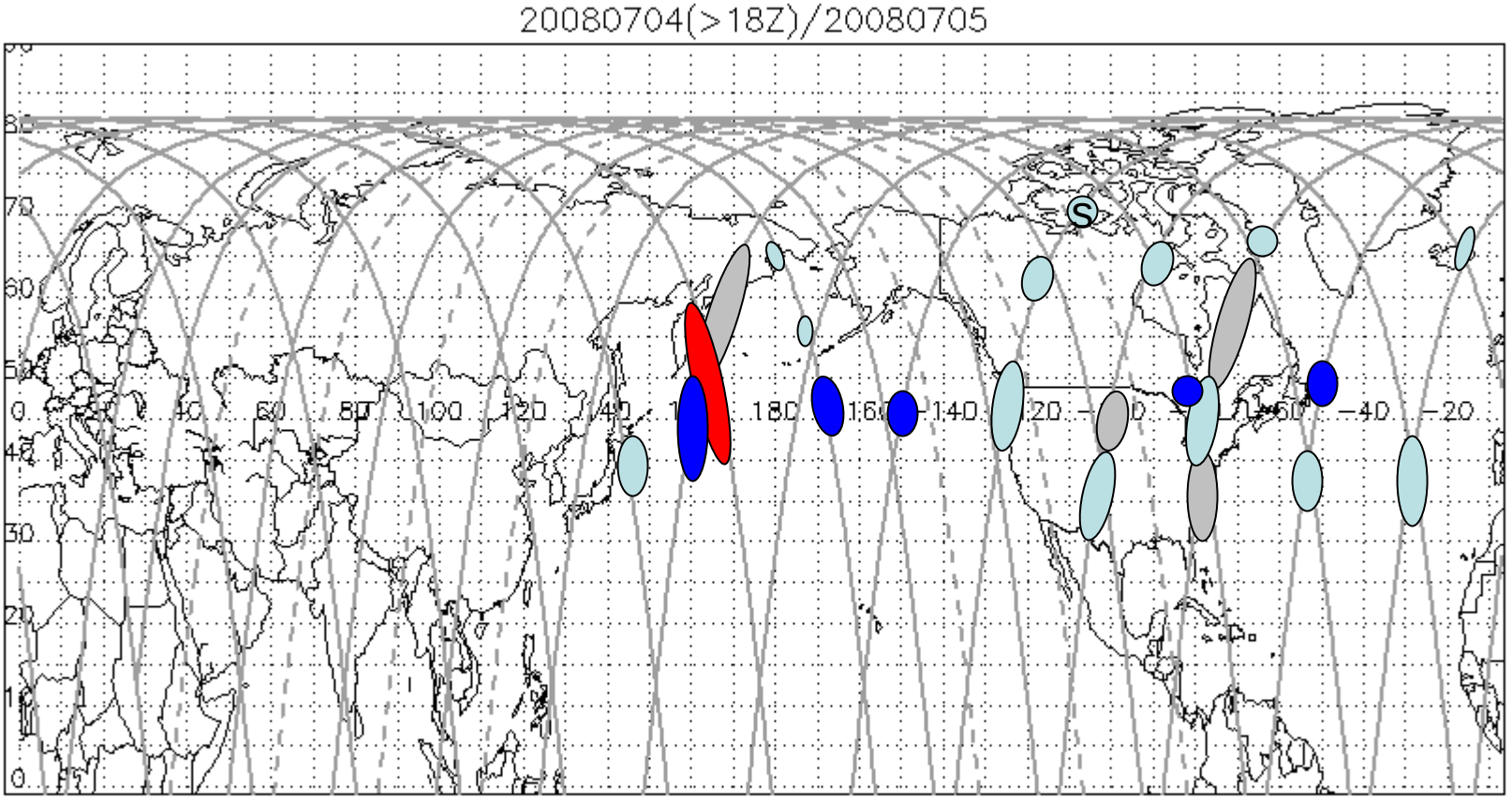


Day 187 (July 5) Saturday

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



Aerosol Layer Locations based on the CALIPSO Obs 7/5

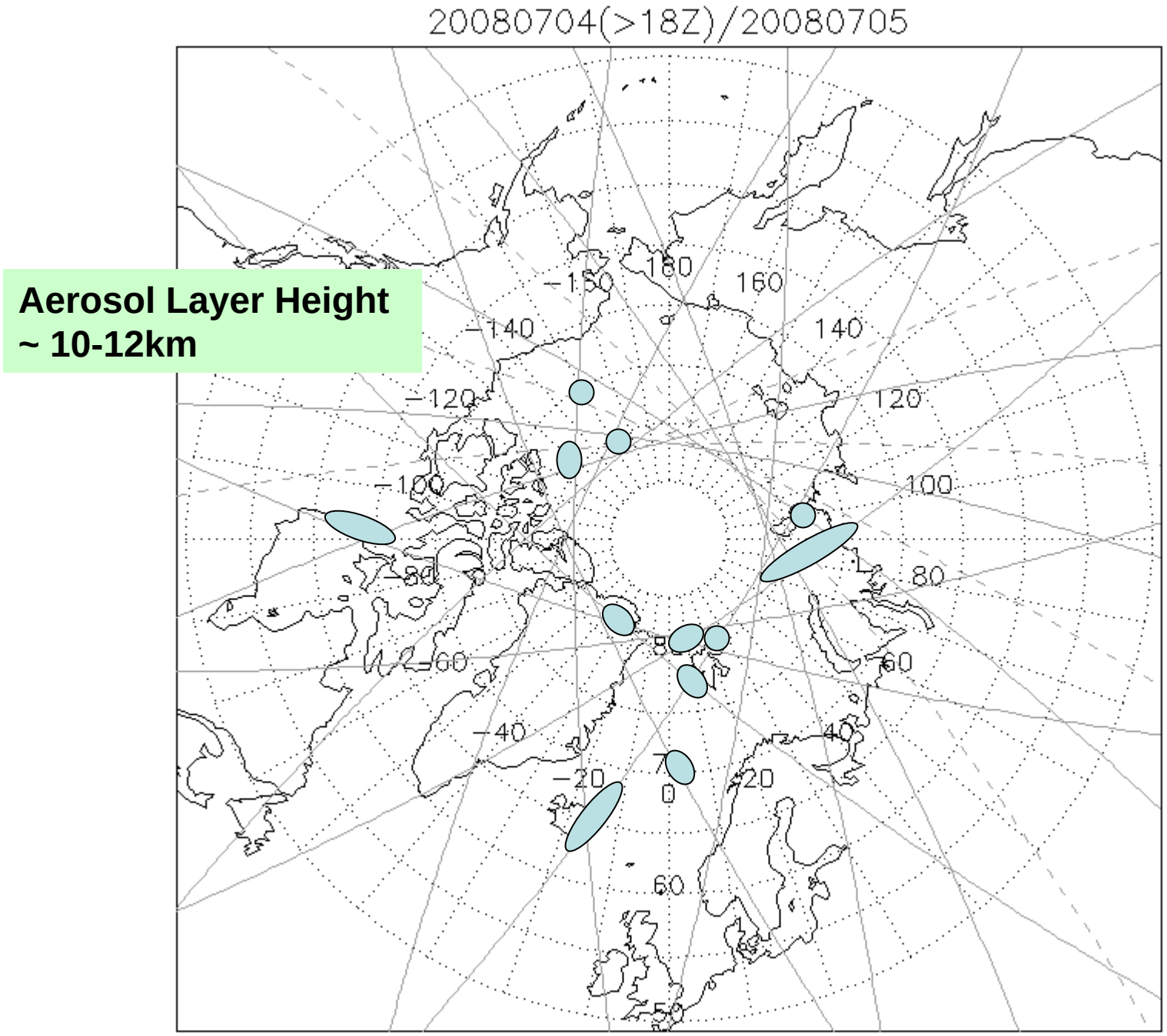


Cloud

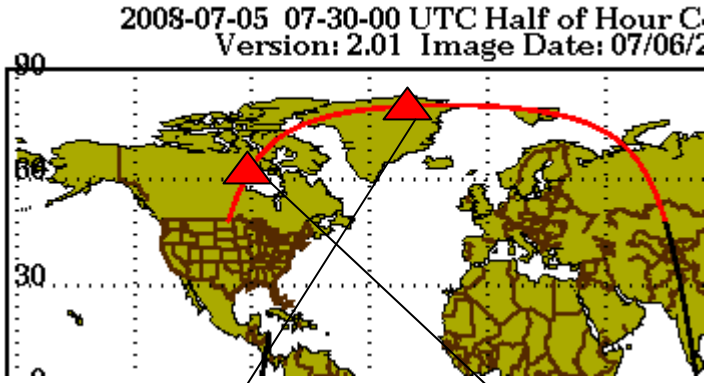
Aerosol Layer- low aerosol loading

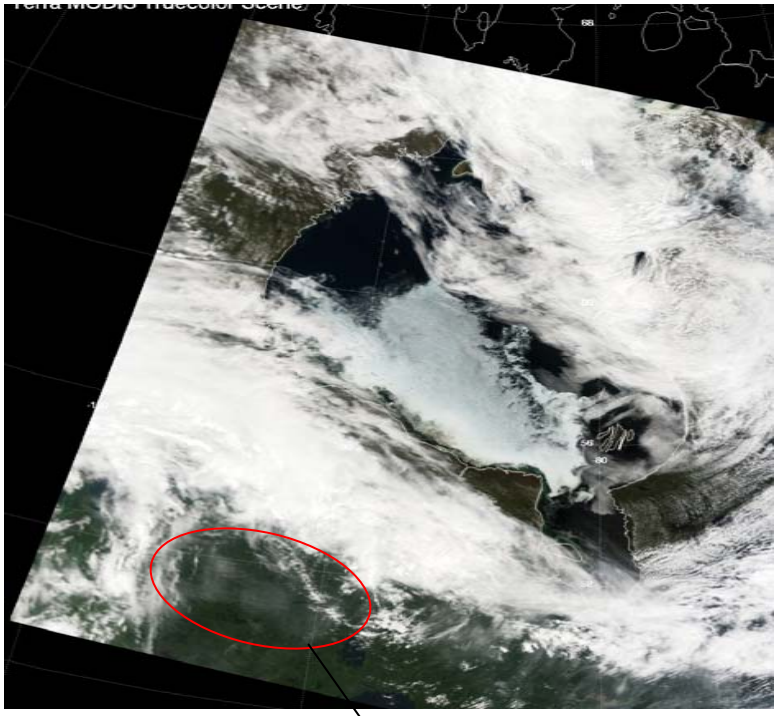
Aerosol Layer- medium aerosol loading

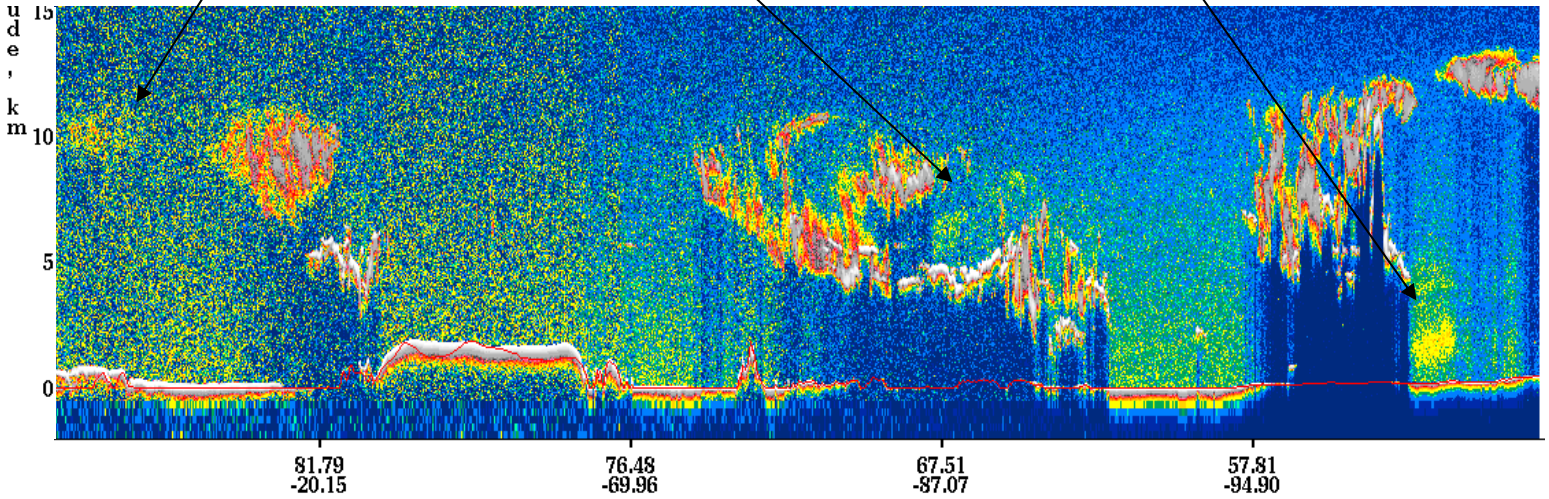
Aerosol Layer- high aerosol loading


20080704(>18Z)/20080705
Aerosol Layer Height
~ 10-12km
180
160
140
120
100
80
60
40
20
0
-140
-120
-100
-80
-60
-40
-20
60

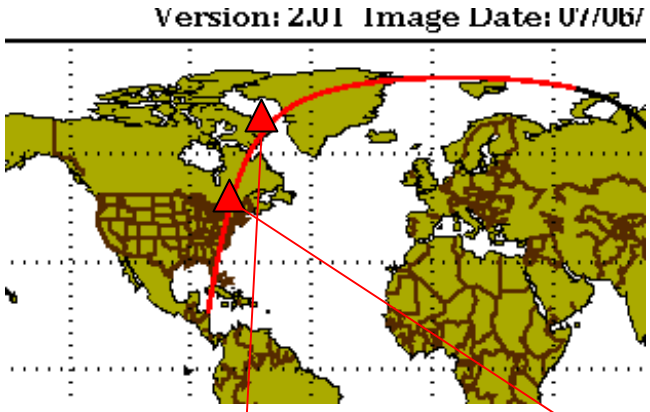
CALIPSO Obs: 7/5

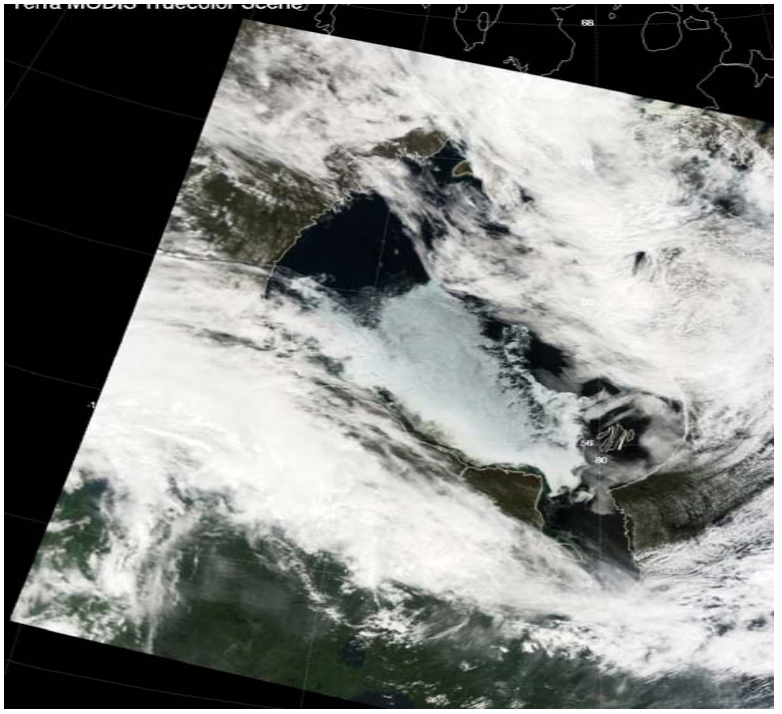


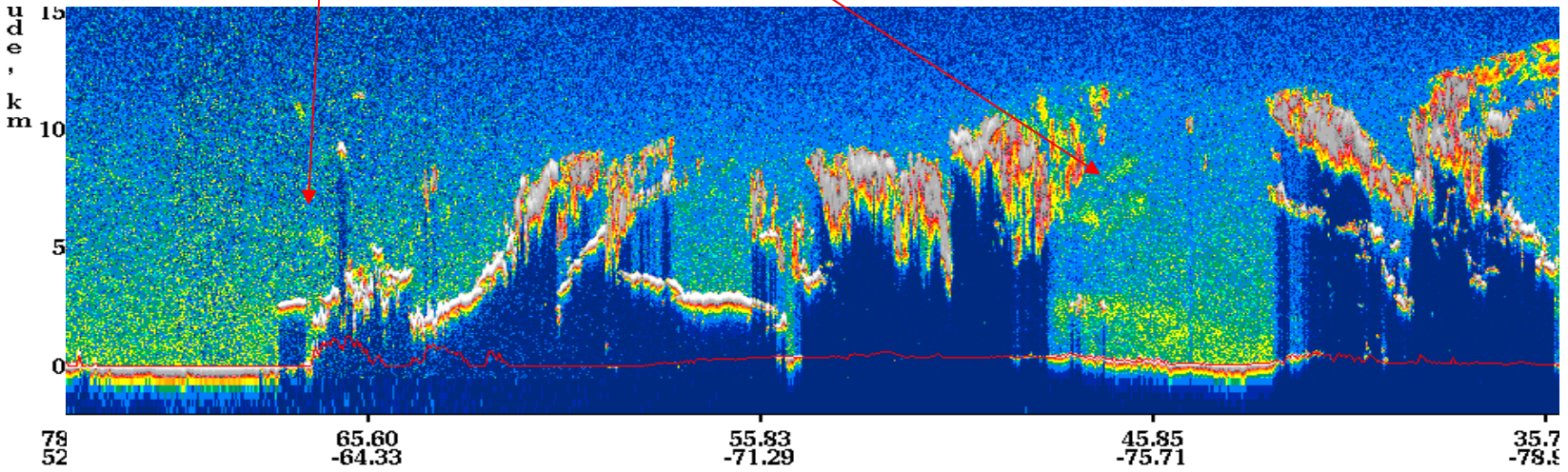




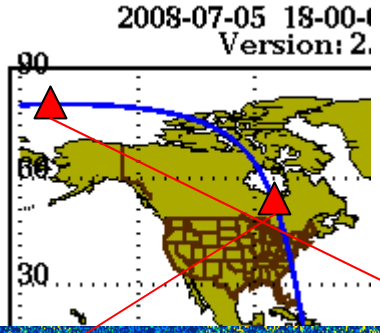
CALIPSO Obs: 7/5

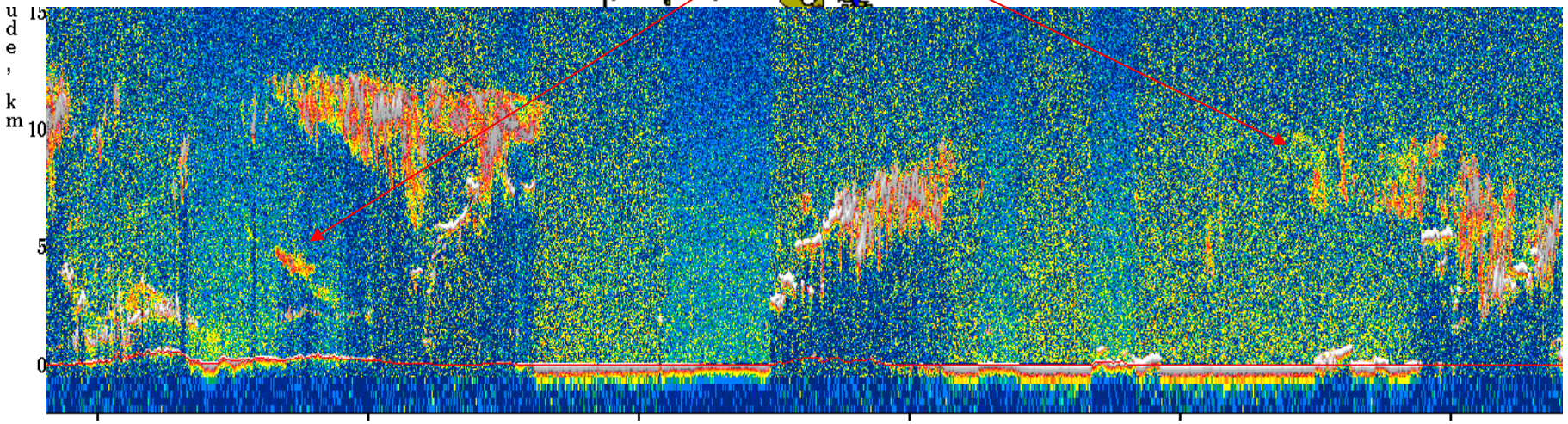


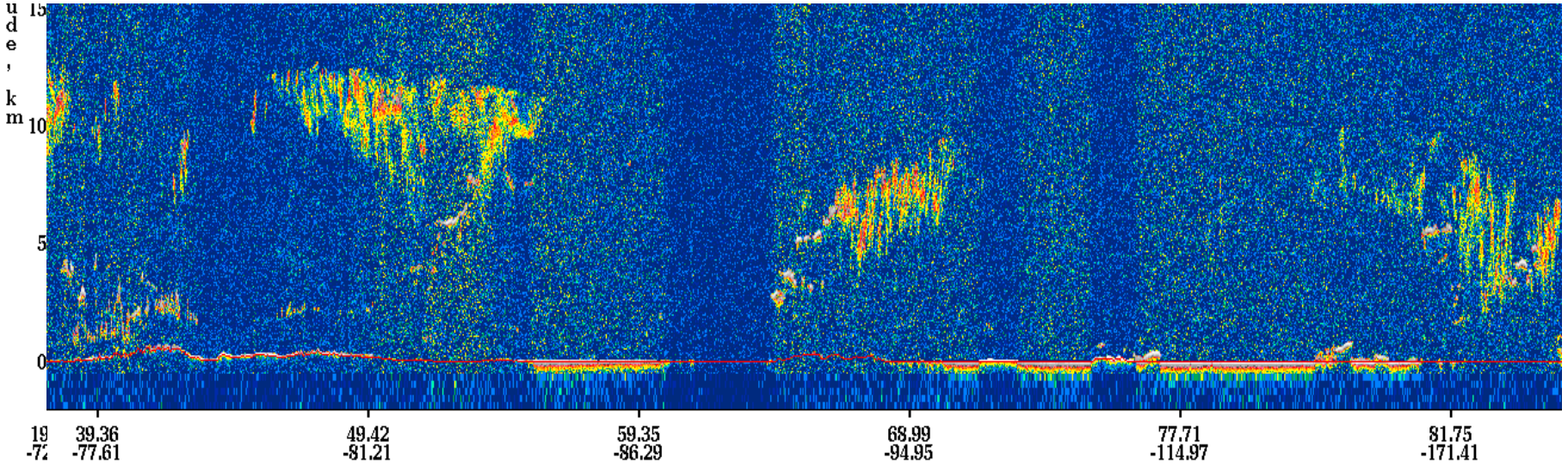




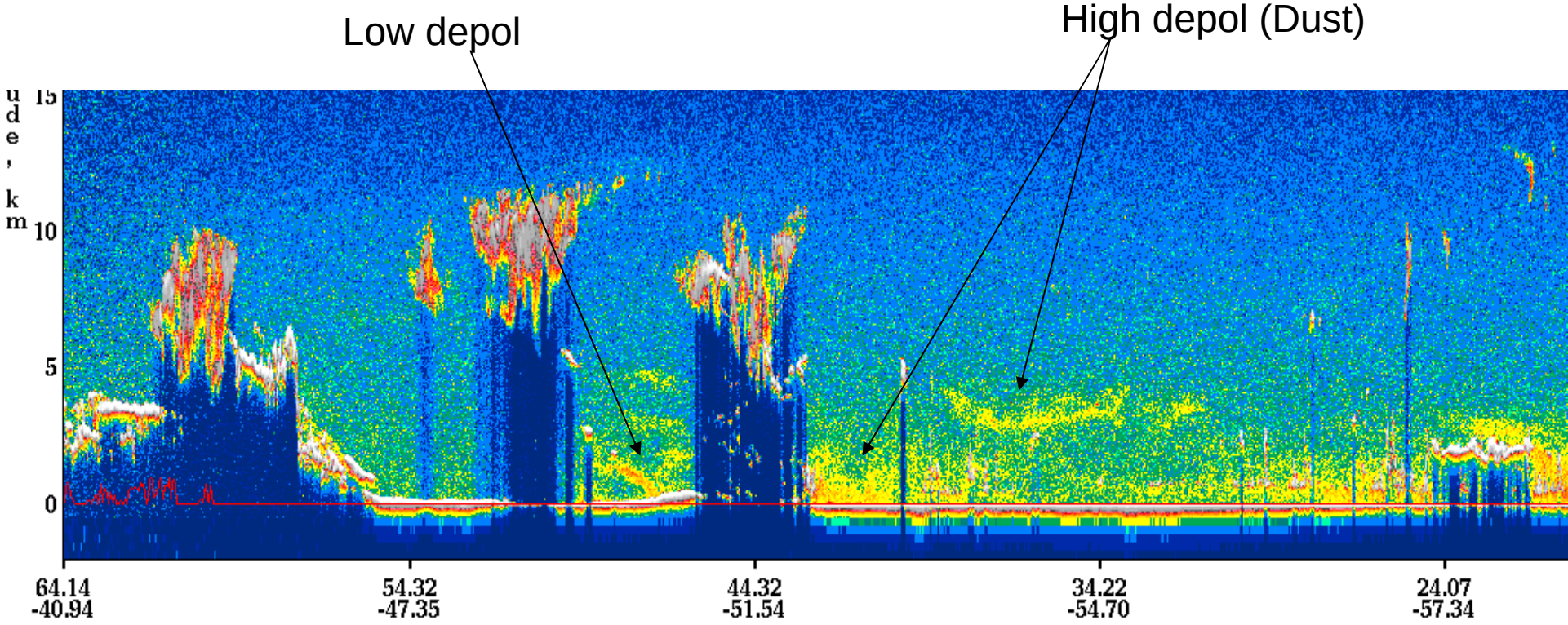
CALIPSO Obs: 7/5



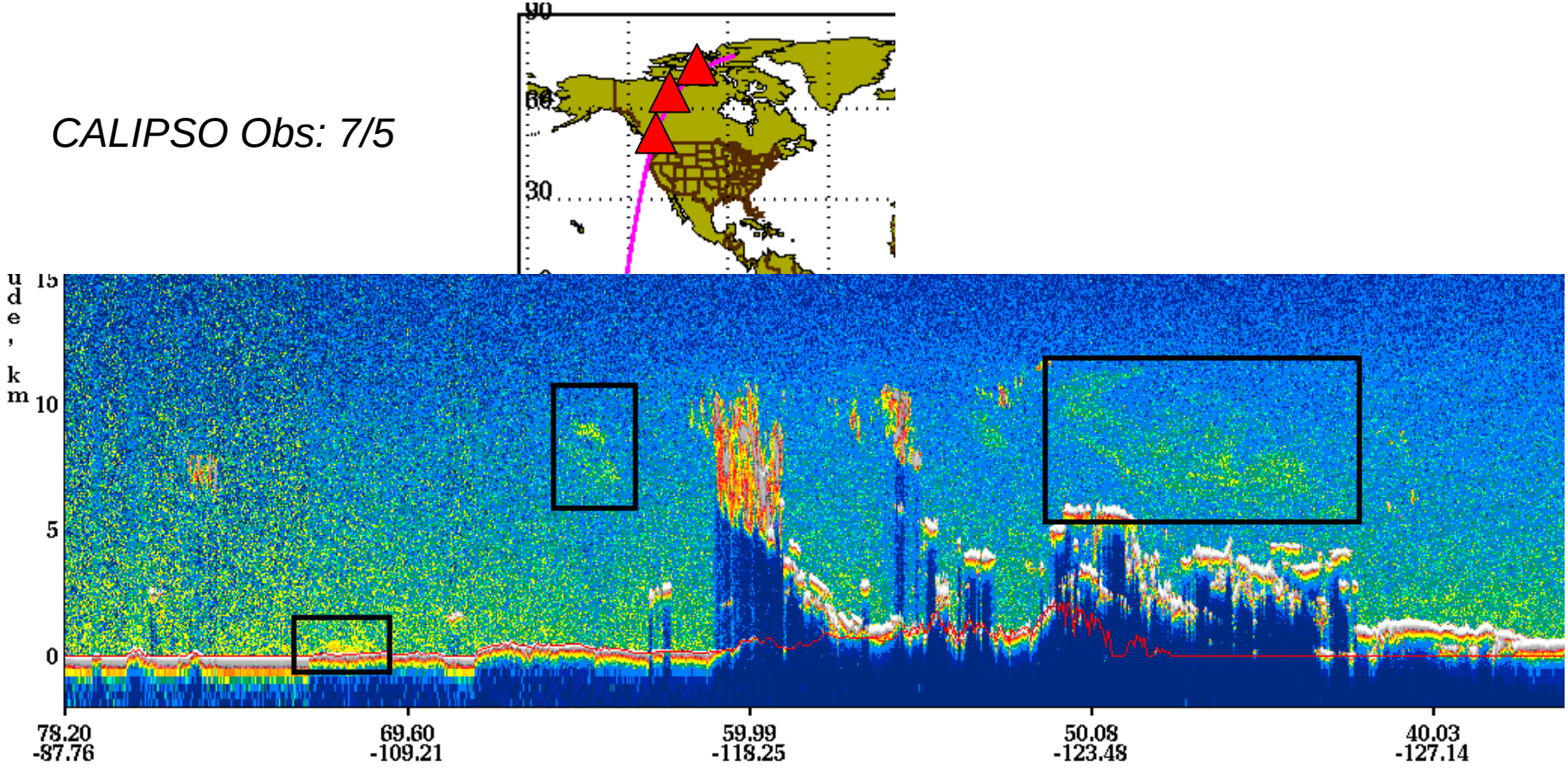


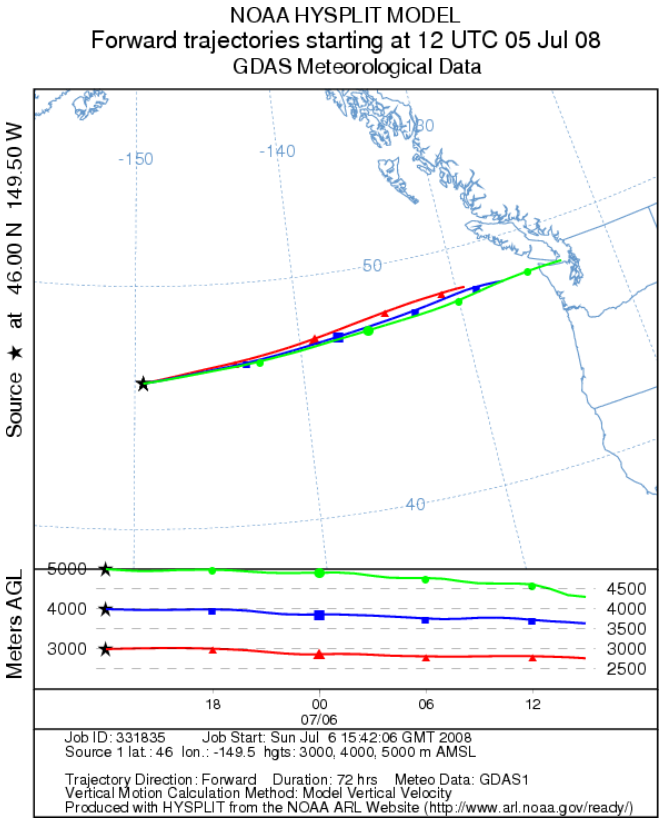


CALIPSO Obs: 7/5



CALIPSO Obs: 7/5





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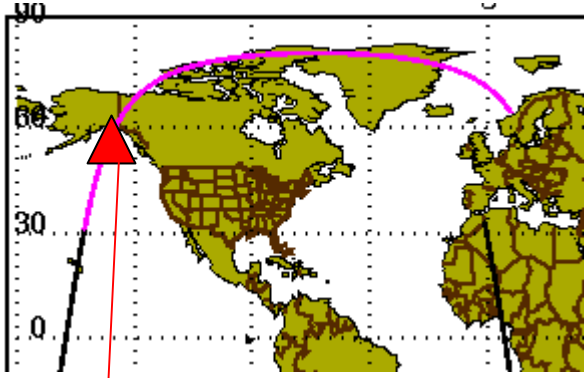
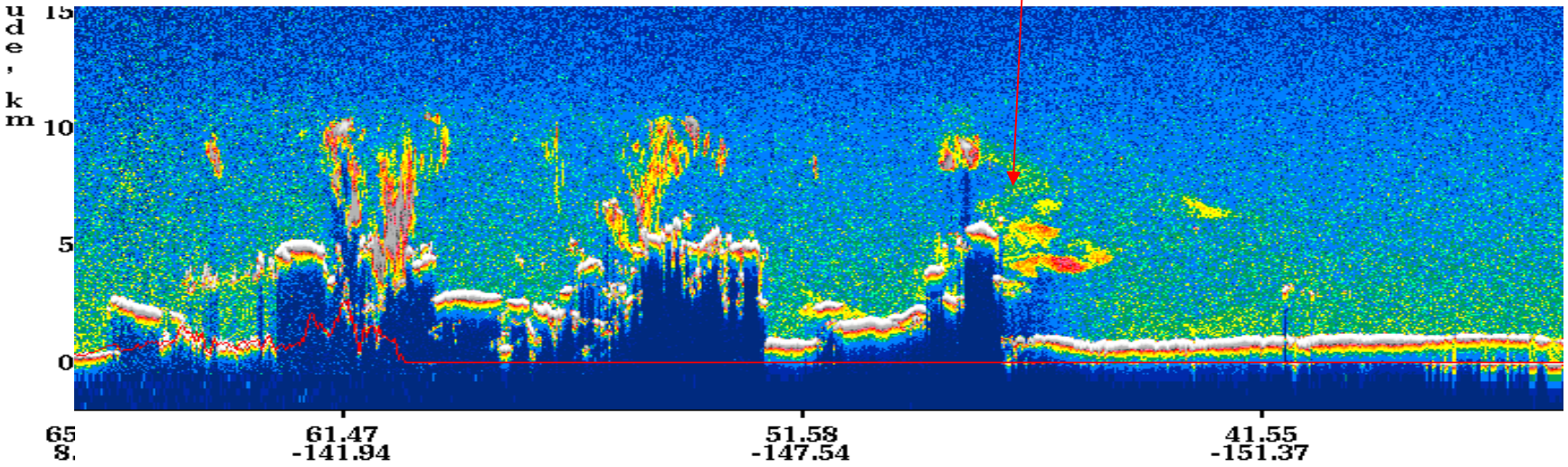
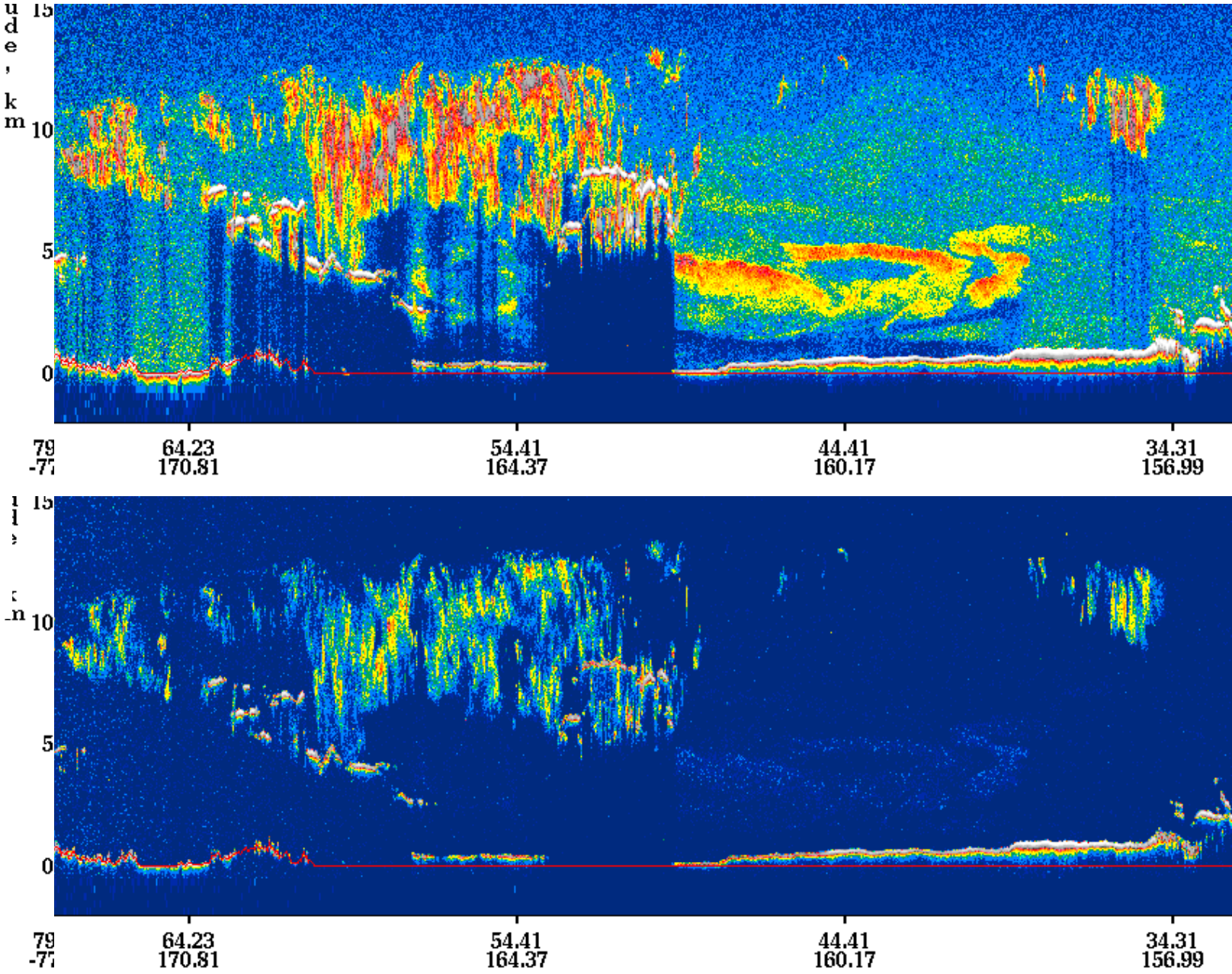
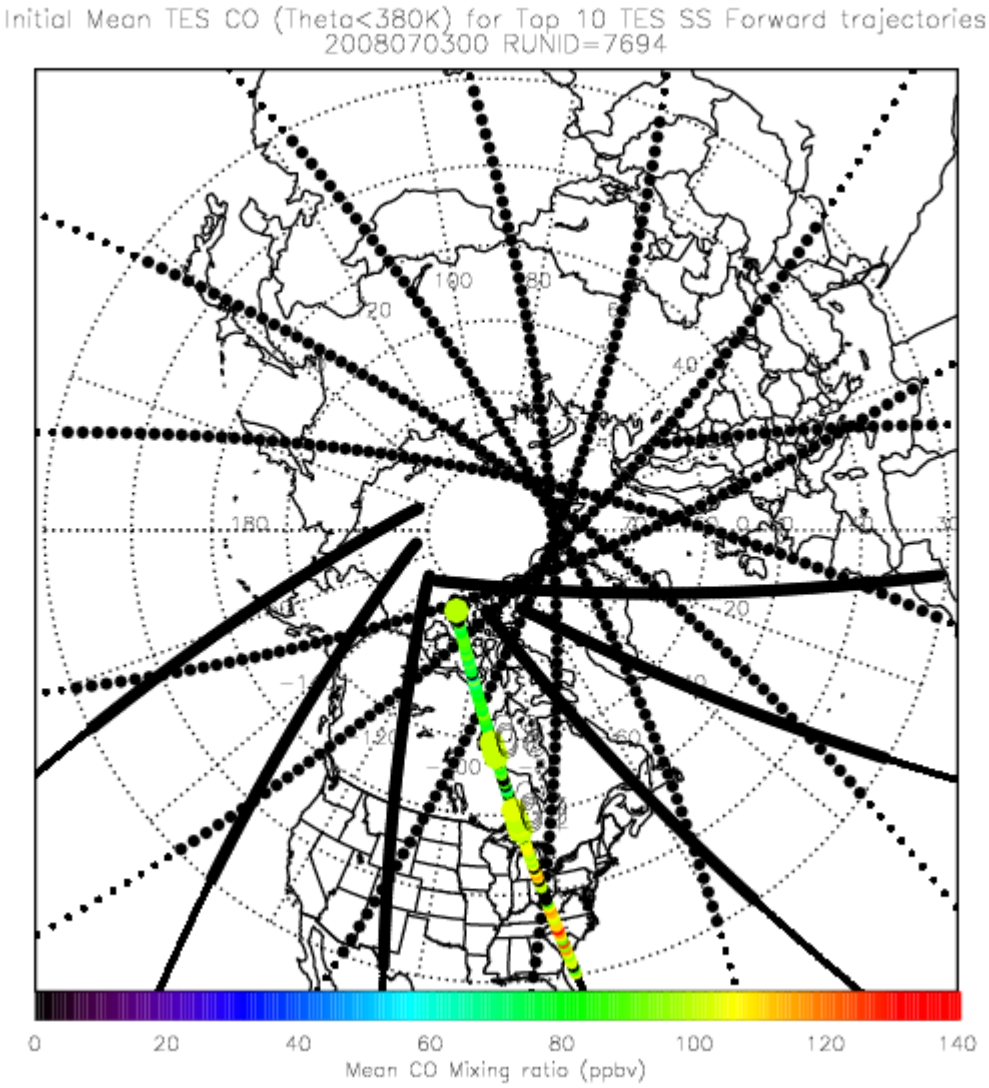




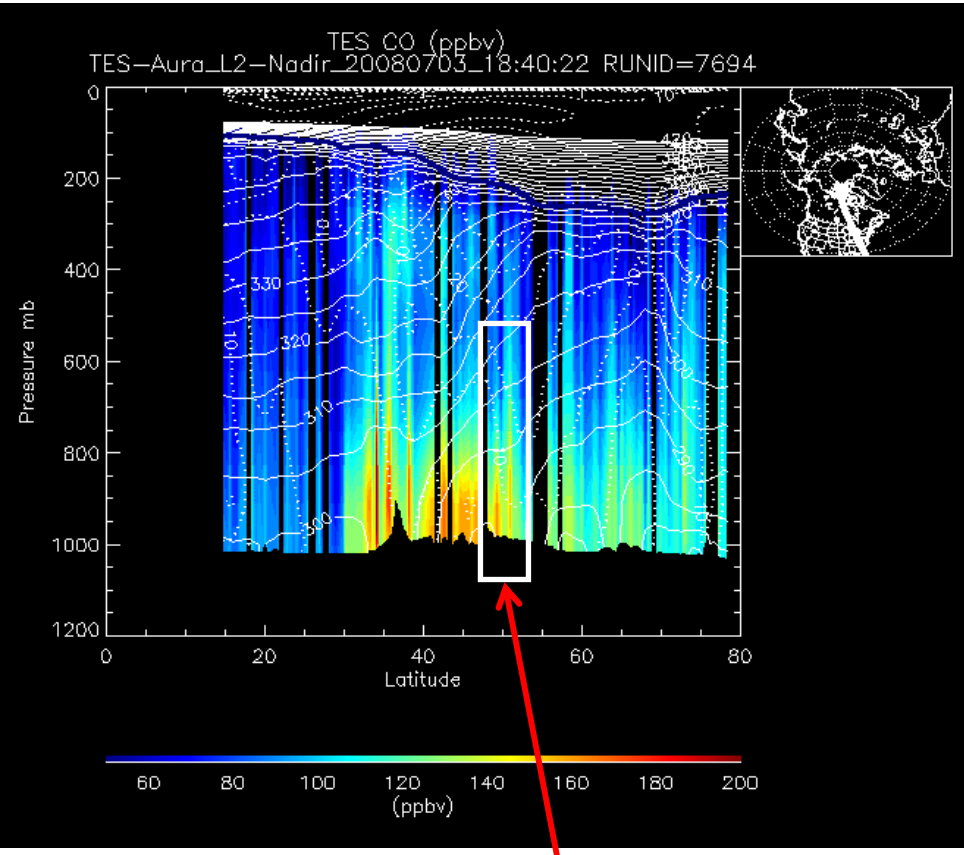
CALIPSO Obs: 7/5

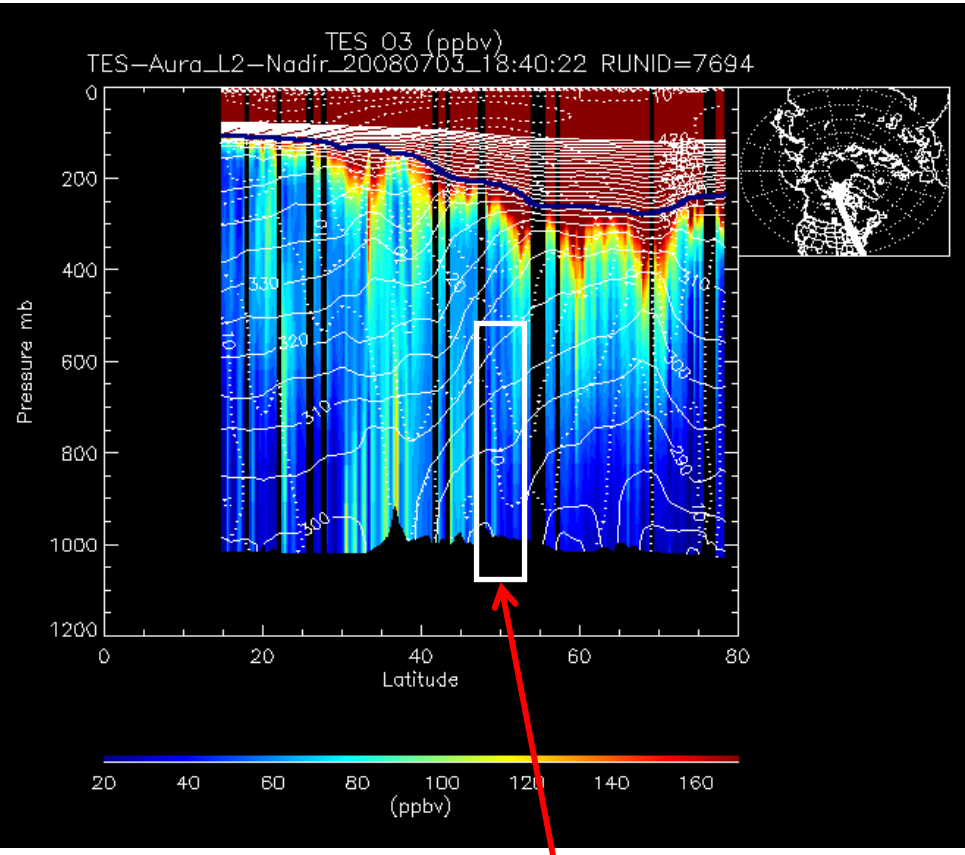


TES Step&Stare Obs 07/03 (Run ID 7694): Mean CO below 380K



TES CO (left) and O3 (right) curtains from SS orbit 7694 (07/03)

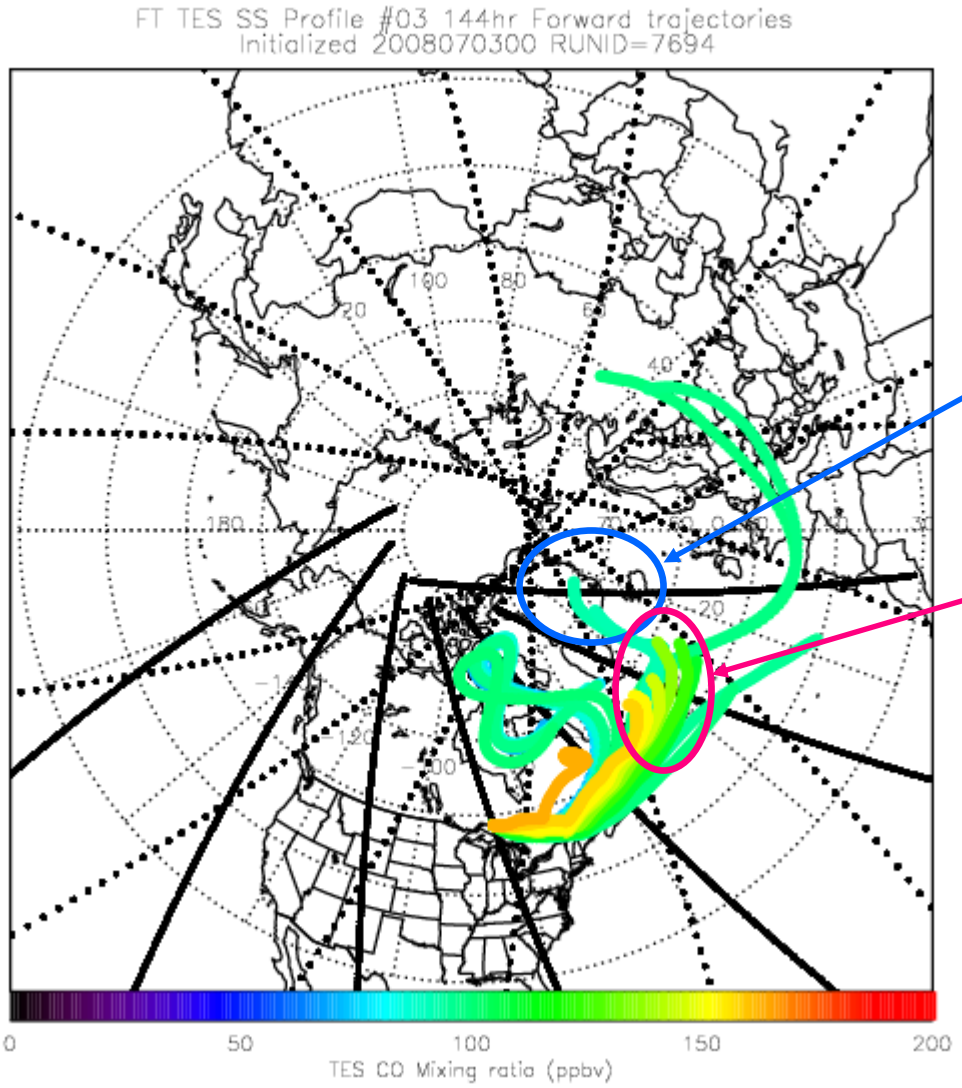




TES observes elevated CO within the lower troposphere likely associated with fresh SK burning

At least one profile also shows enhanced O3 in the lower troposphere.

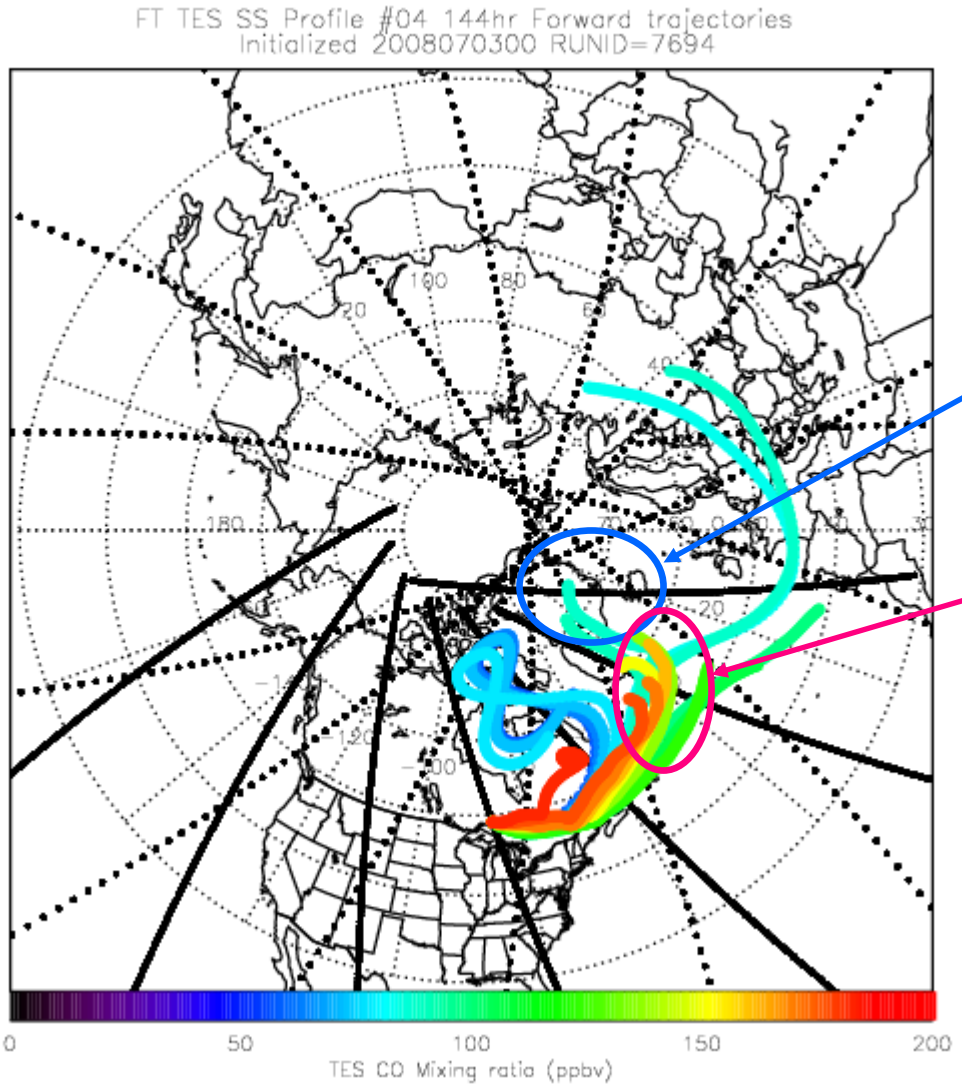
TES SS Forward Trajectories “Profile 3” Valid 00Z 07/09 (07/08 Thule flight)



Canadian outflow over Greenland at about 4-6 km

Canadian outflow to the south of Greenland at about 0-2 km

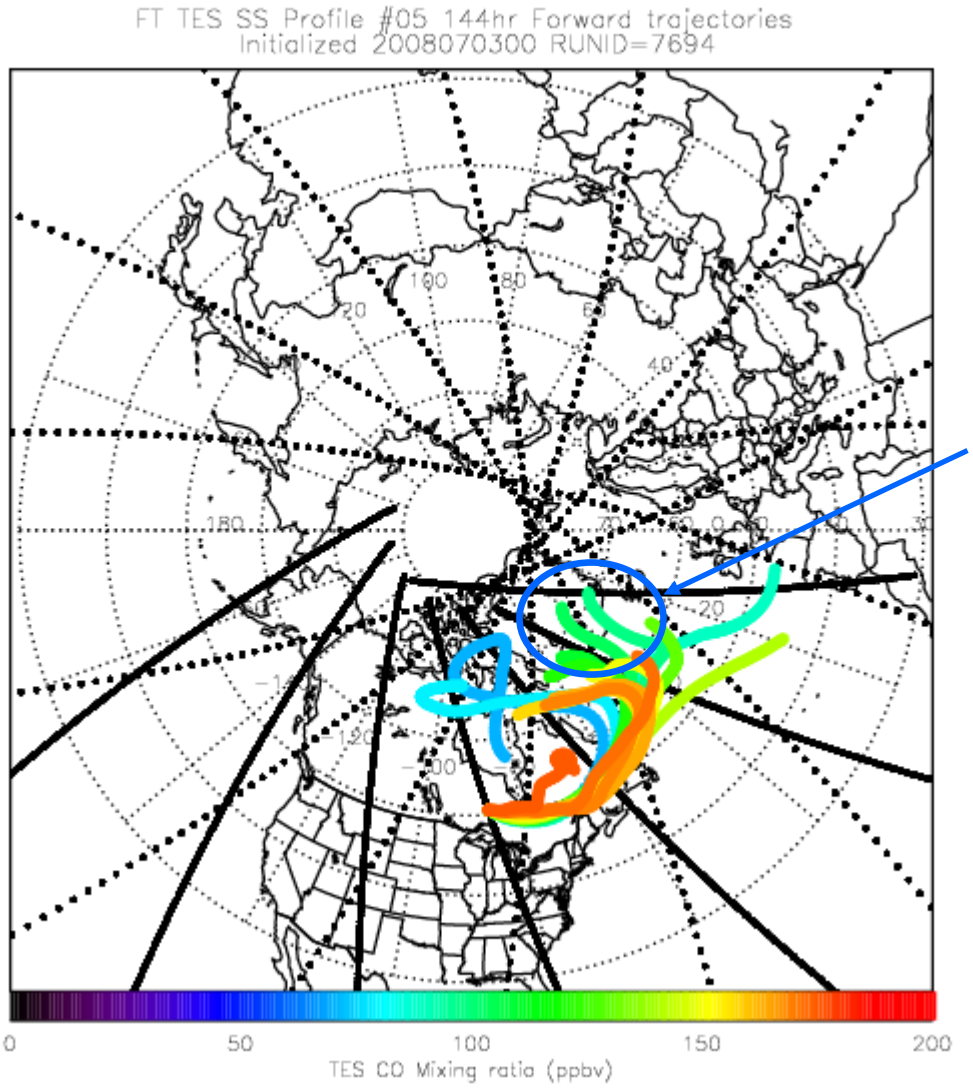
TES SS Forward Trajectories “Profile 4” Valid 00Z 07/09 (07/08 Thule flight)



Canadian outflow over Greenland at about 4-6 km

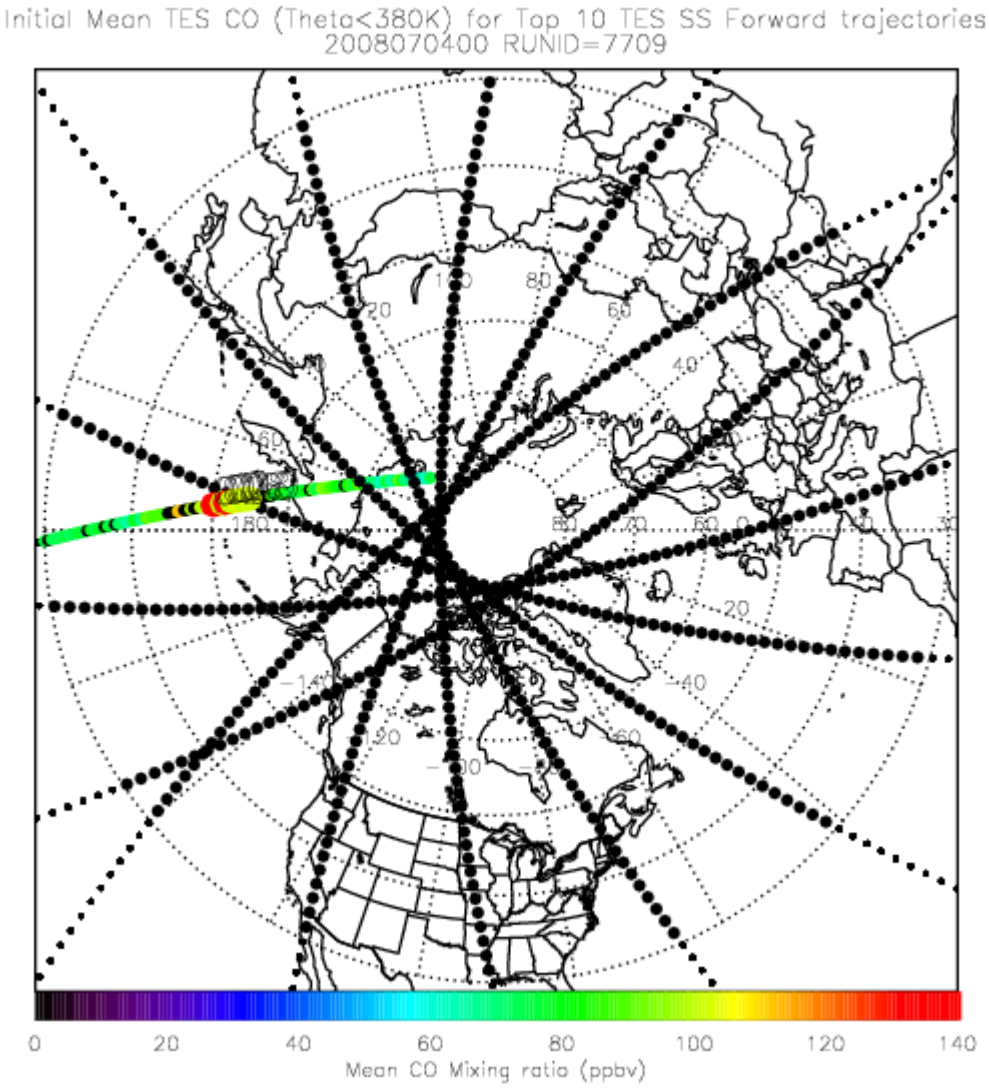
Canadian outflow to the south of Greenland at about 0-2 km

TES SS Forward Trajectories “Profile 5” Valid 00Z 07/09 (07/08 Thule flight)

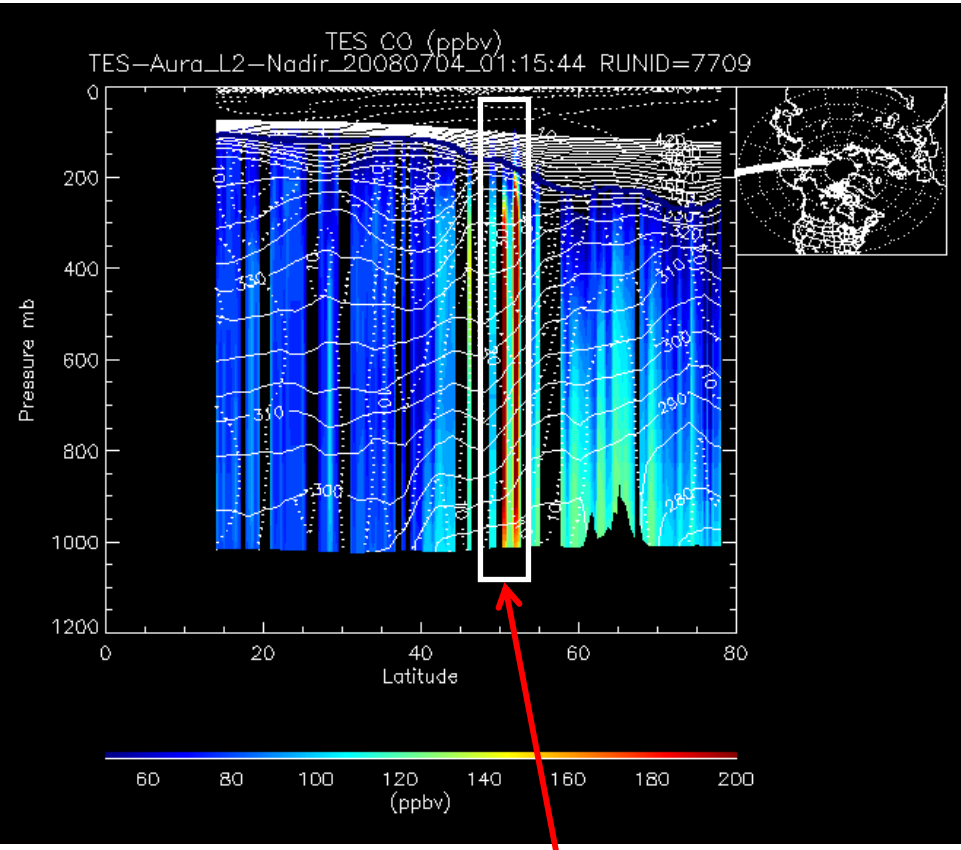


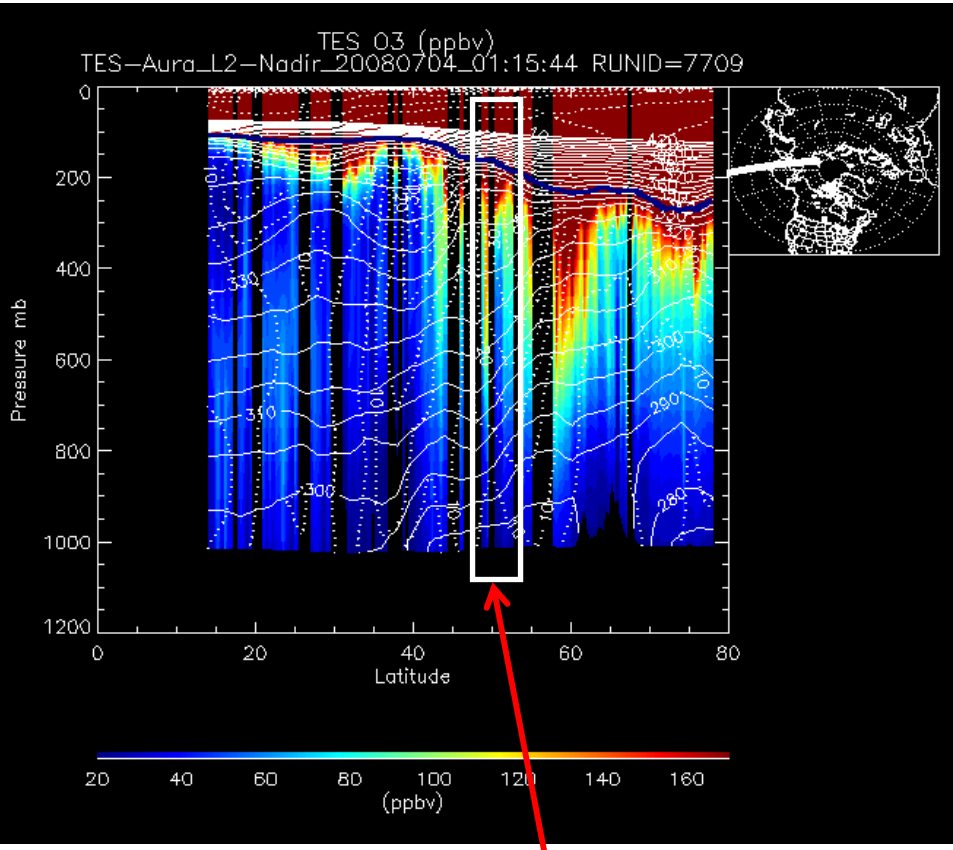
Canadian outflow over Greenland at about 4-6 km

TES Step&Stare Obs 07/04 (Run ID 7709): Mean CO below 380K



TES CO (left) and O3 (right) curtains from SS orbit 7709 (07/04)

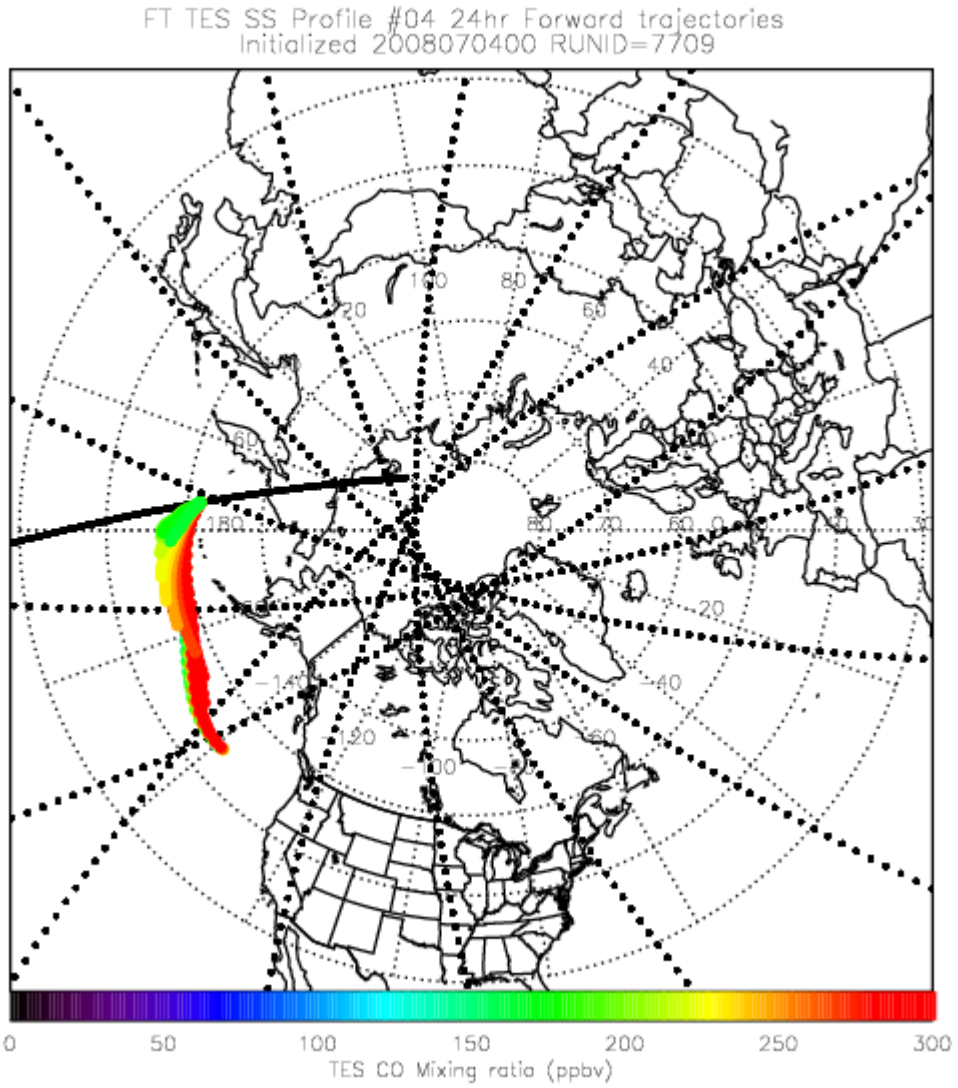




TES observes elevated CO within the upper troposphere likely associated with Siberian burning

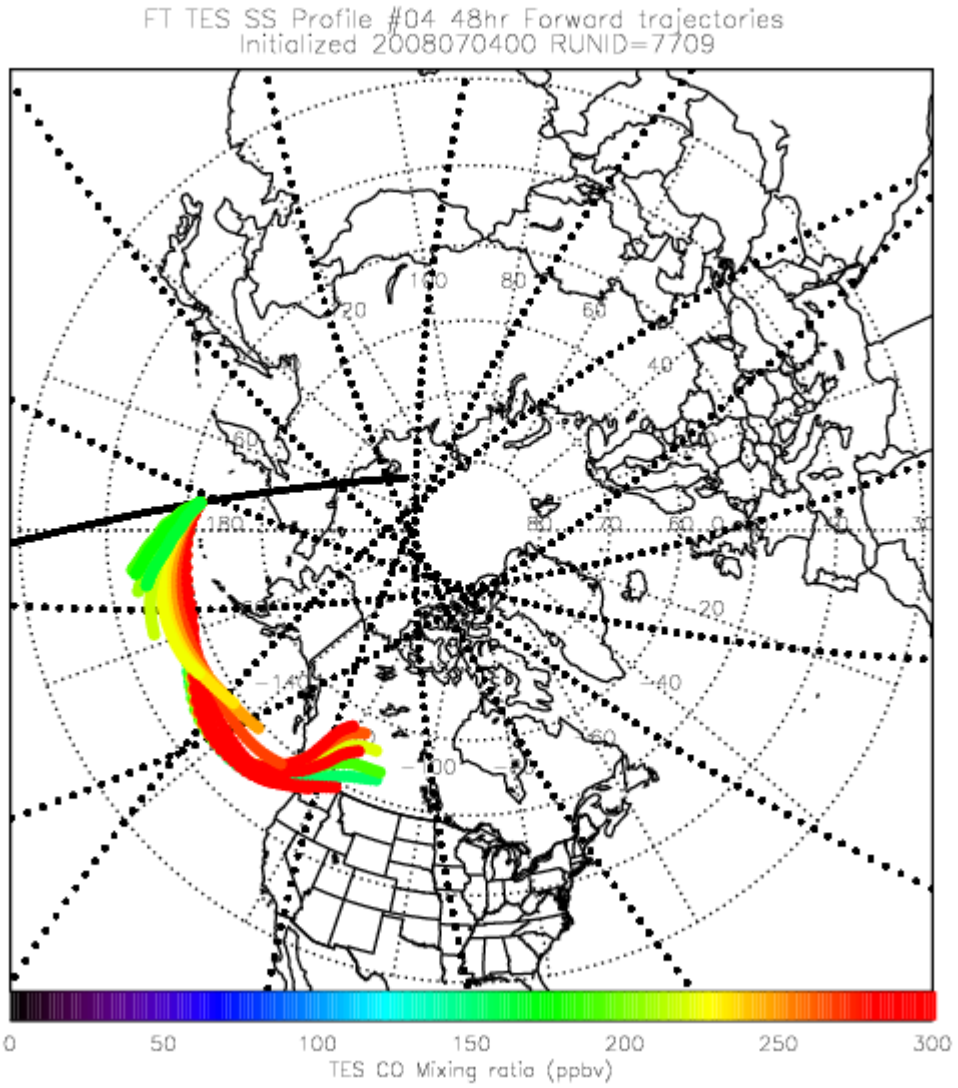
No apparent O3 enhancement associated with elevated CO; Stratospheric influence to the North

TES SS Forward Trajectories “Profile 4” Valid 00Z 07/05 (afternoon 07/04 MDT)



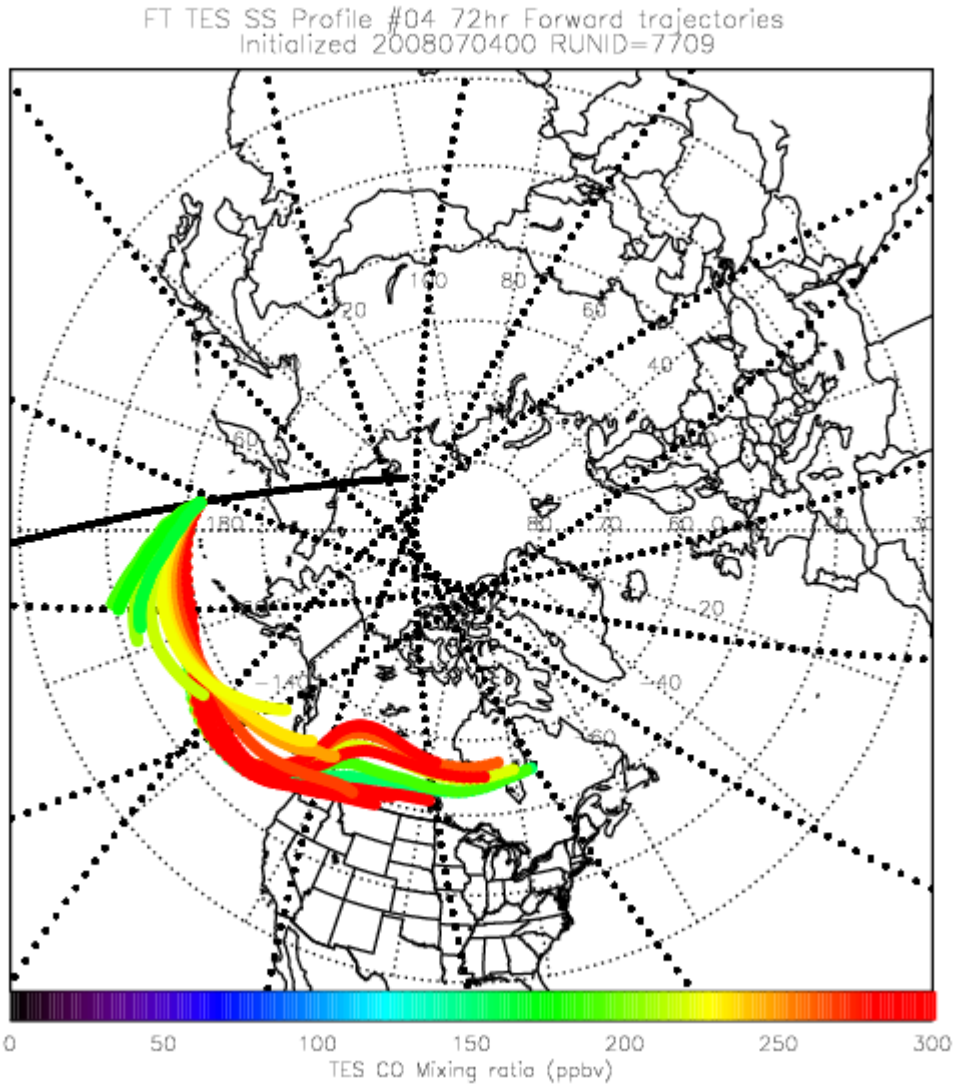
Siberian plumes rapidly transported eastward in upper troposphere

TES SS Forward Trajectories “Profile 4” Valid 00Z 07/06 (afternoon 07/05 MDT)



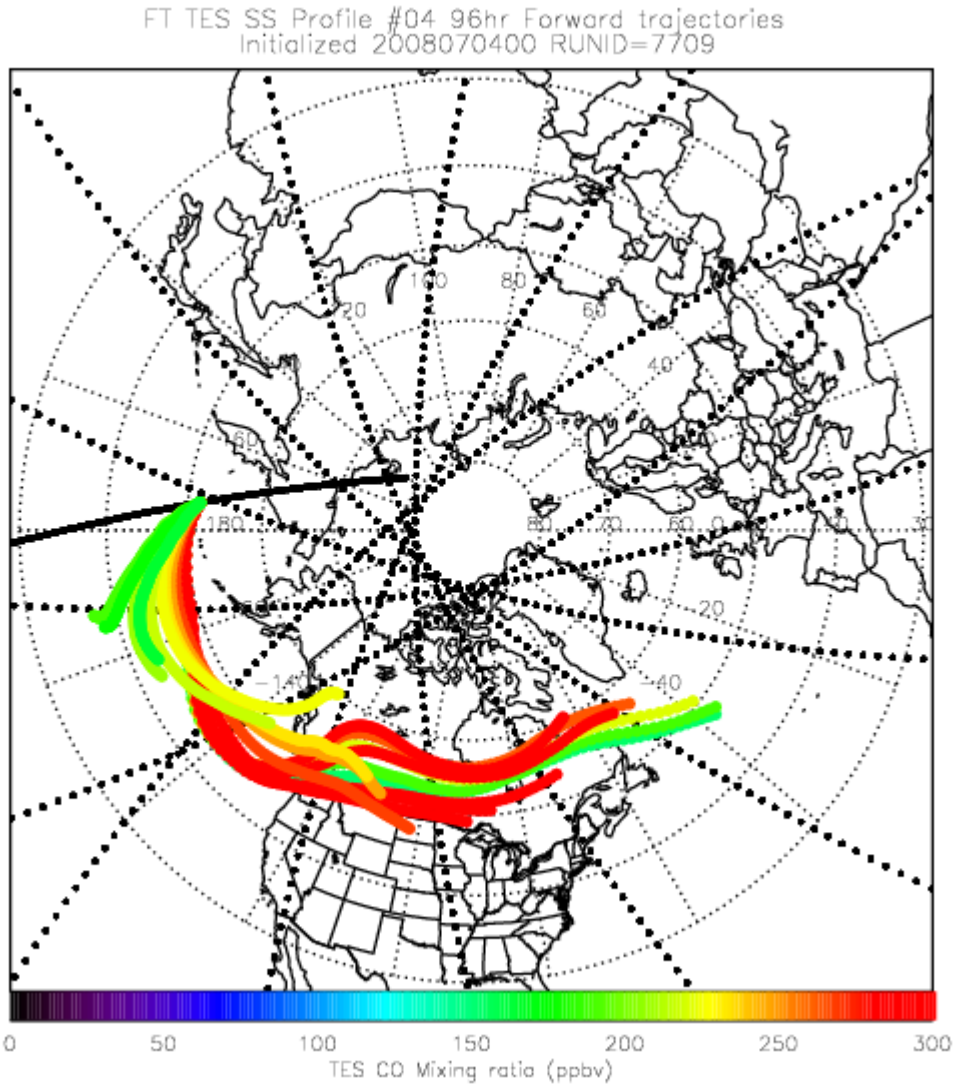
Siberian plumes rapidly transported eastward in upper troposphere

TES SS Forward Trajectories “Profile 4” Valid 00Z 07/07 (afternoon 07/06 MDT)



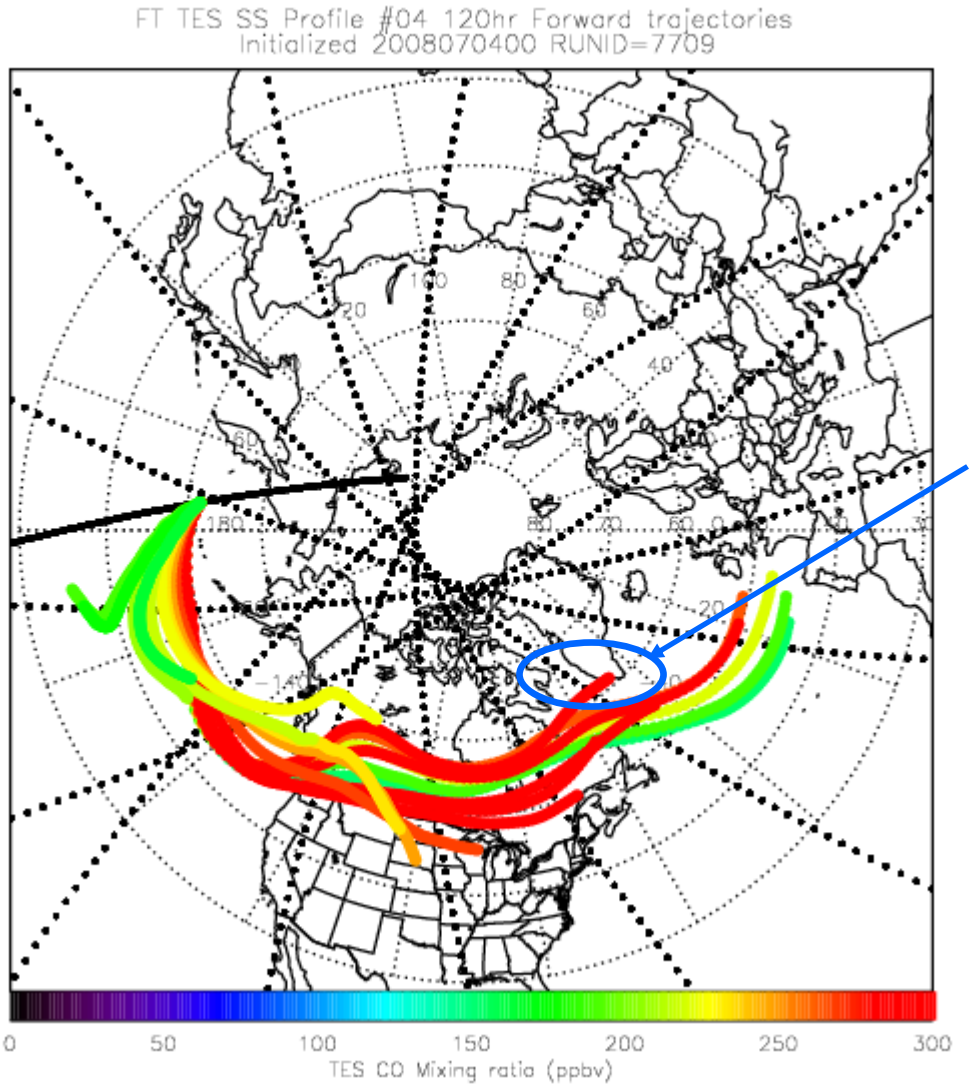
Siberian plumes rapidly transported eastward in upper troposphere (6-12 km over central Canada)

TES SS Forward Trajectories “Profile 4” Valid 00Z 07/08 (afternoon 07/07 MDT)



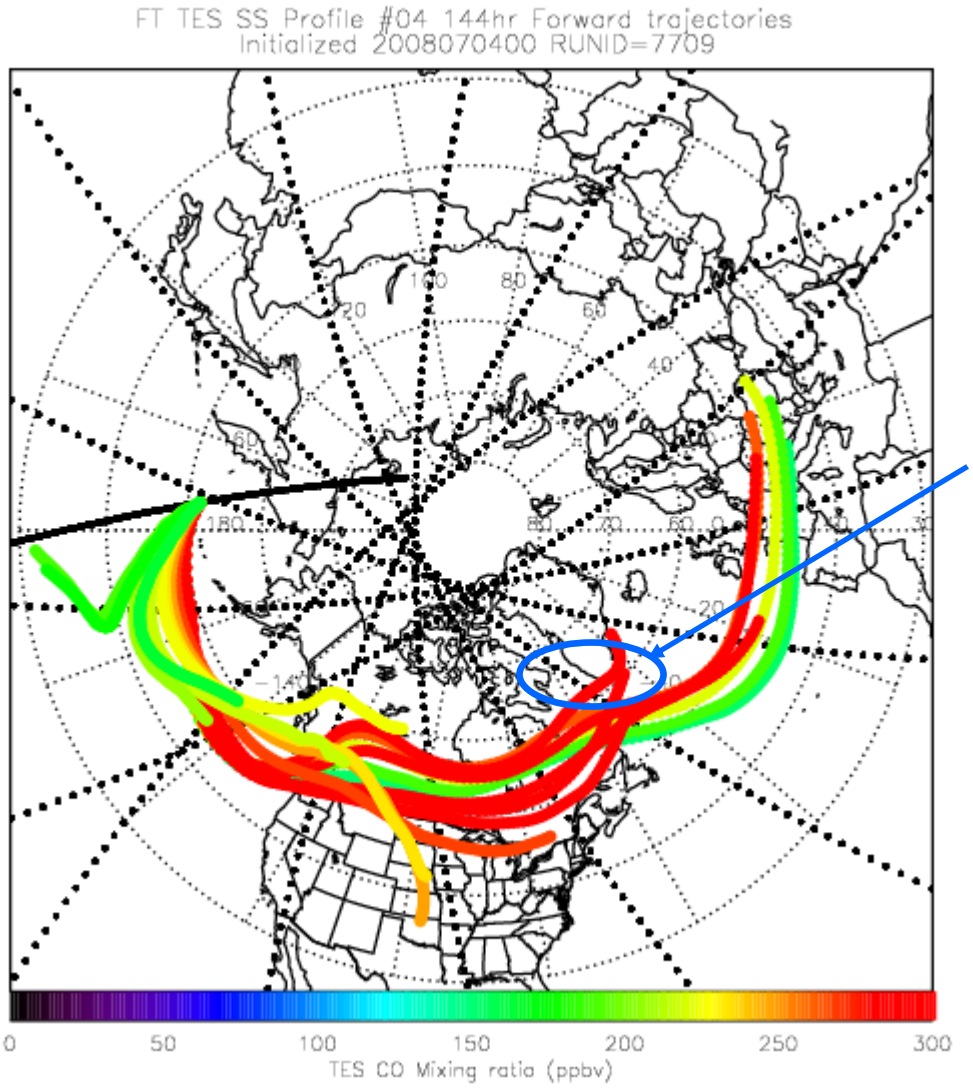
Siberian plumes rapidly transported eastward in upper troposphere

TES SS Forward Trajectories “Profile 4” Valid 00Z 07/09 (07/08 Thule flight)

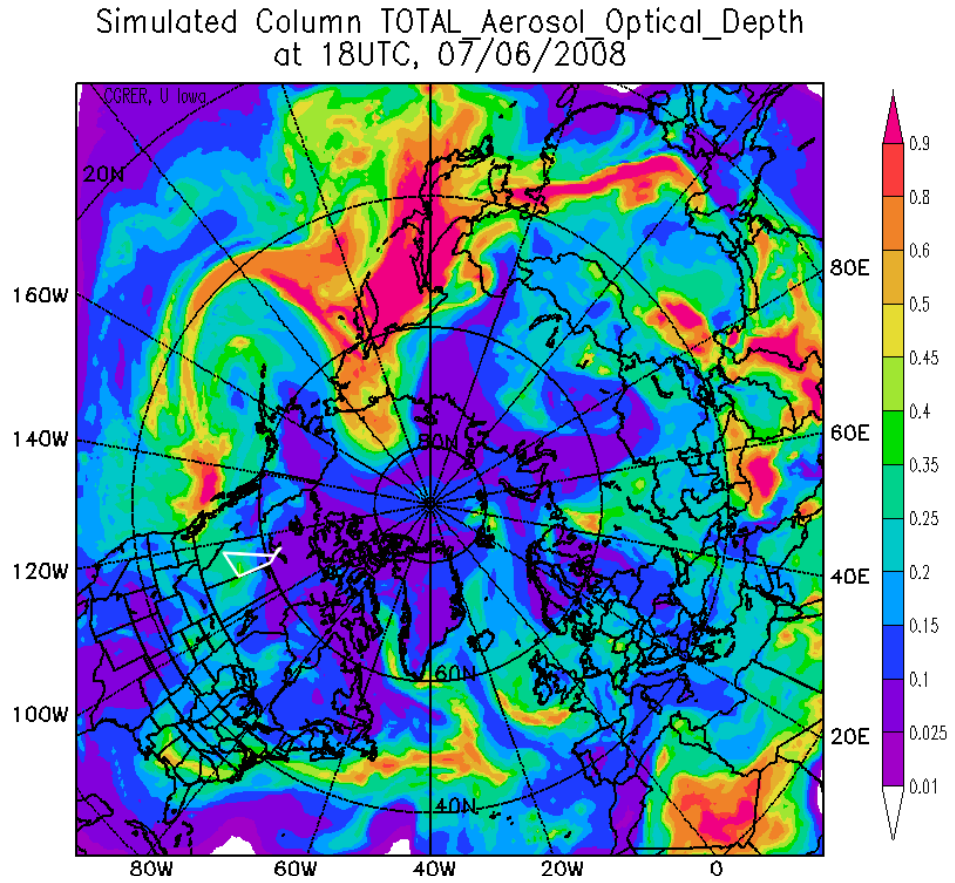


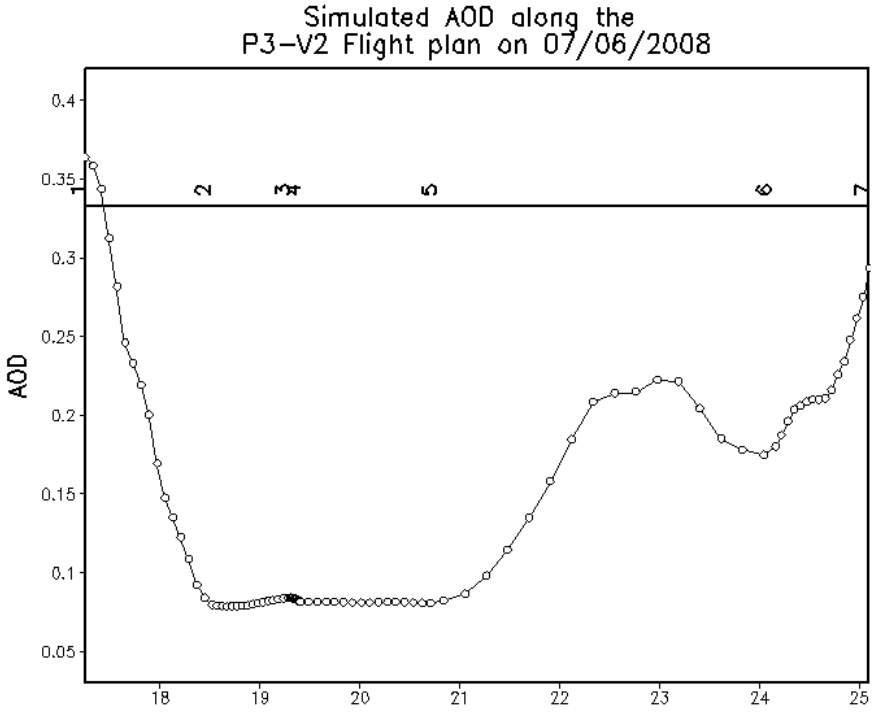
Siberian plumes near southern tip of Greenland at about 9km

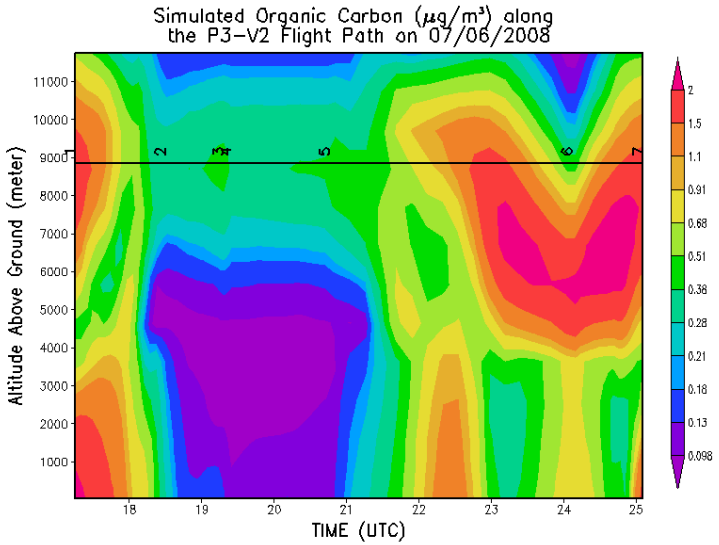
TES SS Forward Trajectories “Profile 4” Valid 00Z 07/10 (07/09 Thule flight)

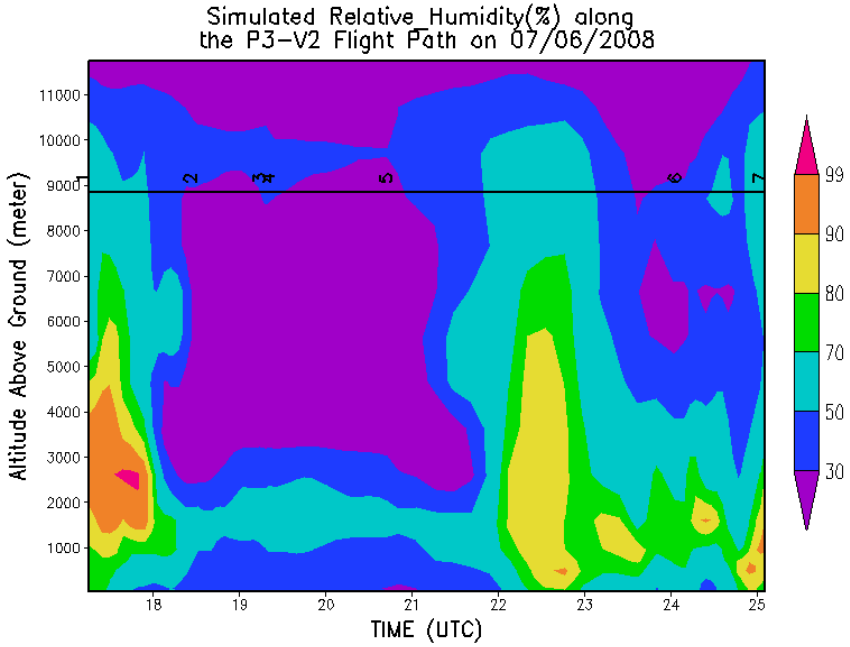


Siberian outflow remains near southern tip of Greenland at about 7-9 km (likely interleaved with SK outflow)

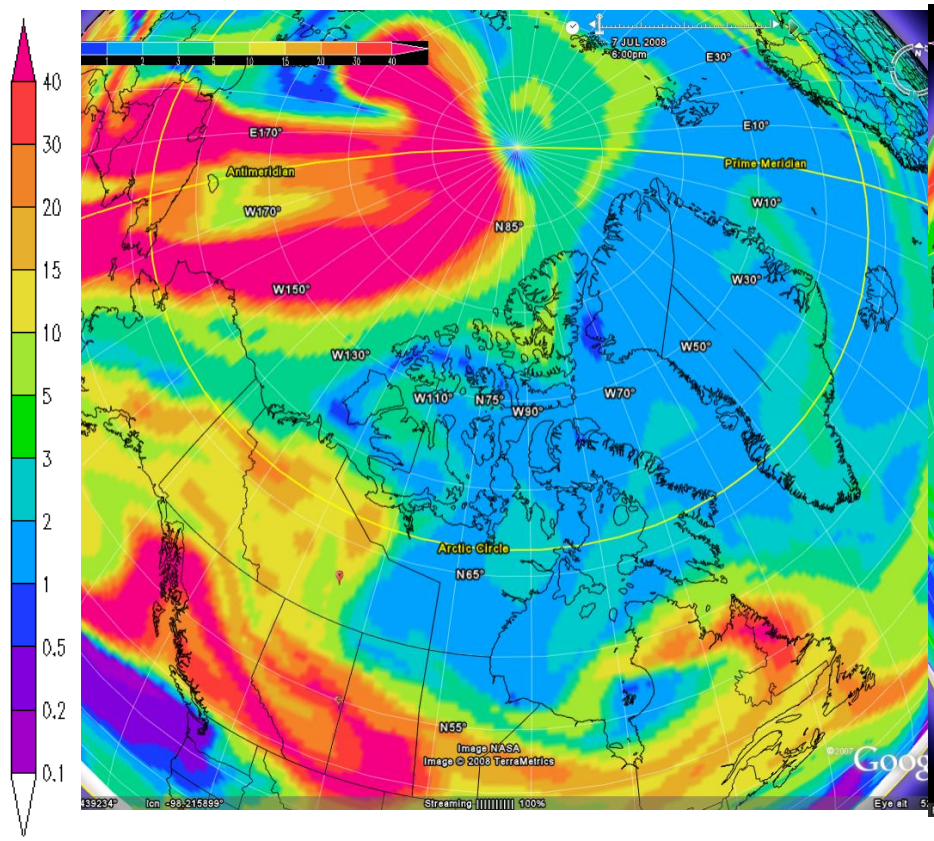

Simulated Column TOTAL_Aerosol_Optical_Depth
at 18UTC, 07/06/2008
CGRER, U Iowa
20N
160W
140W
120W
100W
80N
60N
40N
80E
60E
40E
20E
80W
60W
40W
20W
0
0.9
0.8
0.6
0.5
0.45
0.4
0.35
0.25
0.2
0.15
0.1
0.025
0.01


Simulated AOD along the
P3-V2 Flight plan on 07/06/2008
AOD
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
1
2
3
5
6
7
18
19
20
21
22
23
24
25

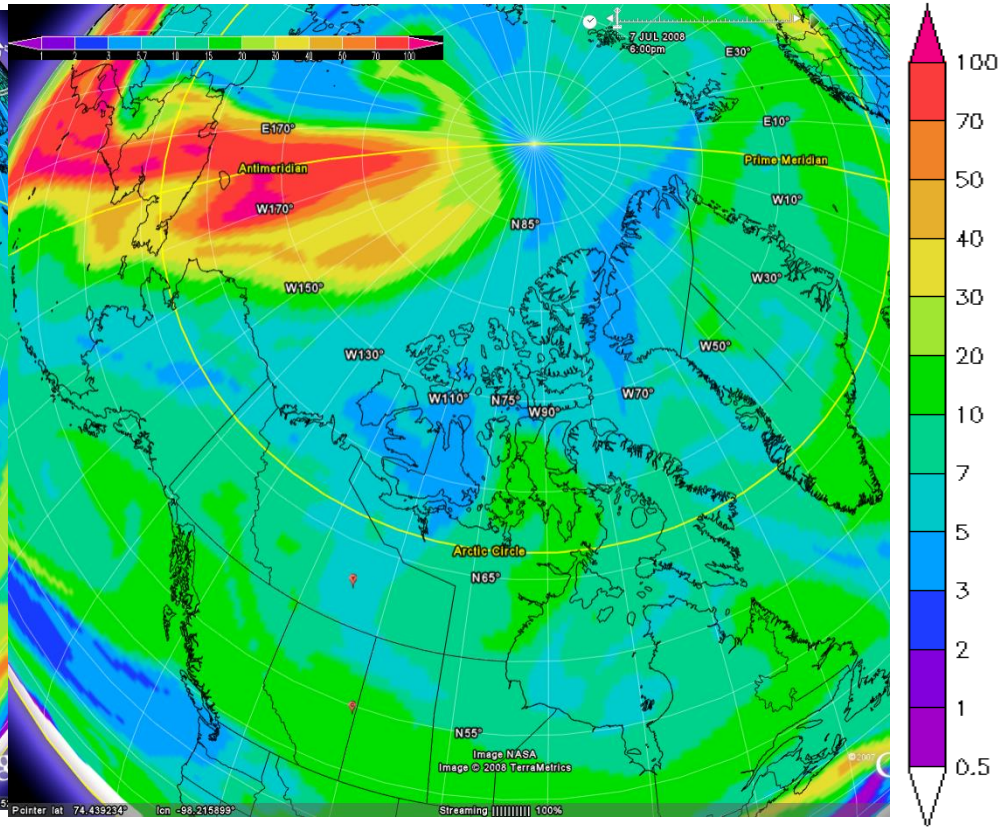

Simulated Organic Carbon (μg/m³) along
the P3-V2 Flight Path on 07/06/2008
Altitude Above Ground (meter)
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
1
2
3
5
6
7
18
19
20
21
22
23
24
25
TIME (UTC)
2
1.5
1.1
0.91
0.68
0.51
0.38
0.28
0.21
0.18
0.13
0.098


Simulated Relative Humidity(%) along
the P3-V2 Flight Path on 07/06/2008
Altitude Above Ground (meter)
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
1
2
3
5
6
7
18
19
20
21
22
23
24
25
TIME (UTC)
99
90
80
70
50
30

5.5 km layer

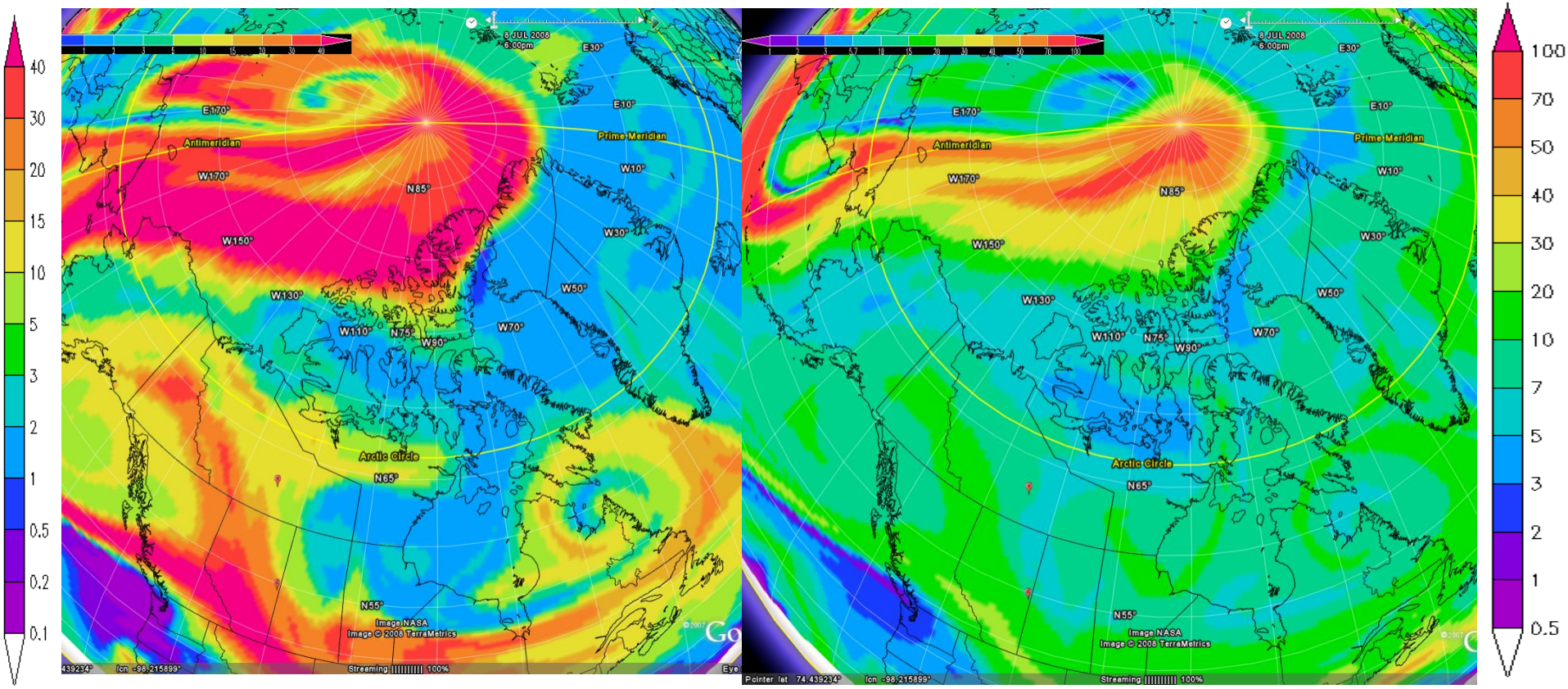


Biomass CO, 18Z, 7/7



Anthropogenic CO, 18Z, 7/7

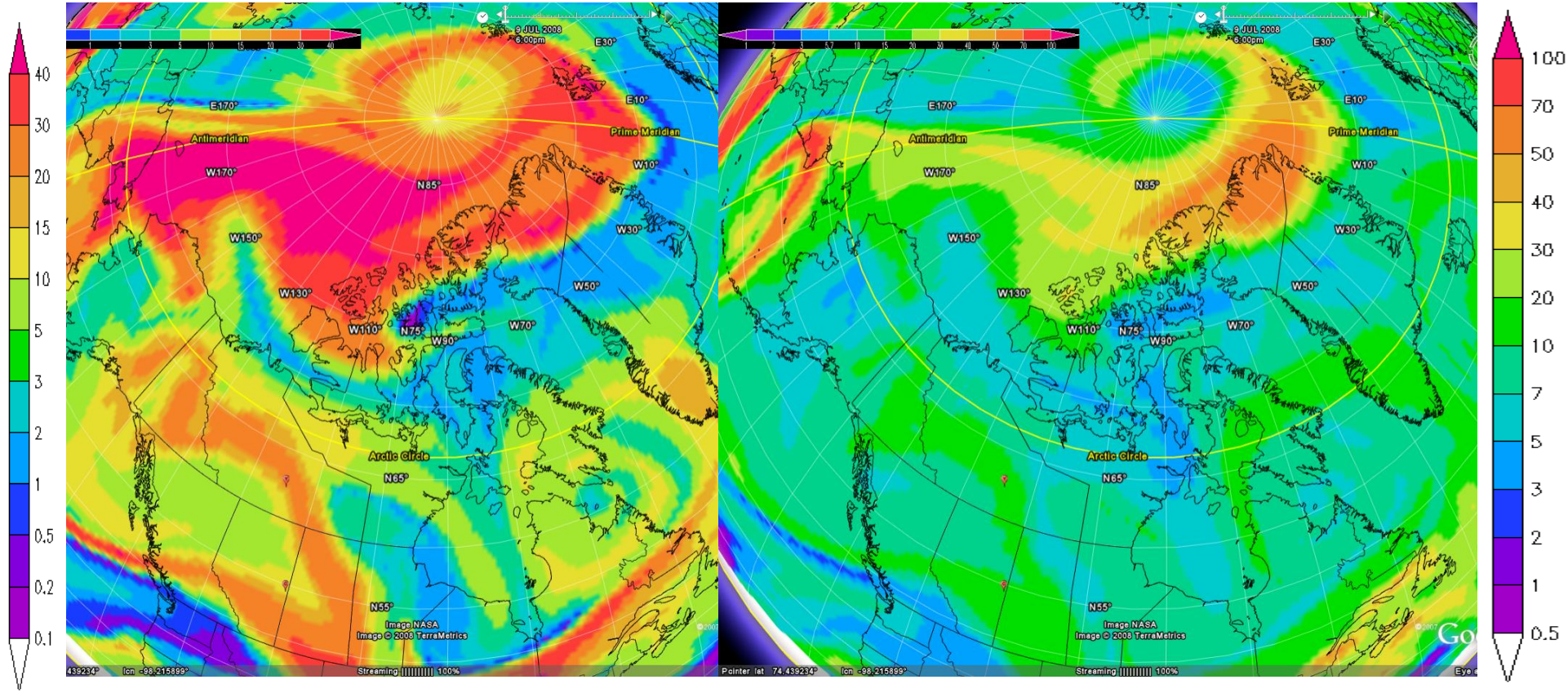
5.5 km layer



Biomass CO, 18Z, 7/8

Anthropogenic CO, 18Z, 7/8

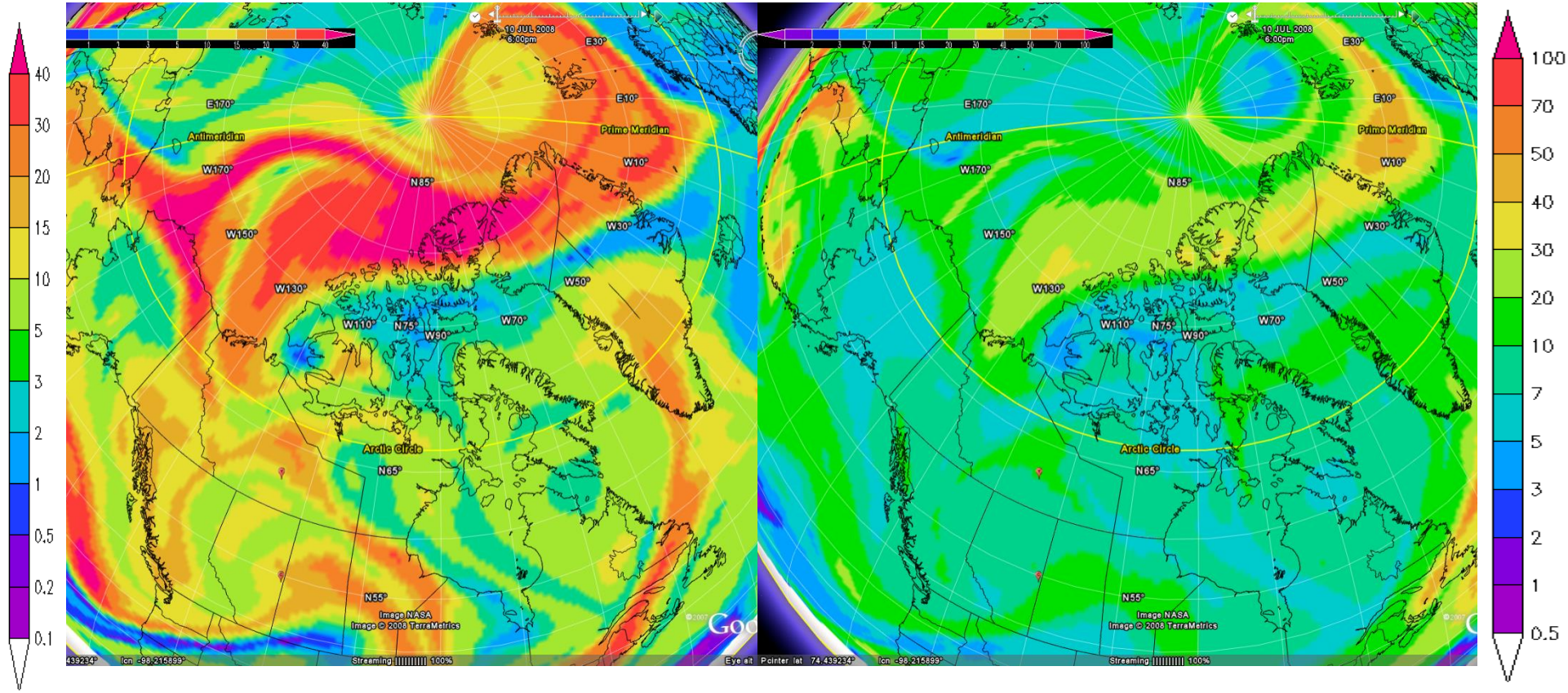
5.5km layer



Biomass CO, 18Z, 7/9

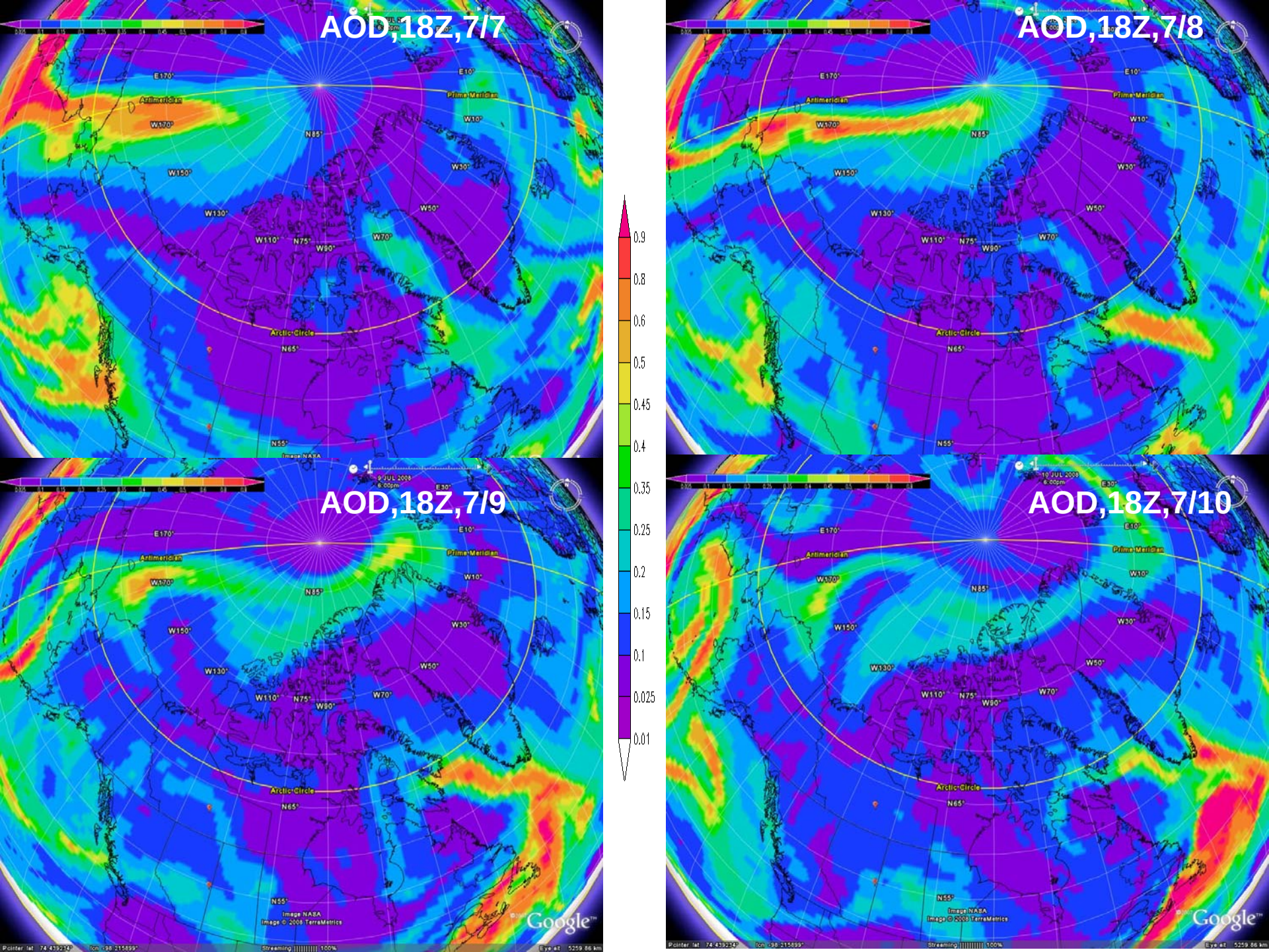
Anthropogenic CO, 18Z, 7/9

5.5 km layer

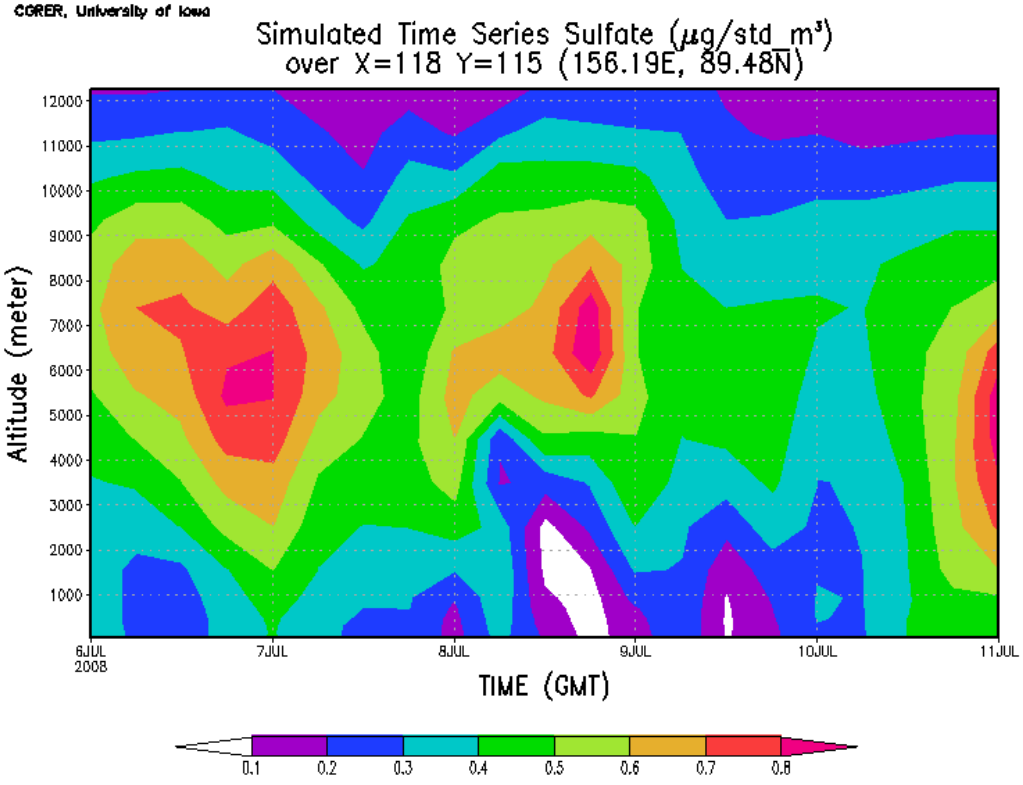


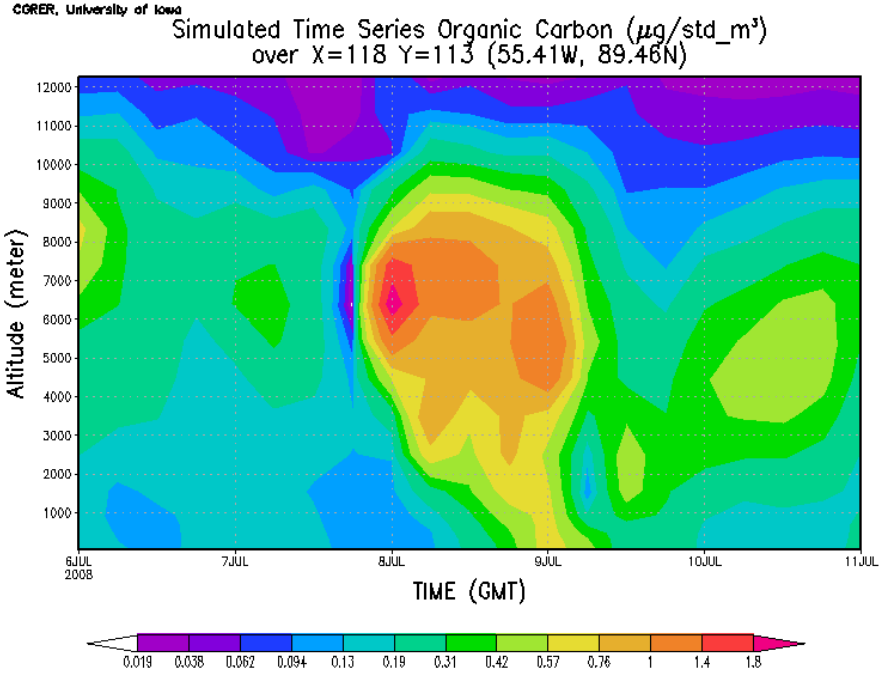
Biomass CO, 18Z, 7/10

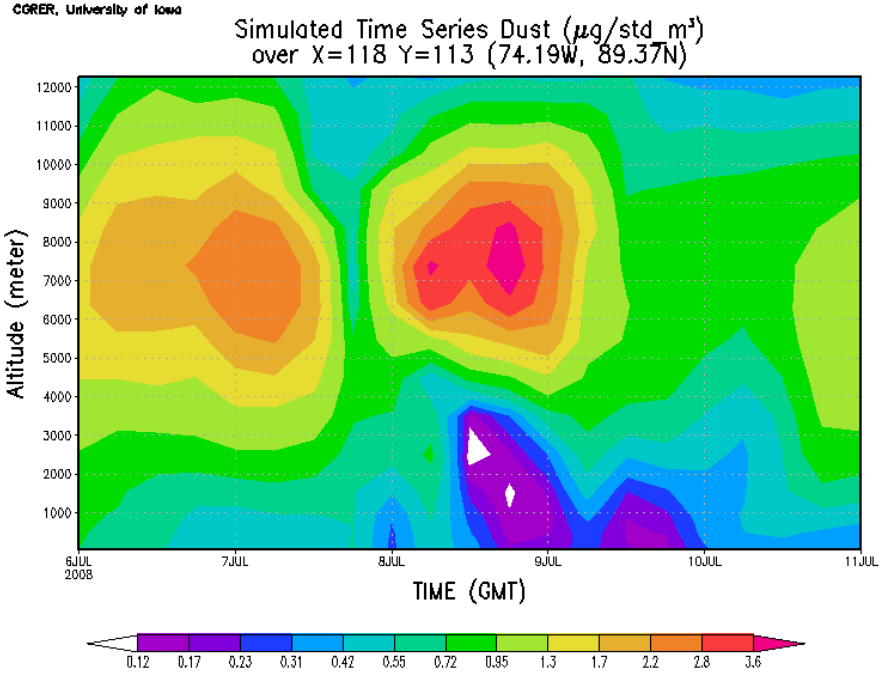
Anthropogenic CO, 18Z, 7/10


AOD,18Z,7/7
AOD,18Z,7/8
AOD,18Z,7/9
AOD,18Z,7/10
0.9
0.8
0.6
0.5
0.45
0.4
0.35
0.25
0.2
0.15
0.1
0.025
0.01
Arctic Circle
Prime Meridian
Antimeridian
Image NASA
Image © 2008 TerraMetrics
Google

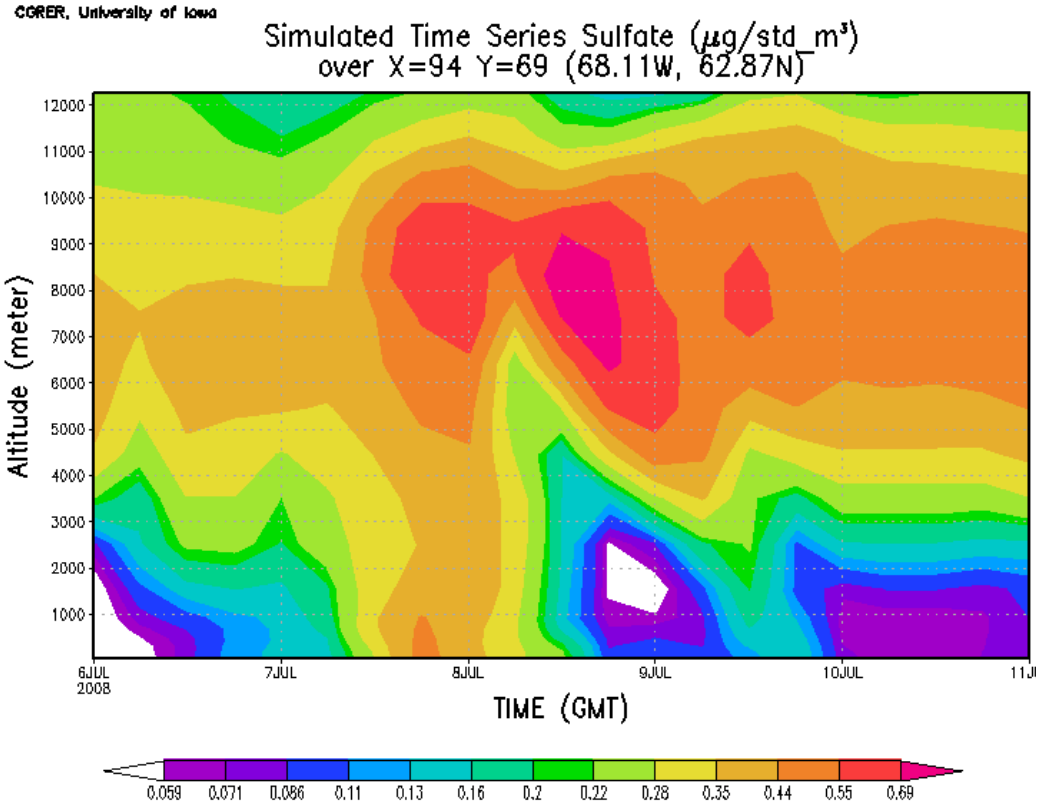
Slides to Illustrate the height of the plume at the North Pole for July 8/9

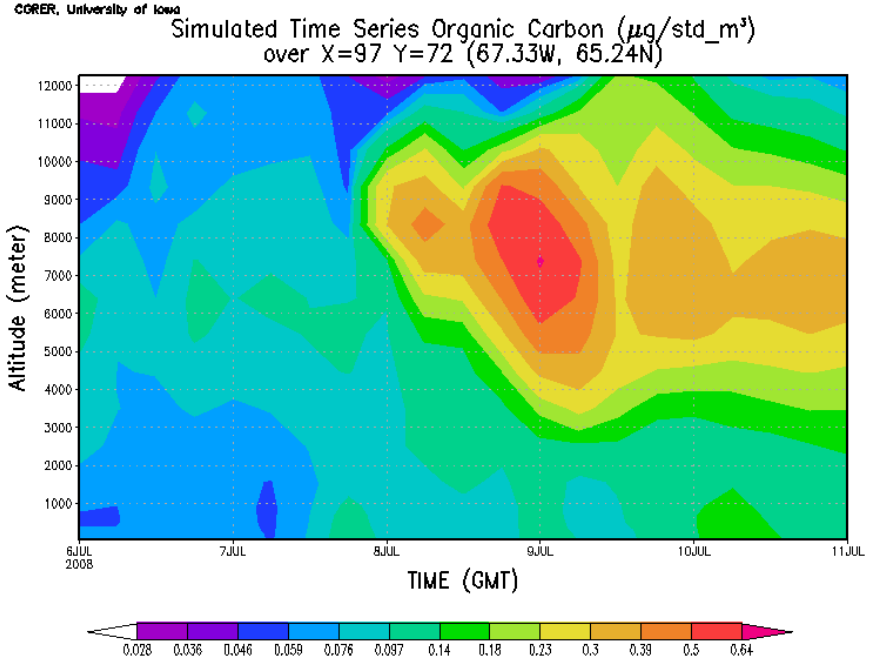


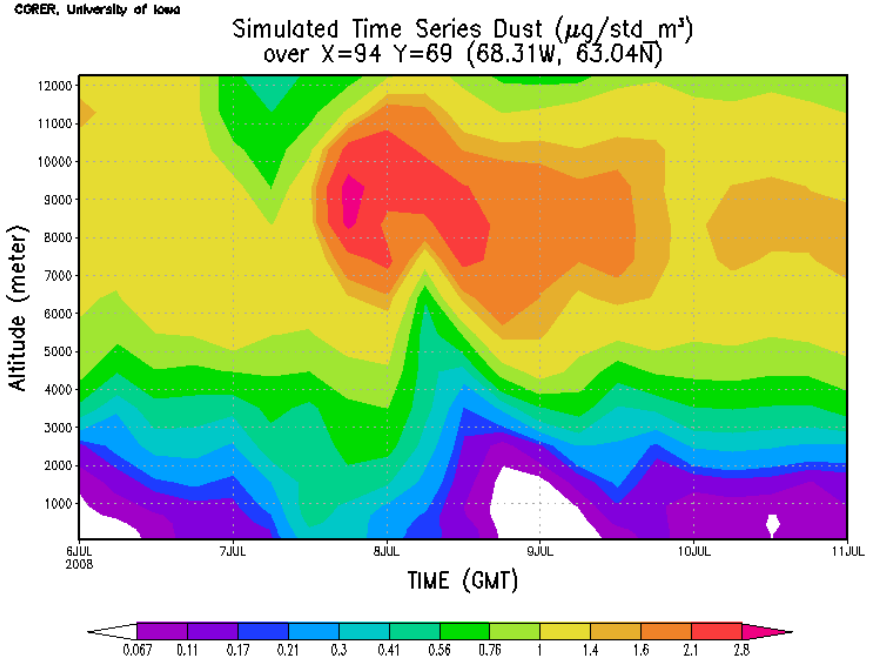




Slides to Illustrate the height of the plume at the Iqaluit for July 8/9

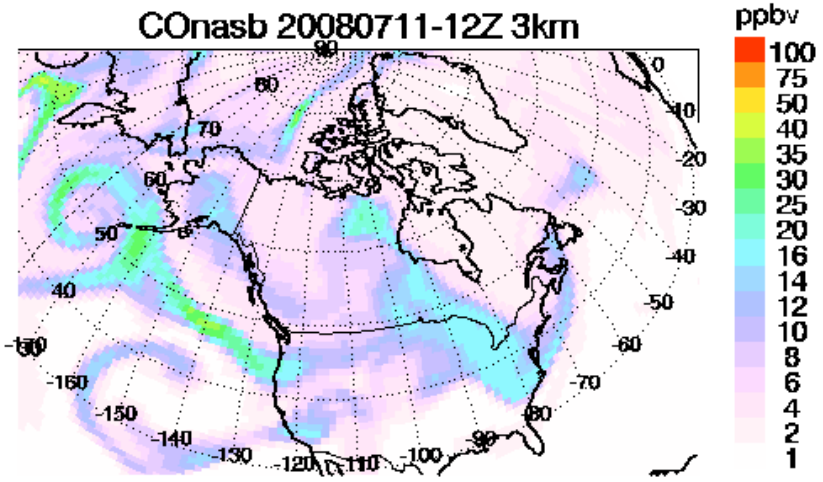






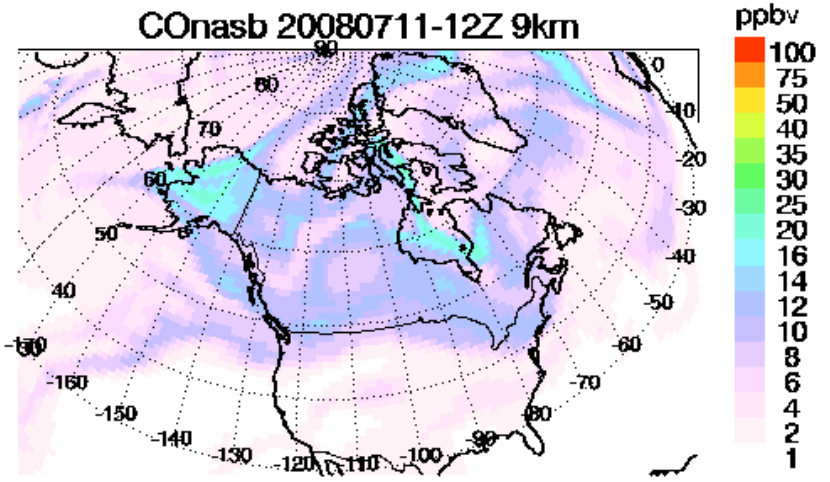
NCAR/CAM-Chem **Jul 7-11 Siberian Plumes**

CO Nasia BB 3 km



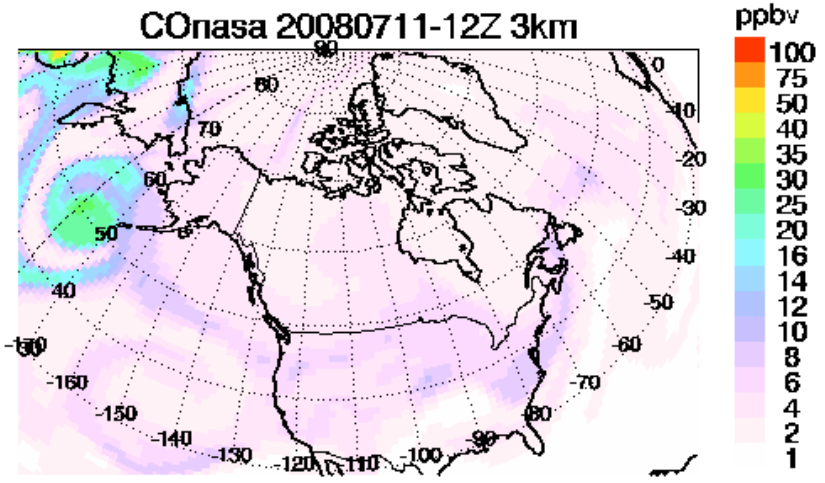
CAM Forecast from 20080705

CO Nasia BB 9 km



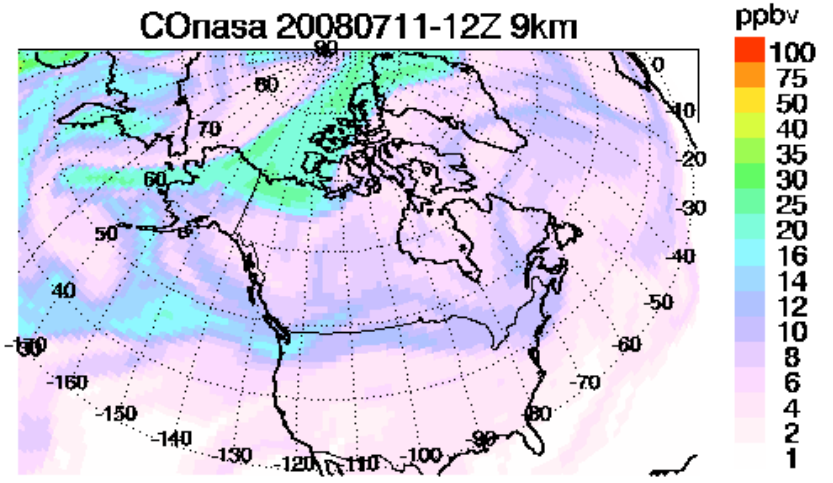
CAM Forecast from 20080705

CO Nasia Anthro 3 km



CAM Forecast from 20080705

CO Nasia Anthro 9 km

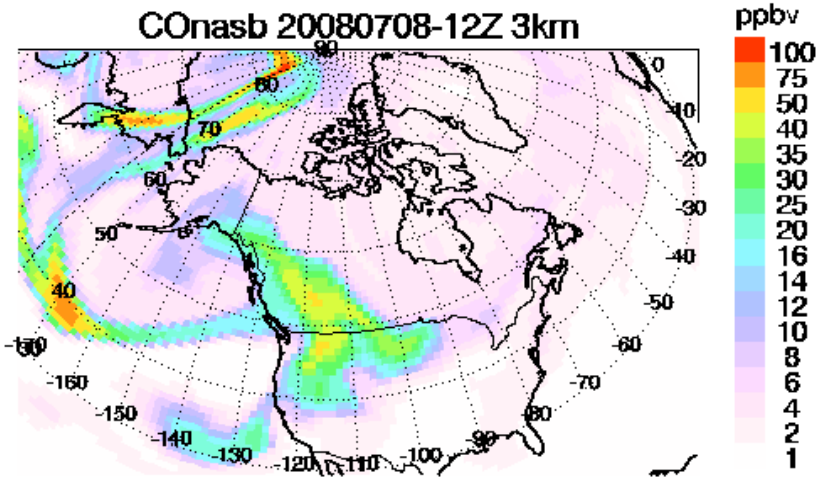


CAM Forecast from 20080705

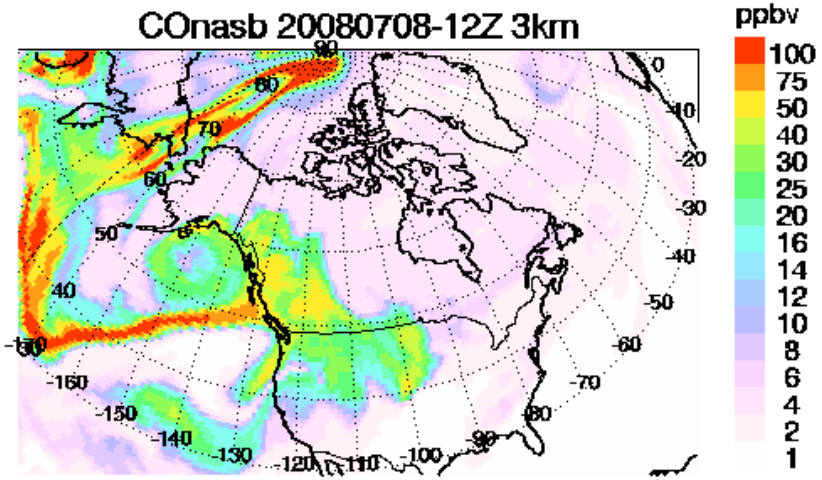
NCAR/CAM-Chem vs. MOZART **Jul 8 12Z Siberian Plumes at 3 km**

CAM-Chem ⟺ **MOZART**

CO Nasia BB

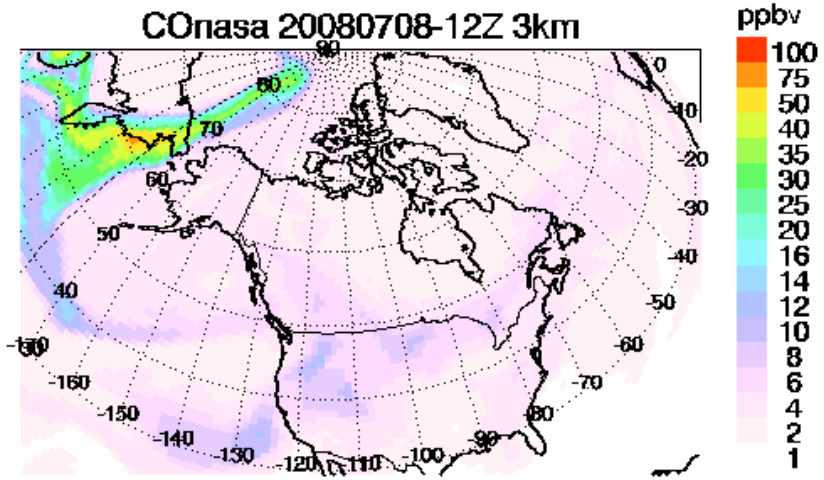


CAM Forecast from 20080705

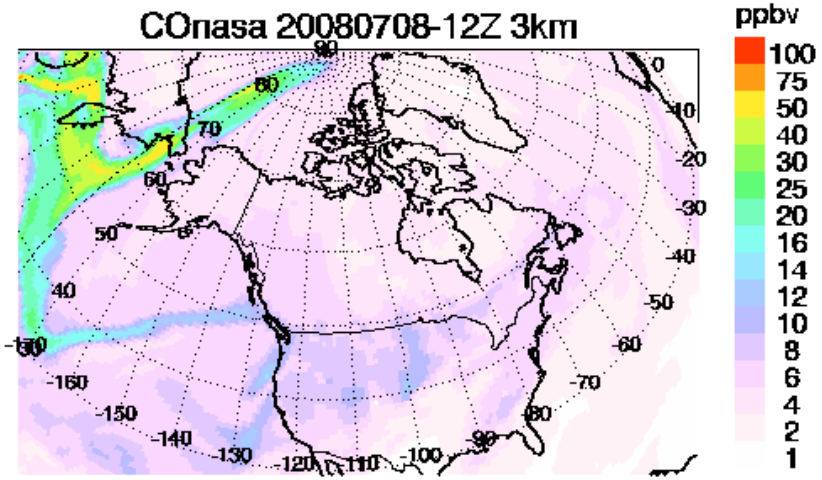


MOZART Forecast from 20080707

CO Nasia Anthro



CAM Forecast from 20080705

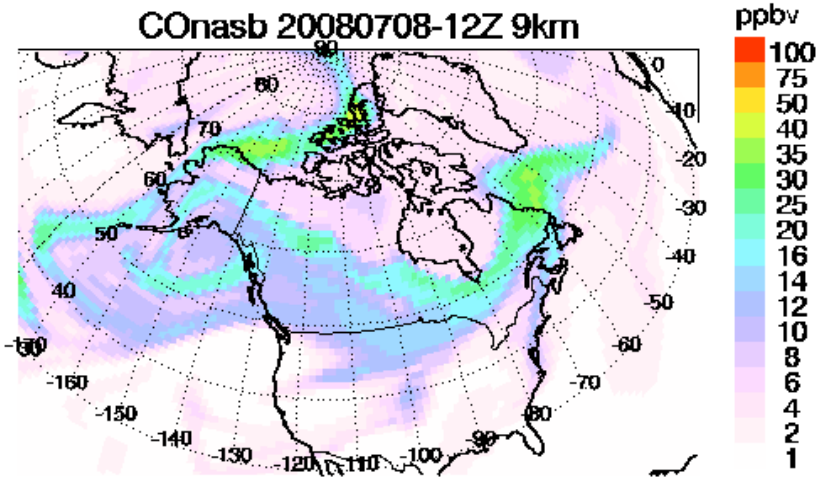


MOZART Forecast from 20080707

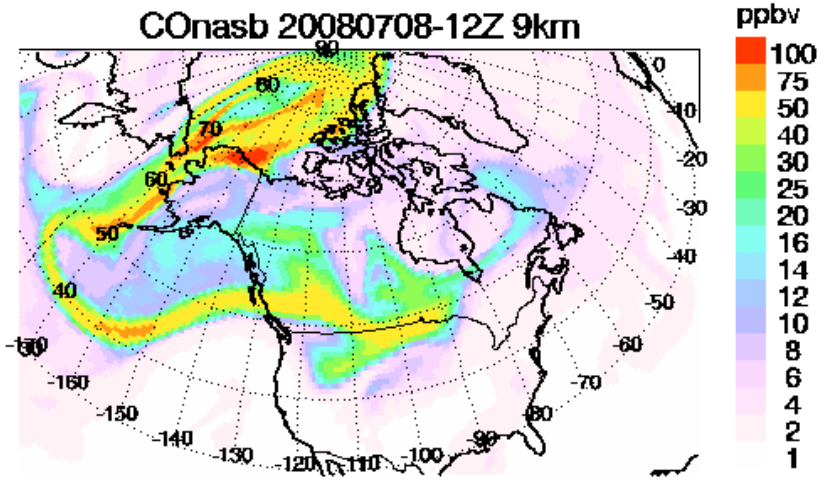
NCAR/CAM-Chem vs. MOZART **Jul 8 12Z Siberian Plumes at 9 km**

CAM-Chem ⟺ **MOZART**

CO Nasia BB

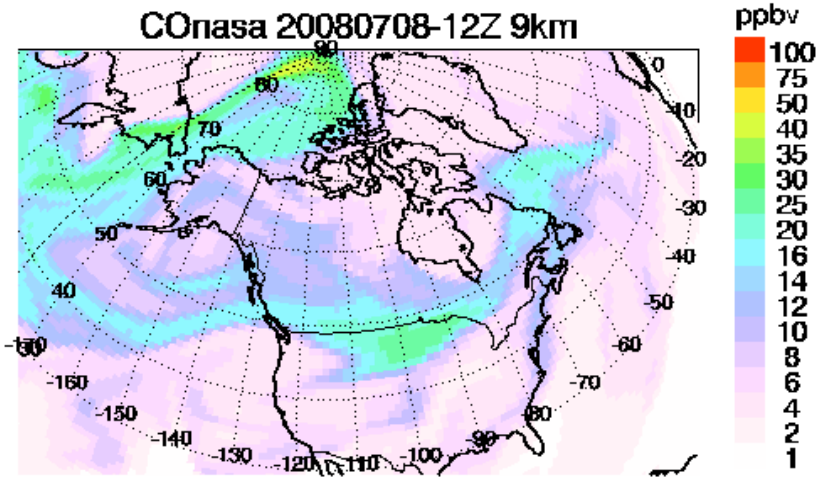


CAM Forecast from 20080705

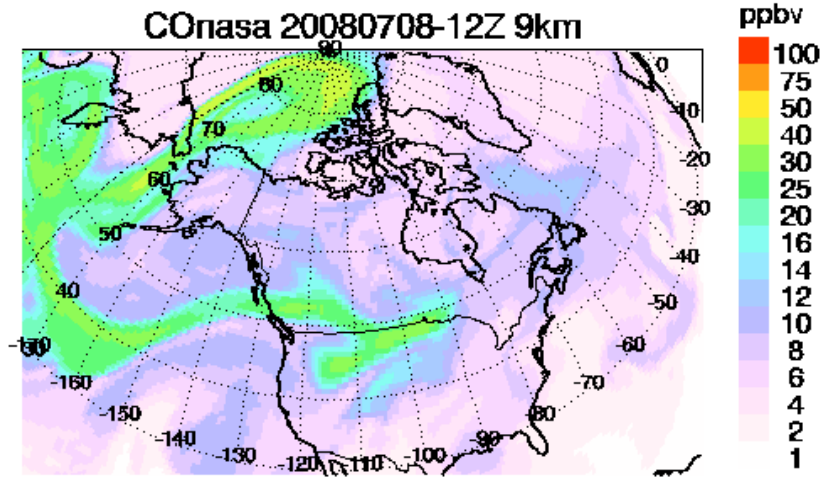


MOZART Forecast from 20080707

CO Nasia Anthro



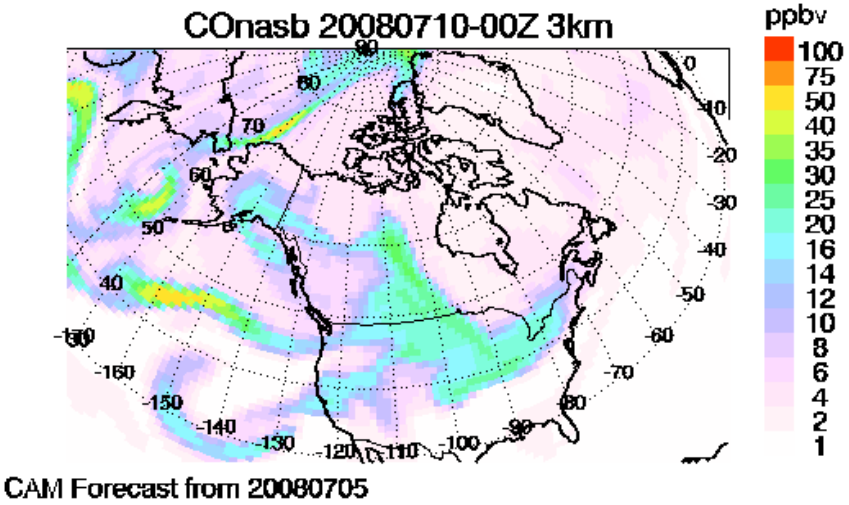
CAM Forecast from 20080705



MOZART Forecast from 20080707

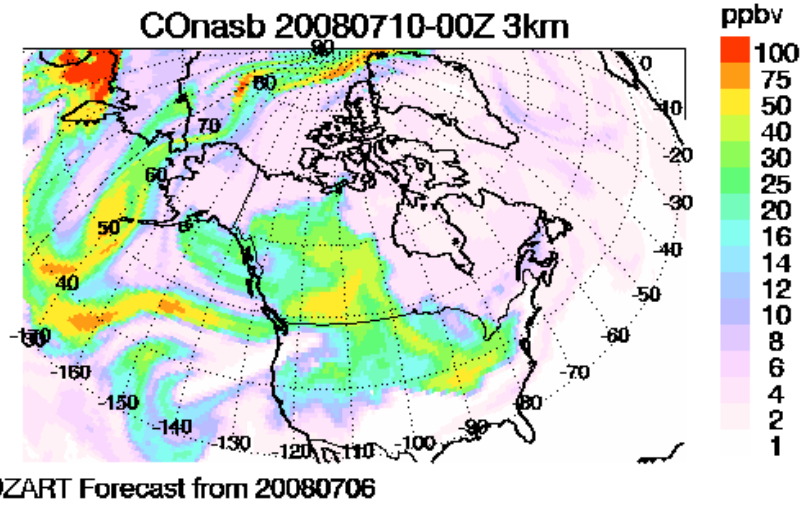
NCAR/CAM-Chem vs. MOZART **Jul 10 00Z Siberian Fire Plumes**

CAM-Chem ⟷ **MOZART**

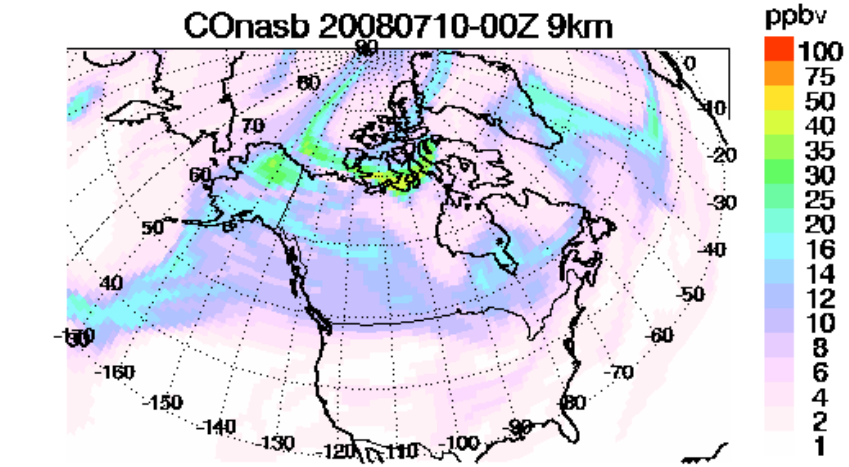


CAM Forecast from 20080705

3 km

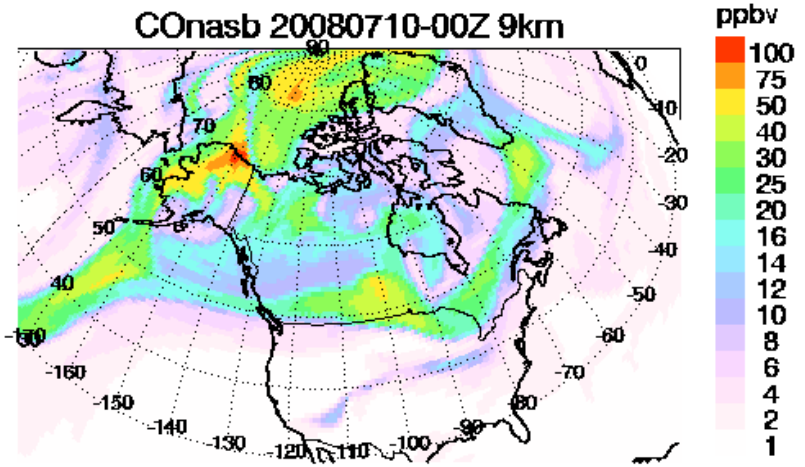


MOZART Forecast from 20080706



CAM Forecast from 20080705

9 km

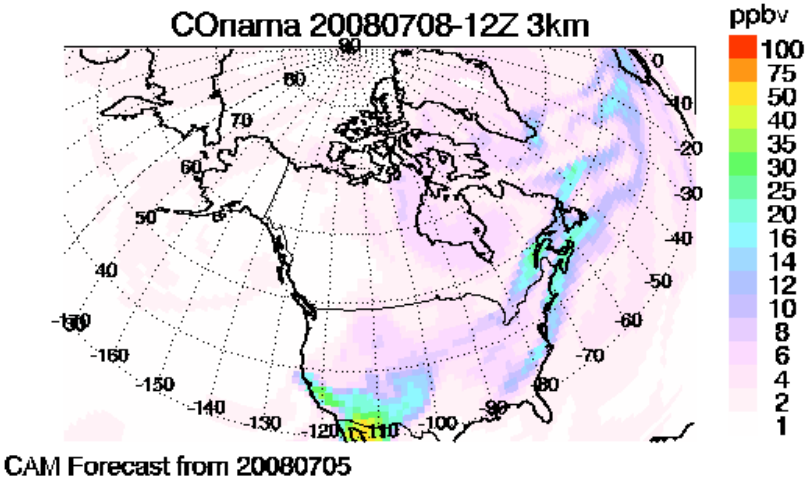


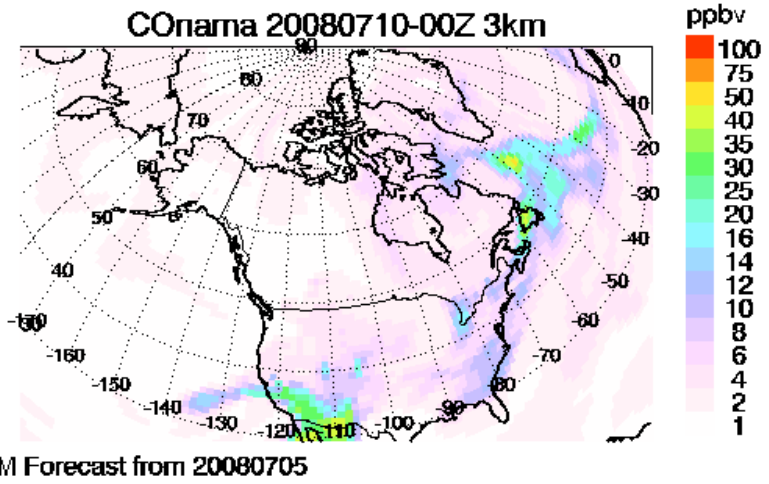
MOZART Forecast from 20080706

NCAR/CAM-Chem **Jul 8 vs. Jul 10** **North American Outflow at low altitudes**

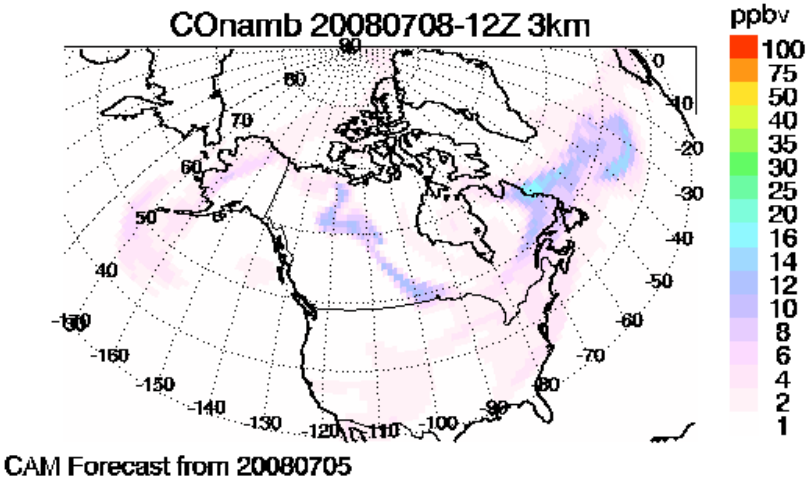
July 8 12Z → **July 10 0Z**

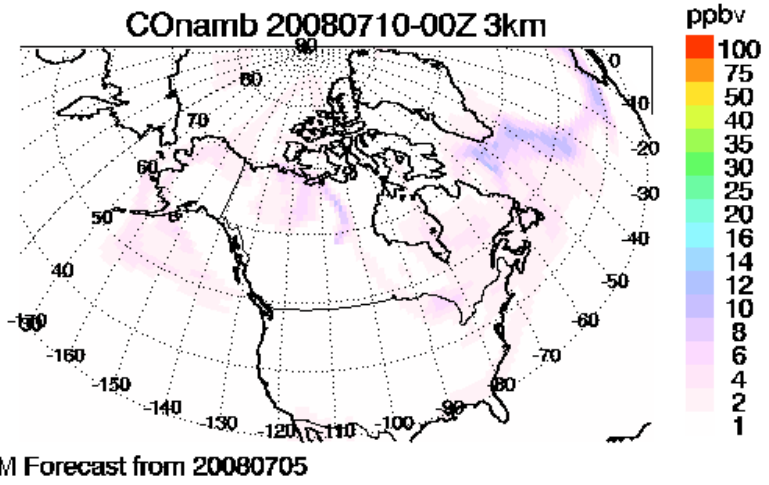
Anthro





BB

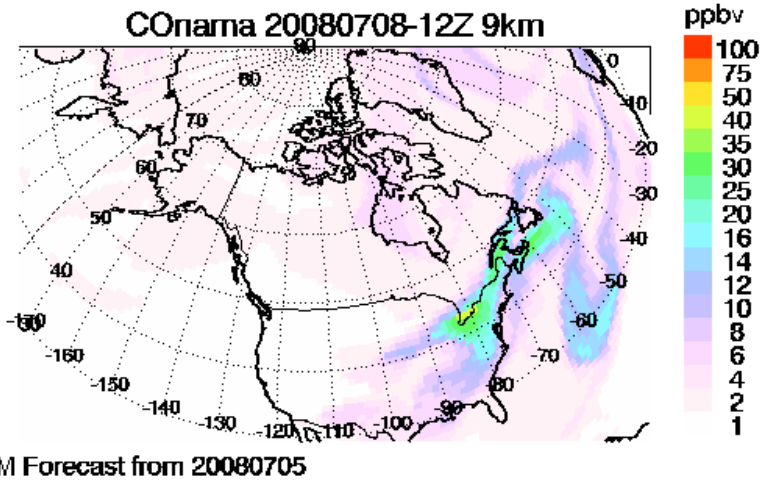


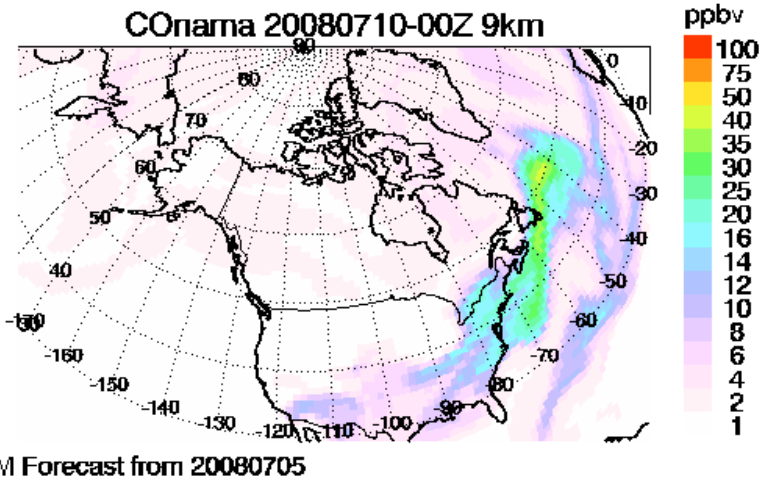


NCAR/CAM-Chem **Jul 8 vs. Jul 10** **North American Outflow at high altitudes**

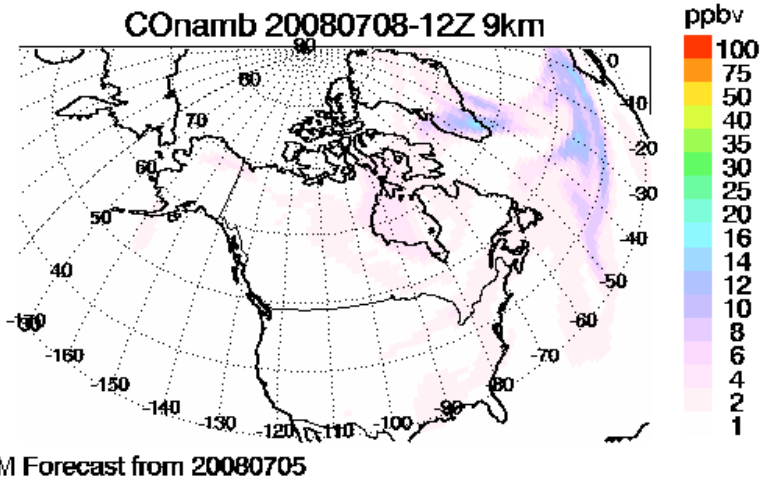
July 8 12Z → **July 10 0Z**

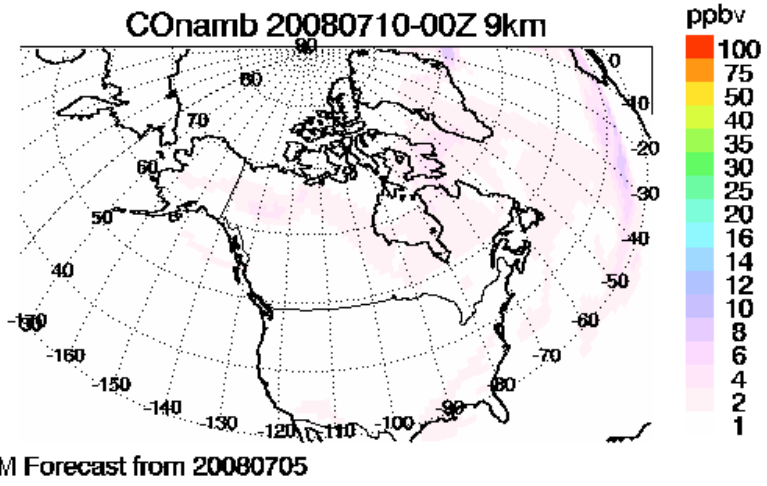
Anthro





BB

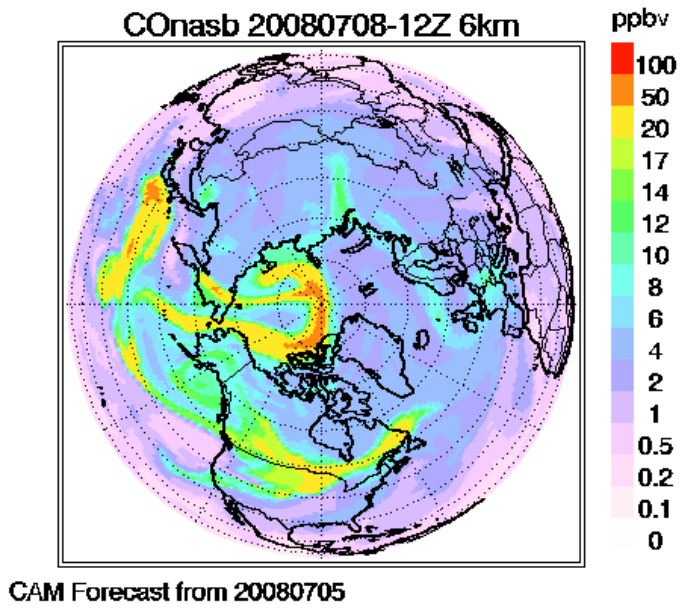




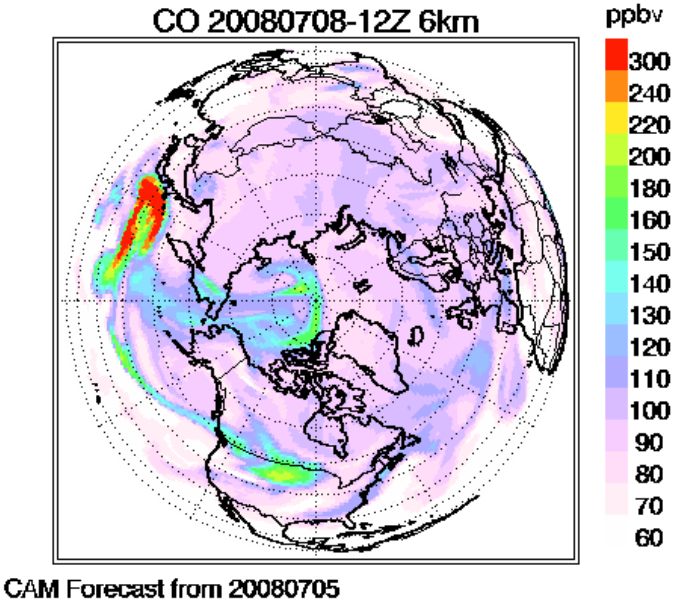
July 8 12Z 6 km

CAM-Chem

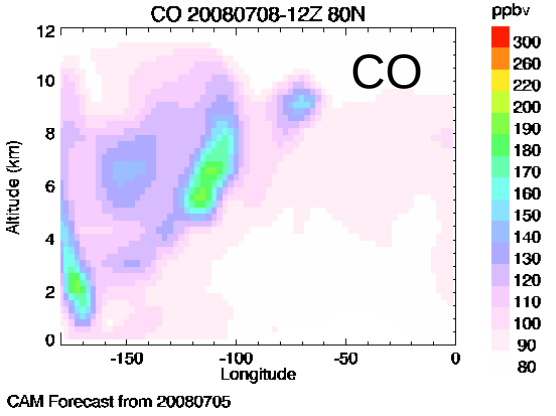
CO Nasia BB

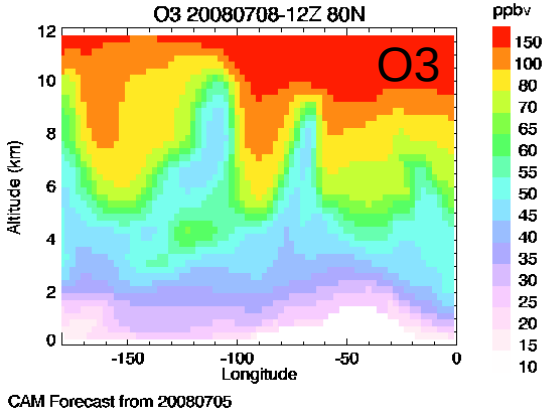


Total CO

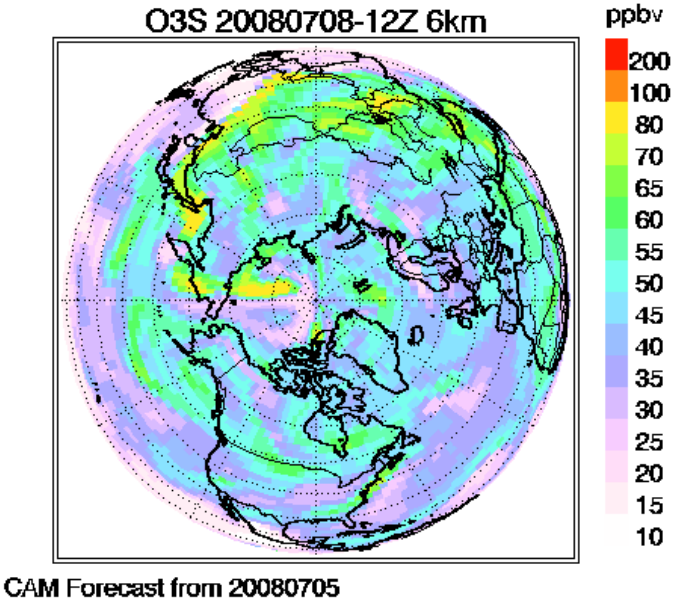


Cross Section for 80N





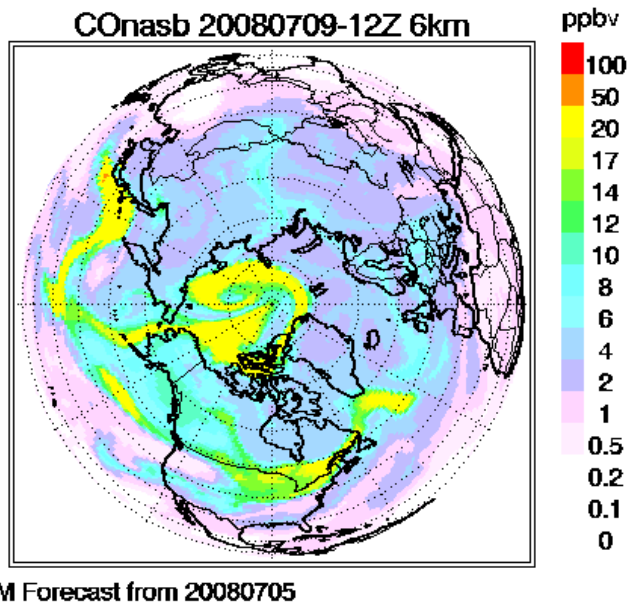
Stratospheric O3 Tracer



July 9 12Z 6 km

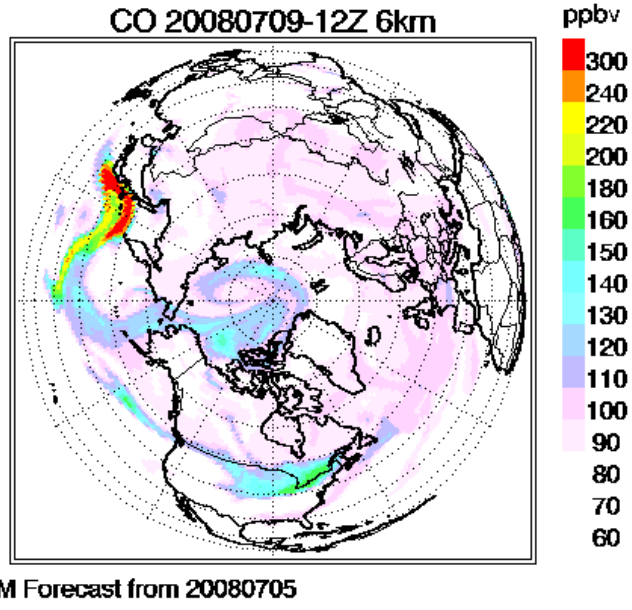
CAM-Chem

CO Nasia BB



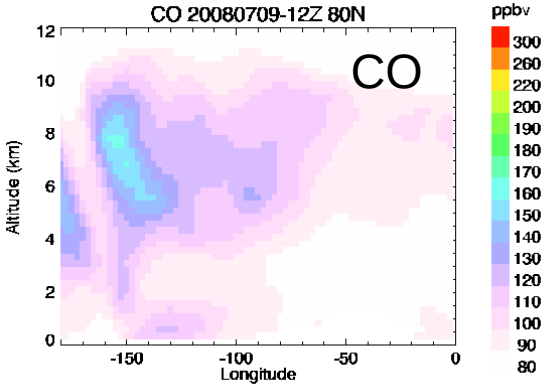
CAM Forecast from 20080705

Total CO

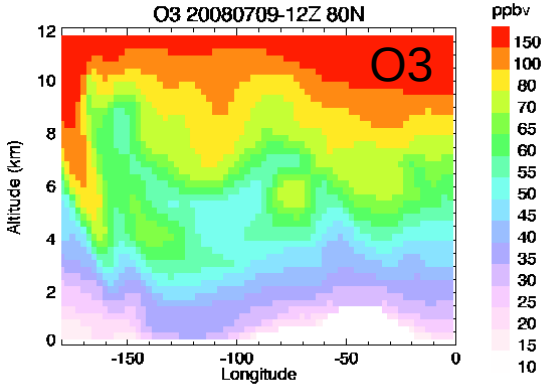


CAM Forecast from 20080705

Cross Section for 80N

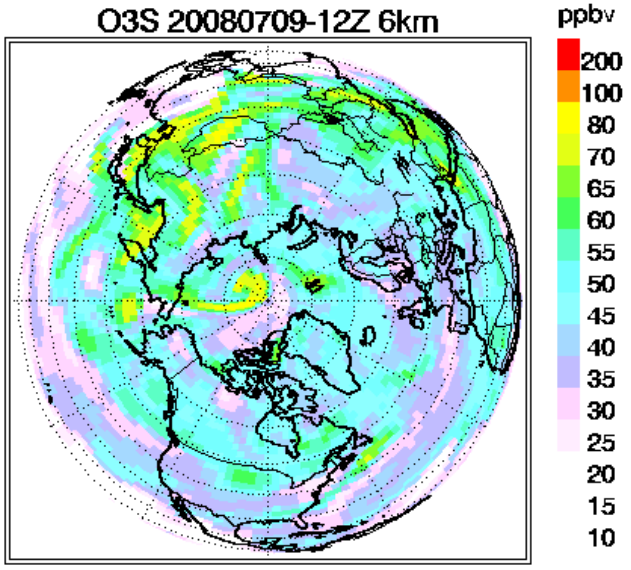


CAM Forecast from 20080705



CAM Forecast from 20080705

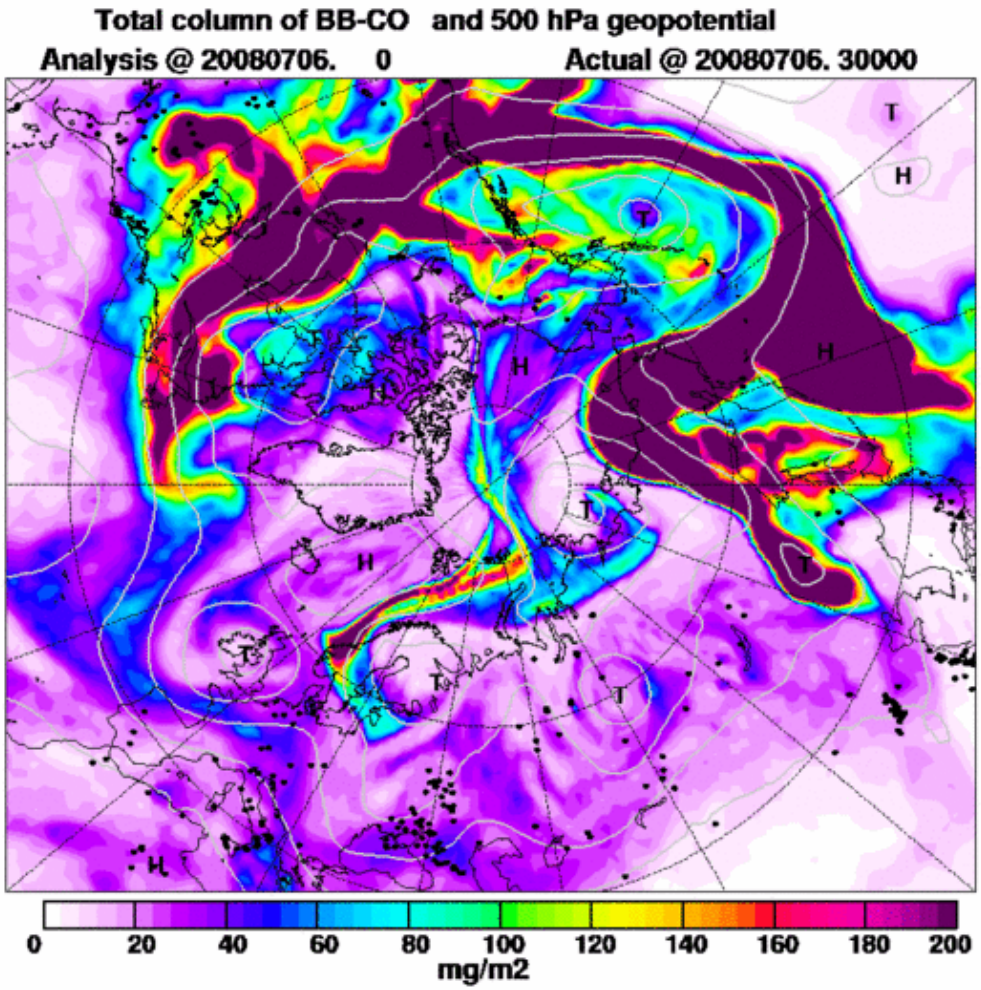
Stratospheric O3 Tracer

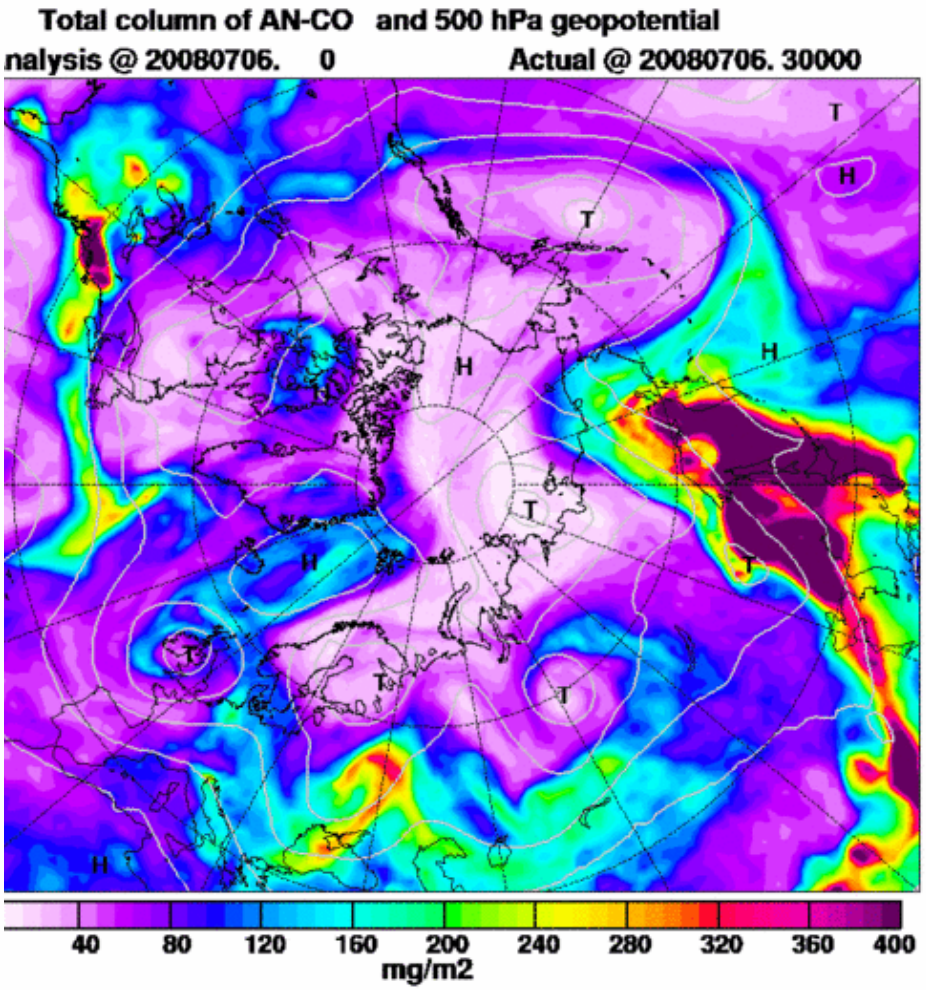


CAM Forecast from 20080705

Biomass and Anthropogenic CO Tracers

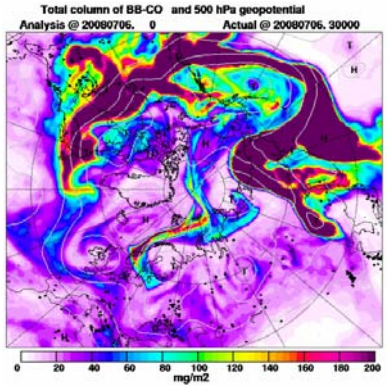
CAN, CA, ASIA export NE-US. BBCO Plume ***leads*** Anthro plume into CAN ARCTIC

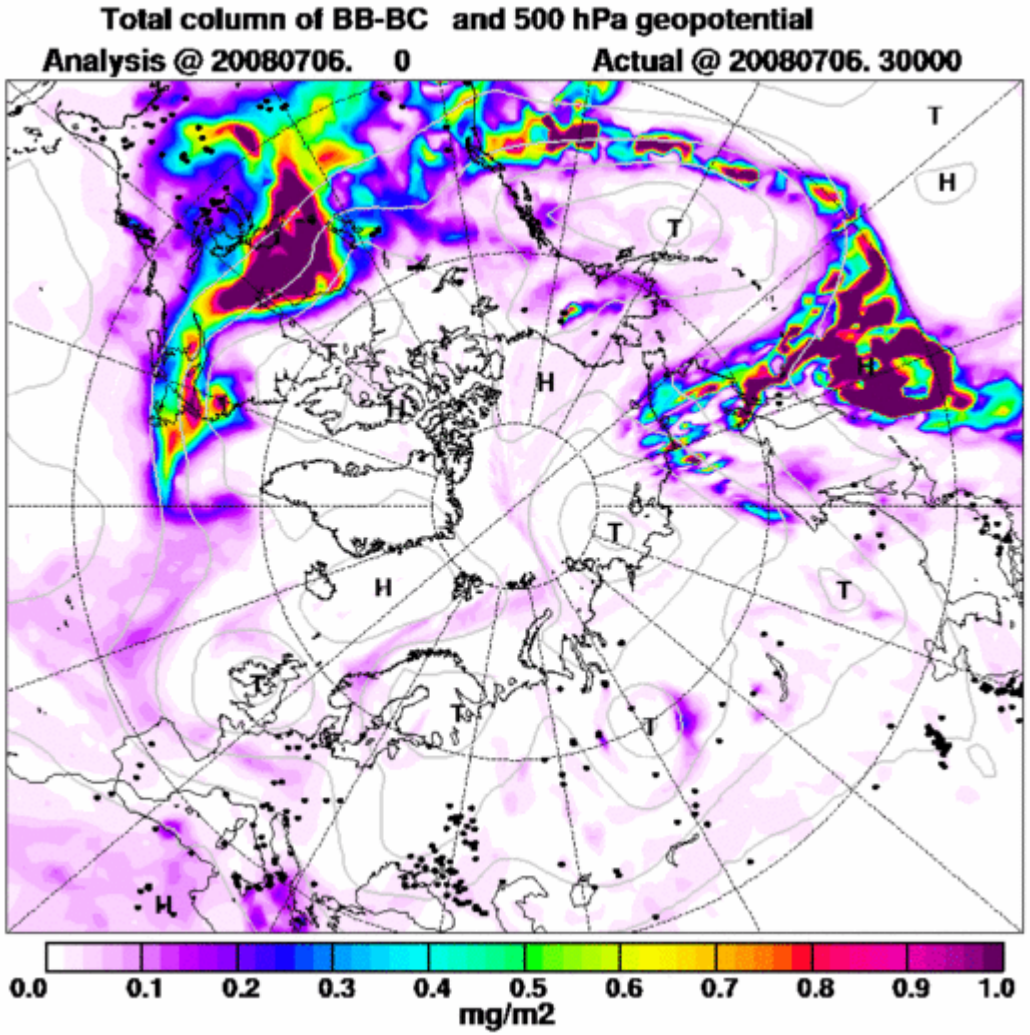




Biomass BC Tracers

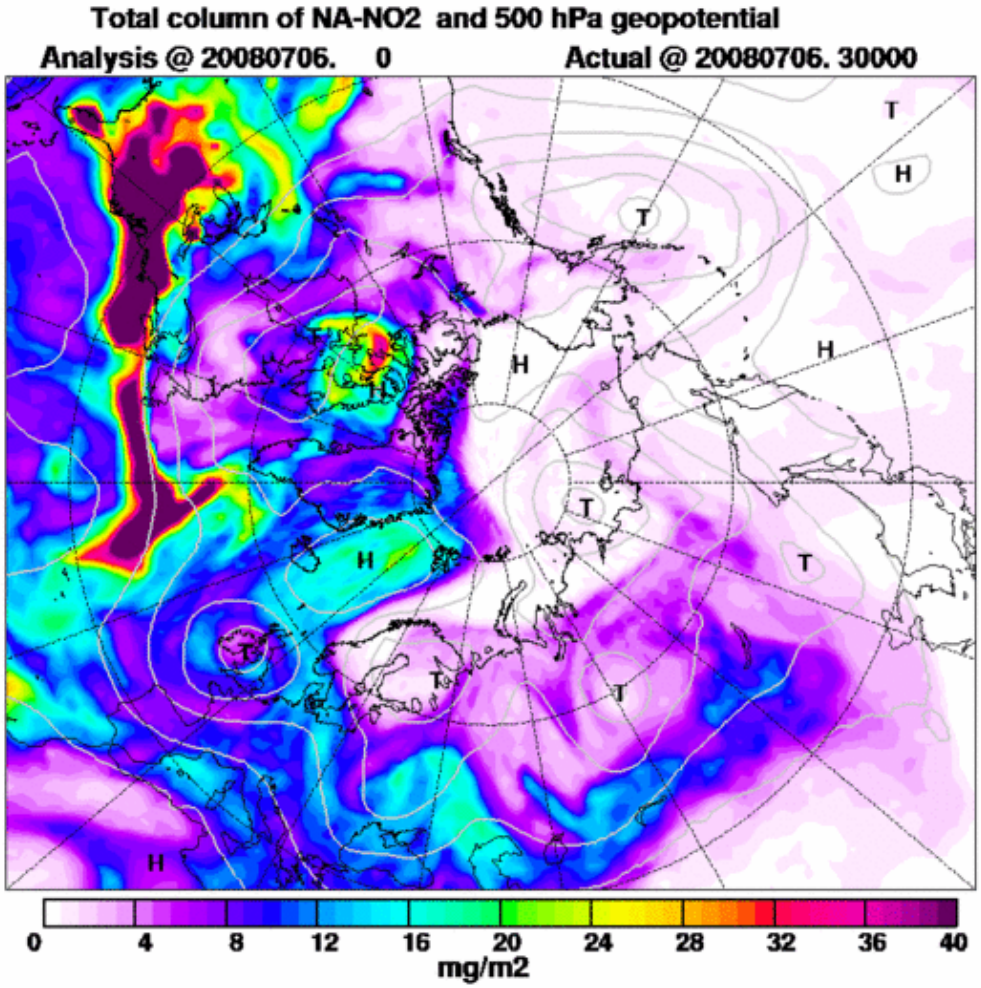
Significantly different situation for aerosol tracers

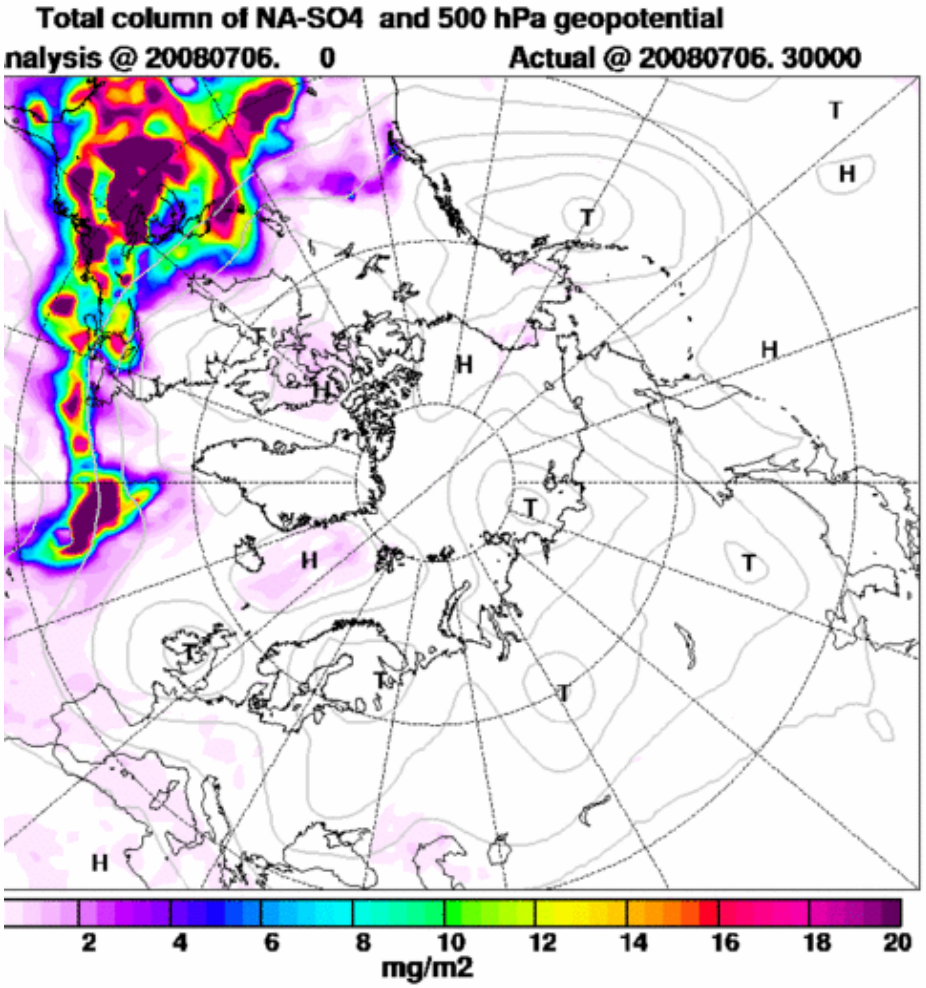




North American NOx / SO4 Tracers

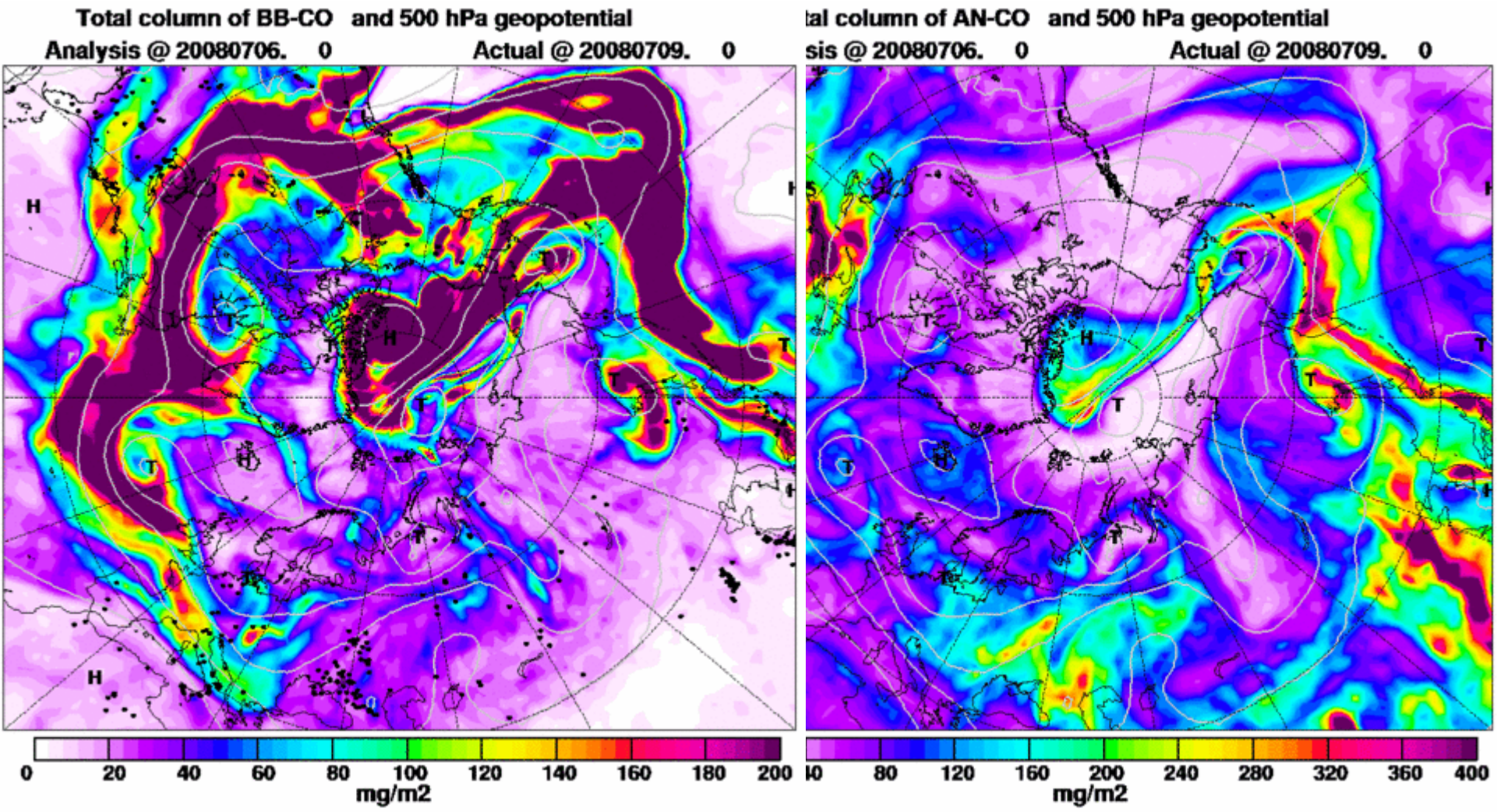
Significantly different situation for aerosol tracers





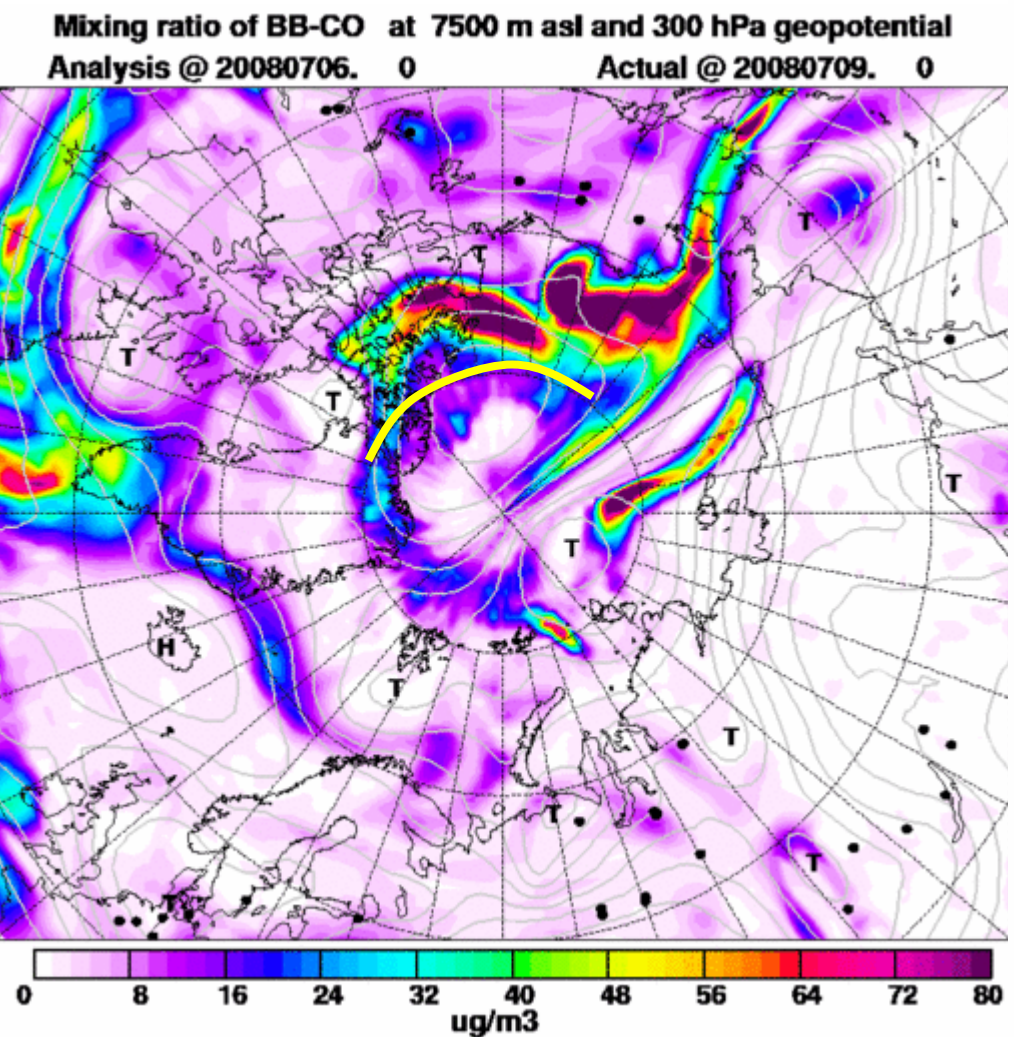
BIOMASS and ASIA CO 07090000Z

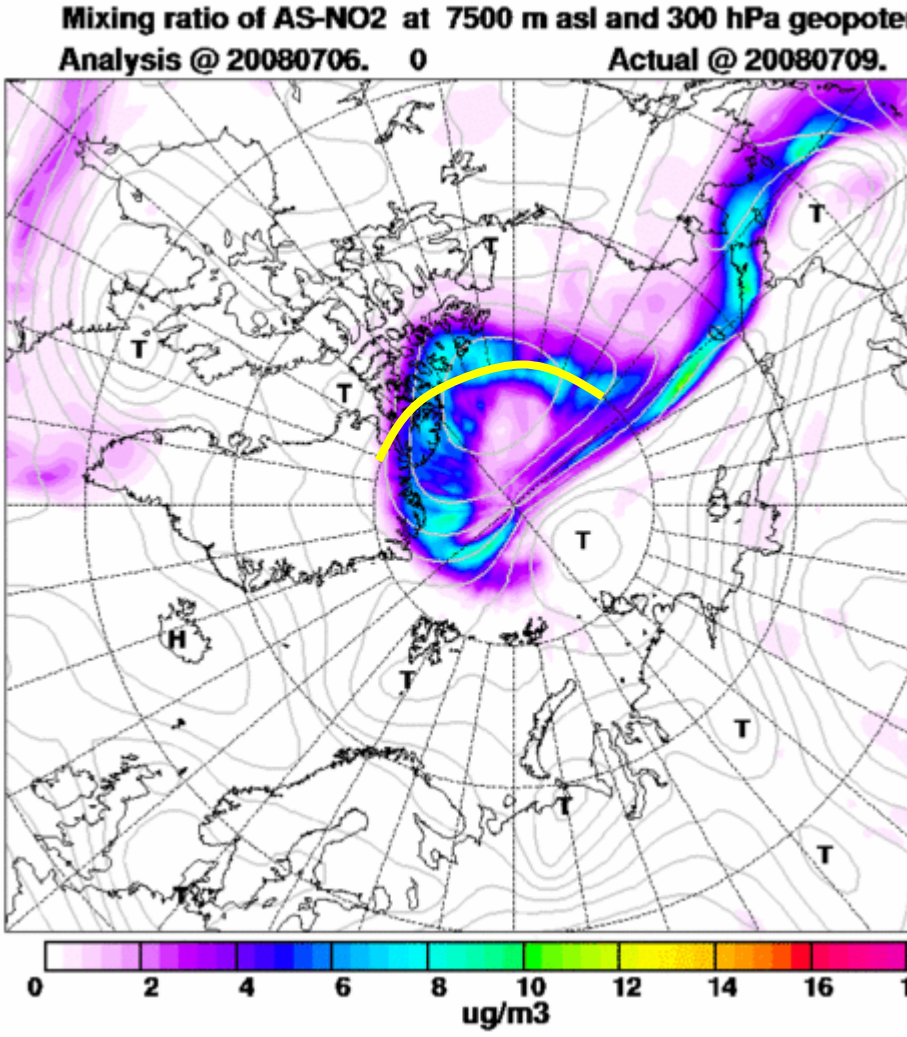
Closer examination of Siberian CO Plume



BIOMASS and ASIA CO 07090000Z

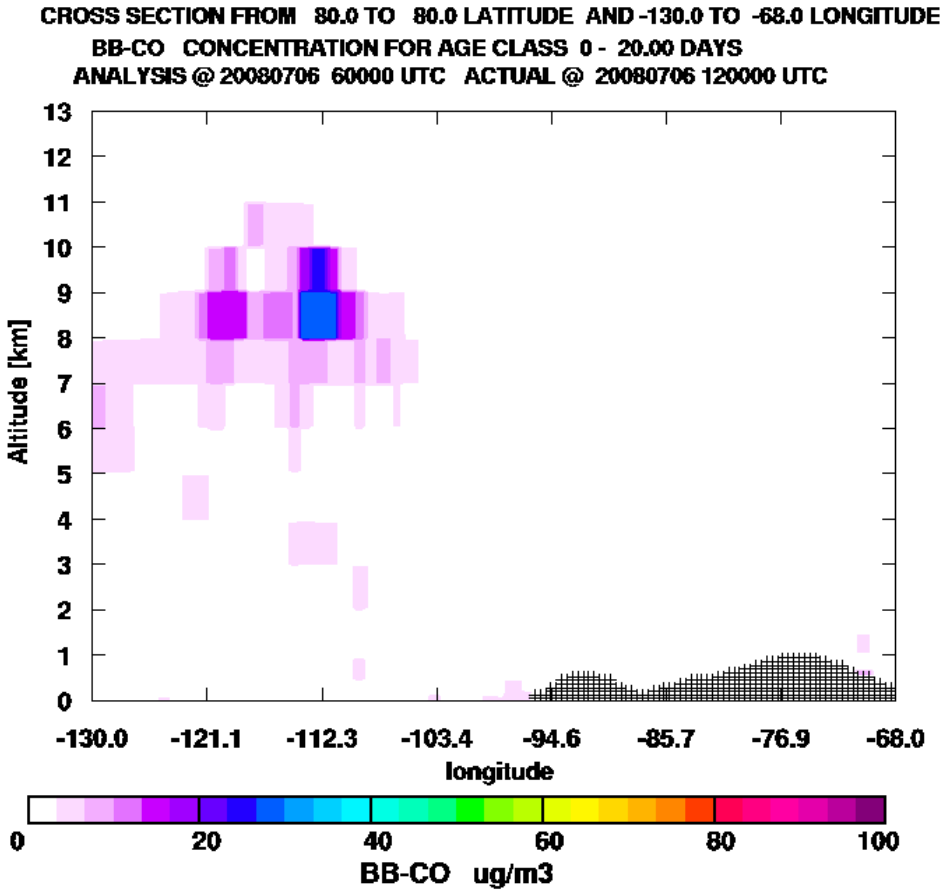
The BB-CO (biomass) is on the leading edge of the plume at 7500m.

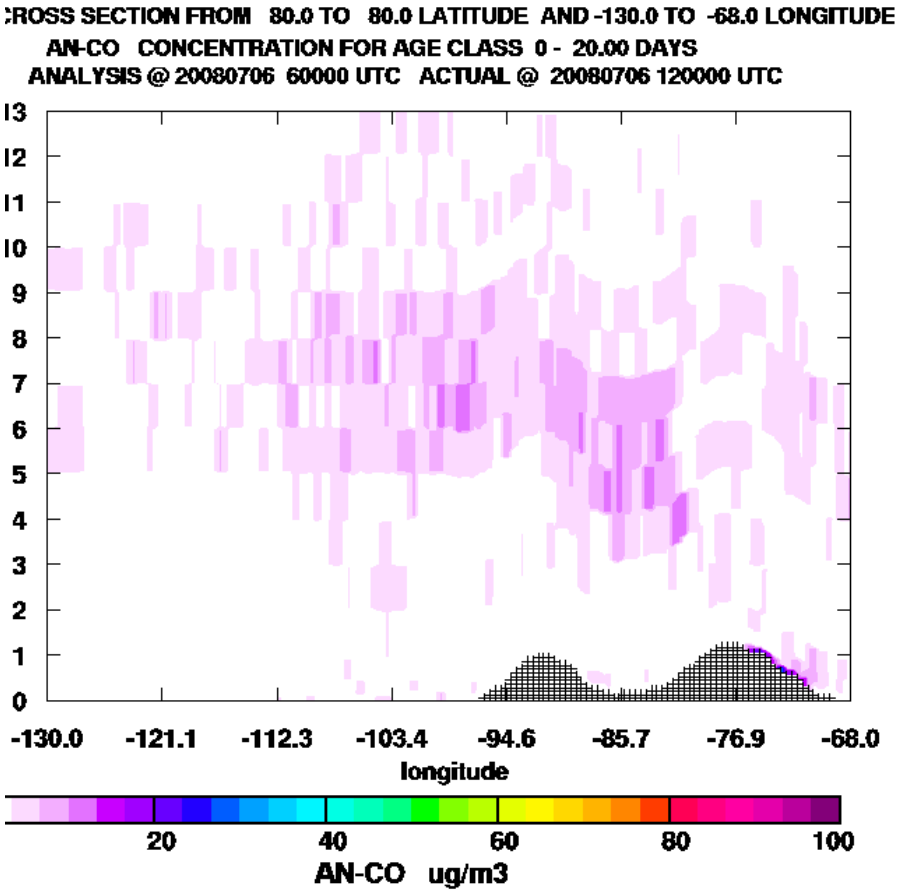




BIOMASS and ASIA CO 07090000Z

The BB-CO (biomass) is on the leading edge of the plume at 7500m.





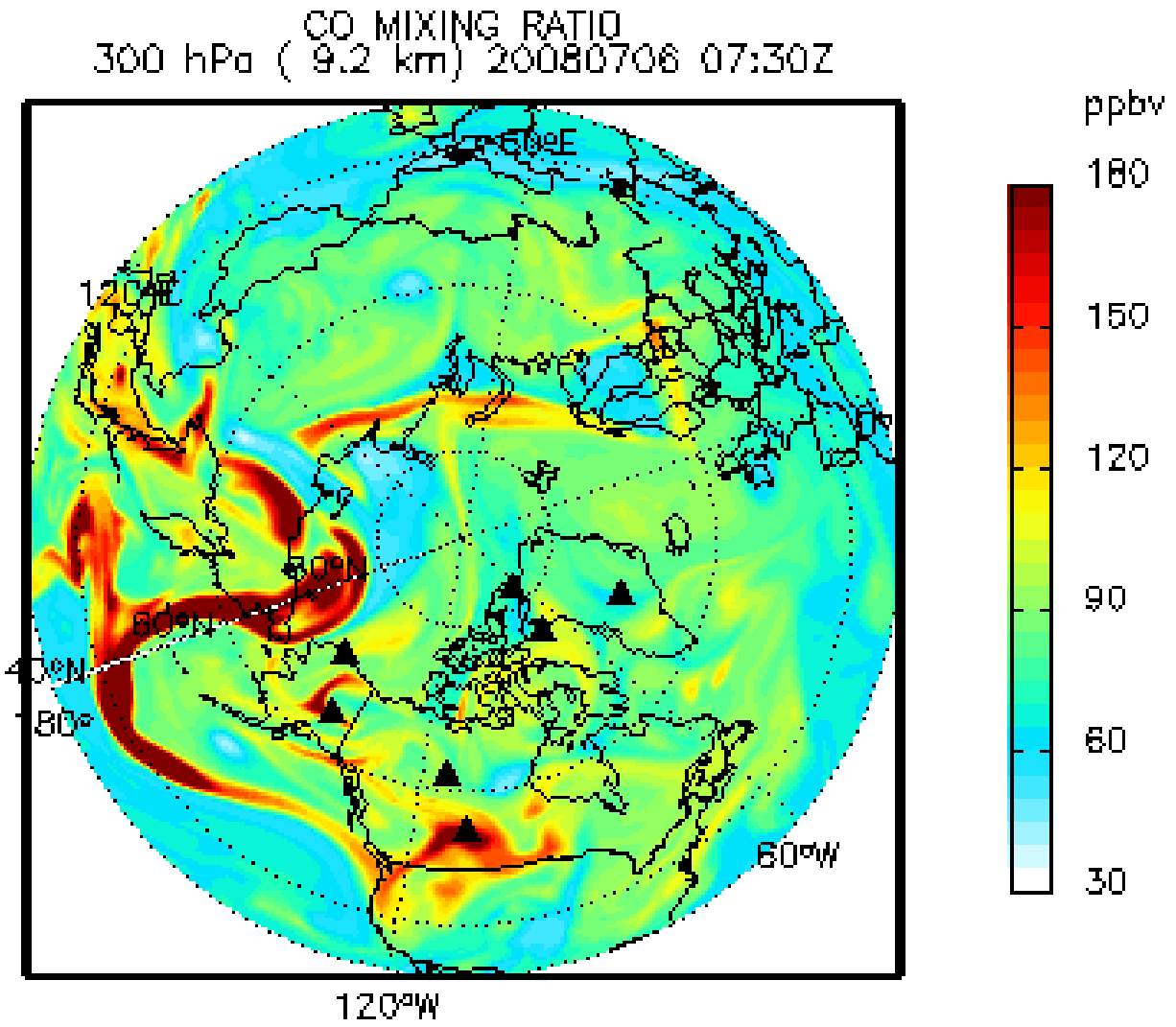
Total CO 5-day Animation: July 6th 06Z

300 mb

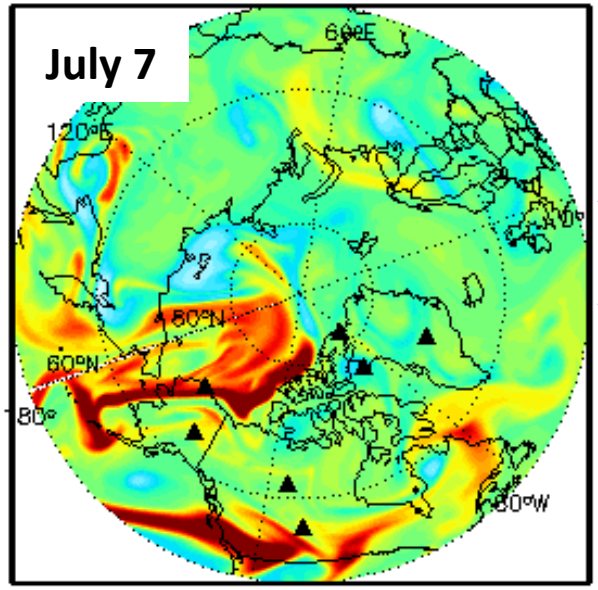
- Old Siberian plume dying in Arctic.

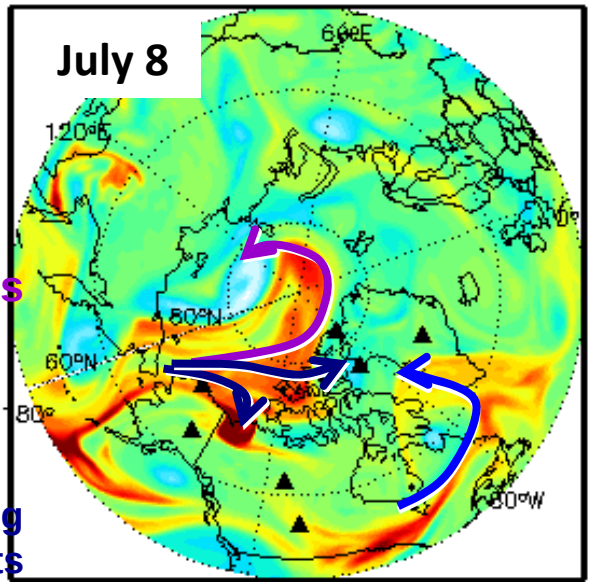
- Current Siberian Fire & Asian Anthro. in Arctic at multiple vertical levels. Begins to move south over Yukon & NWT by mid-week.

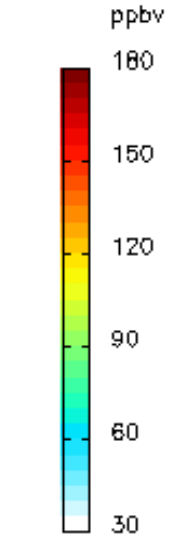
- Continuous Asian Anthro. & Siberian Fire plume crosses Pacific Oc. and southern Canada. Over Greenland by 8th.



GEOS5 Outlook for next four days – Total CO @ 300 hPa

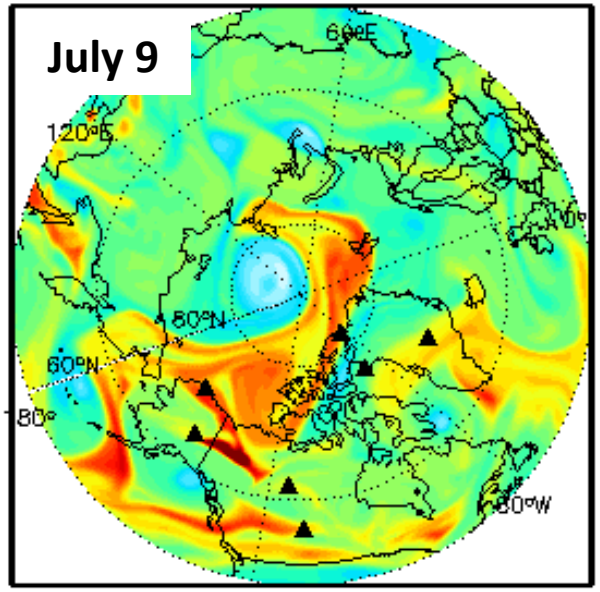




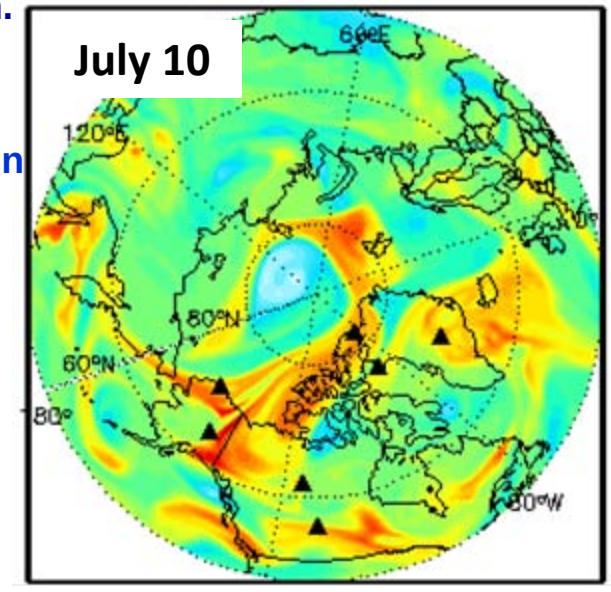


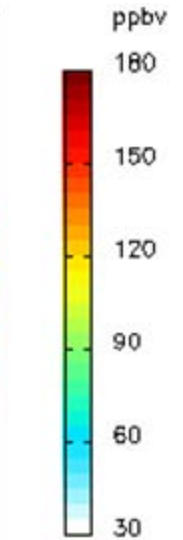
Asian plumes circulate over the Arctic for several days

Siberian biomass burning plume: N. Branch advects to N. Greenland, S. Branch advects south to Yukon.

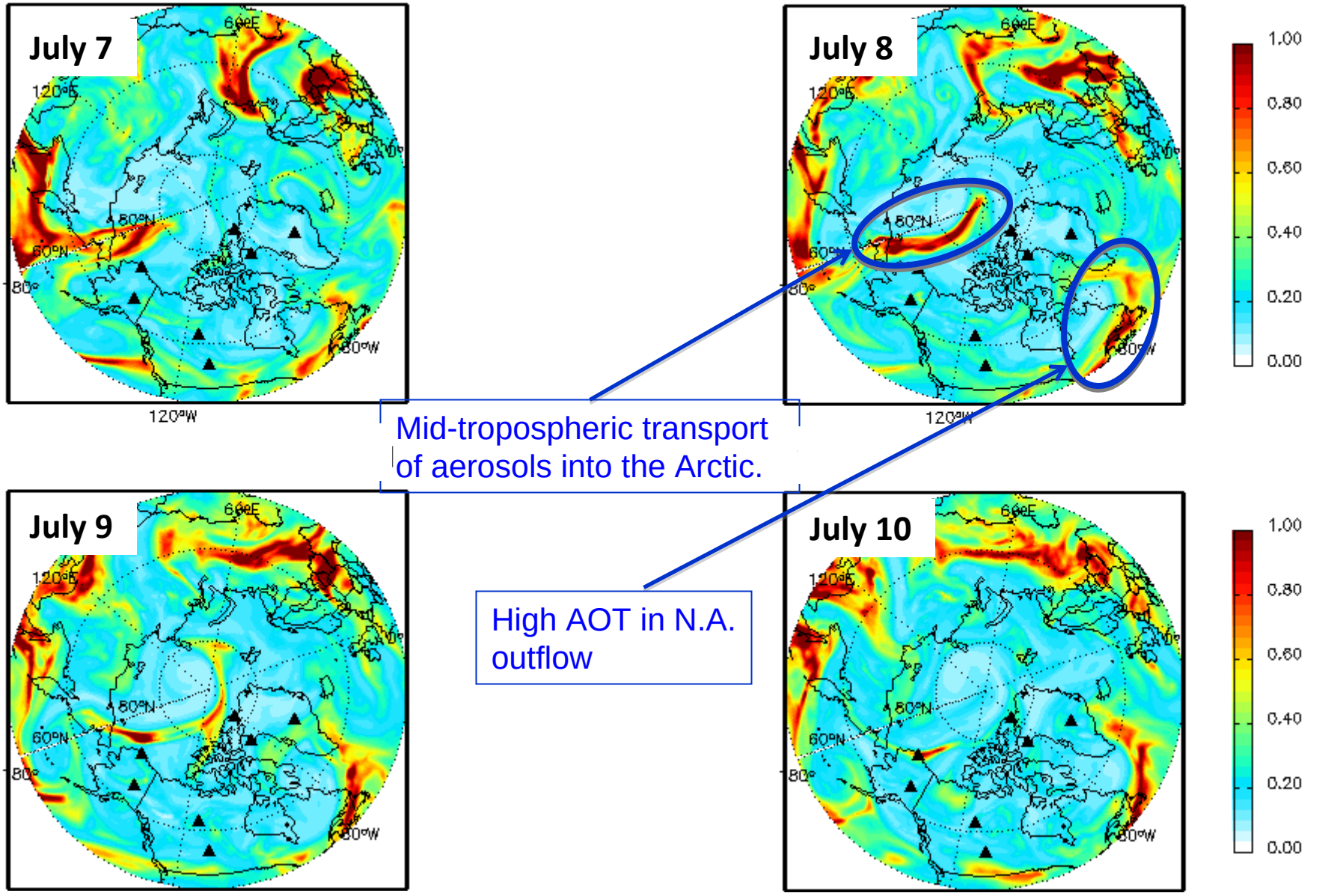


N. Am. outflow (pollution and fires) crosses southern end of Davis Strait – *may affect intercomparison*





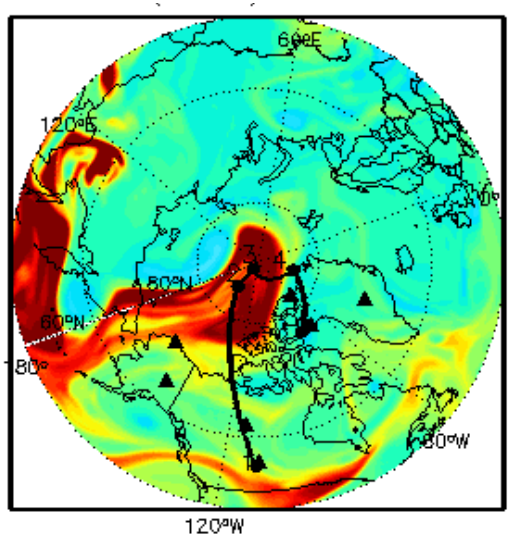
GEOS5 Outlook for next four days – AOT

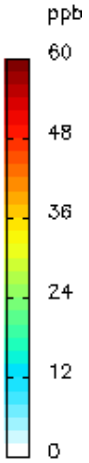


GEOS-5 Forecast 20080706 06Z

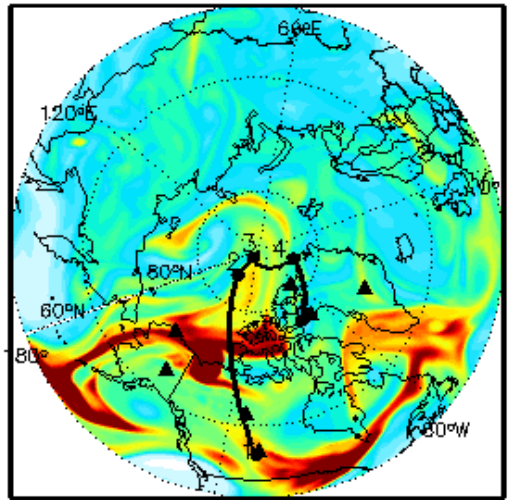
July 8 -- Potential flight track to catch Siberian+Asian plume in Arctic

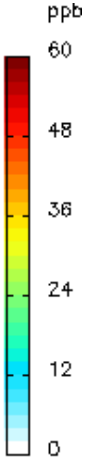
Asian Anthro. CO – 300mb



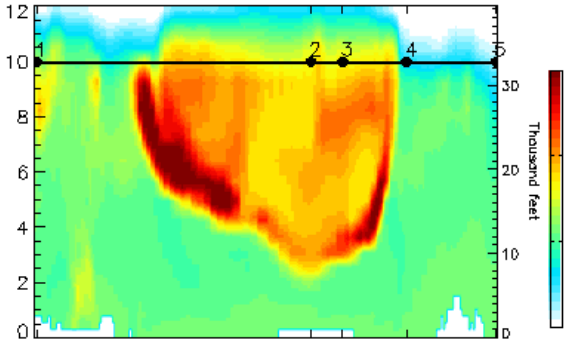


Boreal Biomass Burning CO – 300mb

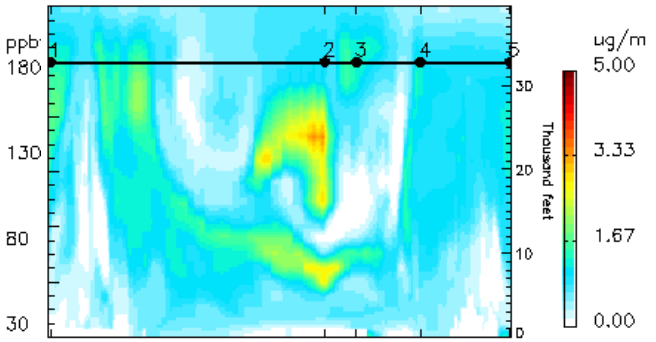




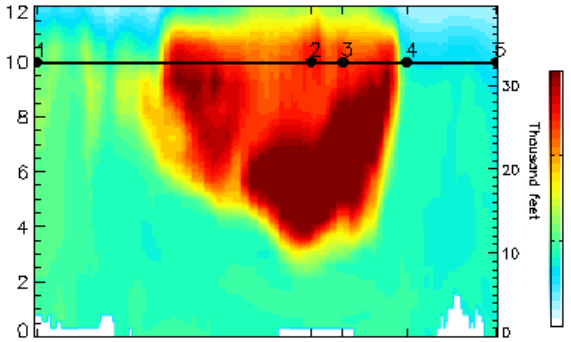
Total CO



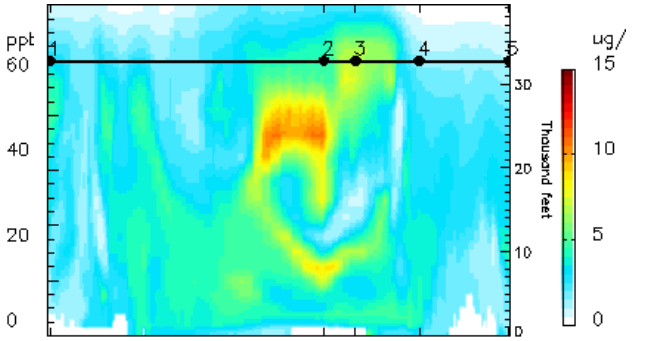
Sulfate



Asian Anthro. CO

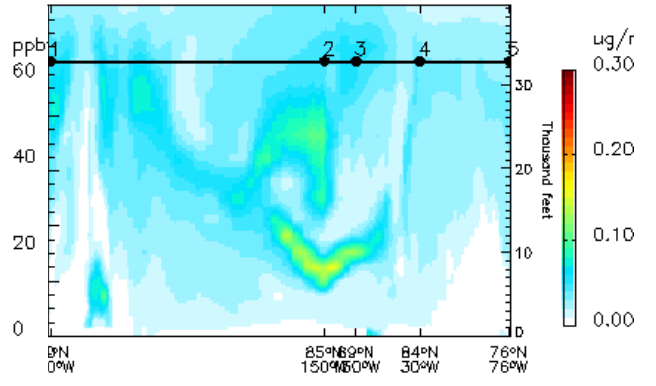


Dust



Boreal Biomass Burning CO

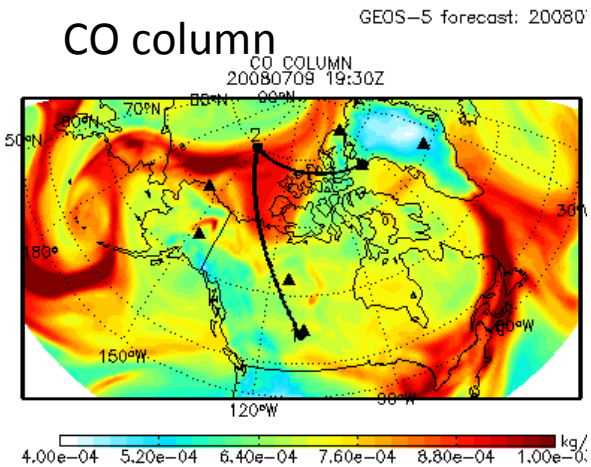
Black Carbon



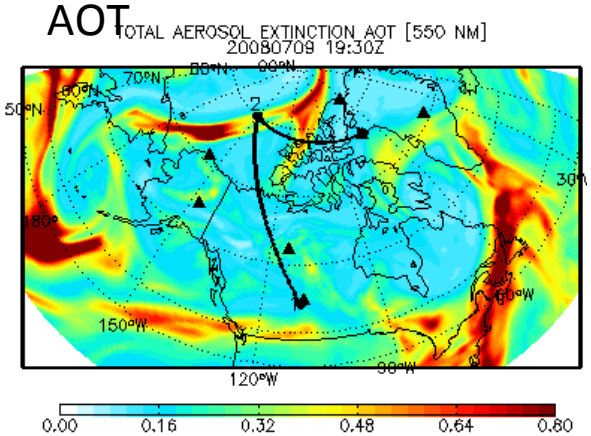
GEOS-5 Forecast 20080706 06Z

GEOS-5 7/9/08:
Cold Lake-Arctic-Thule

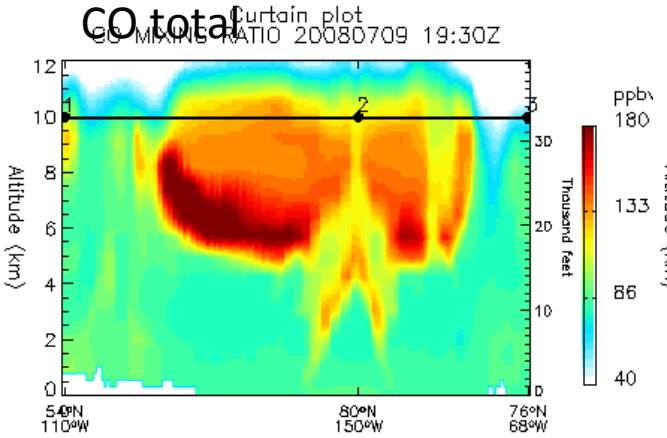
CO column



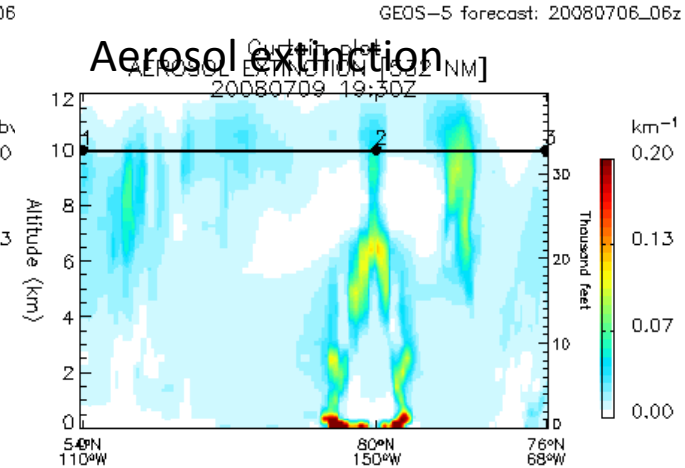
AOT



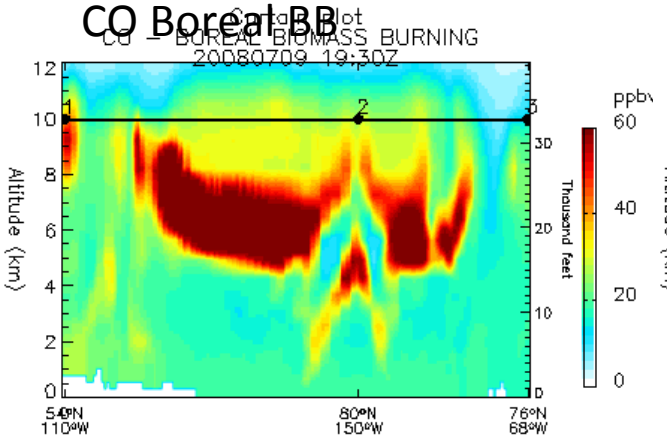
CO total



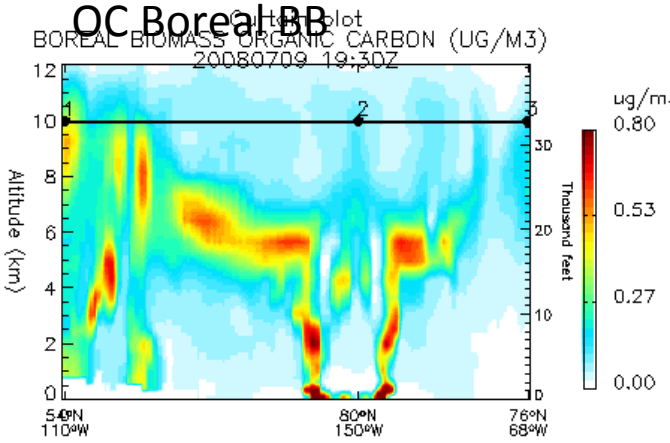
Aerosol extinction



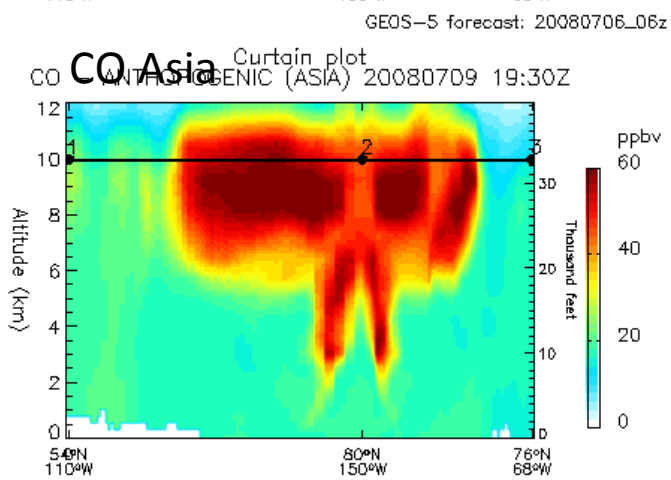
CO Boreal BB



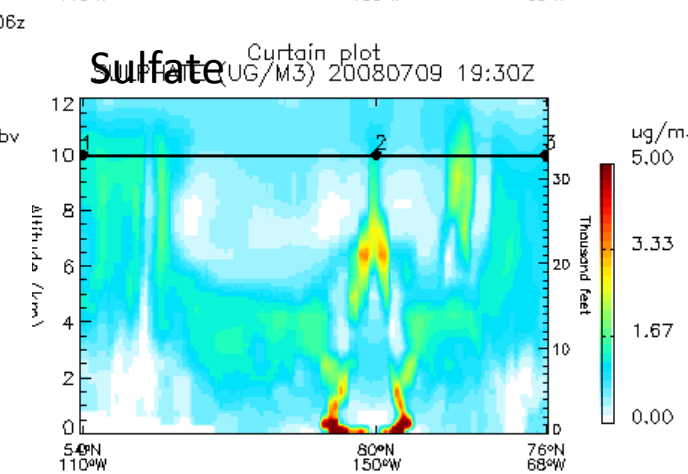
OC Boreal BB



CO Asia



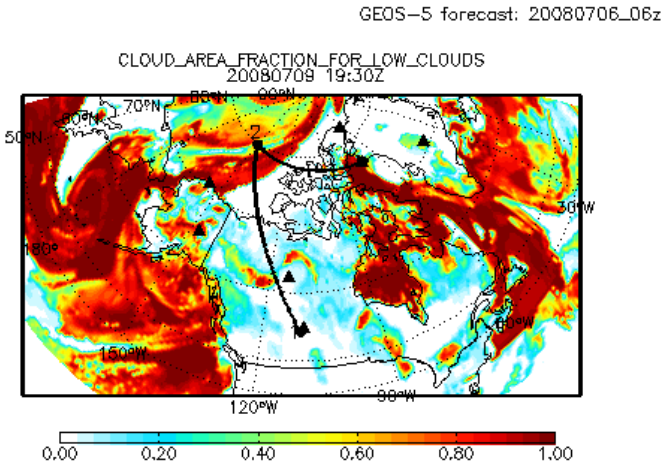
Sulfate

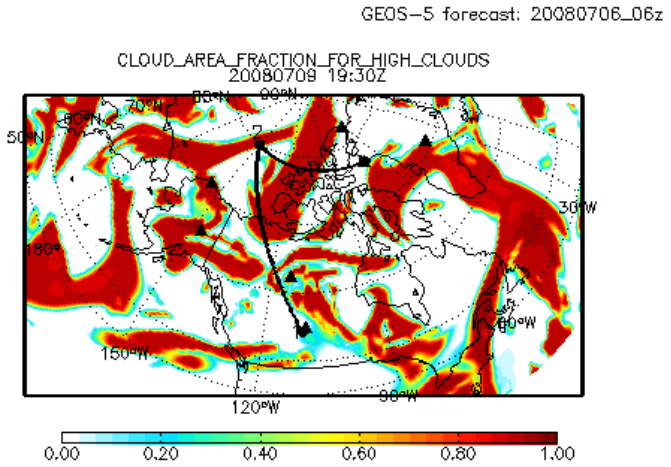


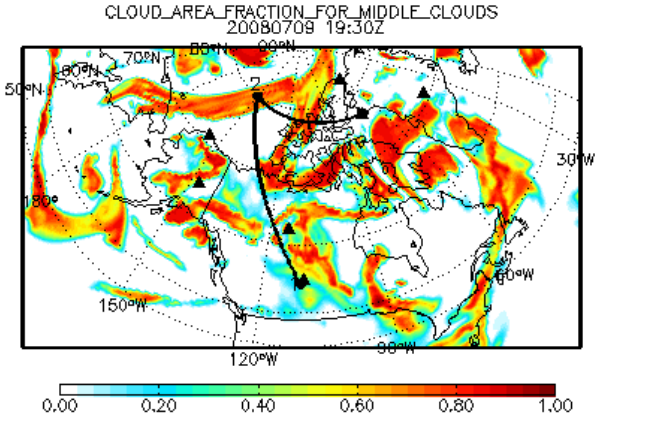
Cold Lake to Arctic: Asian airmass – both boreal fire and anthropogenic, anthro higher than bb

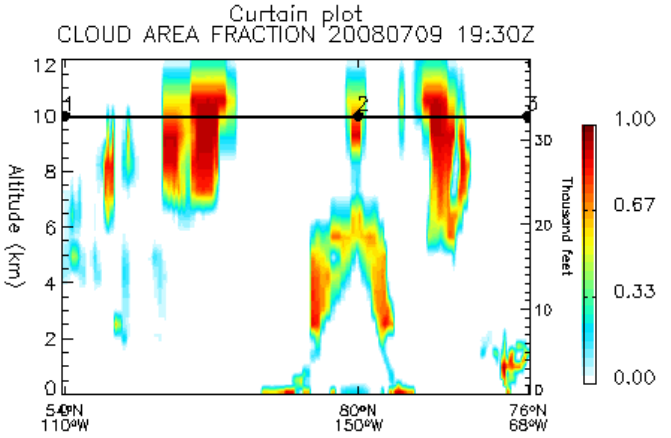
GEOS-5 7/9/08:
Cold Lake-Arctic-Thule

Clouds: OK





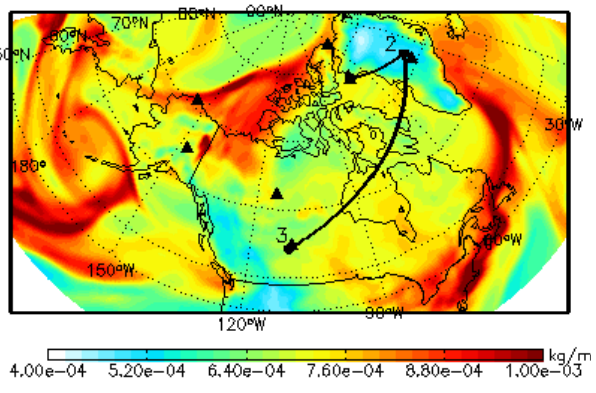




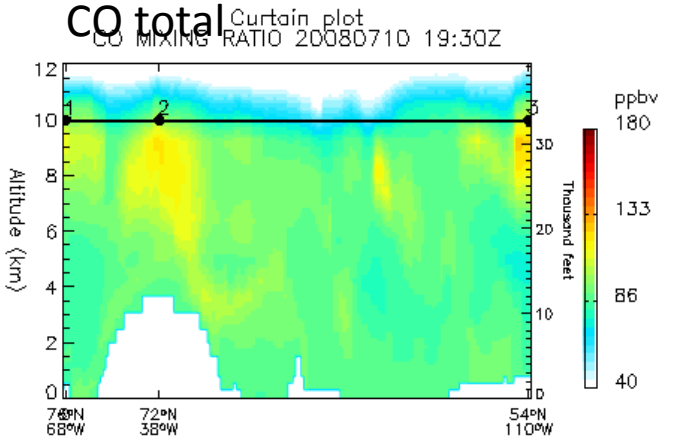
GEOS-5 7/10/08:

Thule-Summit-Cold Lake

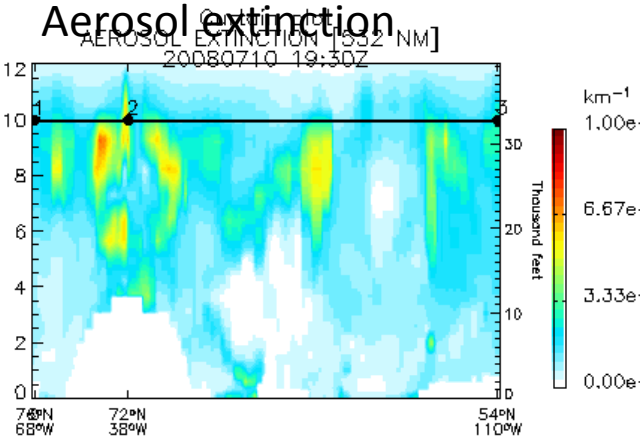
CO column



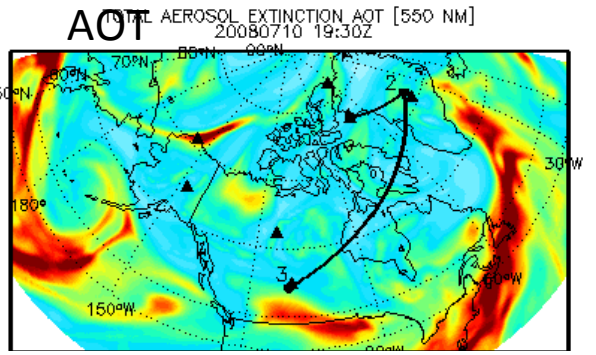
CO total



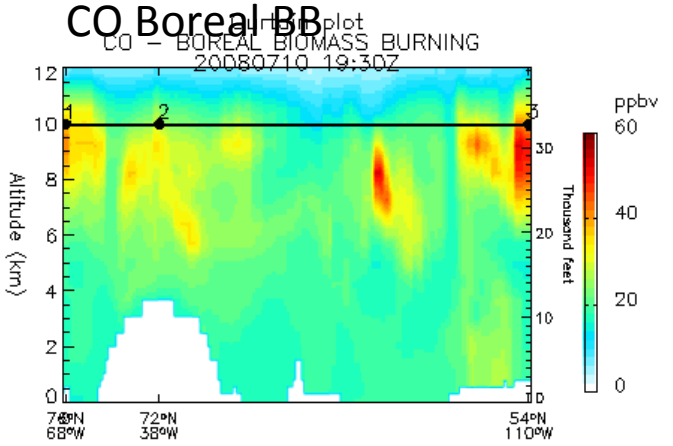
Aerosol extinction



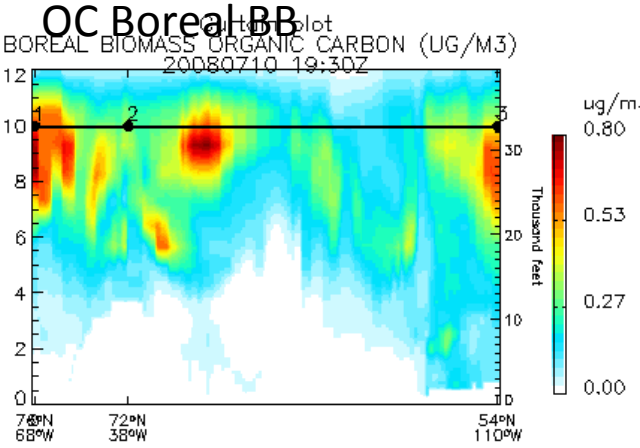
AOT



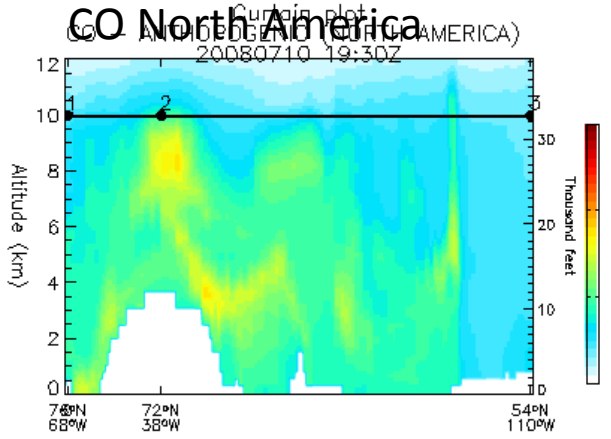
CO Boreal BB



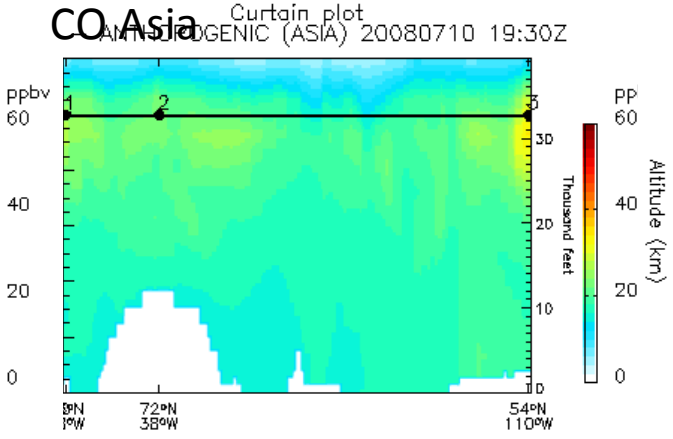
OC Boreal BB



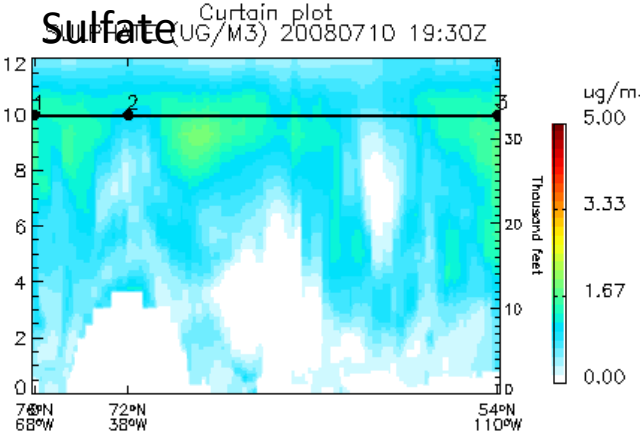
CO North America

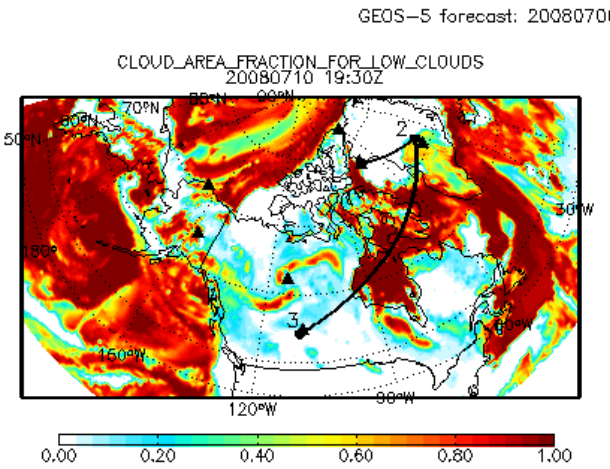
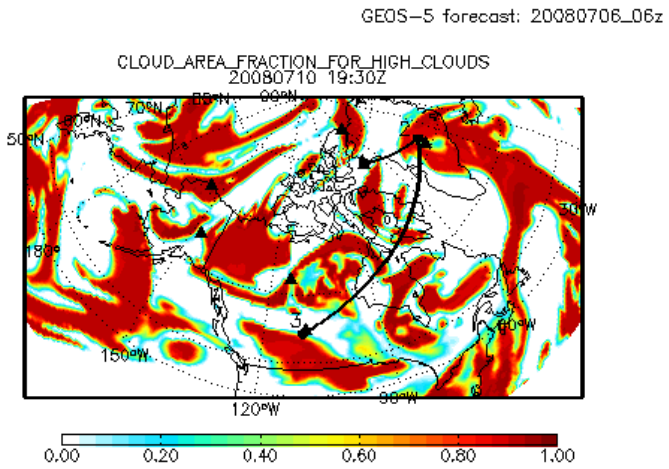
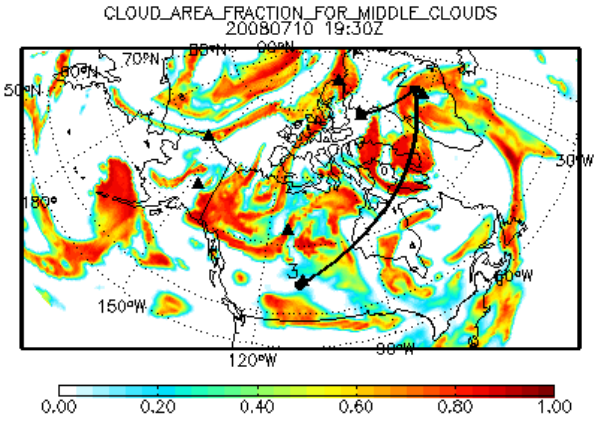
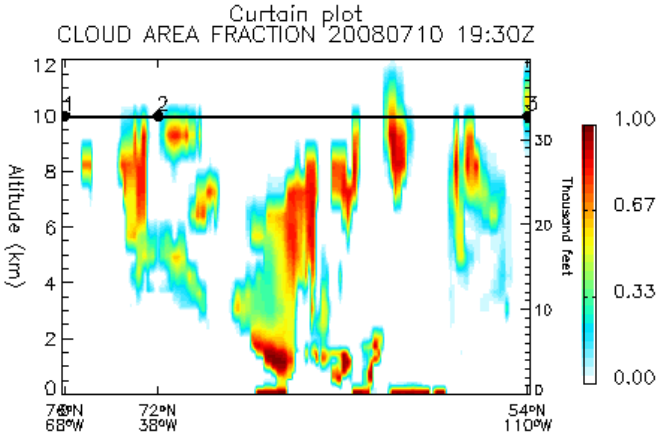


CO Asia



Sulfate



GEOS-5 7/9/08:
Cold Lake-Arctic-Thule

Clouds: Cloudier