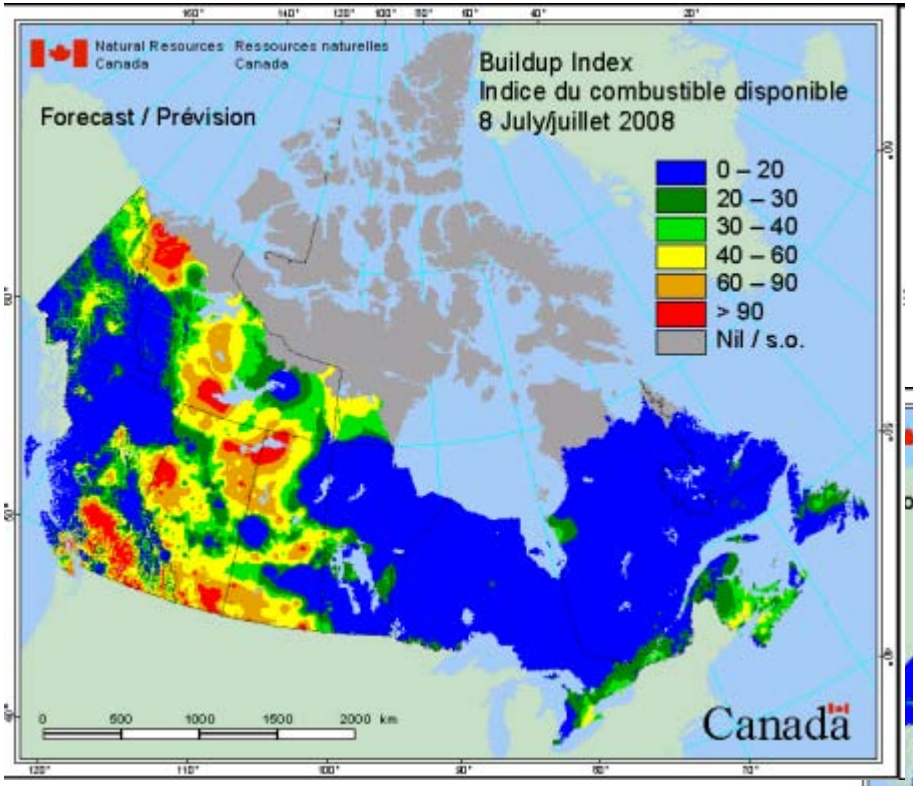
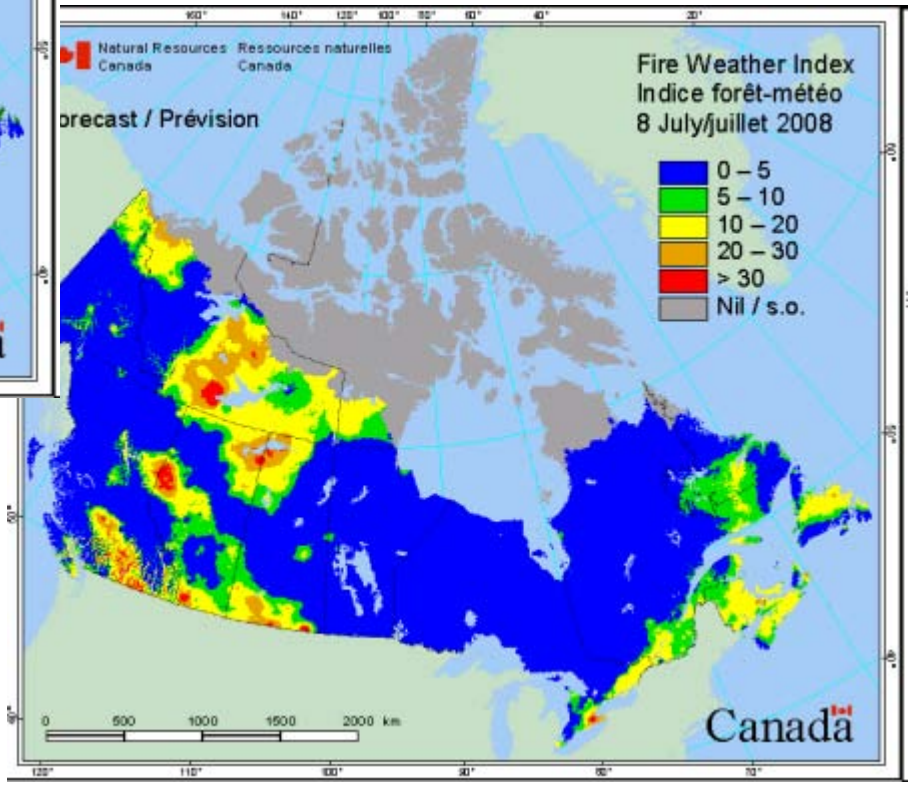
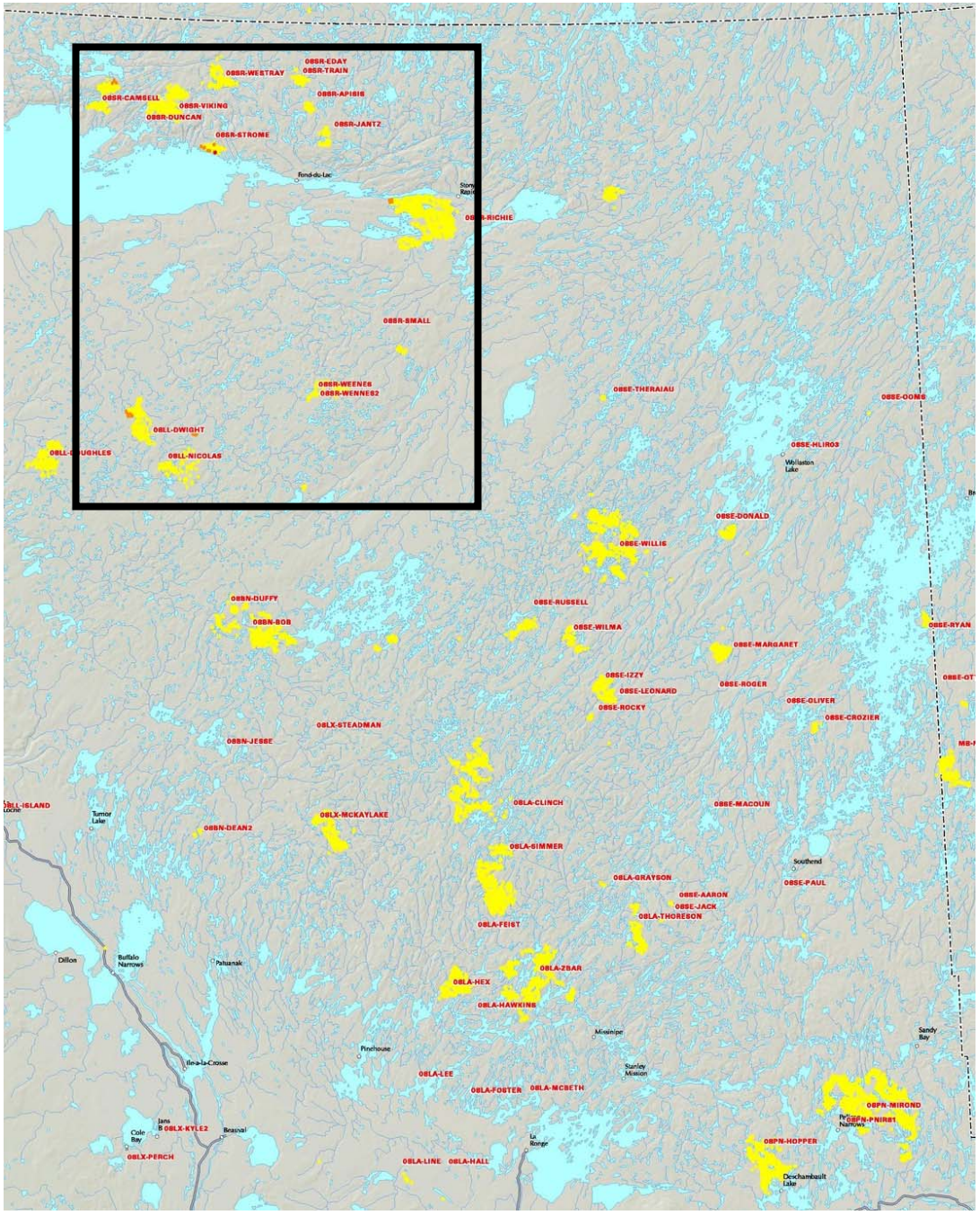
Fire Report July 8/08

- Northern SK fires quiet except for Lake Athabasca and few to south
- Potential for Wednesday DC8 return or PC3?
- AK fires growing but too far?

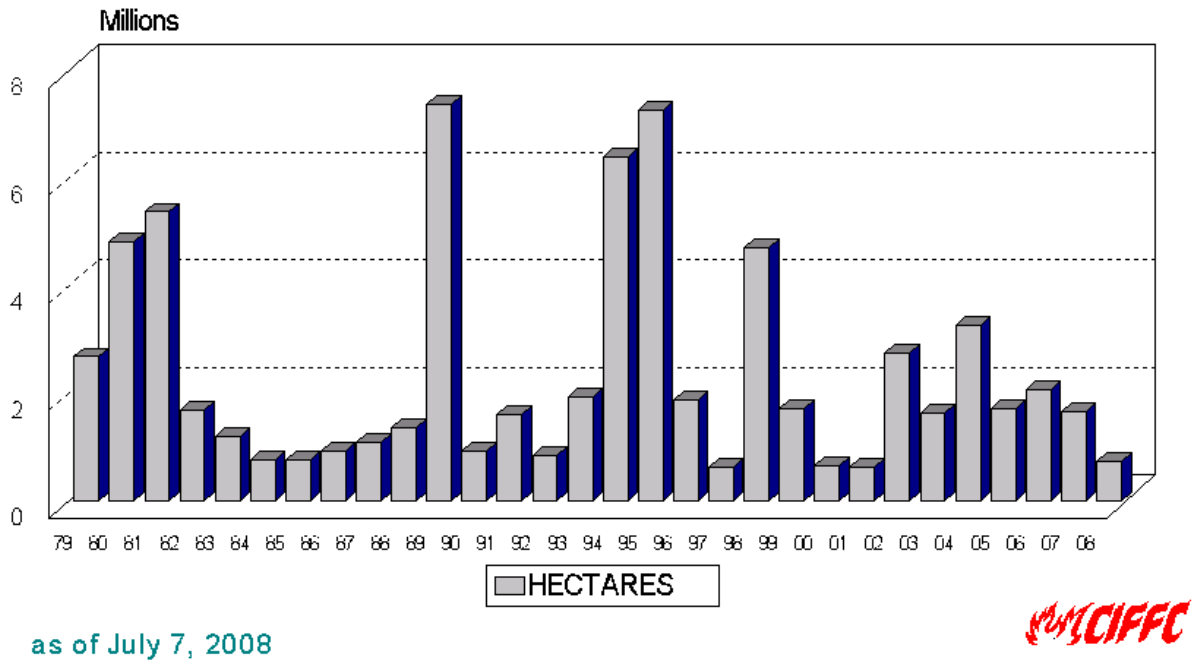

Natural Resources Canada
Ressources naturelles Canada
Buildup Index
Indice du combustible disponible
8 July/juillet 2008
Forecast / Prévision
0 – 20
20 – 30
30 – 40
40 – 60
60 – 90
> 90
Nil / s.o.
0 500 1000 1500 2000 km
Canada


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

Active fire area in SK
Next few days



HECTARES by YEAR

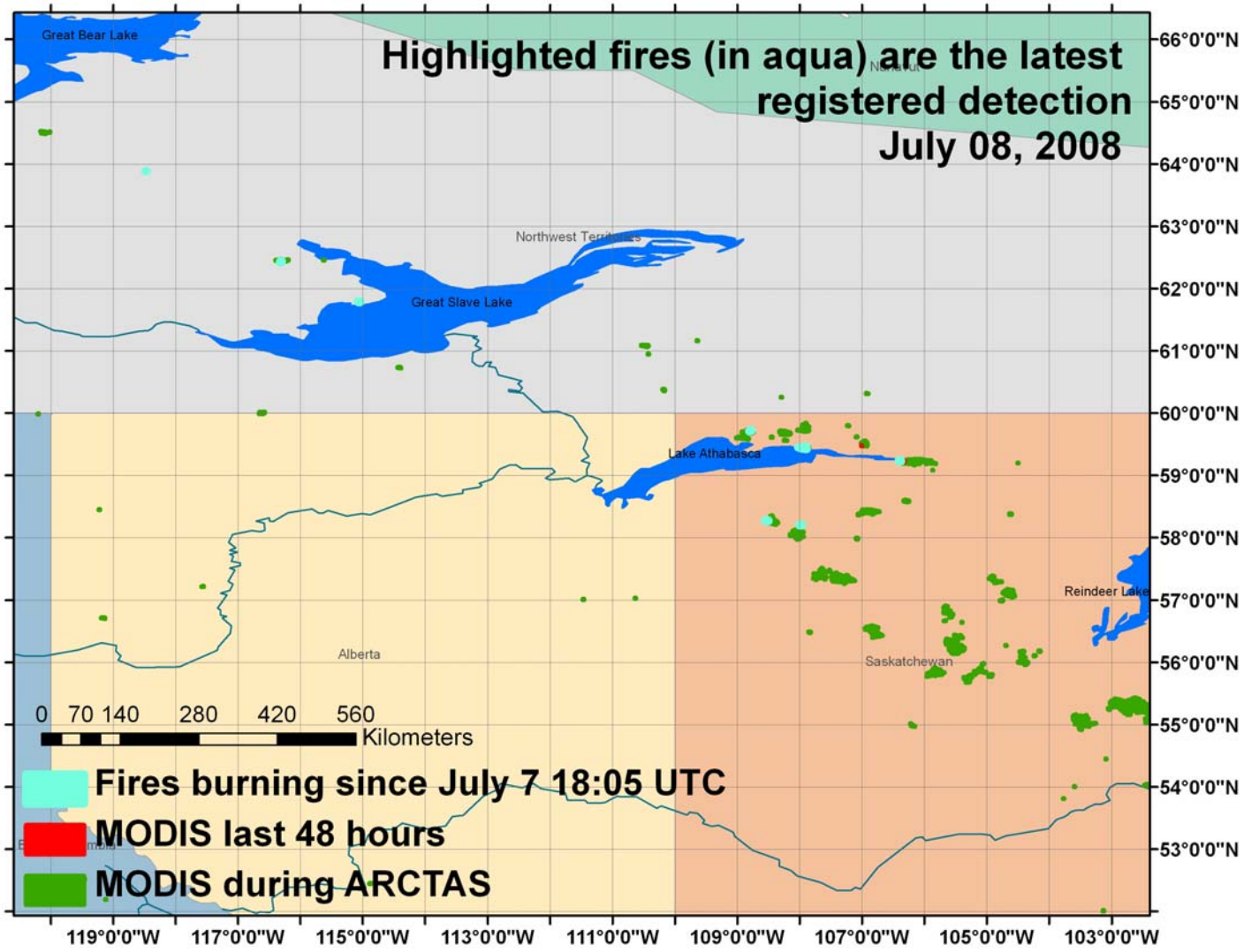


as of July 7, 2008

Very low year nationally to date

SK represents 585K of the total of 741K hectares (7410 sq km) burned

We've been well-positioned and fortunate


Highlighted fires (in aqua) are the latest registered detection
July 08, 2008
Great Bear Lake
Great Slave Lake
Lake Athabasca
Reindeer Lake
Alberta
Saskatchewan
0 70 140 280 420 560
Kilometers
Fires burning since July 7 18:05 UTC
MODIS last 48 hours
MODIS during ARCTAS
66°0'0"N
65°0'0"N
64°0'0"N
63°0'0"N
62°0'0"N
61°0'0"N
60°0'0"N
59°0'0"N
58°0'0"N
57°0'0"N
56°0'0"N
55°0'0"N
54°0'0"N
53°0'0"N
119°0'0"W
117°0'0"W
115°0'0"W
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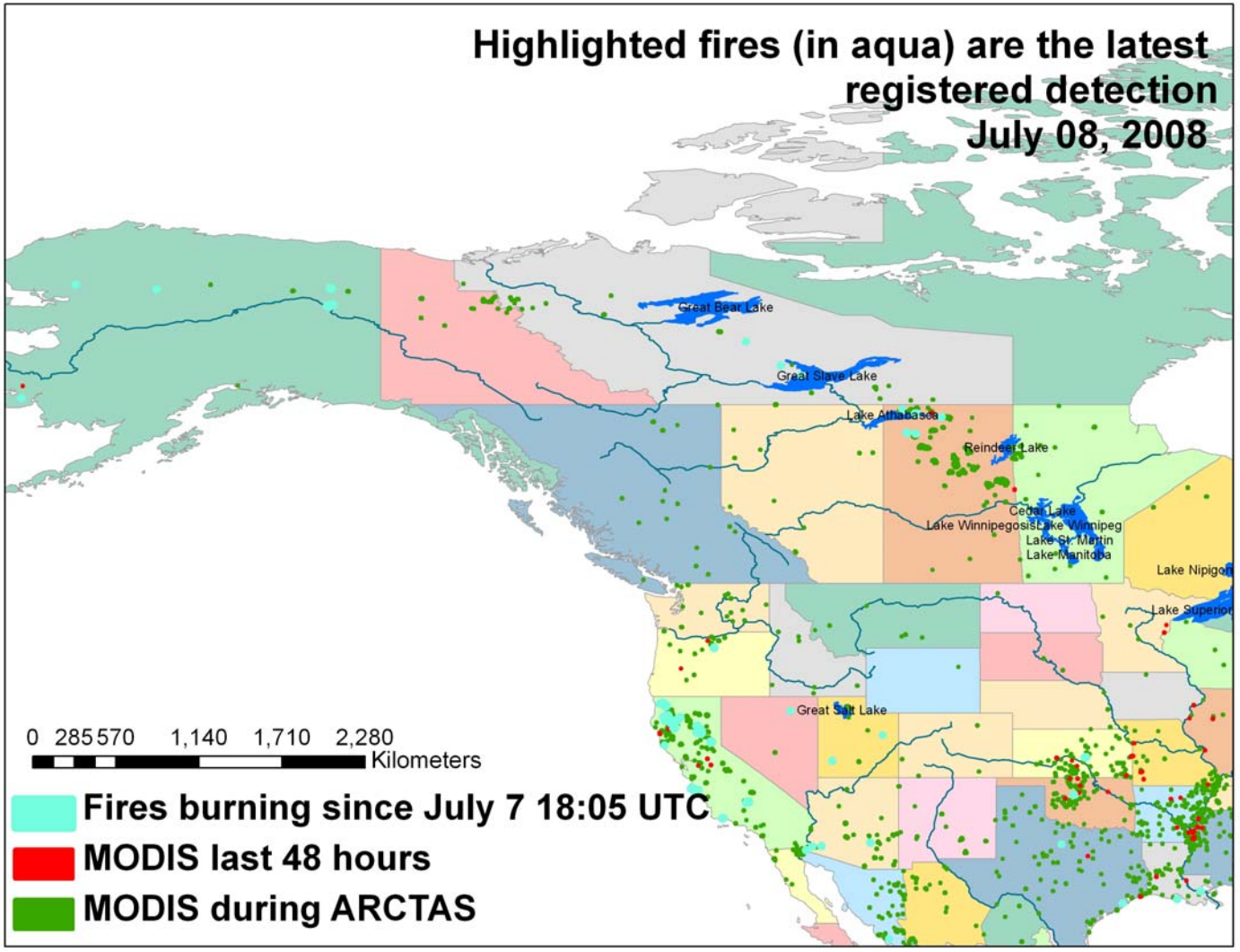
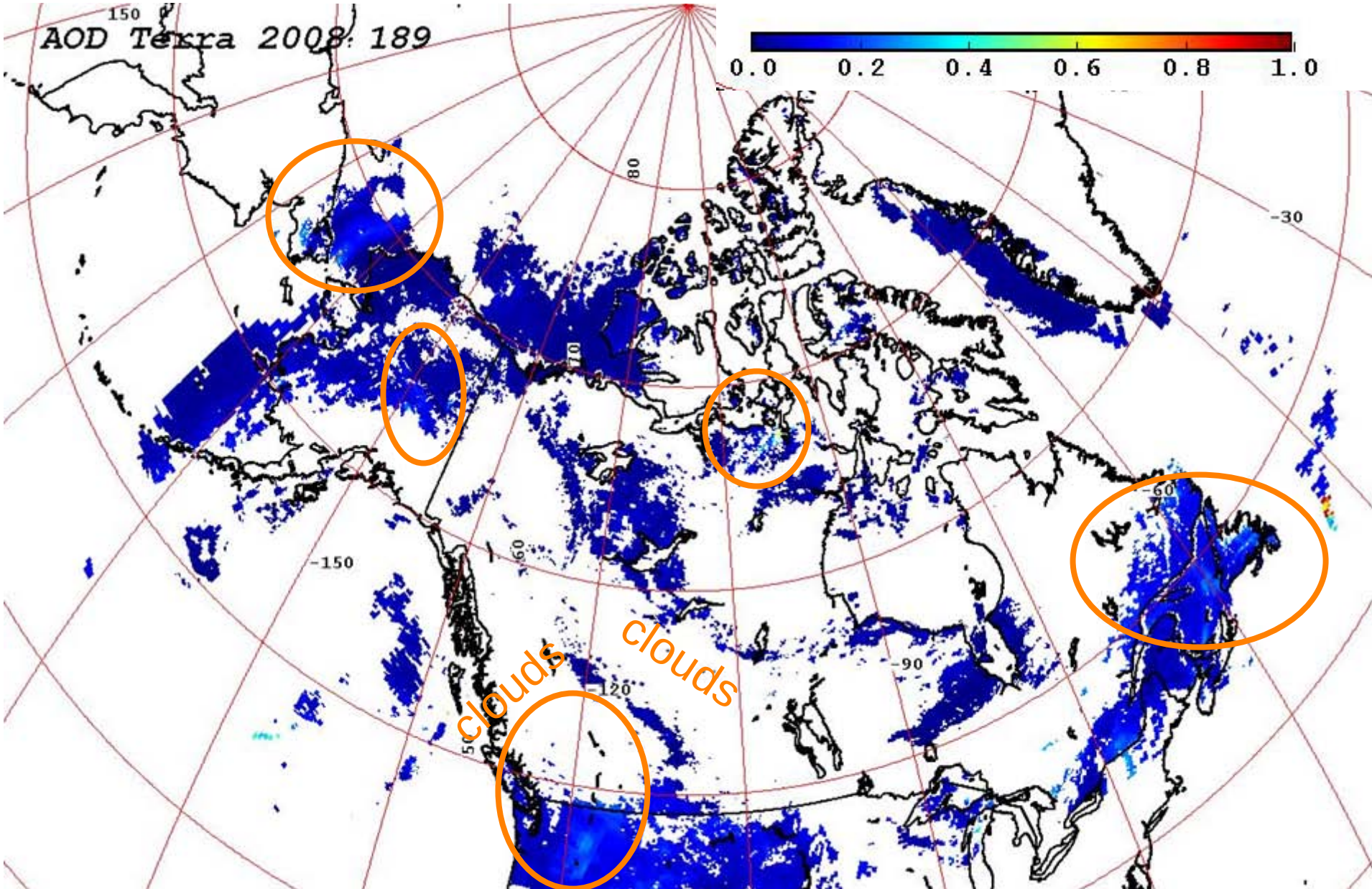
111°0'0"W
109°0'0"W
107°0'0"W
105°0'0"W
103°0'0"W


Highlighted fires (in aqua) are the latest registered detection
July 08, 2008
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
Great Salt Lake
0 285 570 1,140 1,710 2,280
Kilometers
Fires burning since July 7 18:05 UTC
MODIS last 48 hours
MODIS during ARCTAS

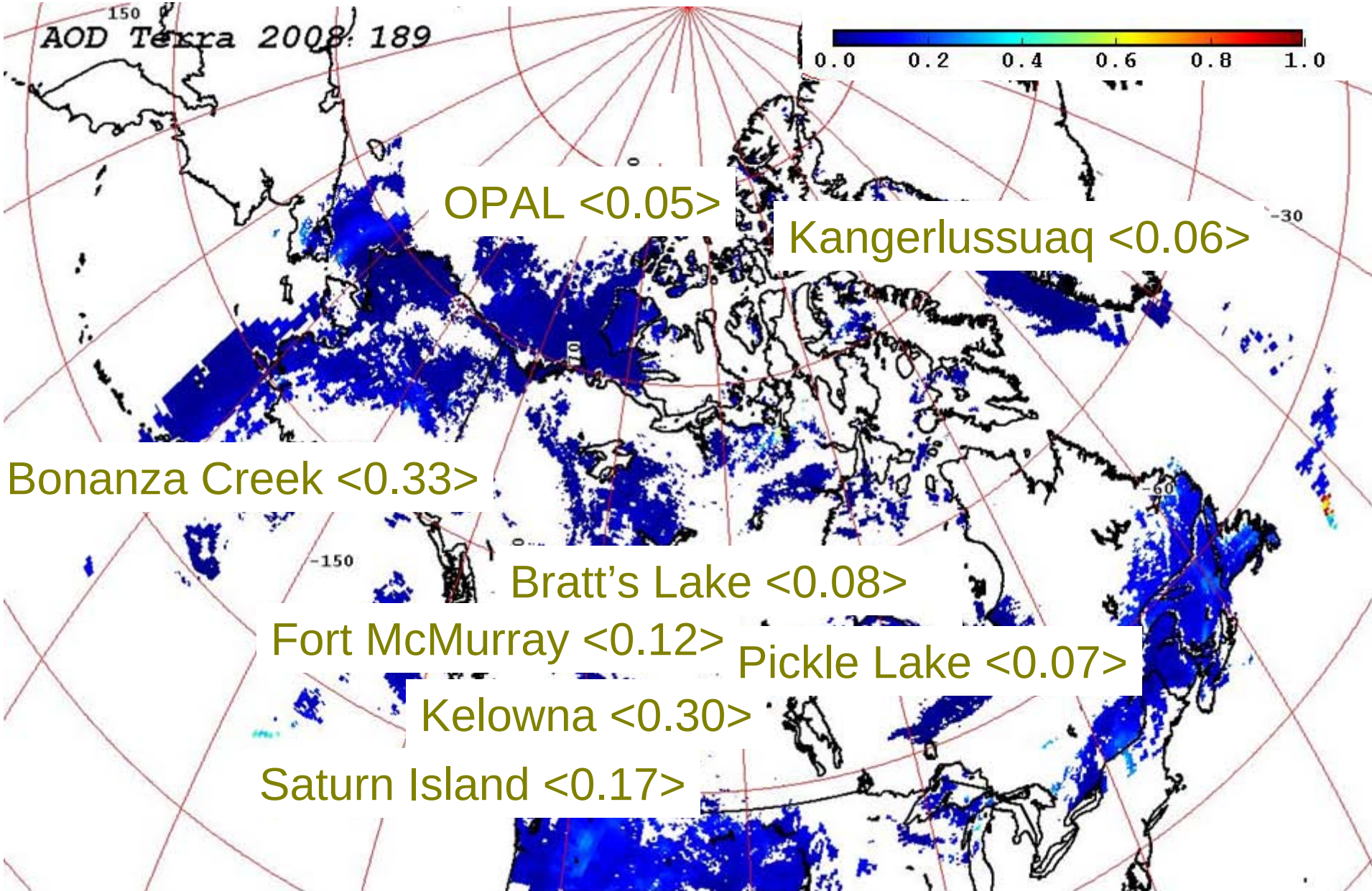
Day 189 (Monday) July 7

MODIS AOD Hotspots in North America



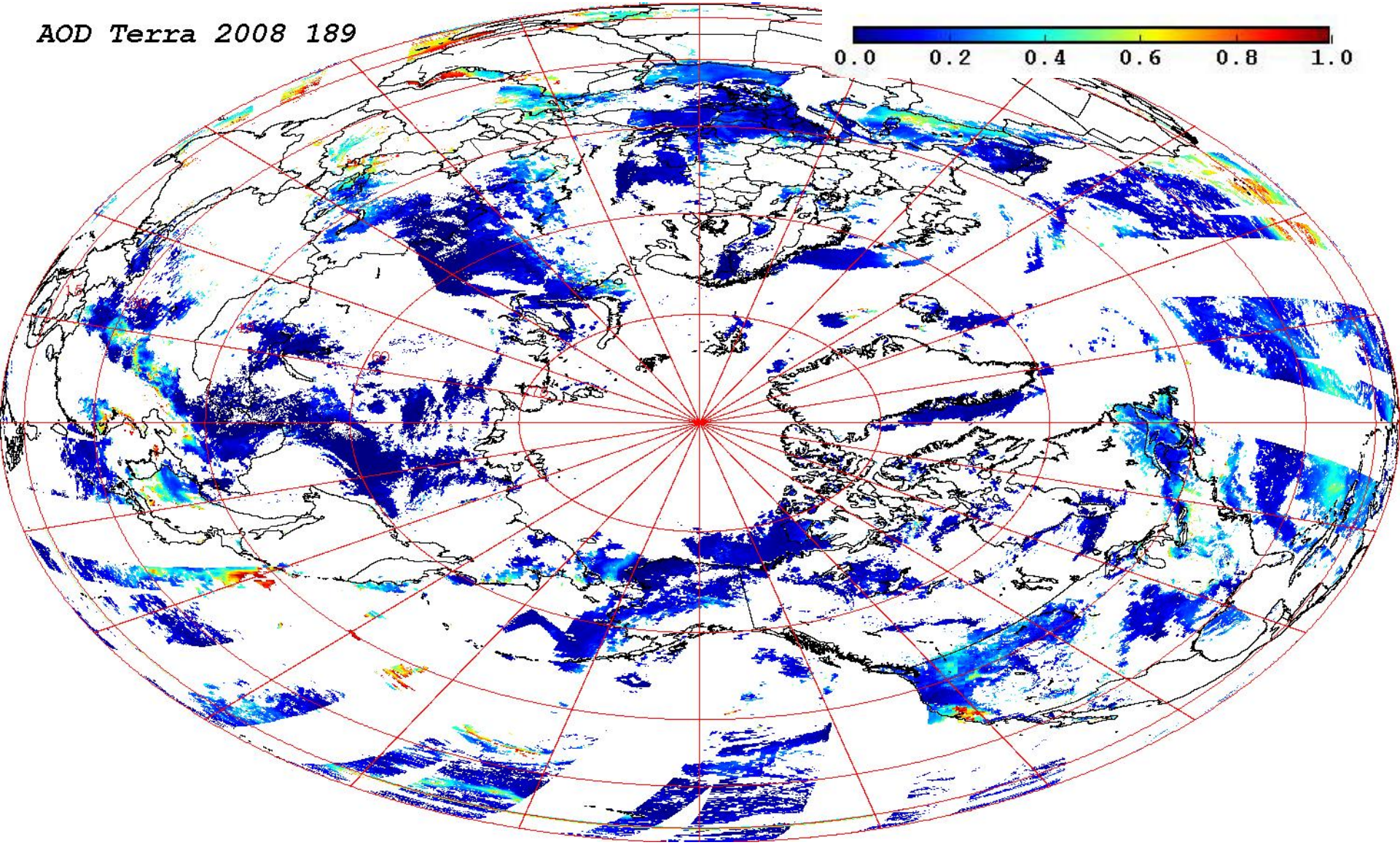
Day 189 (Monday) July 7

MODIS AOD Hotspots in North America



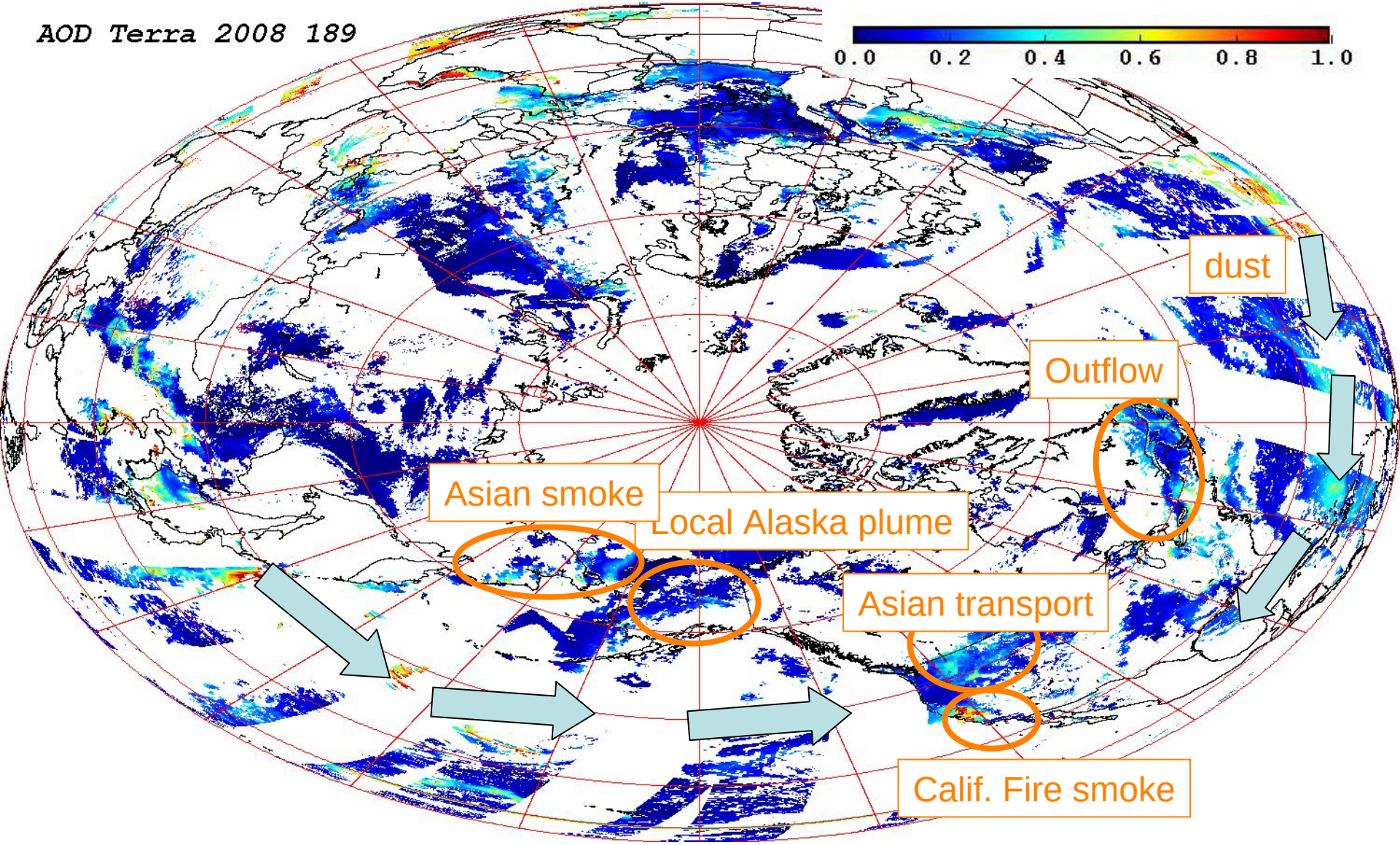
Day 189 (July 7) Monday

MODIS Hot Spots in Northern Hemisphere

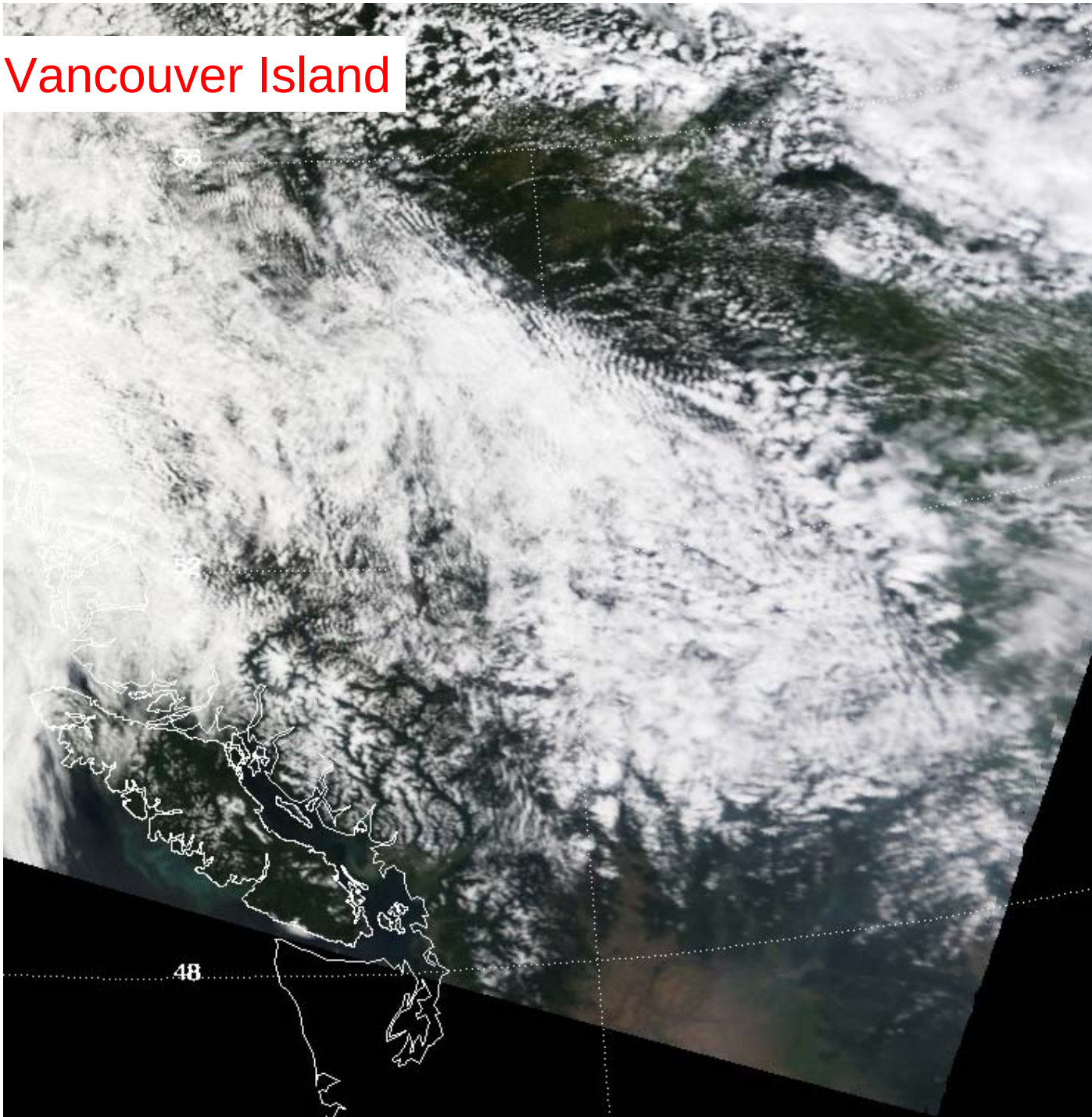


Day 189 (July 7) Monday

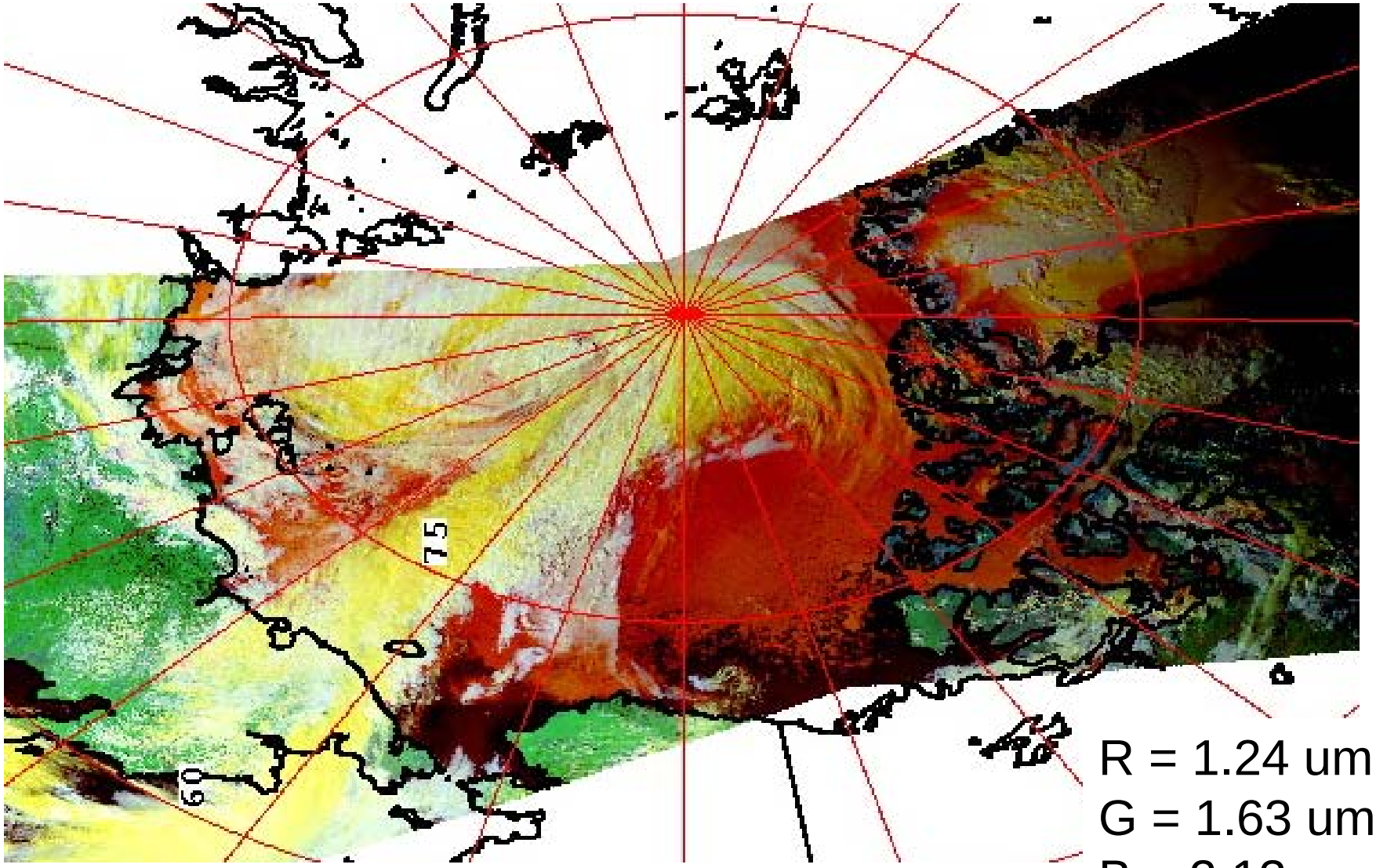
MODIS Hot Spots in Northern Hemisphere



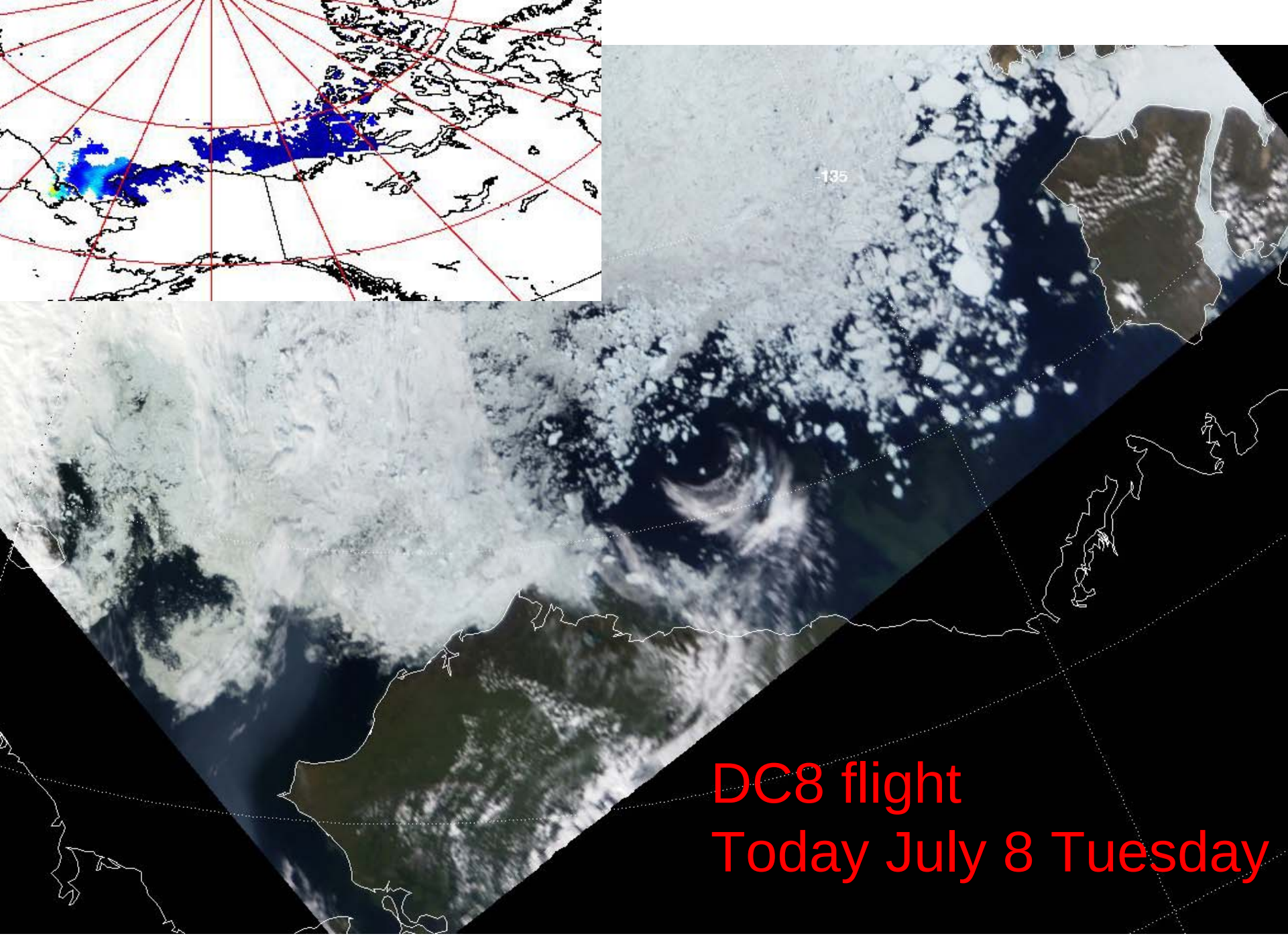
Yesterday over Vancouver Island



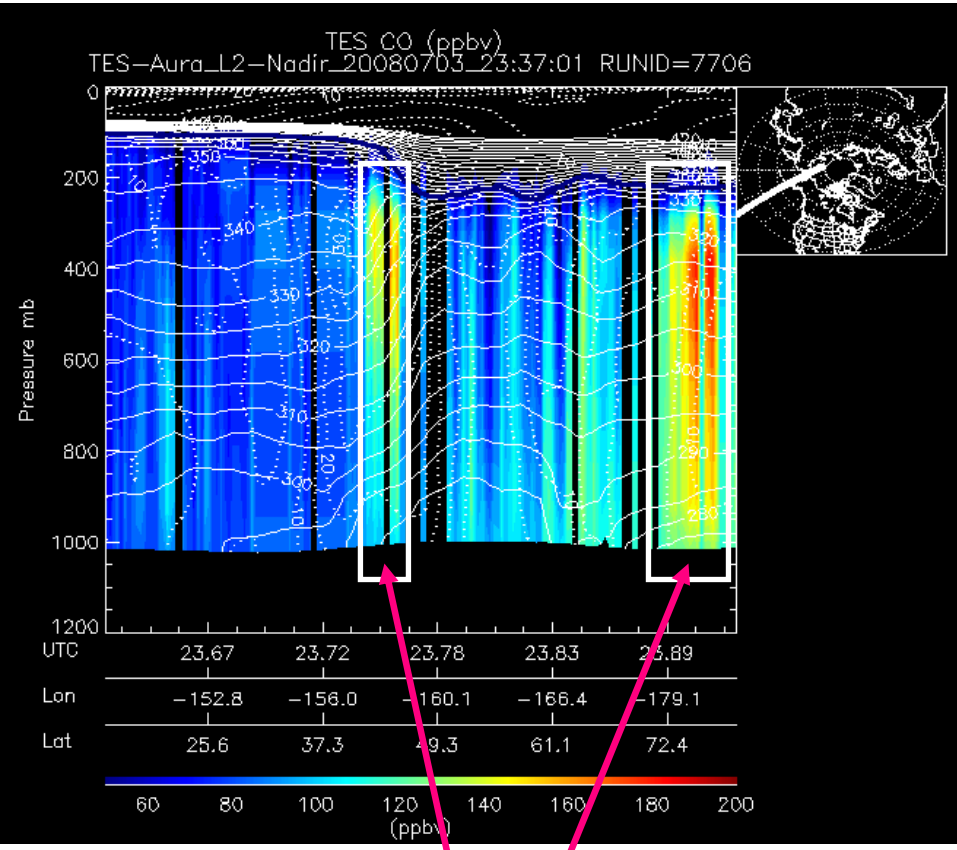
DC8 flight Today!!! July 9 Tuesday

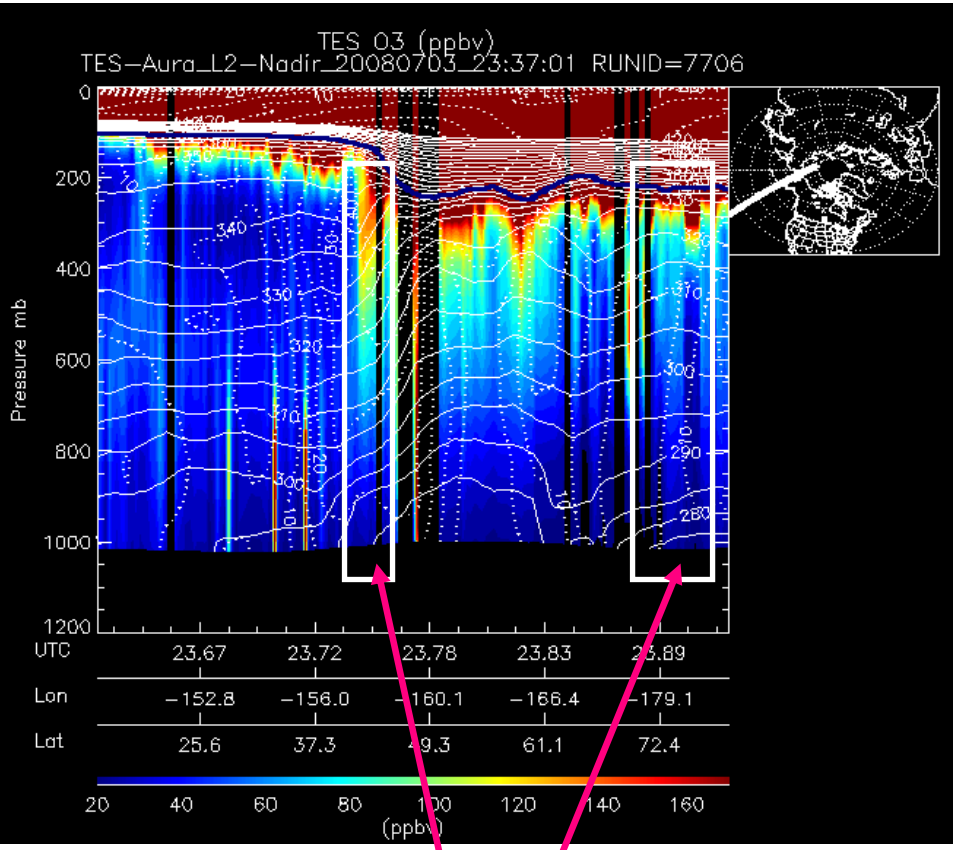


R = 1.24 um
G = 1.63 um
B = 2.13 um


135
DC8 flight
Today July 8 Tuesday

TES CO (left) and O3 (right) curtains from SS orbit 7706 (07/03)





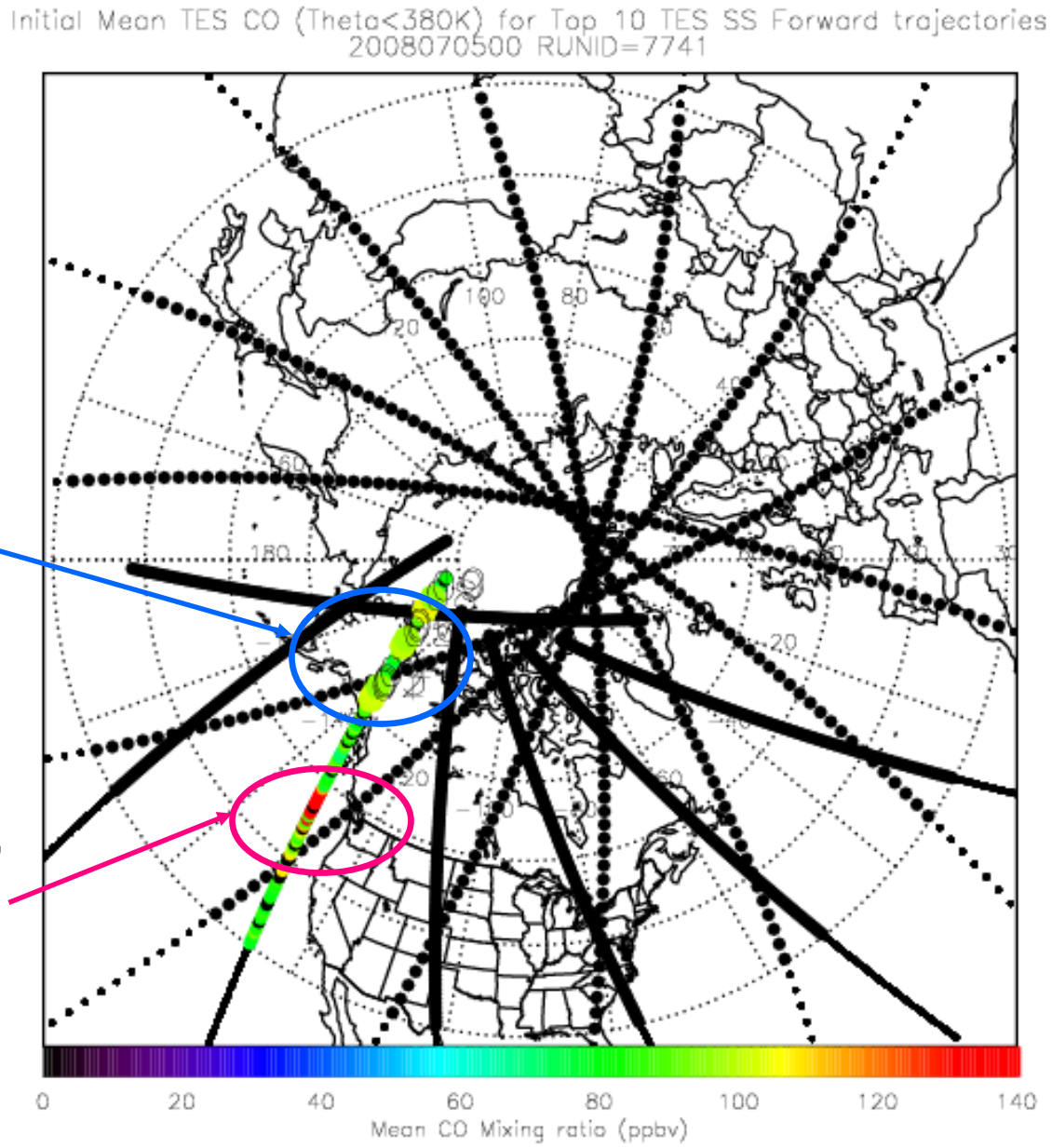
TES observes two branches of the North Asian outflow: Southern branch with rapid east-west transport, Northern branch transported into the Arctic.

TES observes enhanced upper tropospheric O3 in the southerly branch and moderate free tropospheric enhancements in the northerly branch.

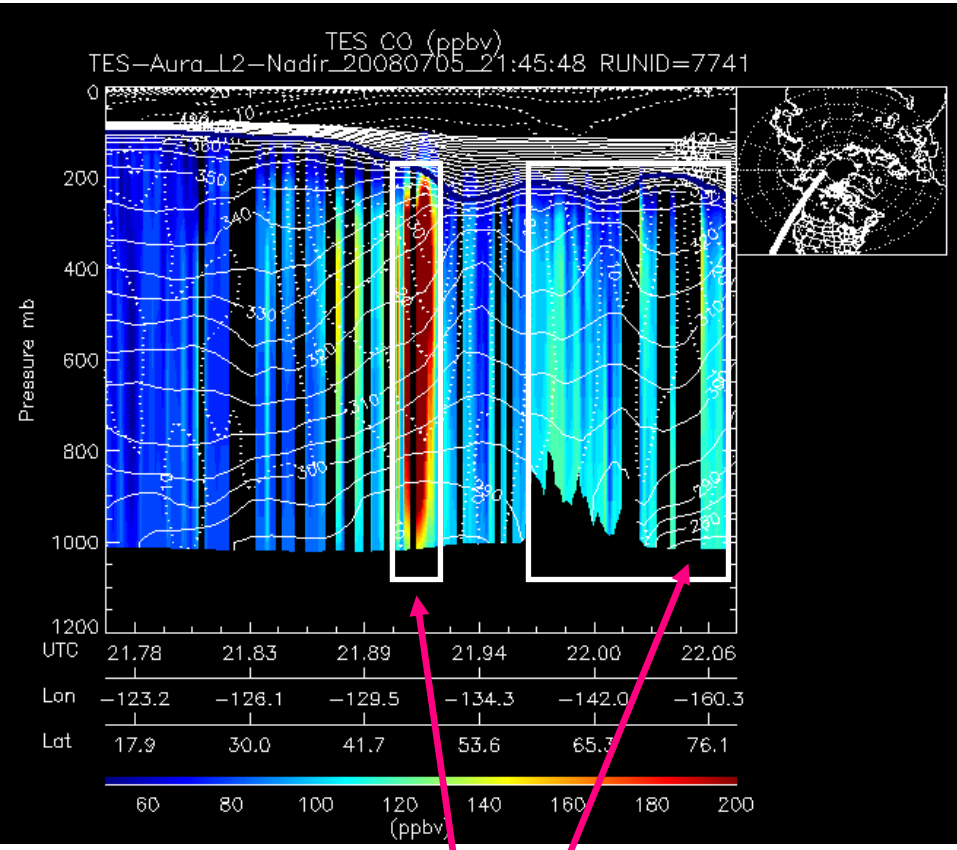
TES Step&Stare Obs 07/05 (Run ID 7741): Mean CO below 380K

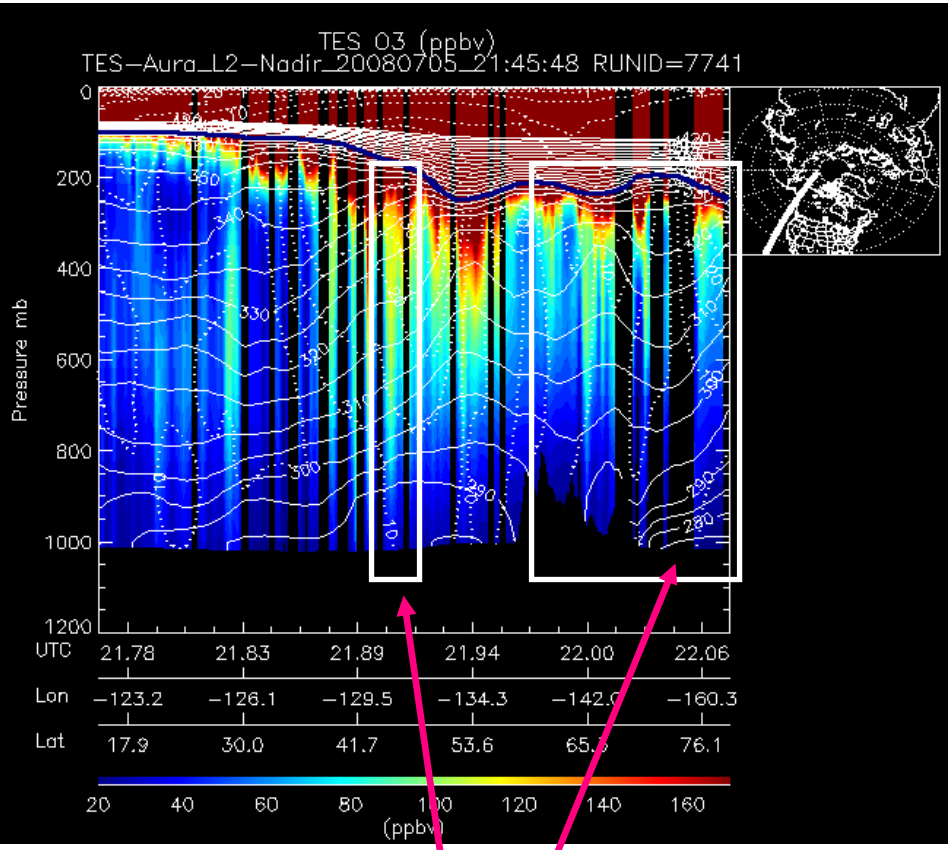
Northerly branch, peak CO approx 160 ppbv

Southerly branch, peak CO approx 400 ppbv



TES CO (left) and O3 (right) curtains from SS orbit 7741 (07/05)

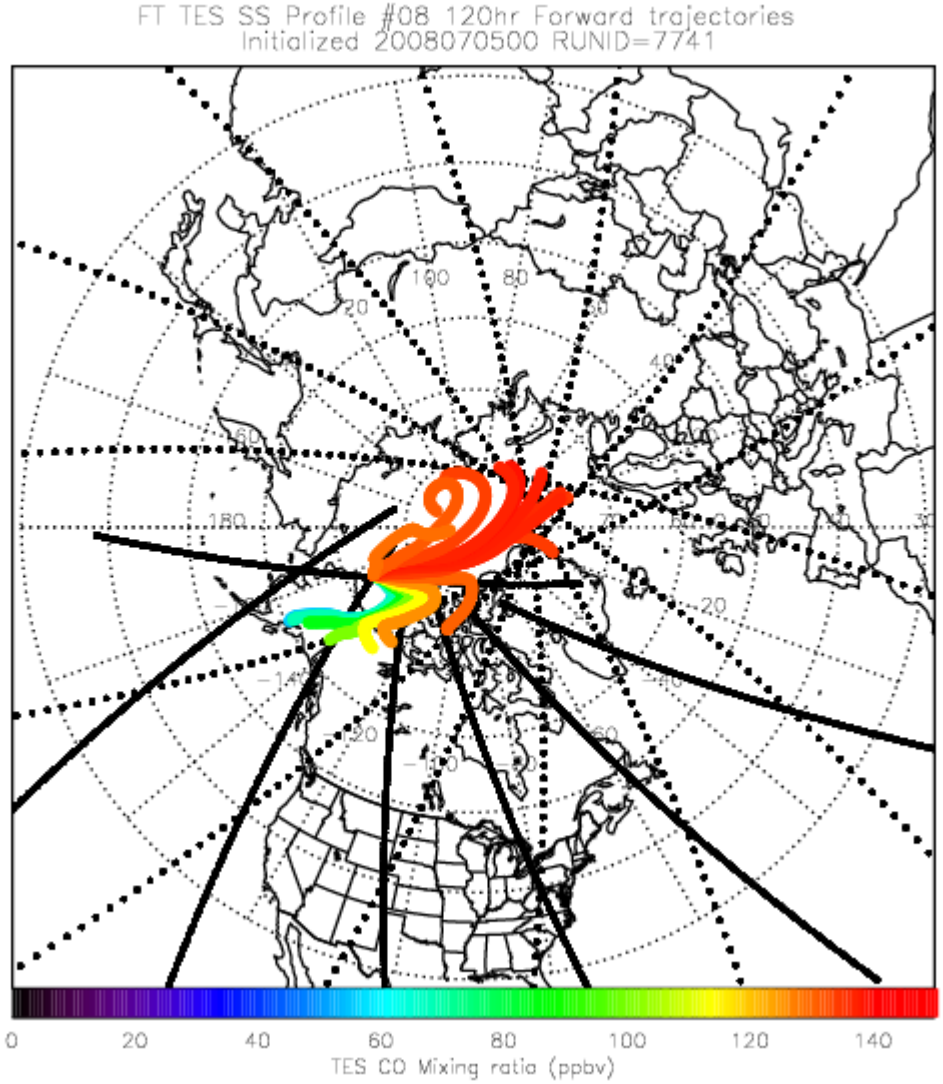




2 days later, southerly plume is still coherent while northerly plume appears more diffuse.

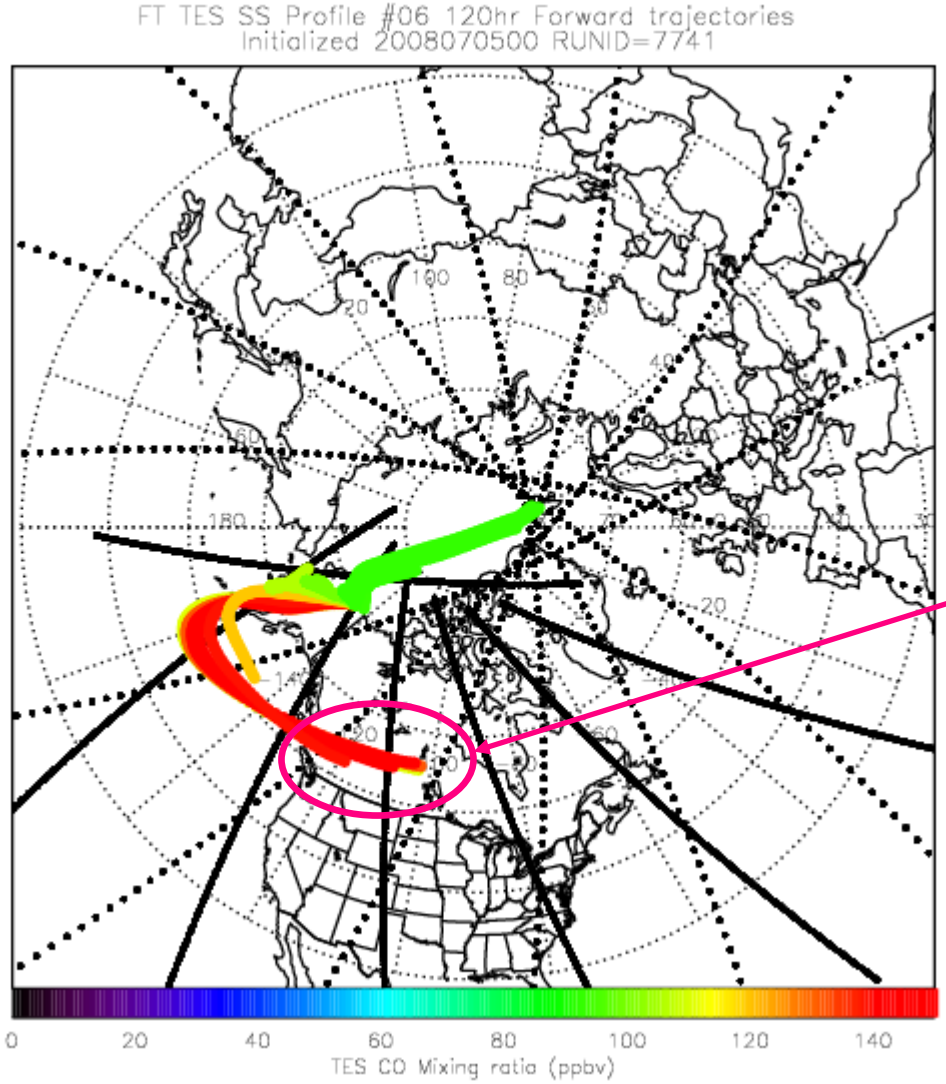
TES observes enhanced mid tropospheric O3 in the southerly branch and stratospheric air between the 2 branches.

TES SS Forward Trajectories “Profile 8” Valid 00Z 07/10 (07/09 Thule-Cold Lake flight)



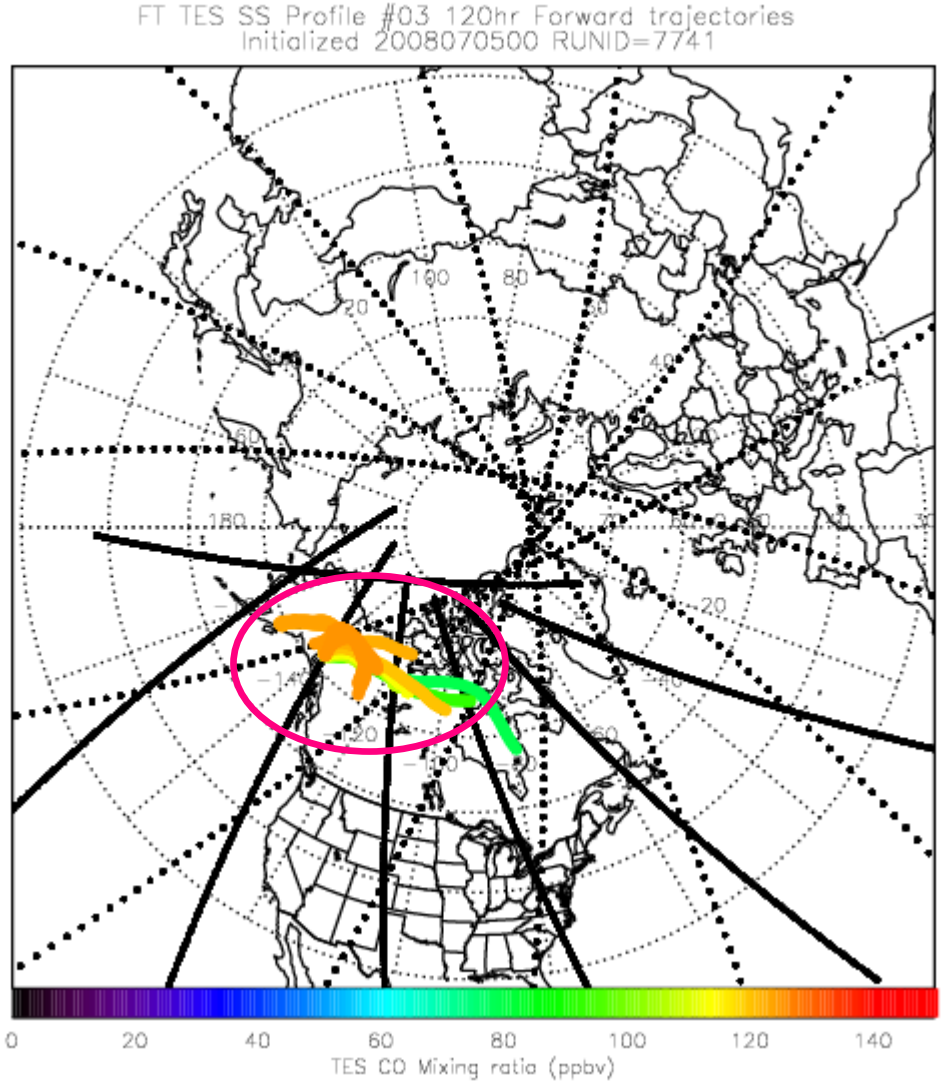
Main branch transported into Northern Eurasia, however significant stagnation/ recirculation

TES SS Forward Trajectories “Profile 6” Valid 00Z 07/10 (07/09 Thule-Cold Lake flight)



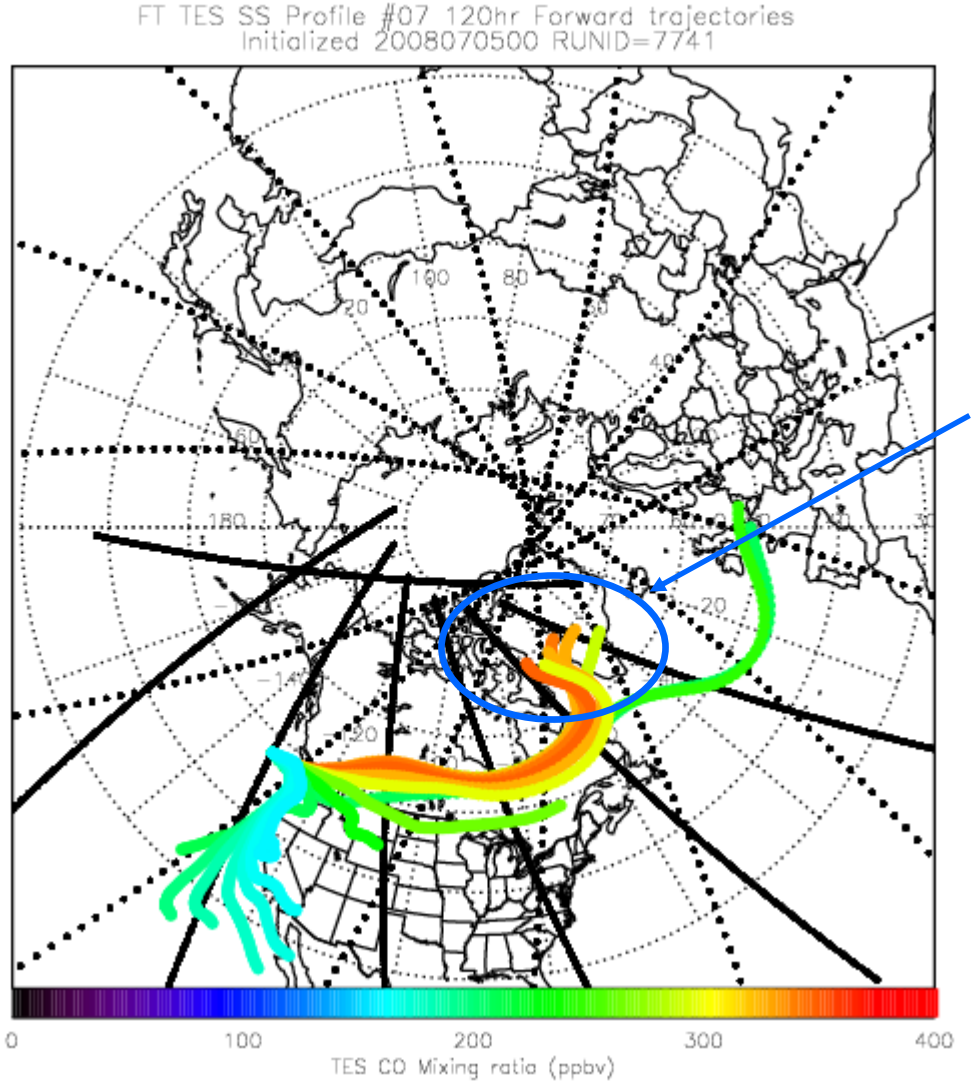
From a more southerly part of the plume, aged Asian/ Siberian outflow in lower troposphere approaching local flight area

TES SS Forward Trajectories “Profile 3” Valid 00Z 07/10
(07/09 Thule-Cold Lake flight)



Significant stagnation/ recirculation

TES SS Forward Trajectories “South Plume Profile 7” Valid 00Z 07/10 (07/09 Thule-Cold Lake flight)



Well aged Asian/ Siberian outflow influencing Greenland flight area

FLIGHT DAY FORECAST

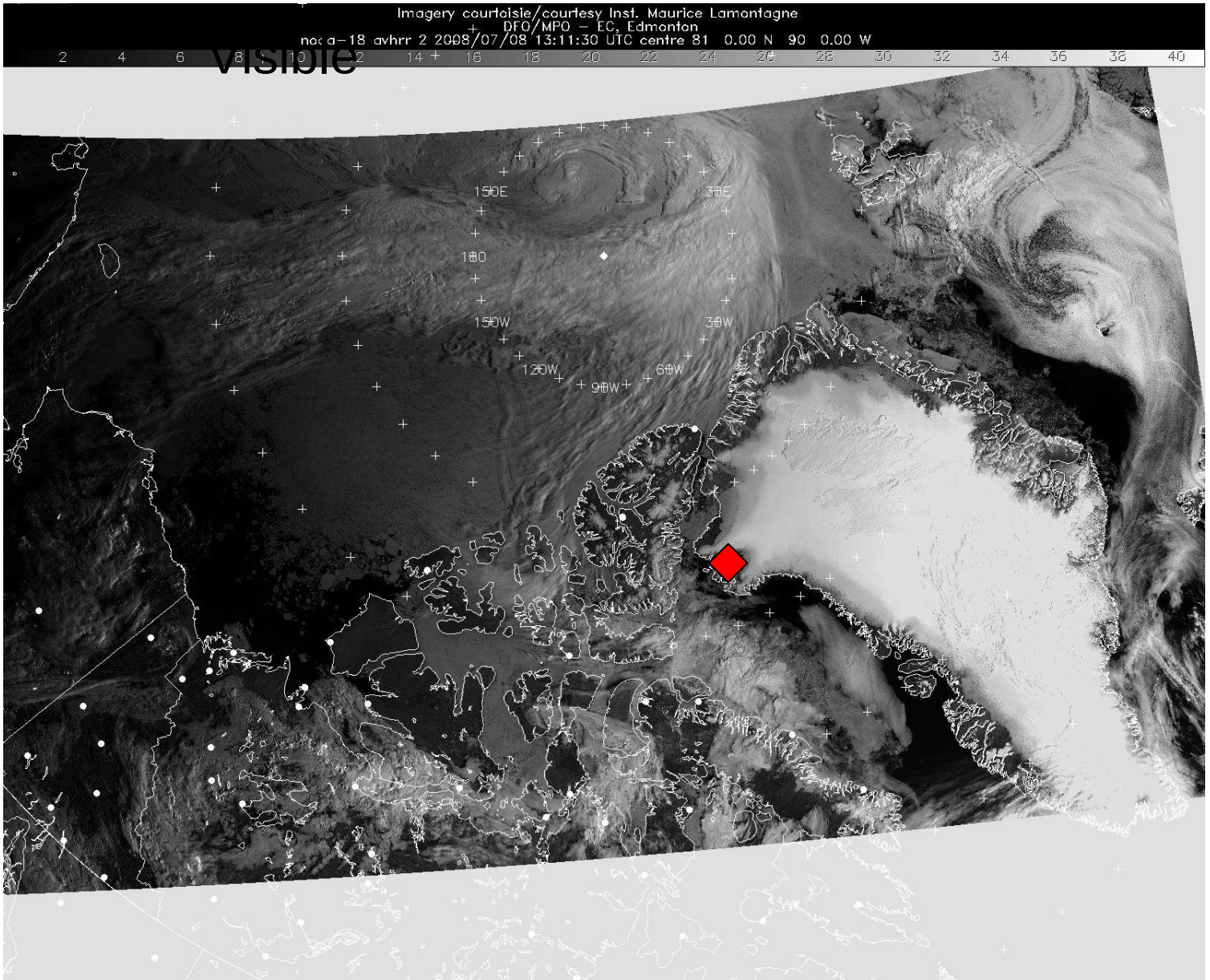
July 9-11

Henry Fuelberg
Walter Sessions

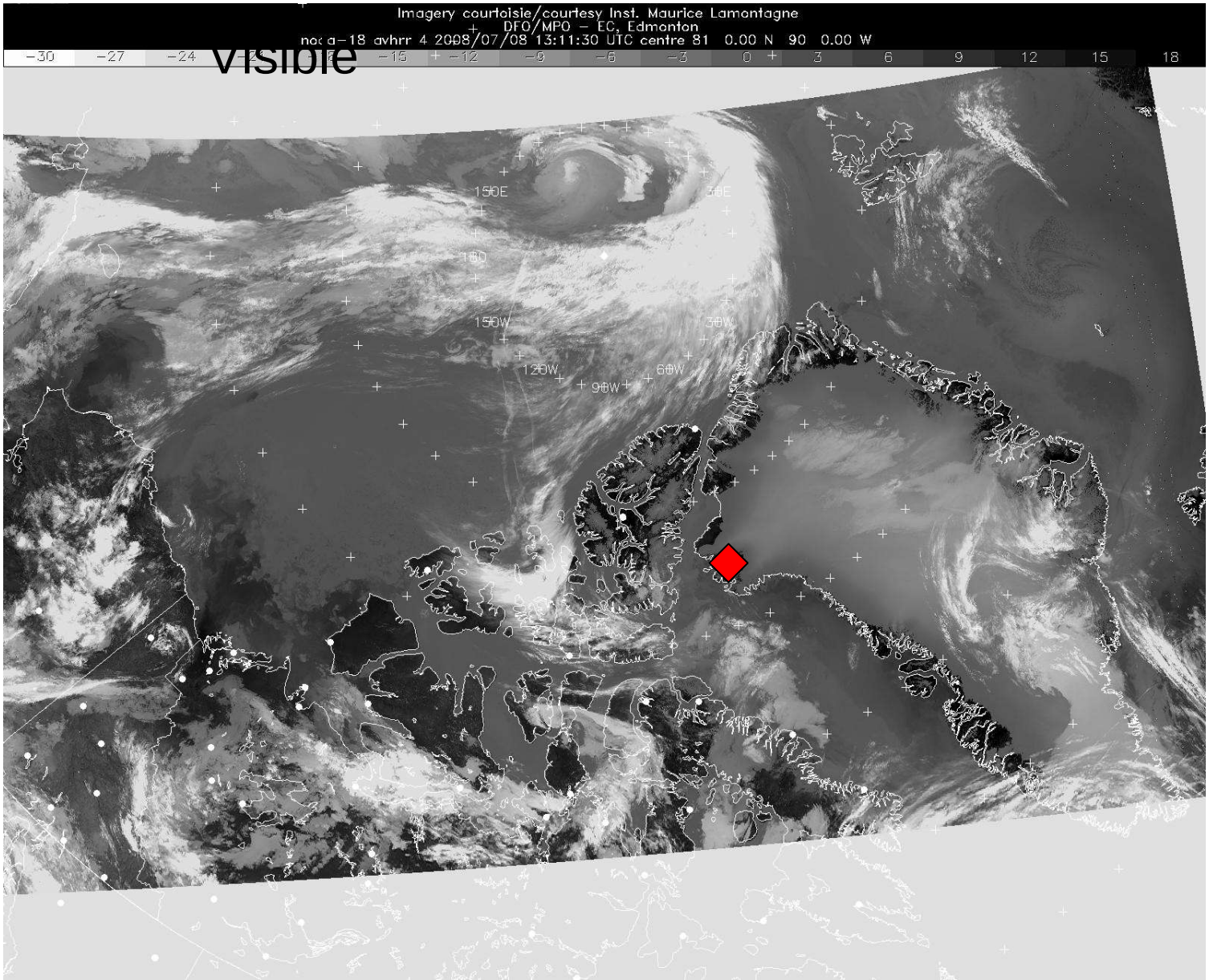
"Your eyes to the skies"
And "No Surprise Weather Service"

Current Weather

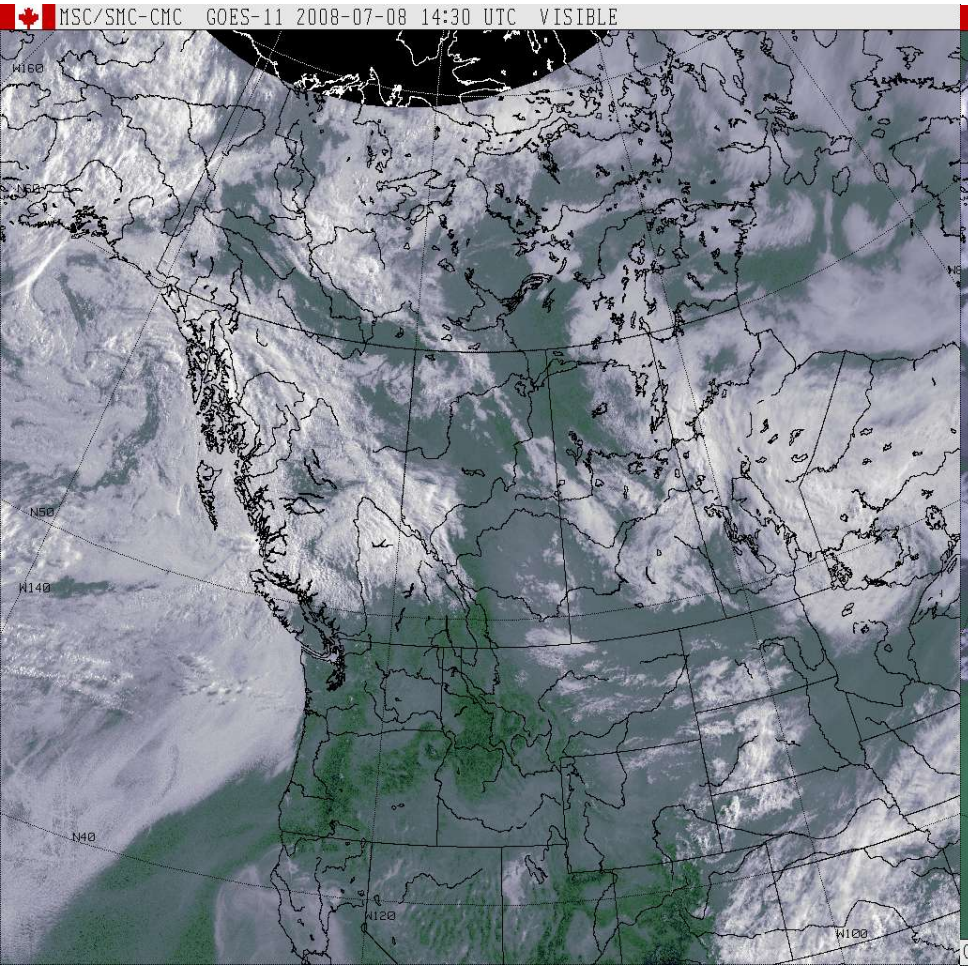
Satellite Imagery-VIS



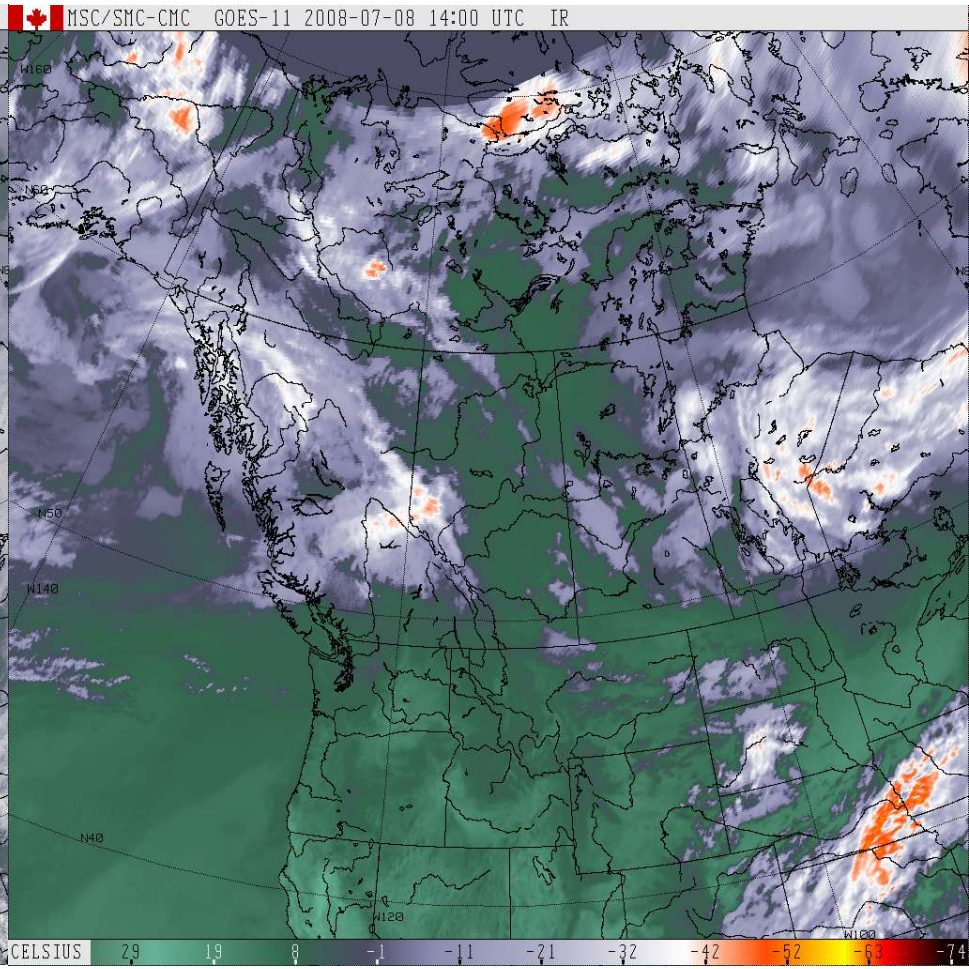
Satellite Imagery-IR



WCAN GOES Imagery



Visible



Infrared

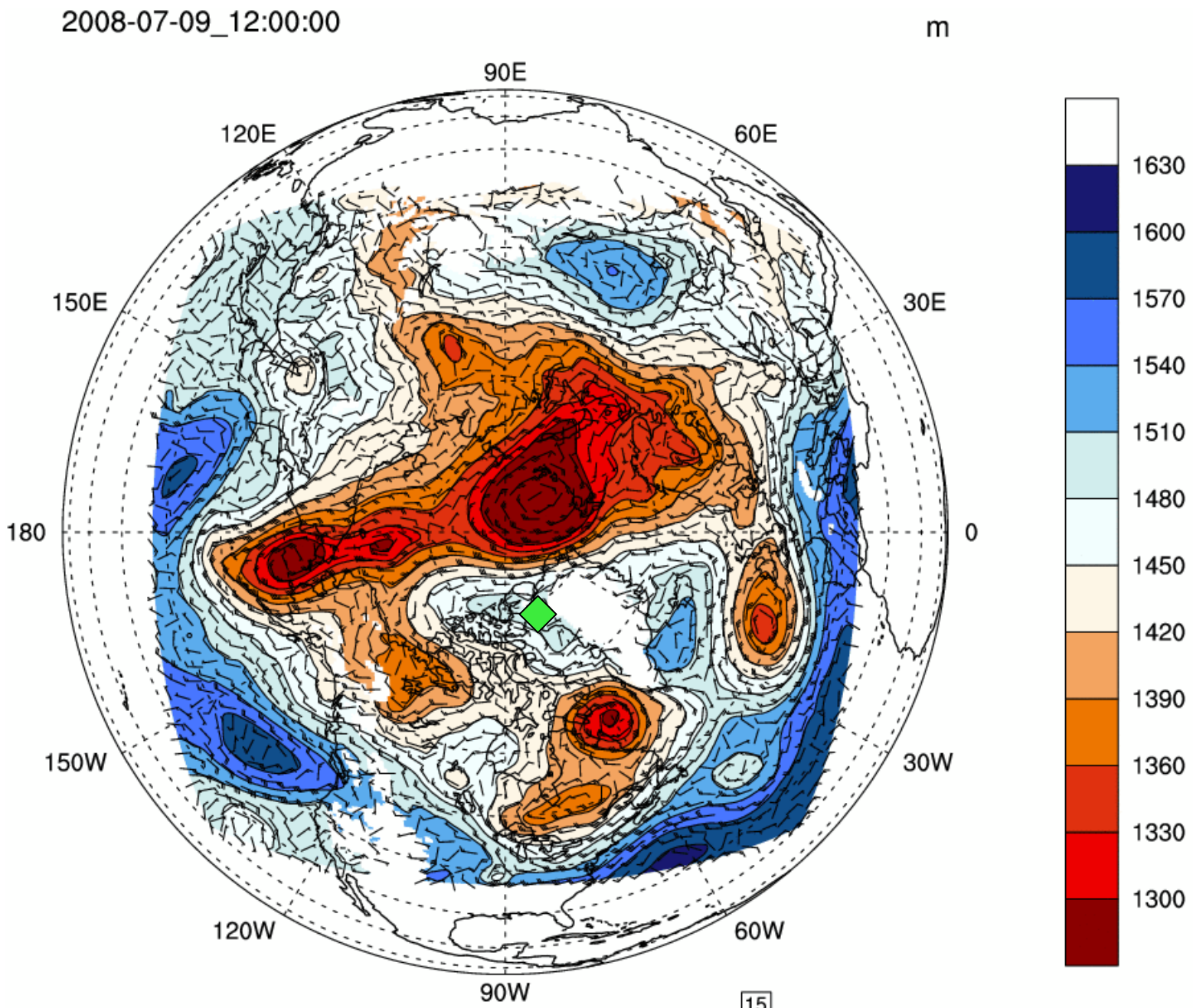
Wednesday

July 8th

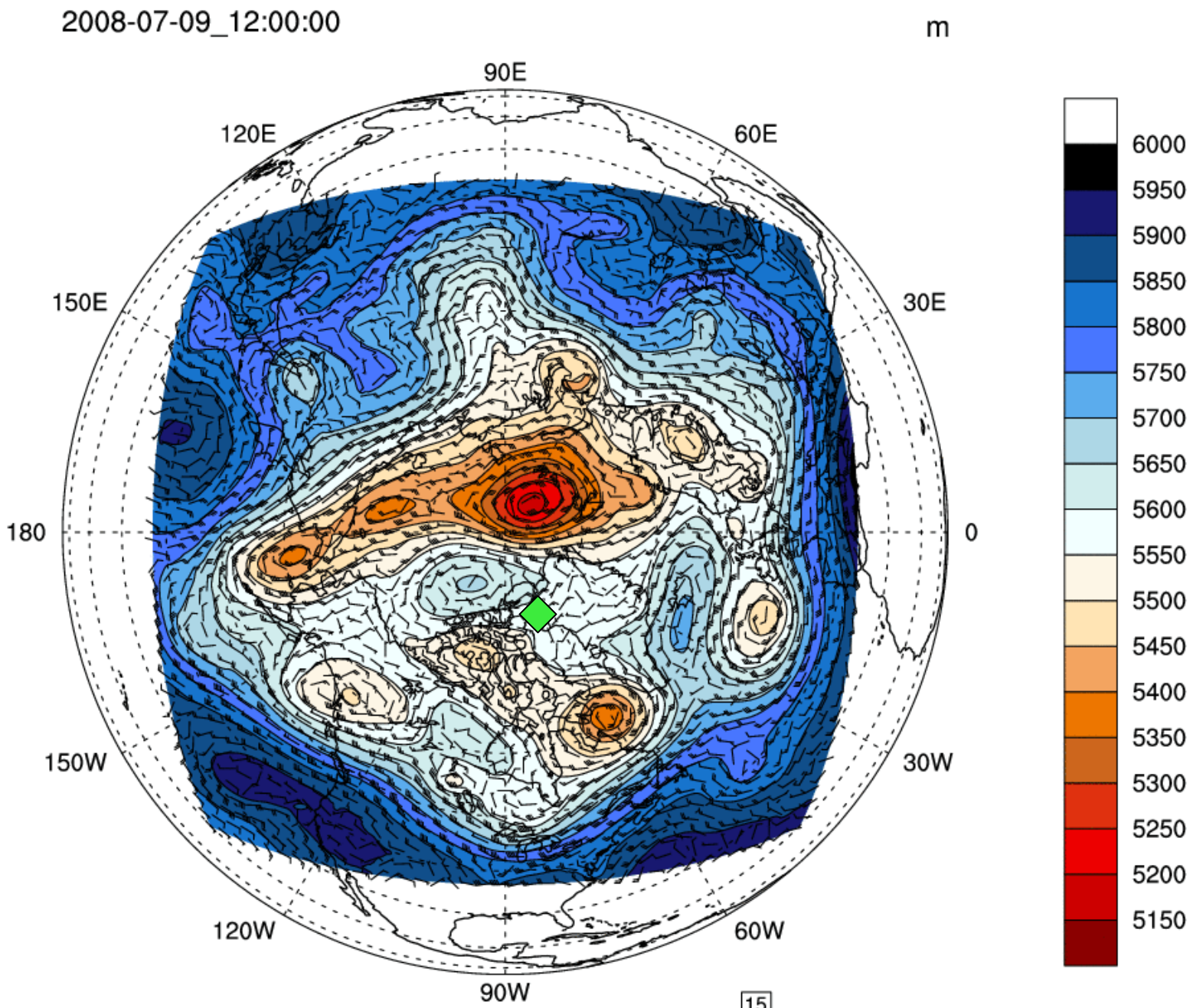
1200 UTC

0900 Thule

0600 MDT


2008-07-09_12:00:00
m
90E
120E
60E
150E
30E
180
0
150W
30W
120W
60W
90W
1630
1600
1570
1540
1510
1480
1450
1420
1390
1360
1330
1300
15

WRF 850 mb


2008-07-09_12:00:00
m
90E
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90W
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5950
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5850
5800
5750
5700
5650
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5500
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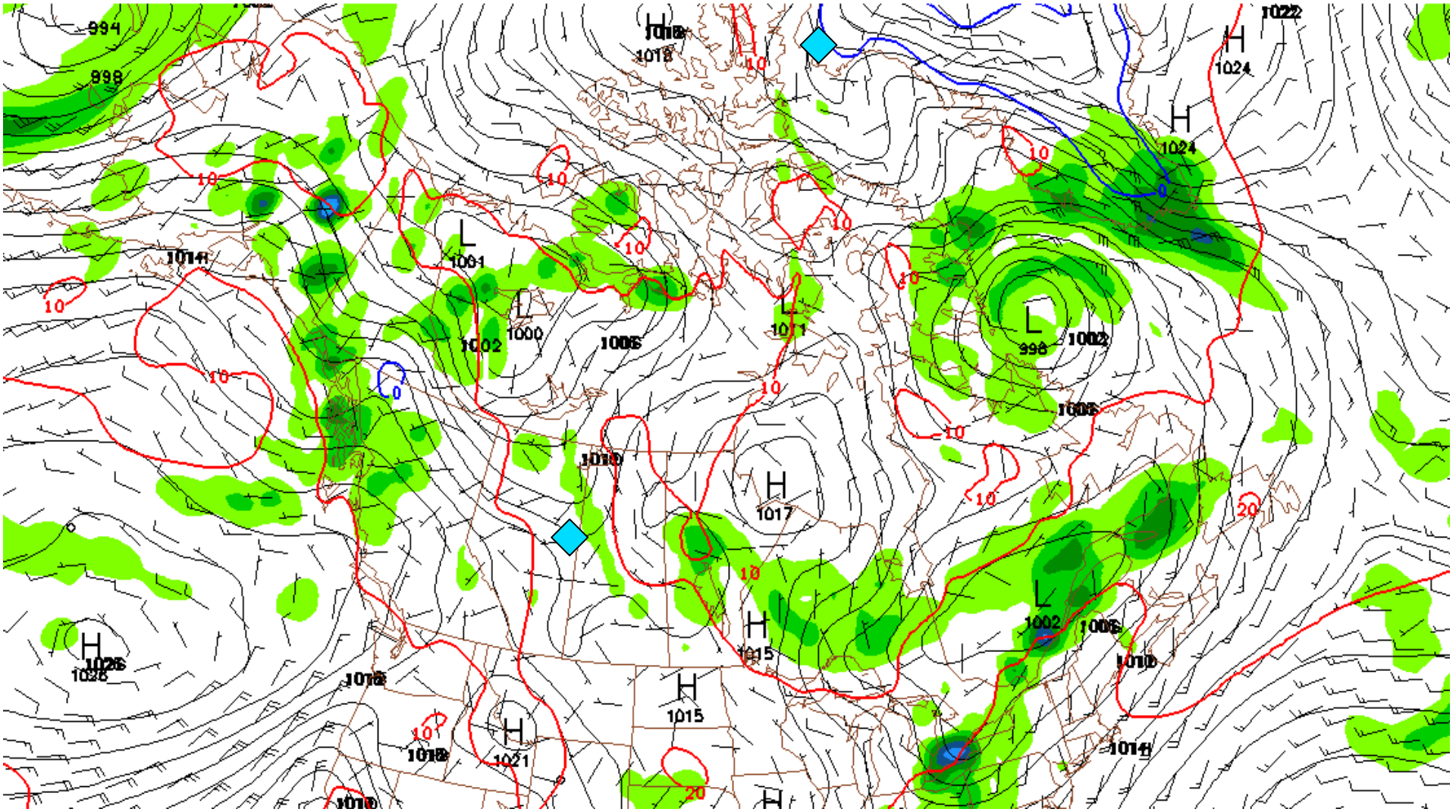
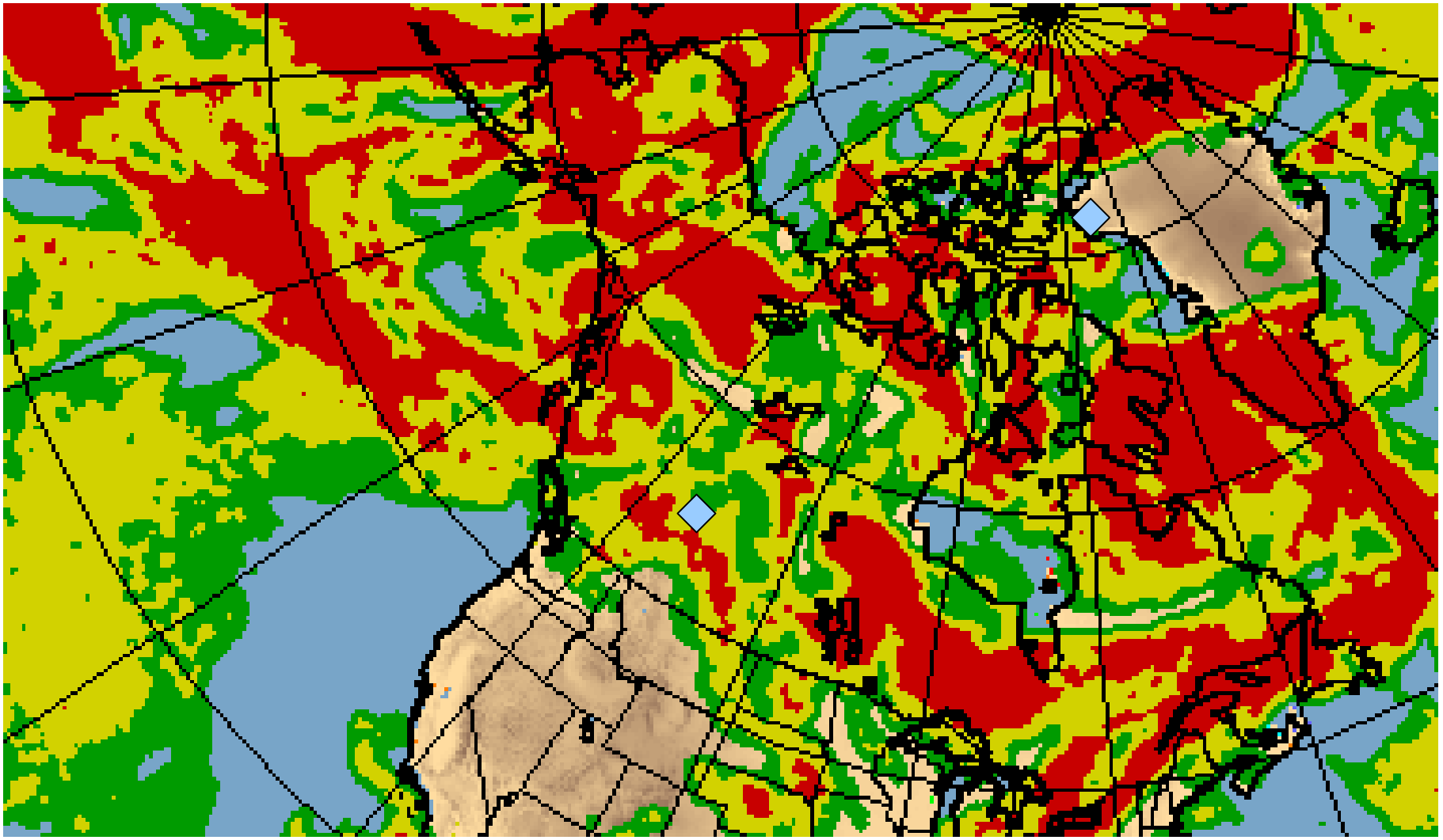
5400
5350
5300
5250
5200
5150
15

WRF 500 mb

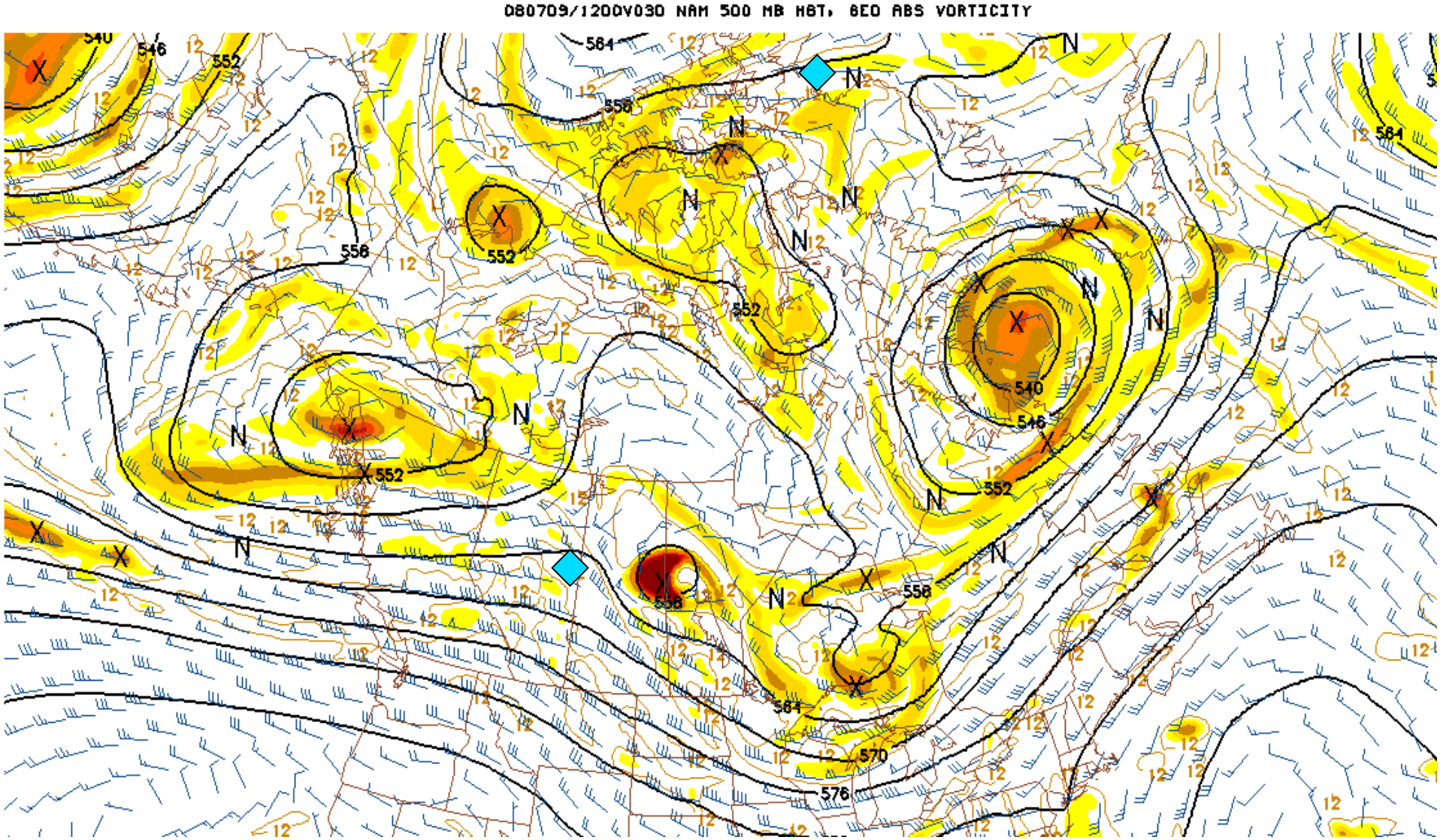
Wed AM Surface and Precip



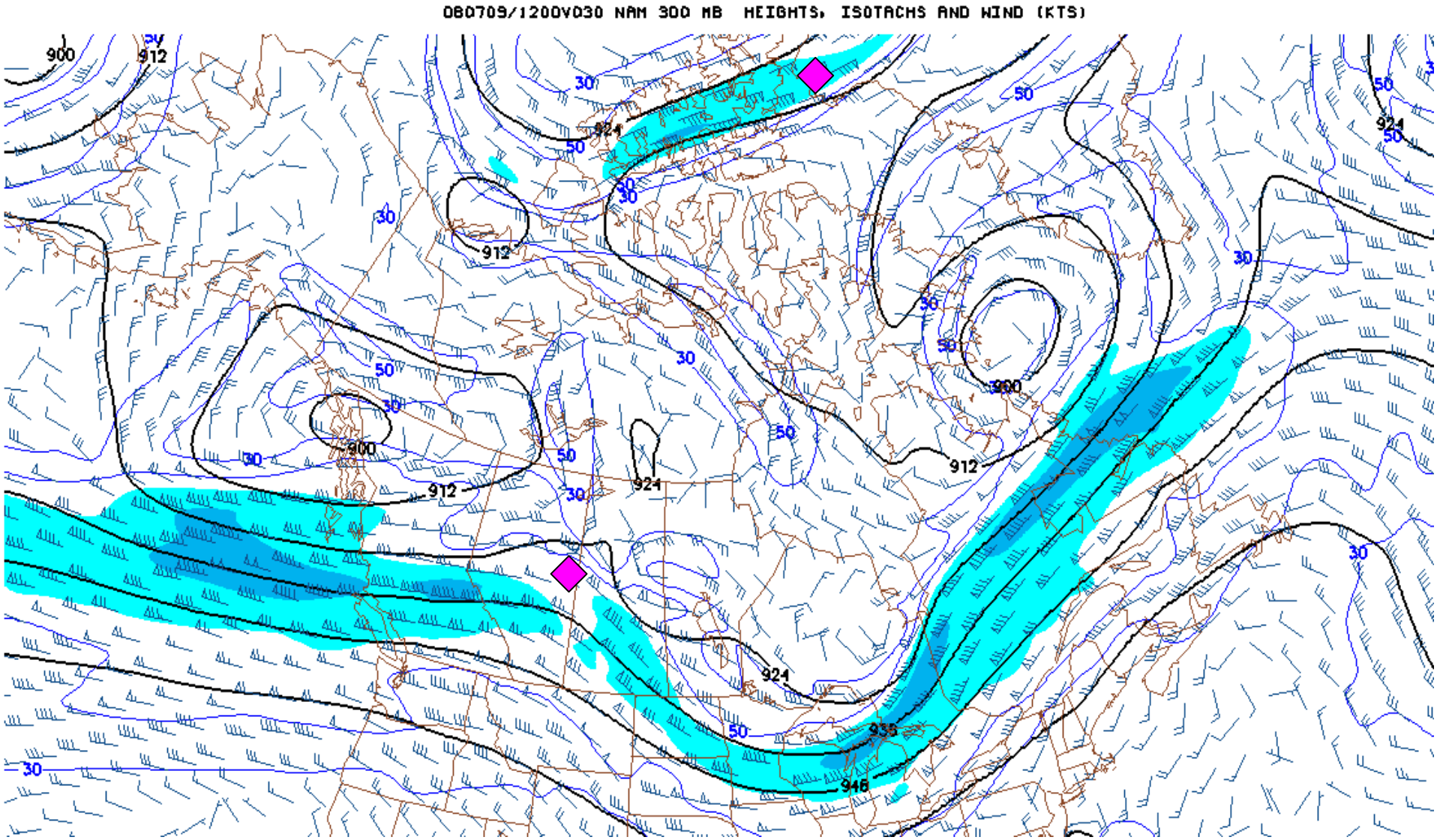
Wednesday AM Cloud Cover



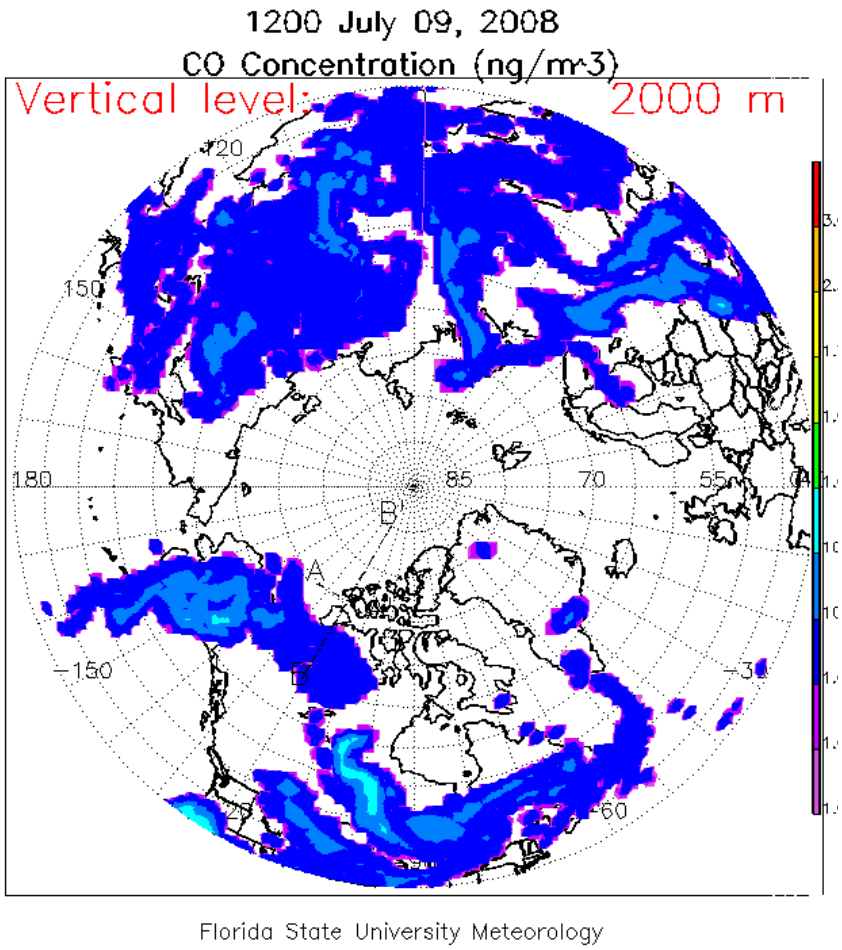
500 mb (5,000 ft MSL)



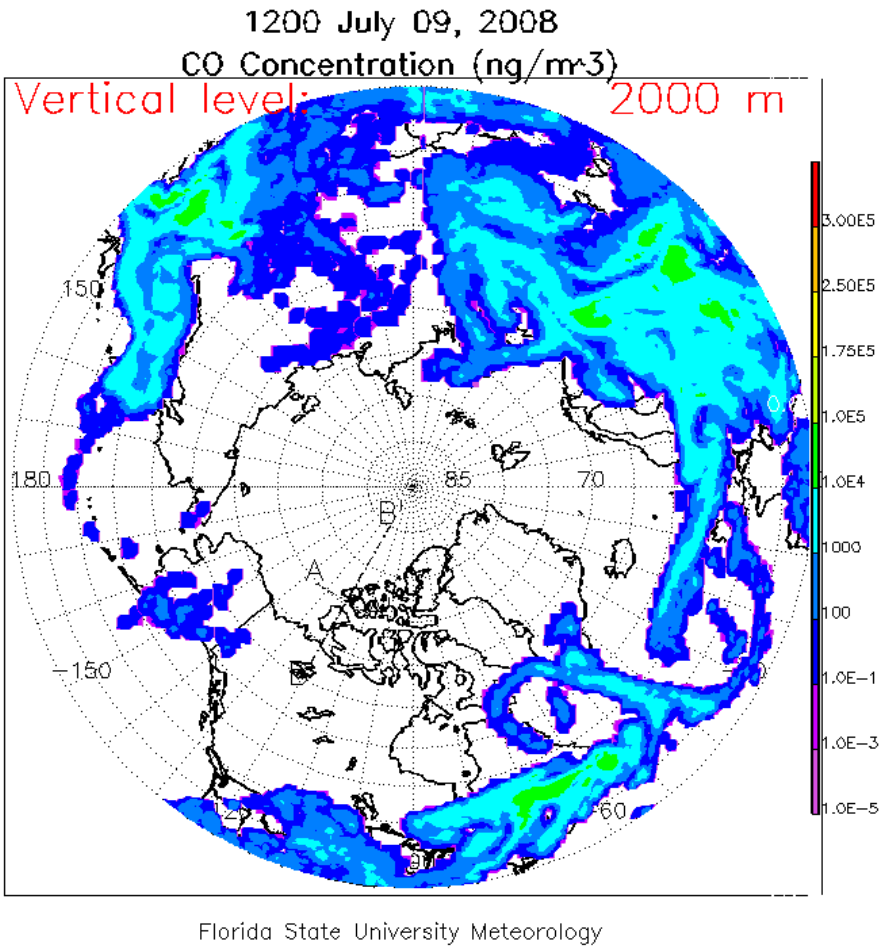
300 mb Heights and Isotachs



FLEXPART 2K

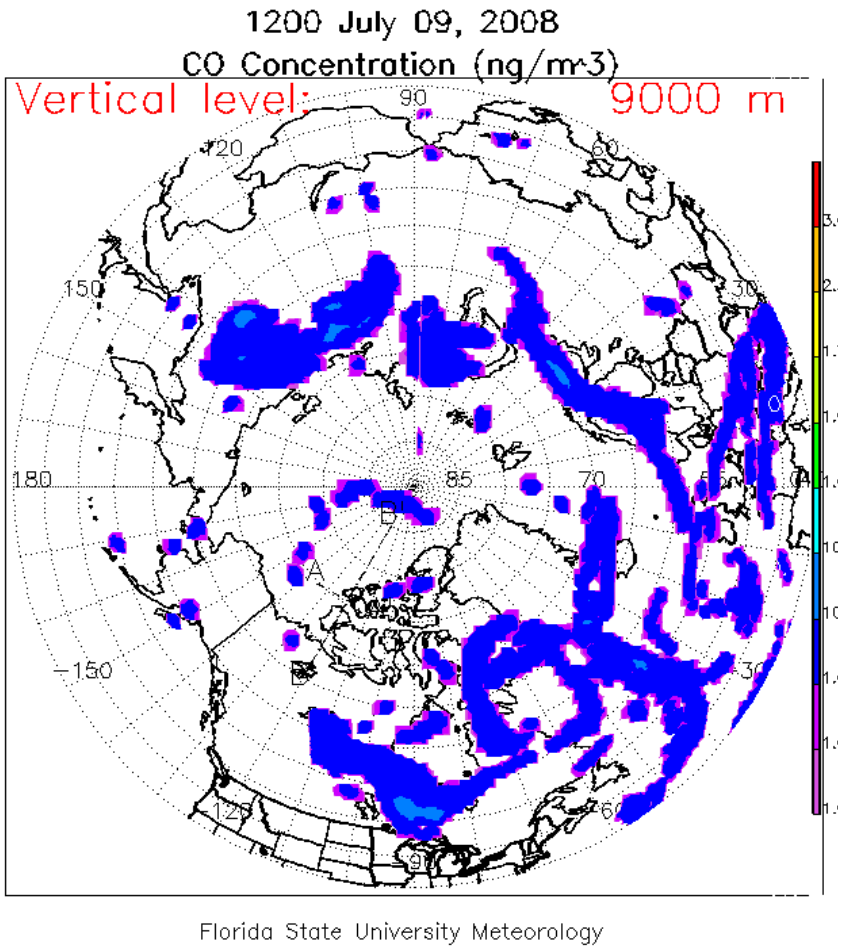


Biomass

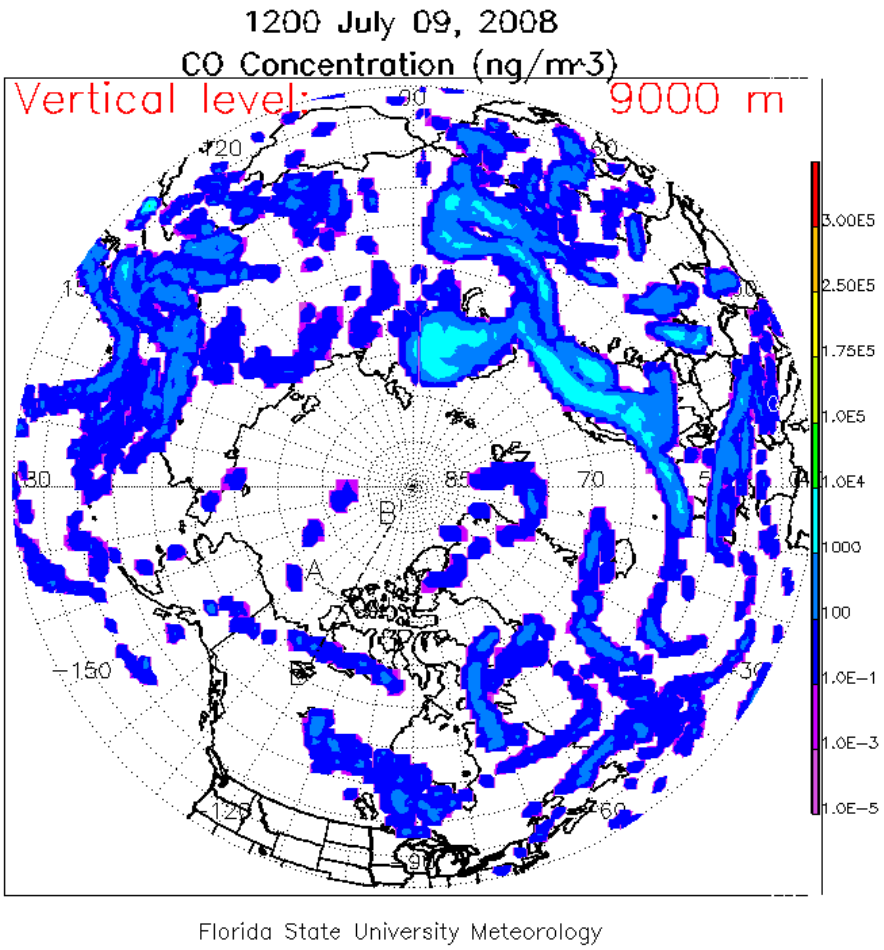


Anthropogenc

FLEXPART 2K



Biomass



Anthropogenc

Wednesday

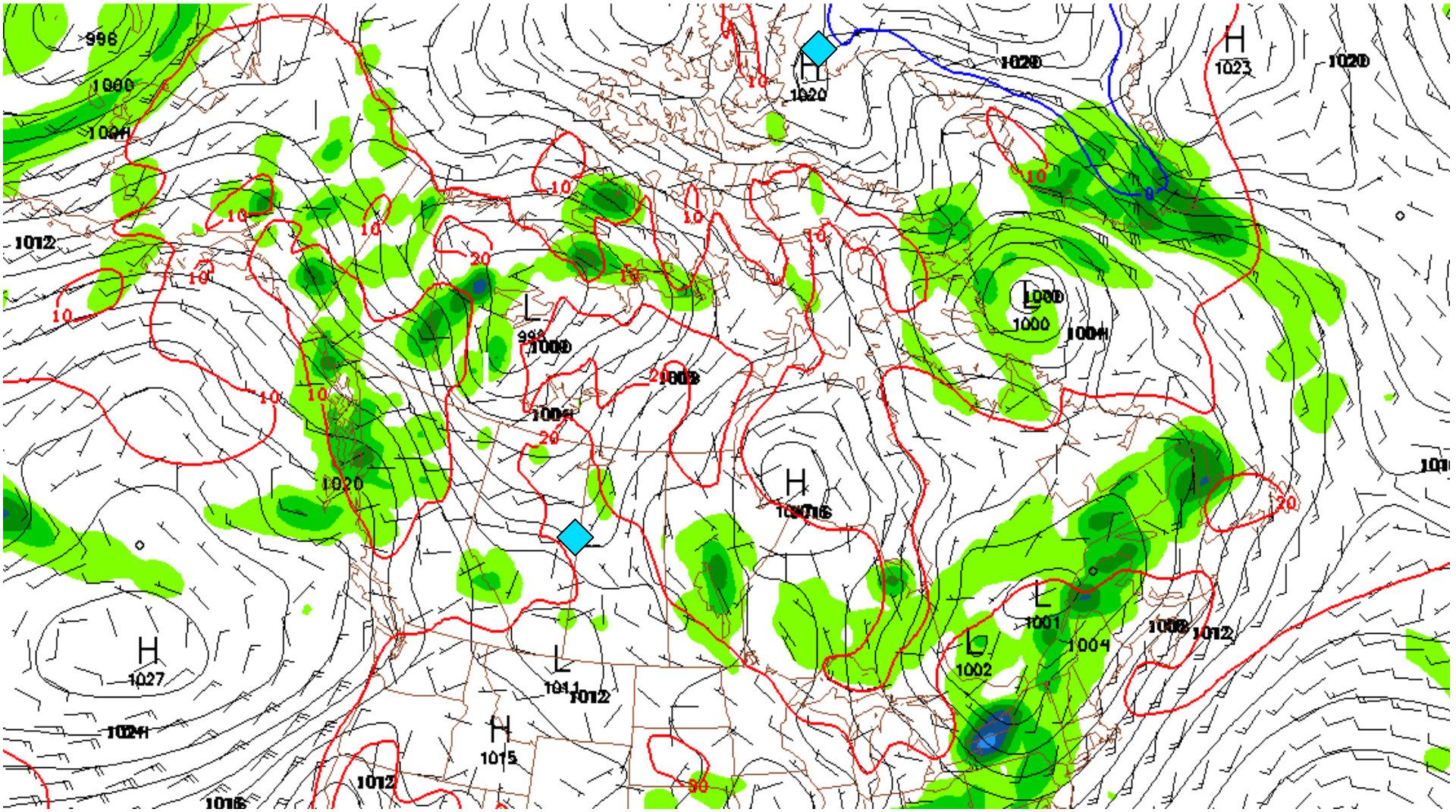
July 8th

1800 UTC

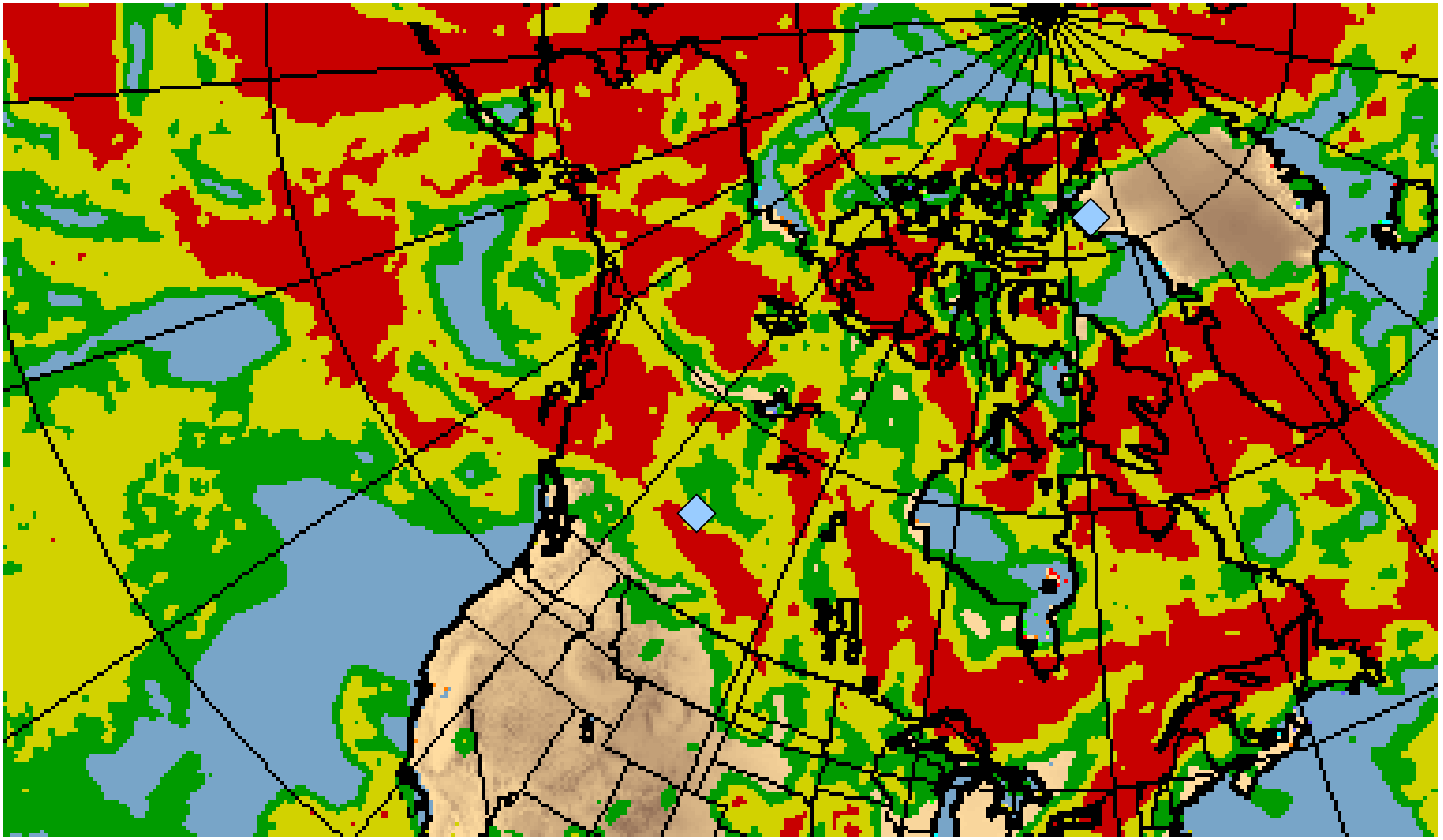
1500 Thule

1200 MDT

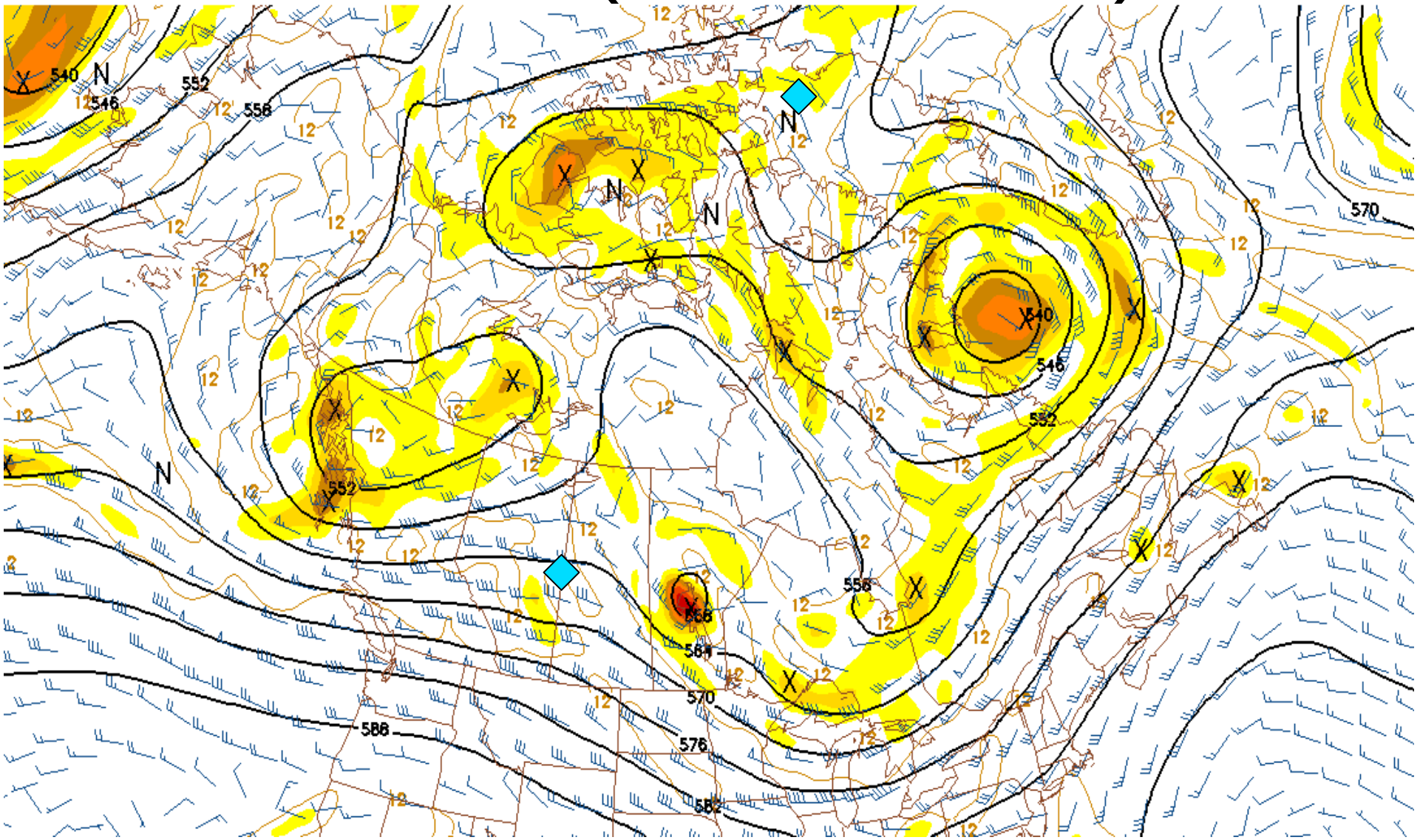
Wed PM Surface and Precip



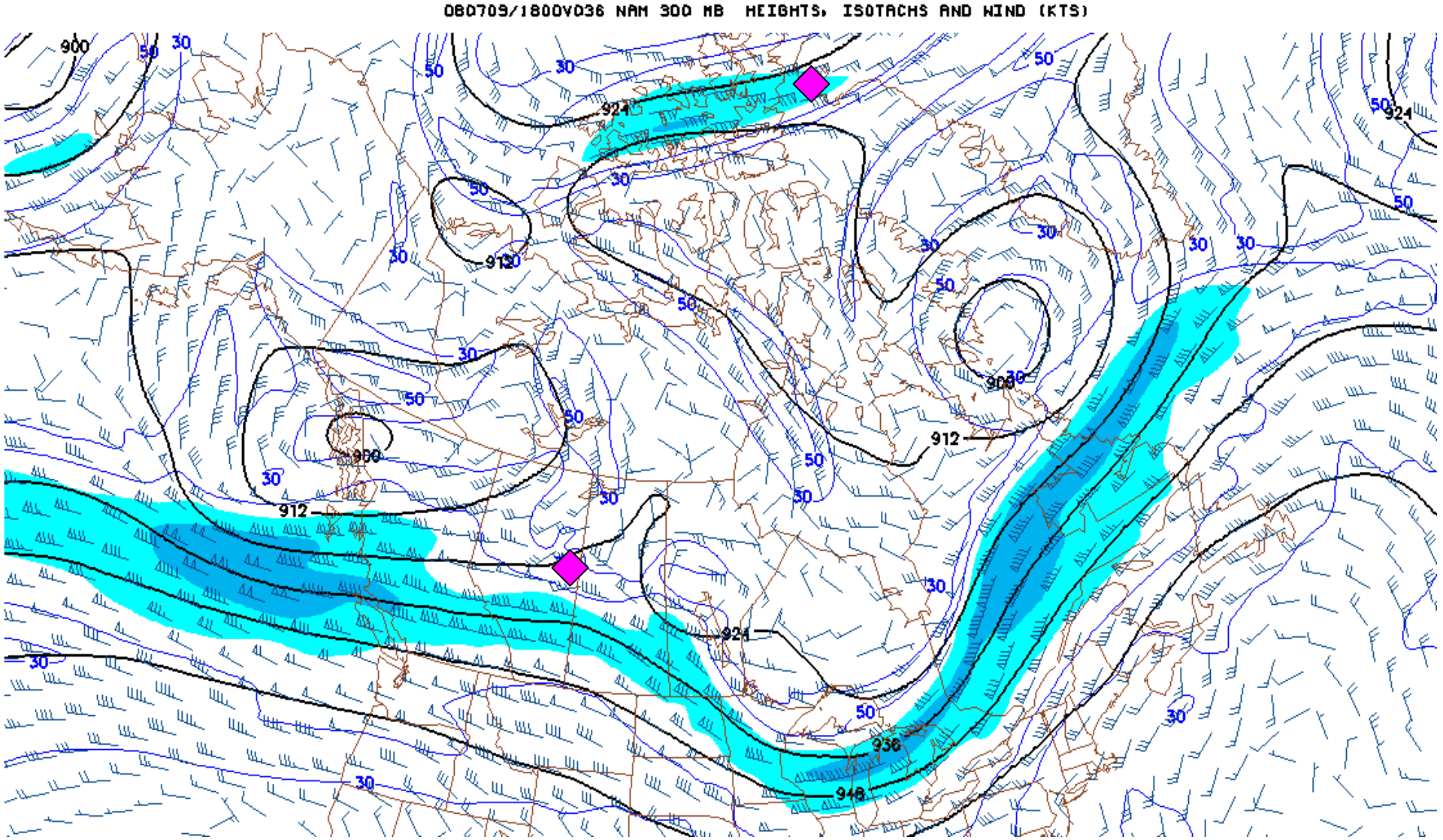
Wednesday PM Cloud Cover



500 mb (5,000 ft MSL)



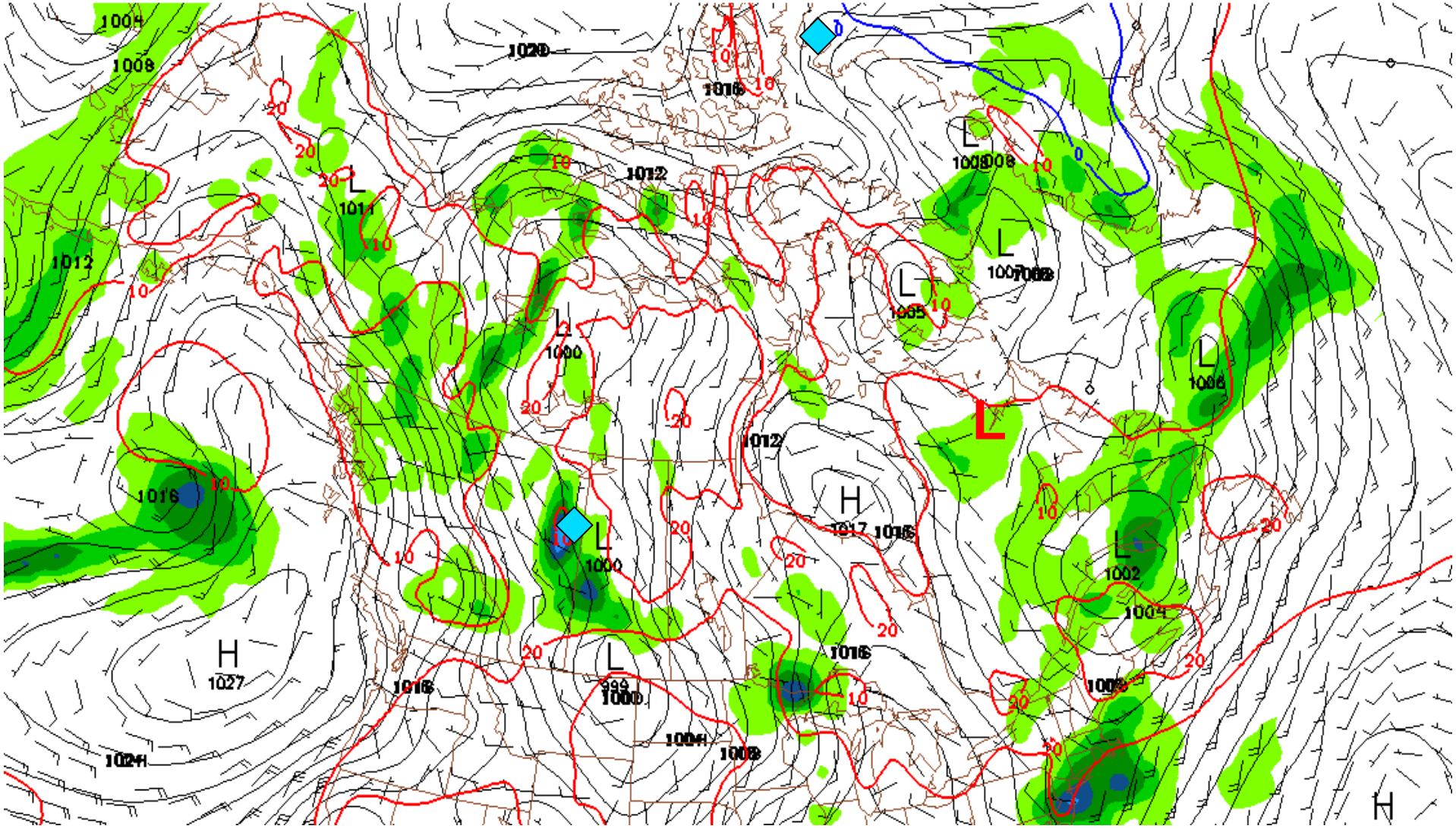
300 mb Heights and Isotachs



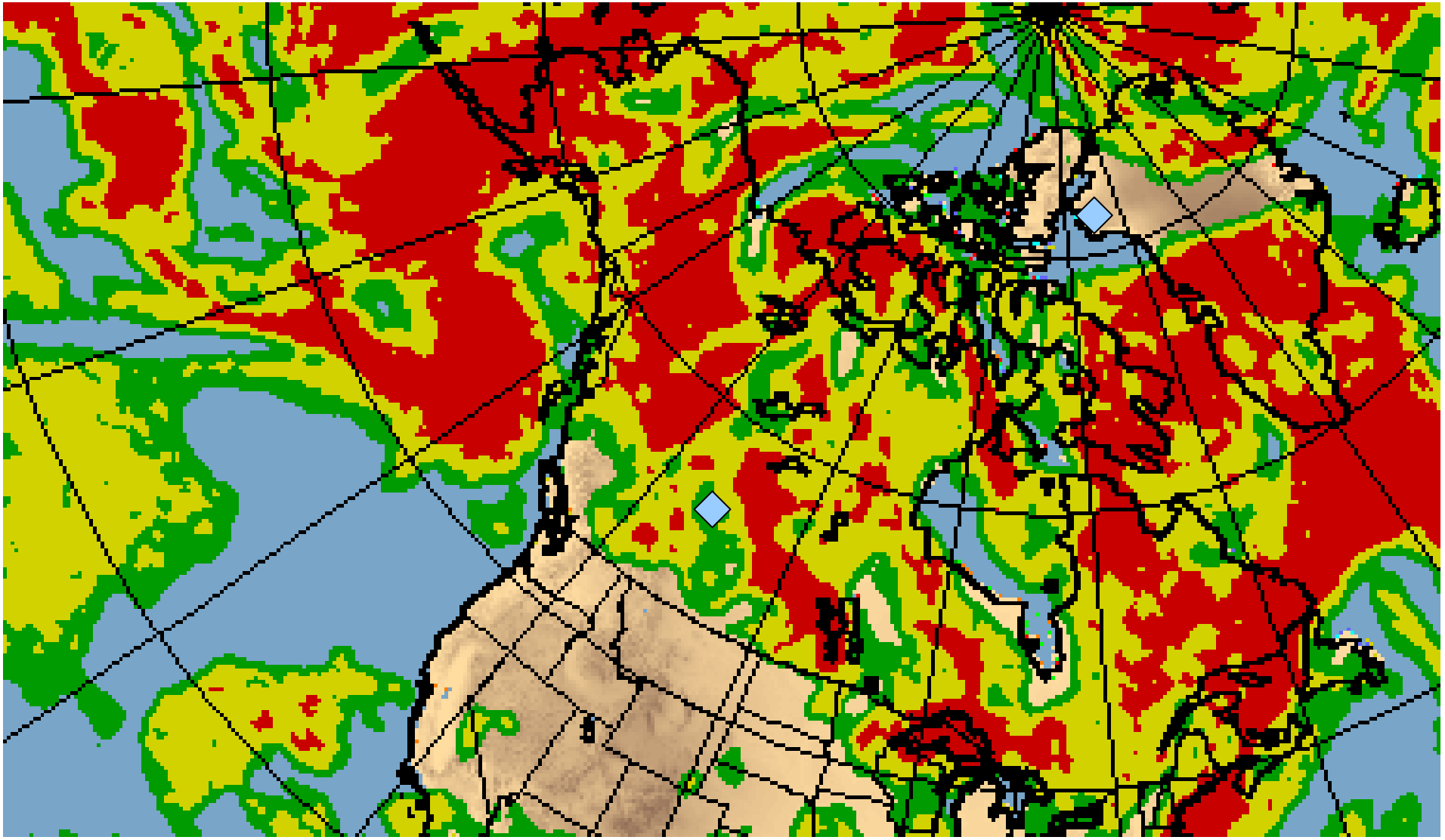
Looking Ahead
Thur-Sat

1800 Z (Noon)

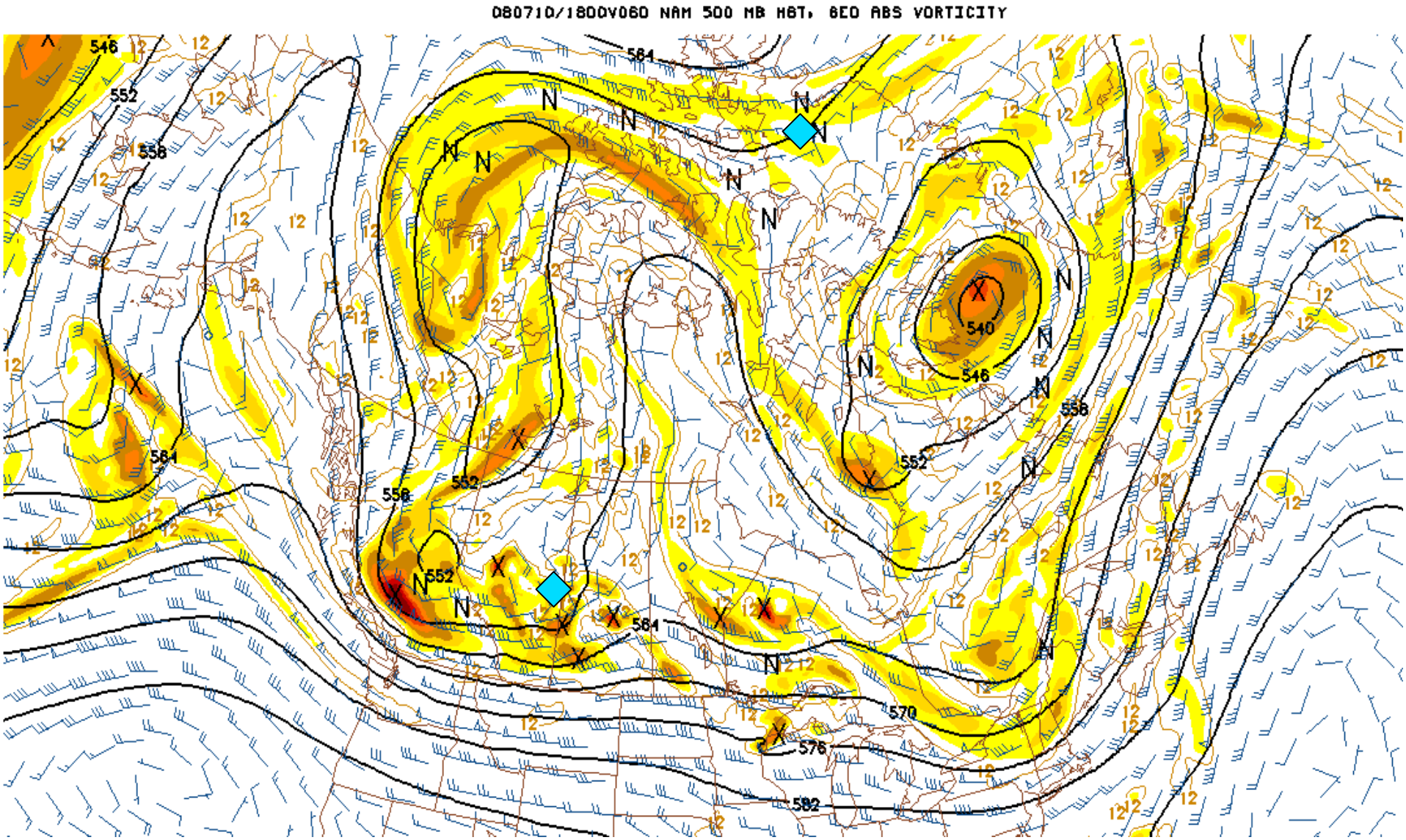
Thursday Surface and Precip



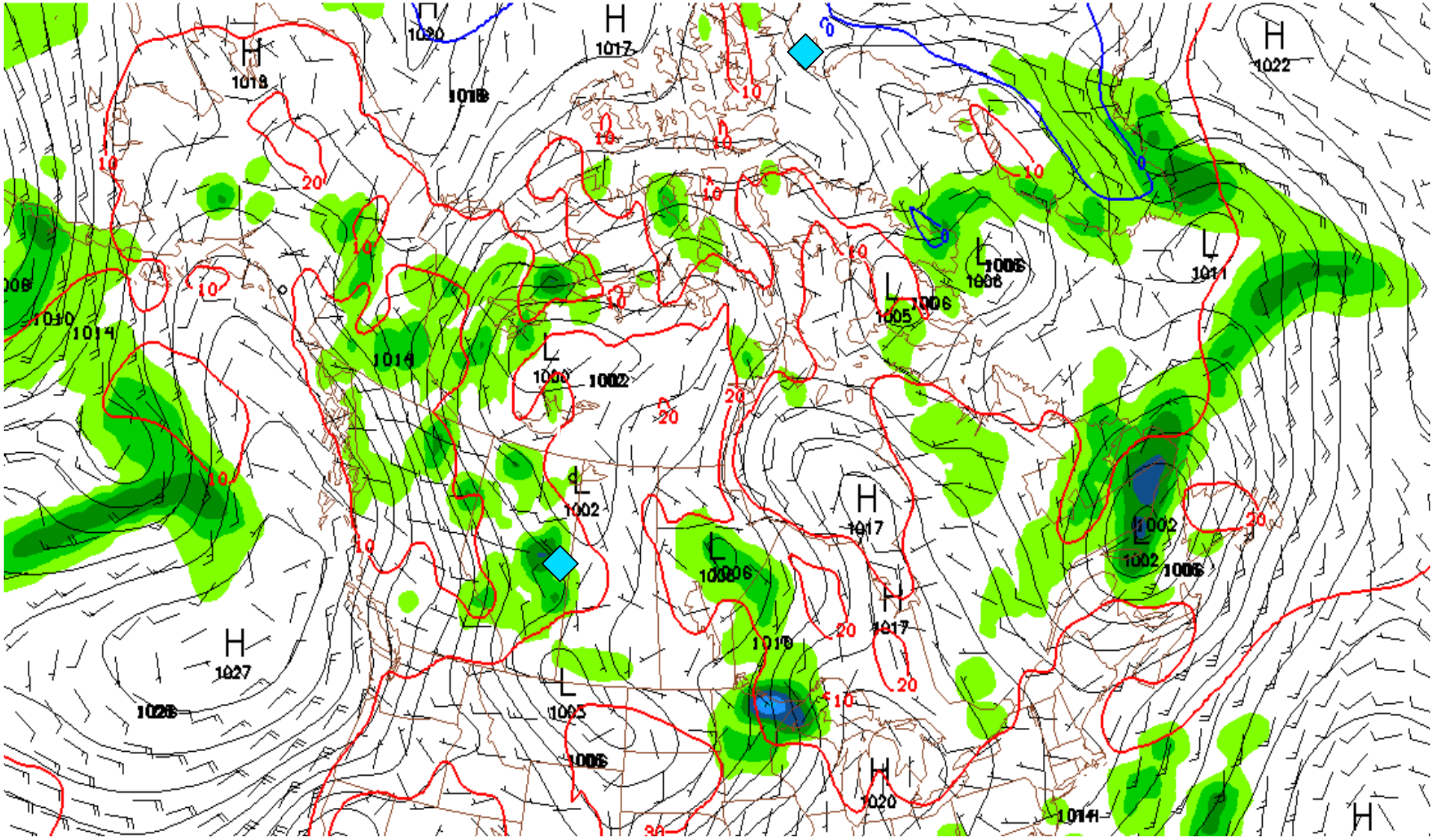
Thursday Cloud Cover



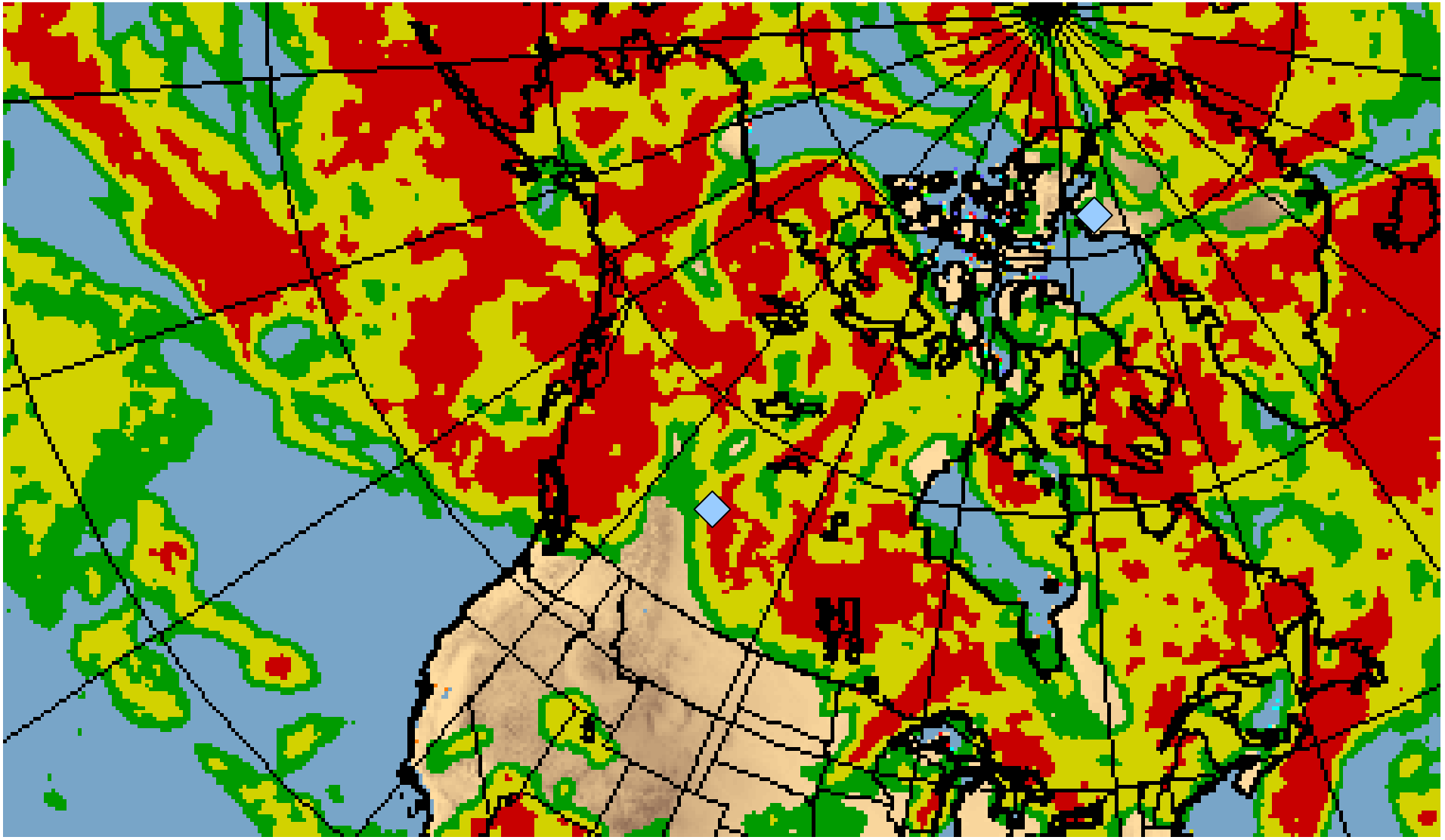
Thursday 500 mb Heights and Vort



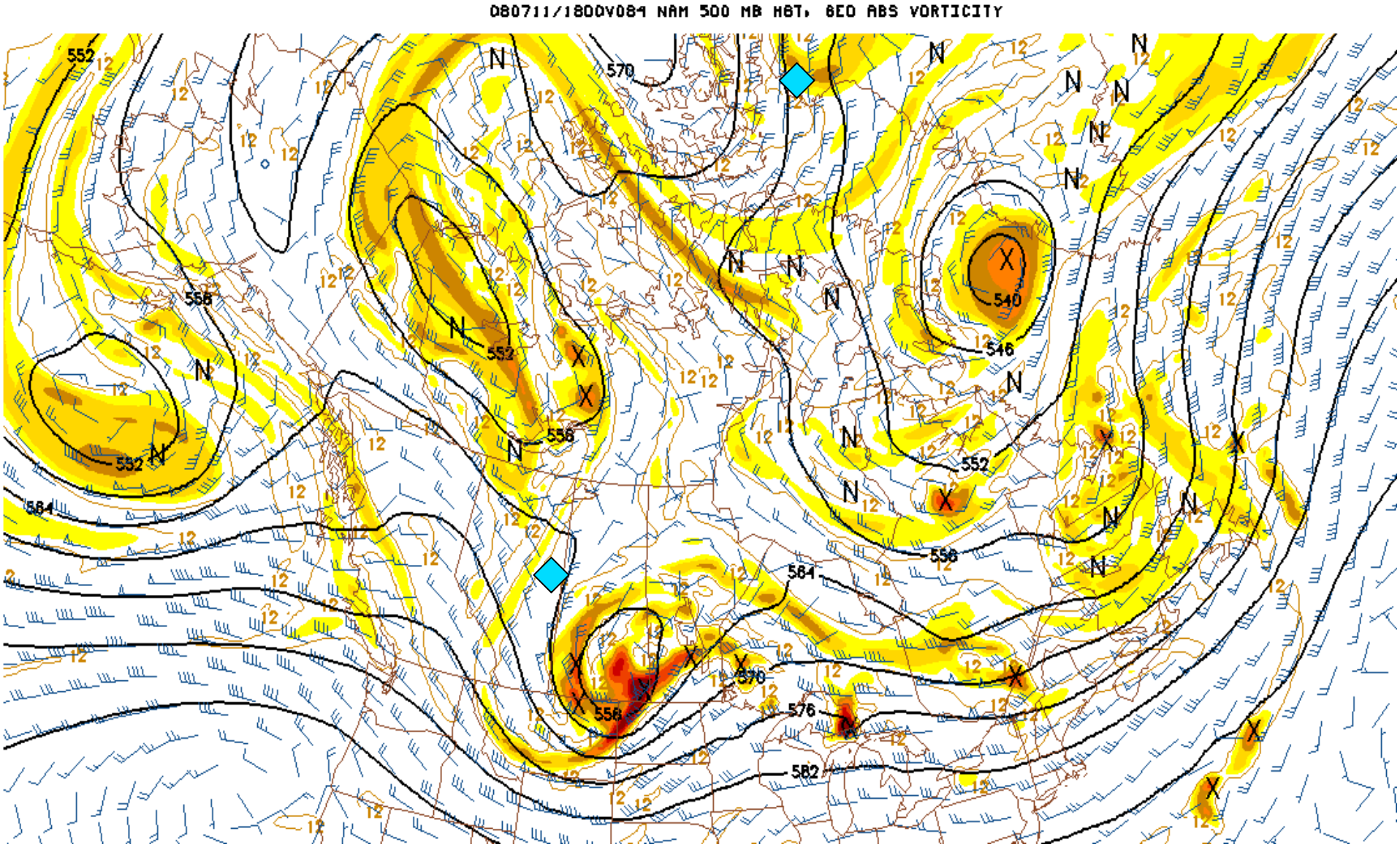
Friday Surface and Precip



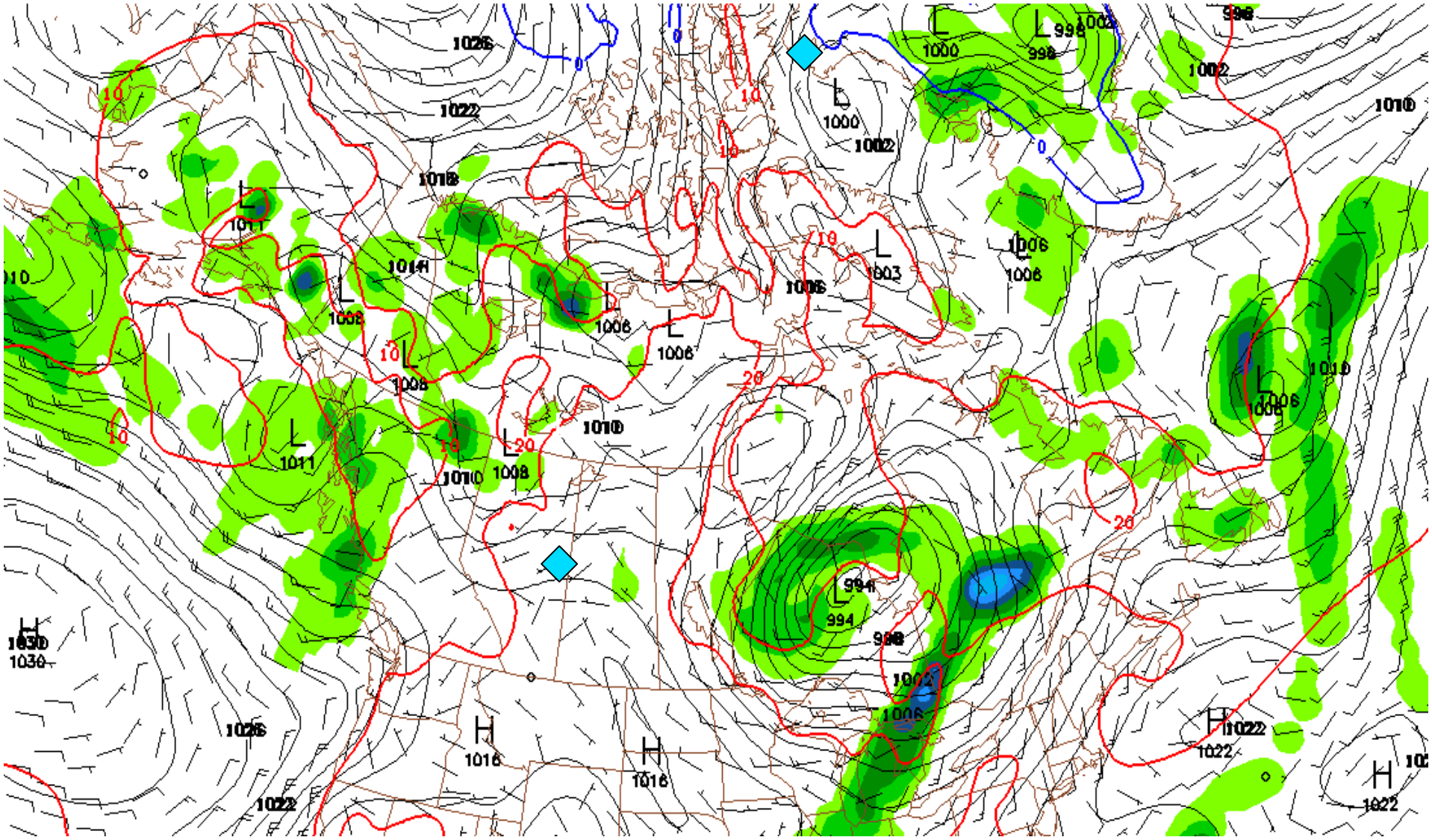
Friday Cloud Cover



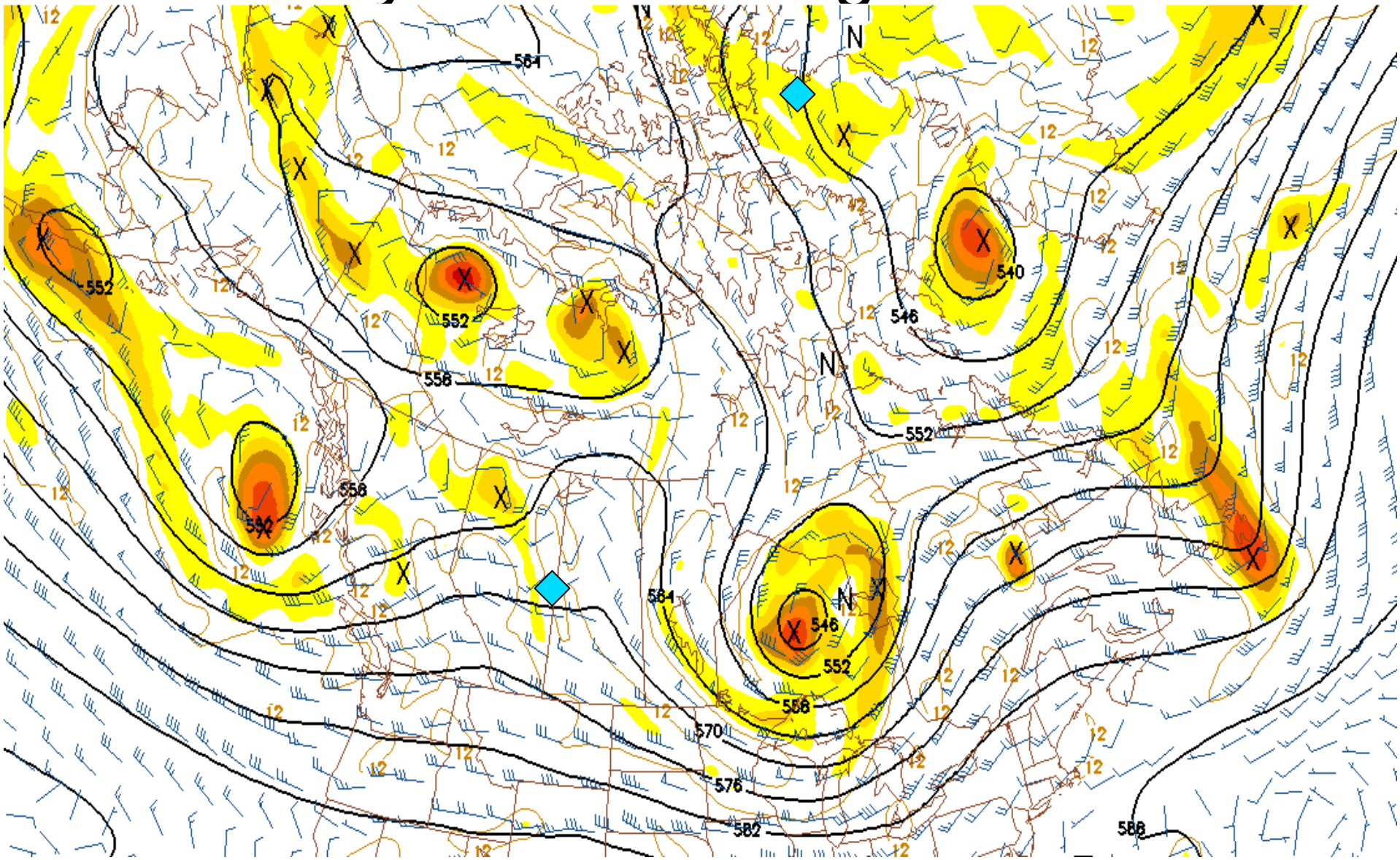
Friday 500 mb Heights and Vort



Saturday Surface and Precip

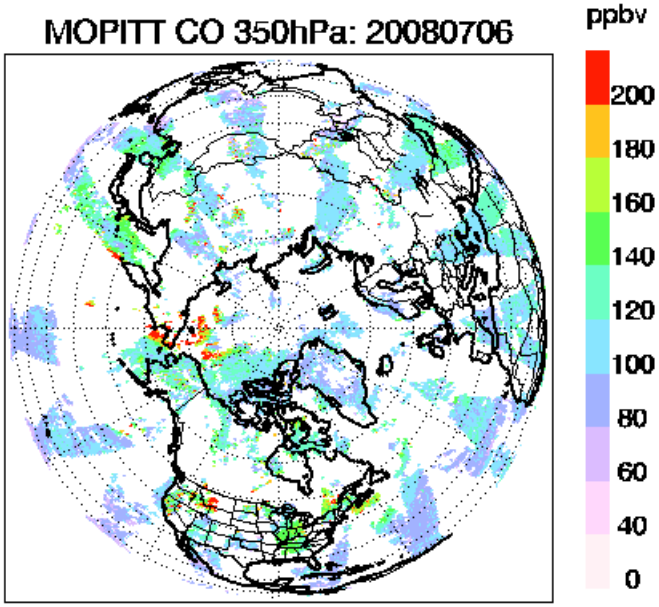


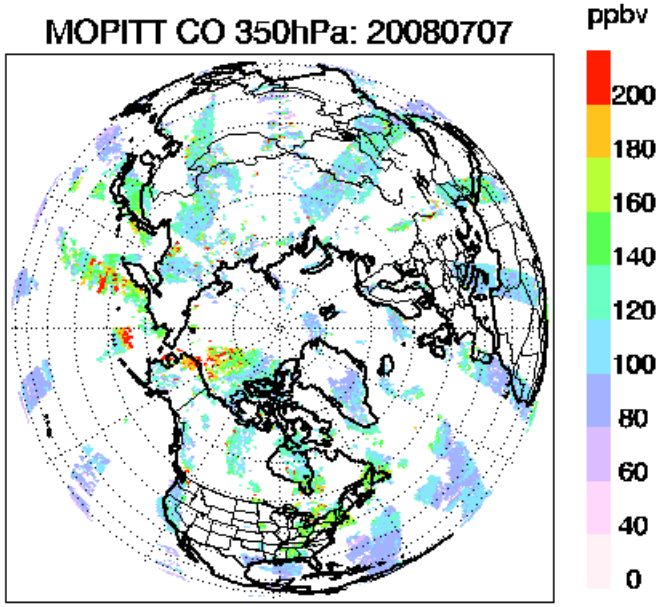
Saturday 500 mb Heights and Vort



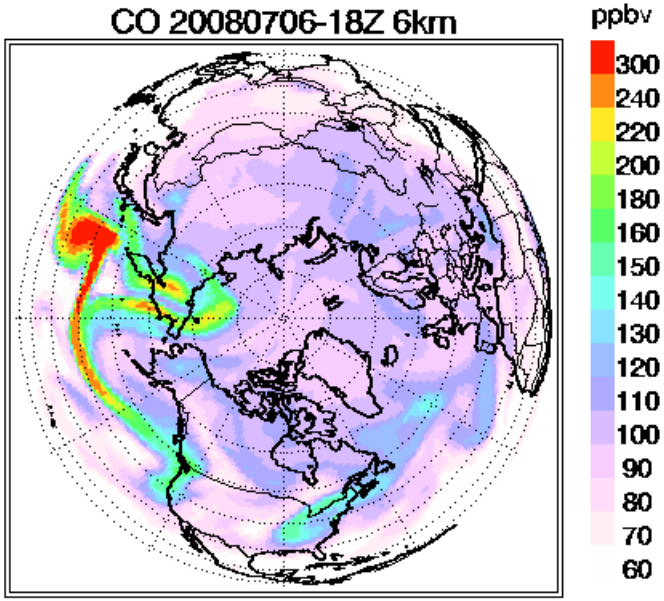
July 6 **July 7**

MOPITT CO @ 350 hPa

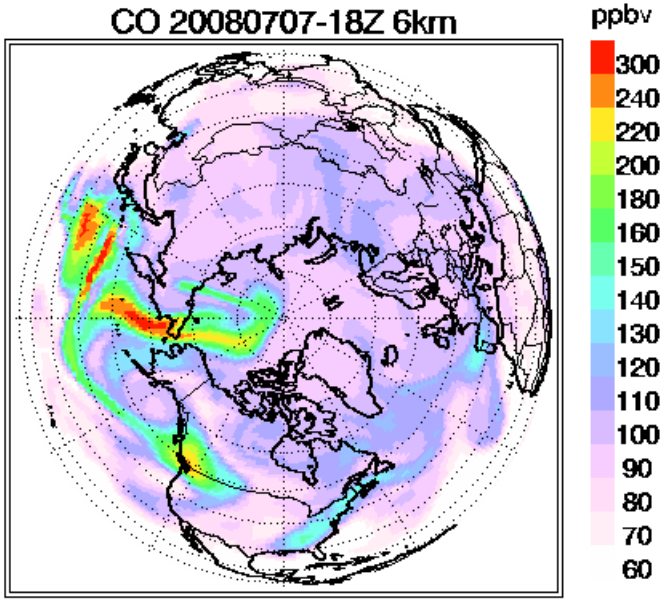




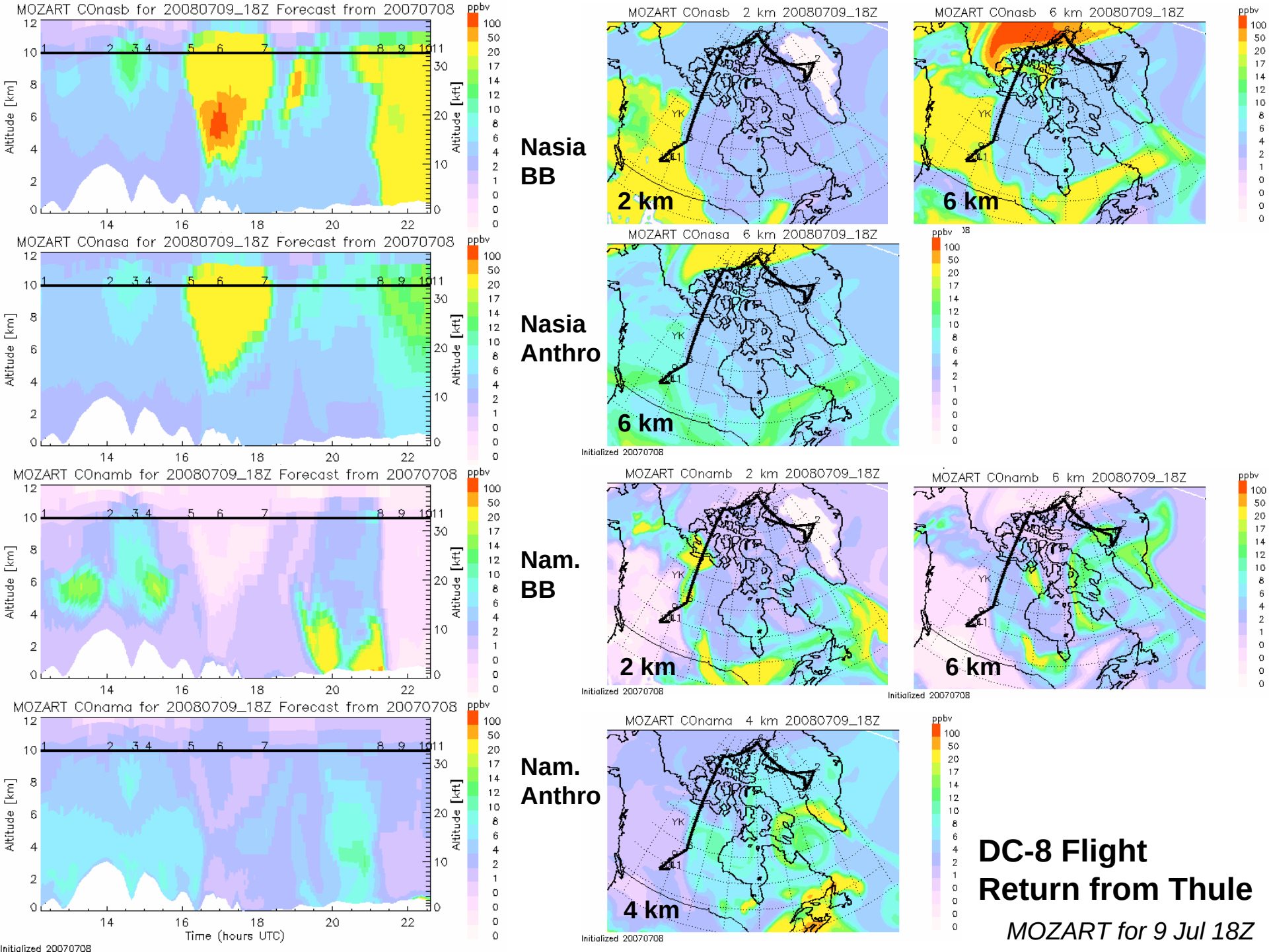
CAM-Chem CO @ 6 km

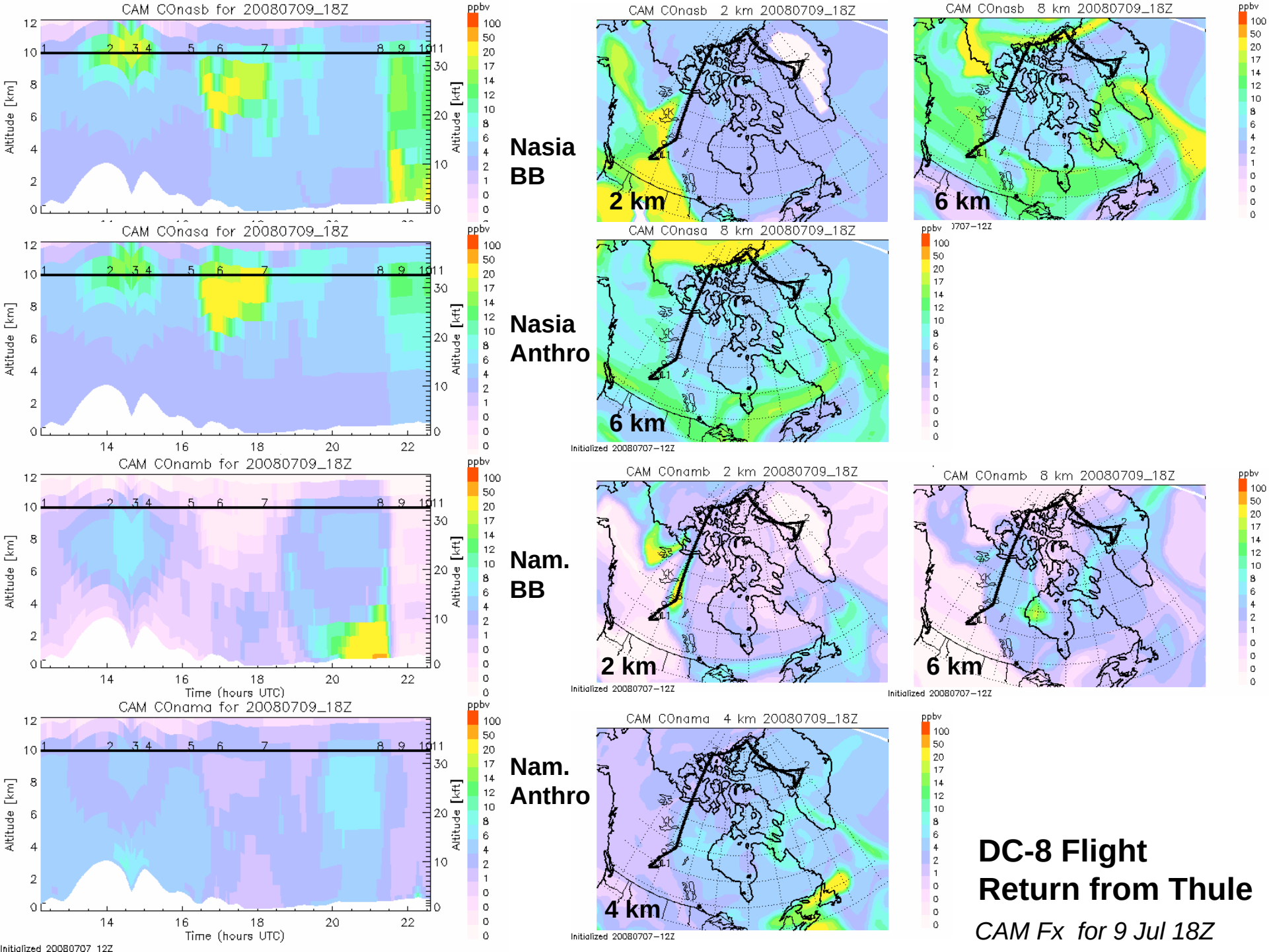


CAM Forecast from 20080706



CAM Forecast from 20080707

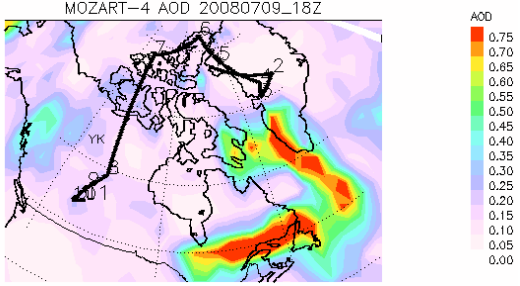

MOZART COnasb for 20080709_18Z Forecast from 20070708
MOZART COnasa for 20080709_18Z Forecast from 20070708
MOZART COnamb for 20080709_18Z Forecast from 20070708
MOZART COnama for 20080709_18Z Forecast from 20070708
Altitude [km]
Altitude [kft]
Time (hours UTC)
ppbv
Initialized 20070708
Nasia BB
MOZART COnasb 2 km 20080709_18Z
MOZART COnasb 6 km 20080709_18Z
2 km
6 km
Nasia Anthro
MOZART COnasa 6 km 20080709_18Z
6 km
Nam. BB
MOZART COnamb 2 km 20080709_18Z
MOZART COnamb 6 km 20080709_18Z
2 km
6 km
Nam. Anthro
MOZART COnama 4 km 20080709_18Z
4 km
YK
DC-8 Flight
Return from Thule
MOZART for 9 Jul 18Z



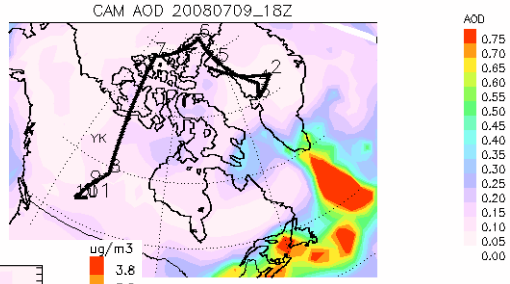
DC-8 Flight Return from Thule

CAM Fx for 9 Jul 18Z

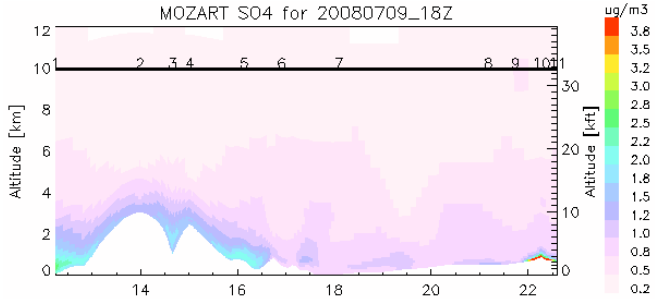
MOZART

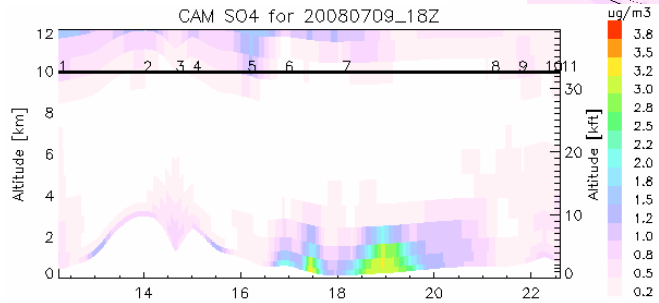


CAM-Chem

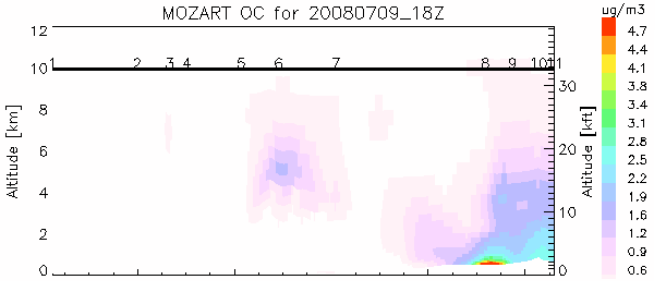


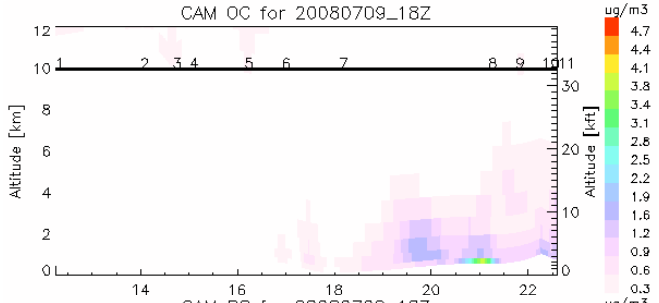
AOD



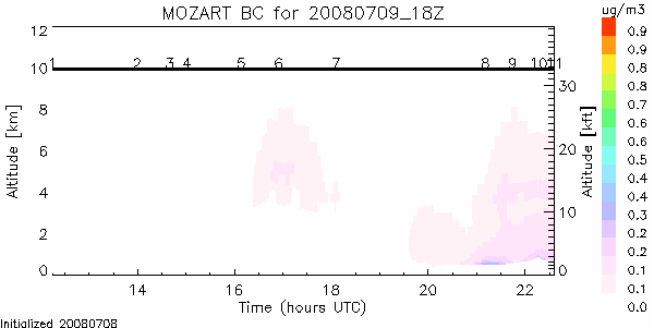


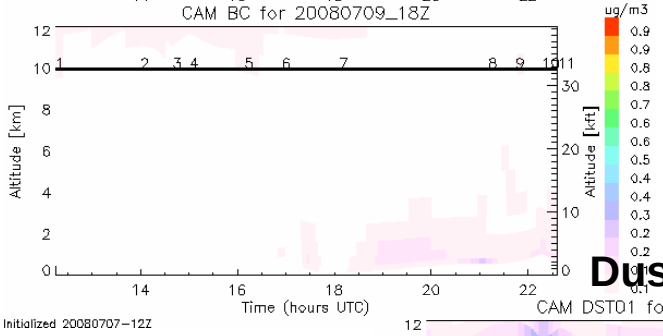
SO4





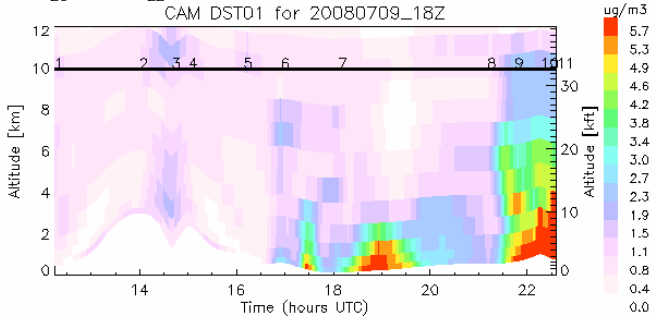
Org. Carbon





Black Carbon

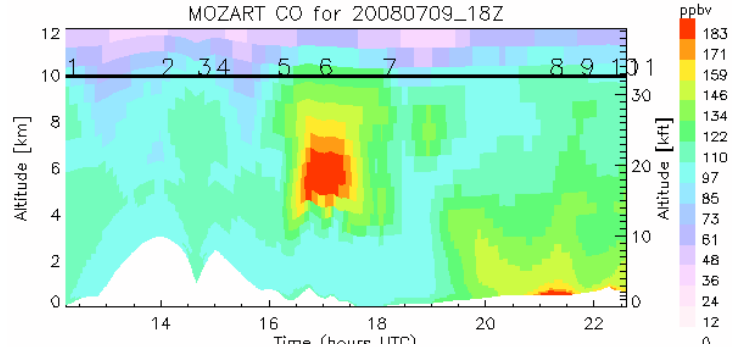
Dust (small size)



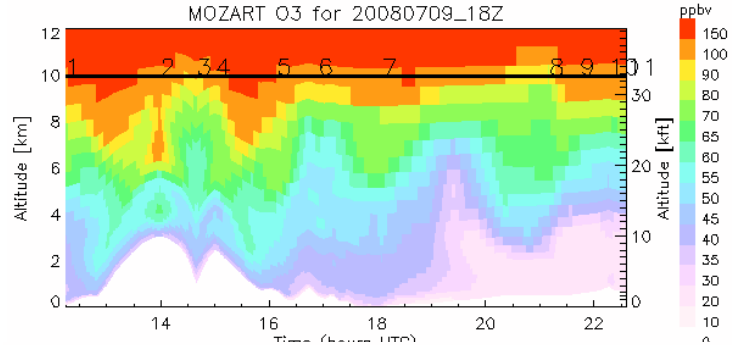
DC-8 Return from Thule
July 9 Aerosols

DC-8 Return from Thule July 9
Stratospheric Influence

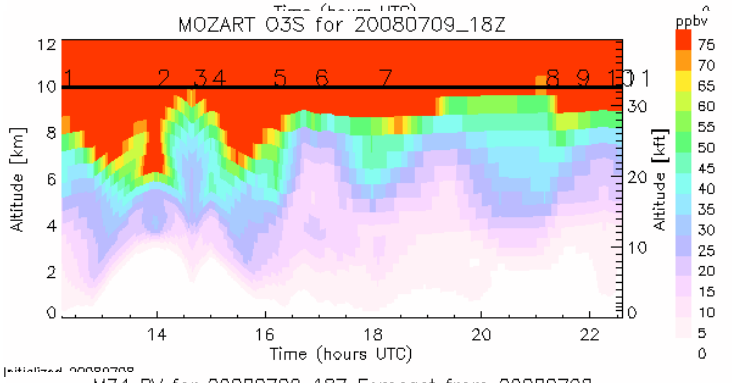
CO



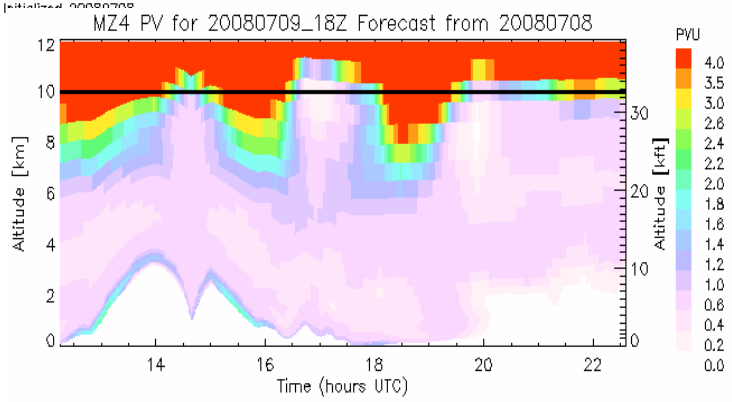
O3



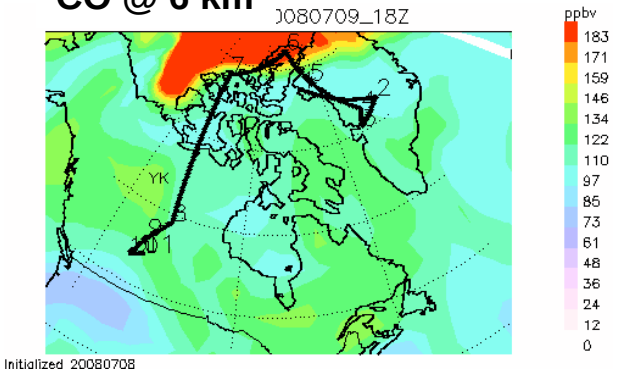
O3S



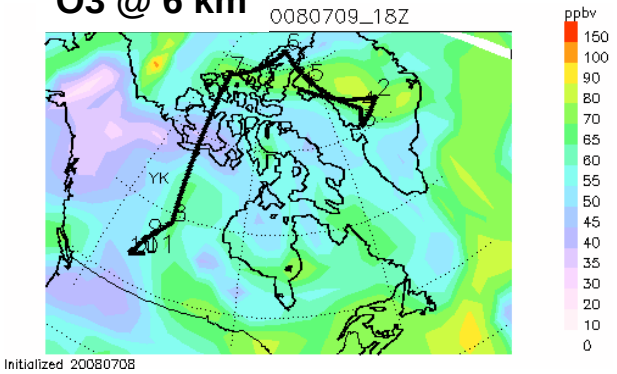
PV



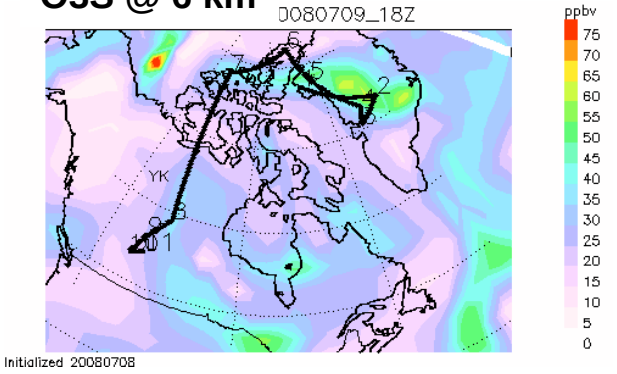
CO @ 6 km



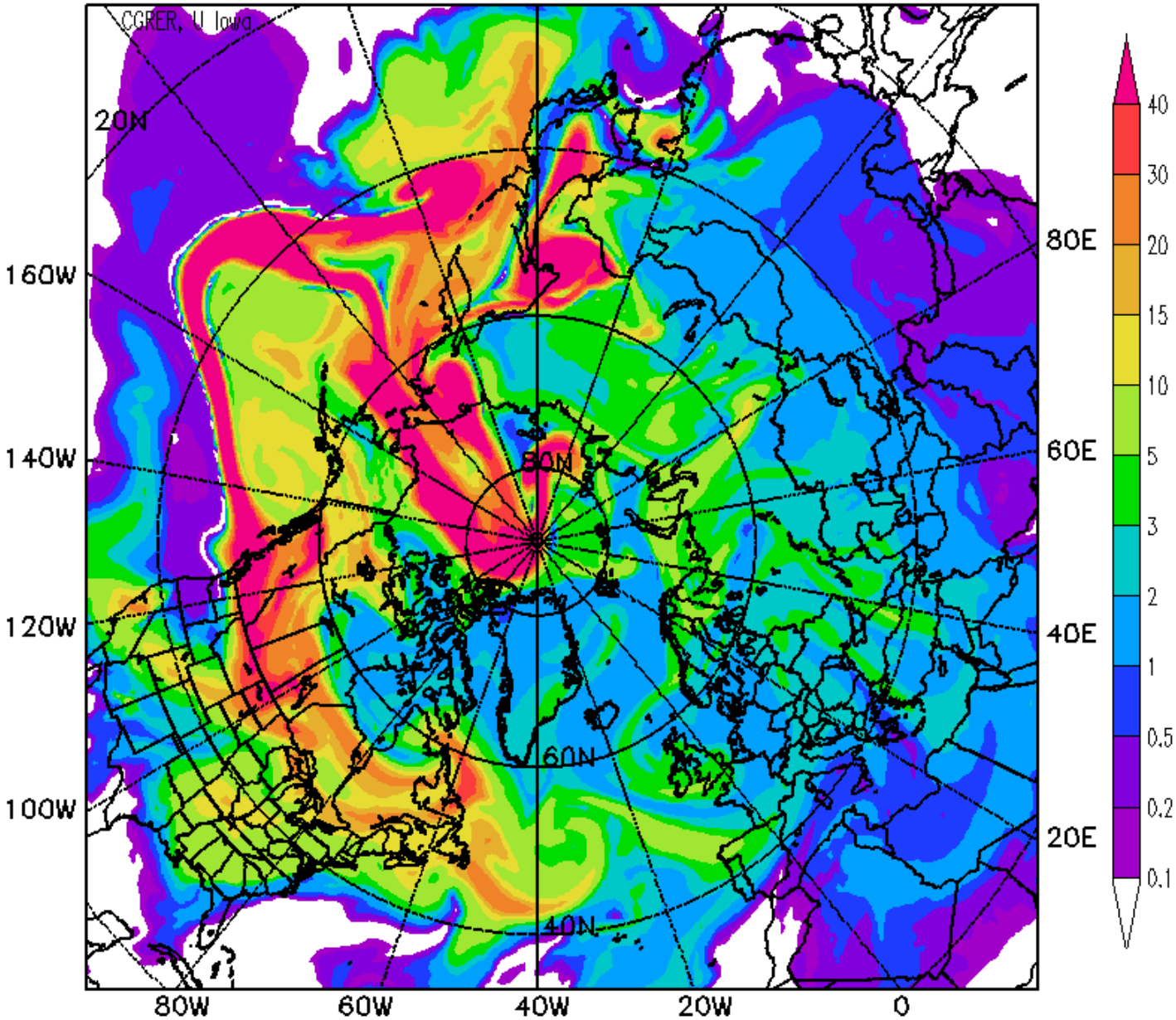
O3 @ 6 km



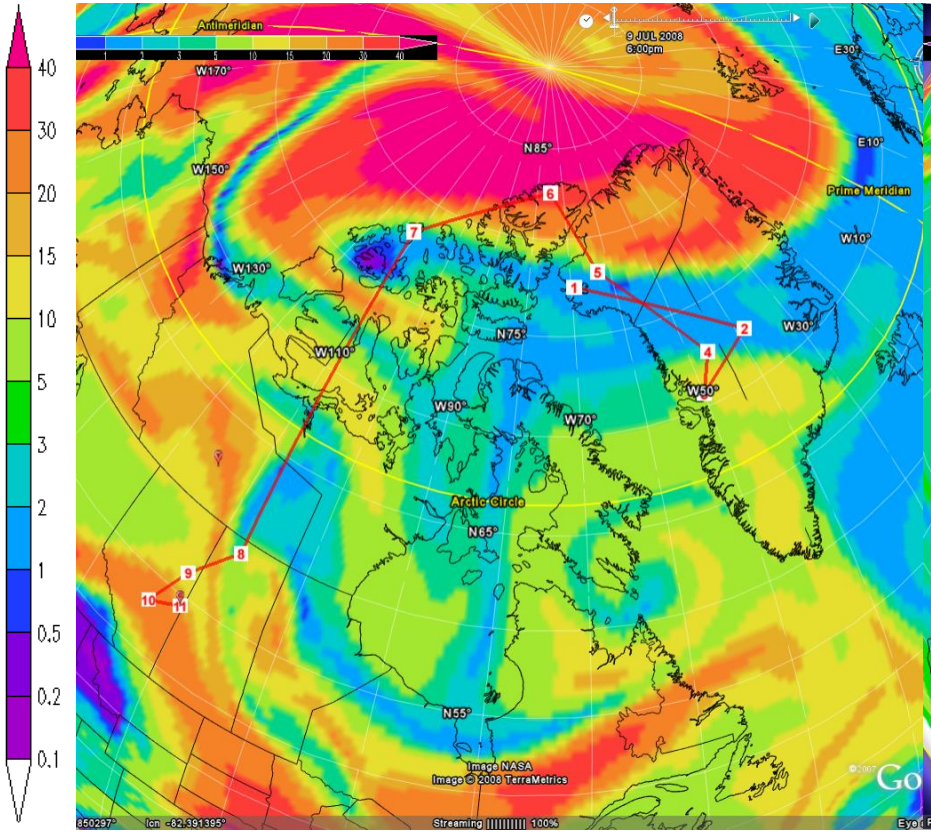
O3S @ 6 km

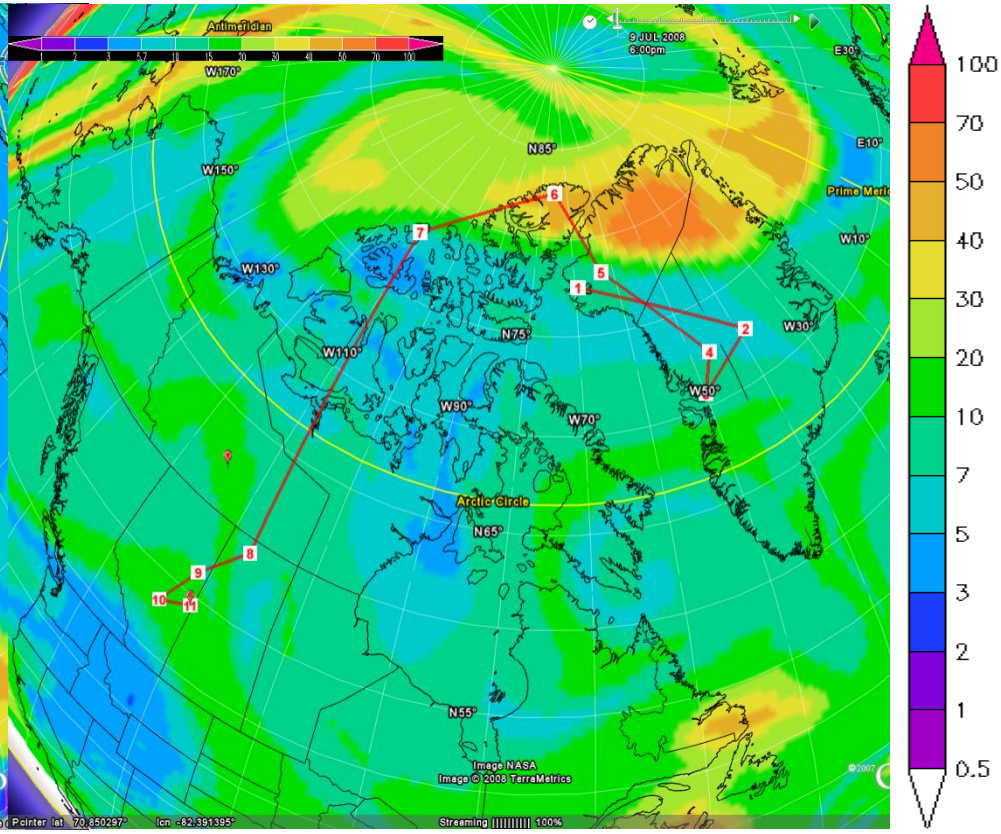


Simulated BB_CO (ppbv) in the 5.5km layer
at 0UTC, 07/08/2008



5.5km layer

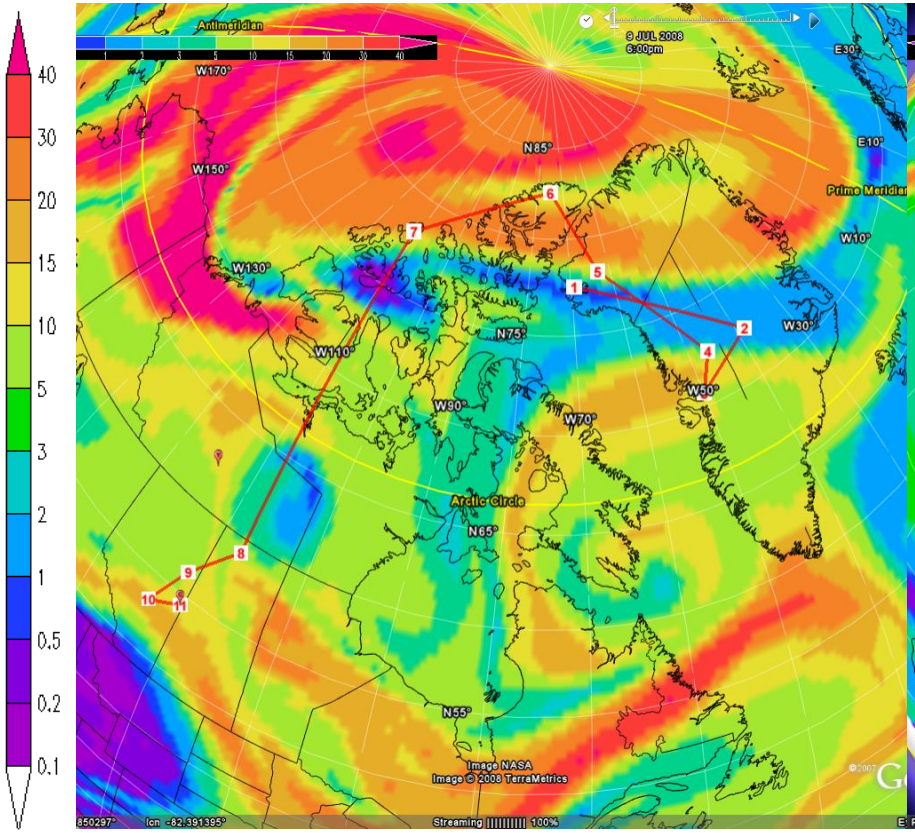


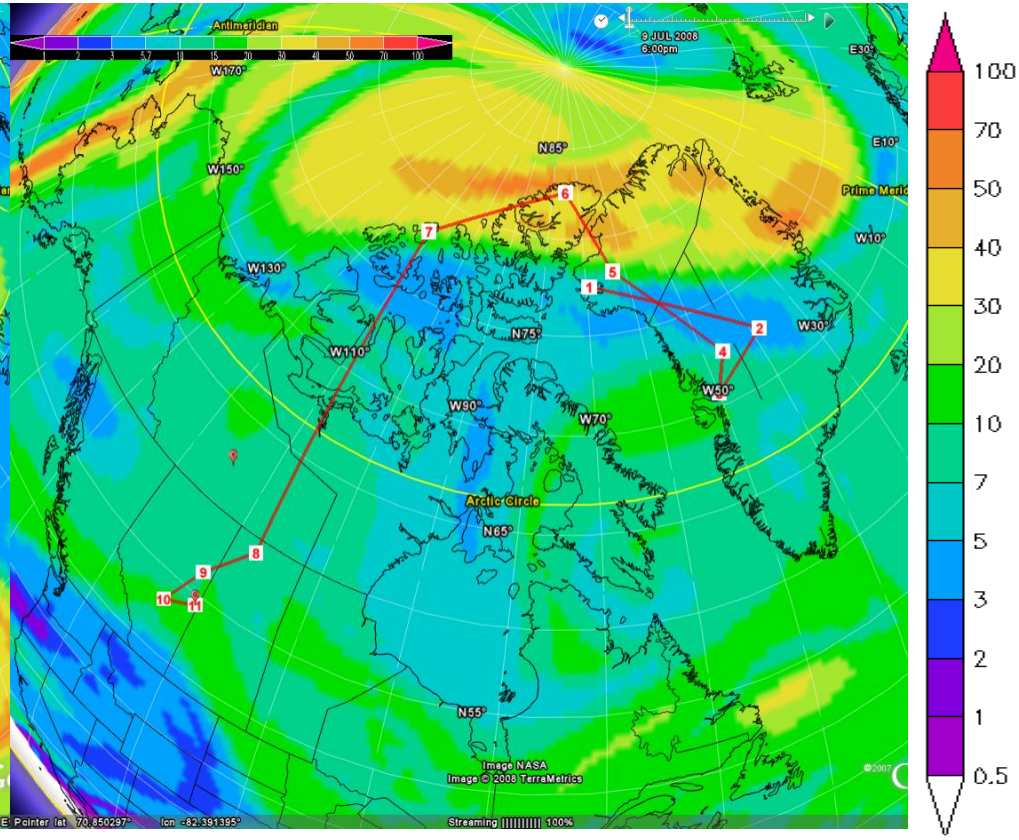


Biomass CO, 18Z, 7/9

Anthropogenic CO, 18Z, 7/9

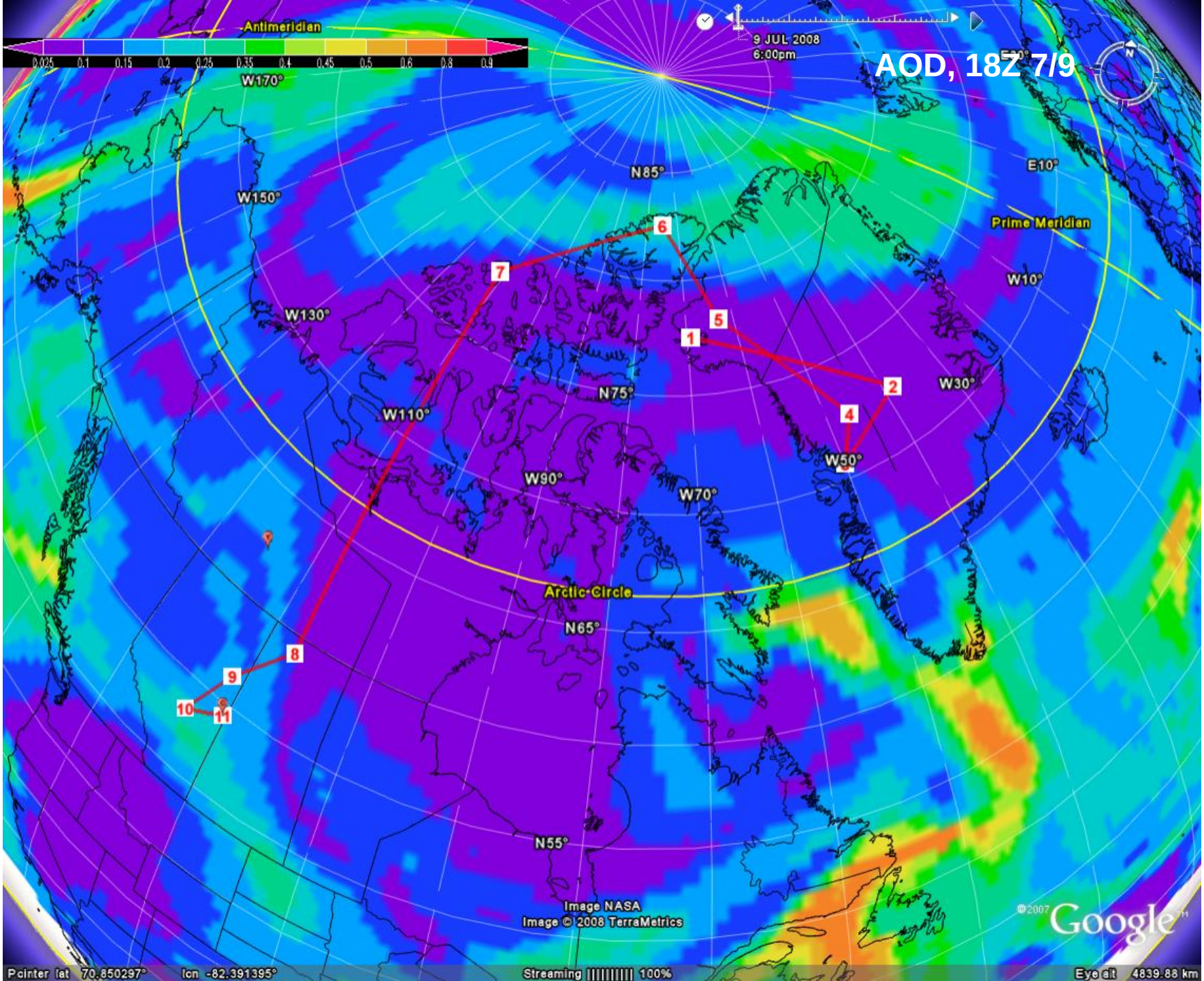
8.4 km layer

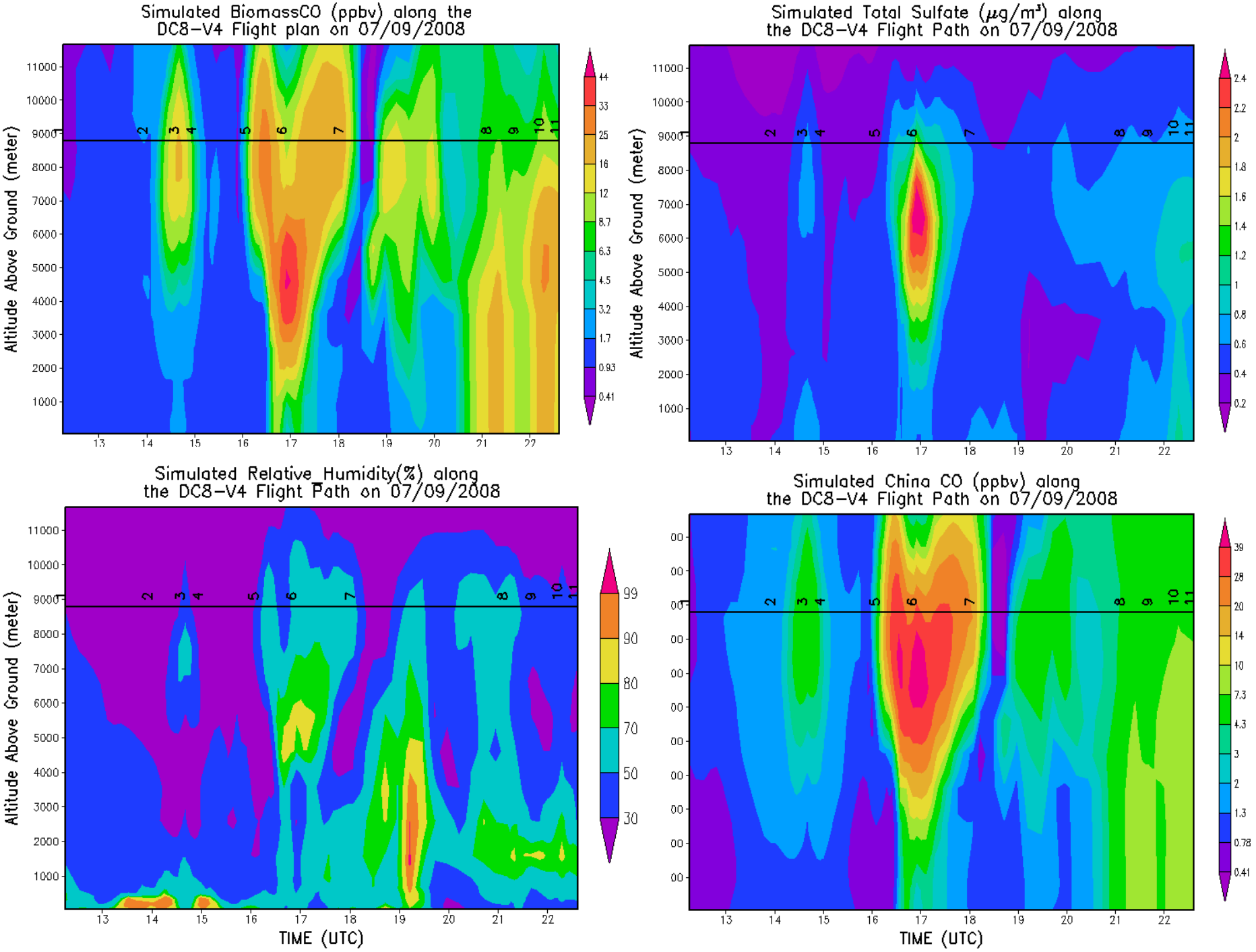


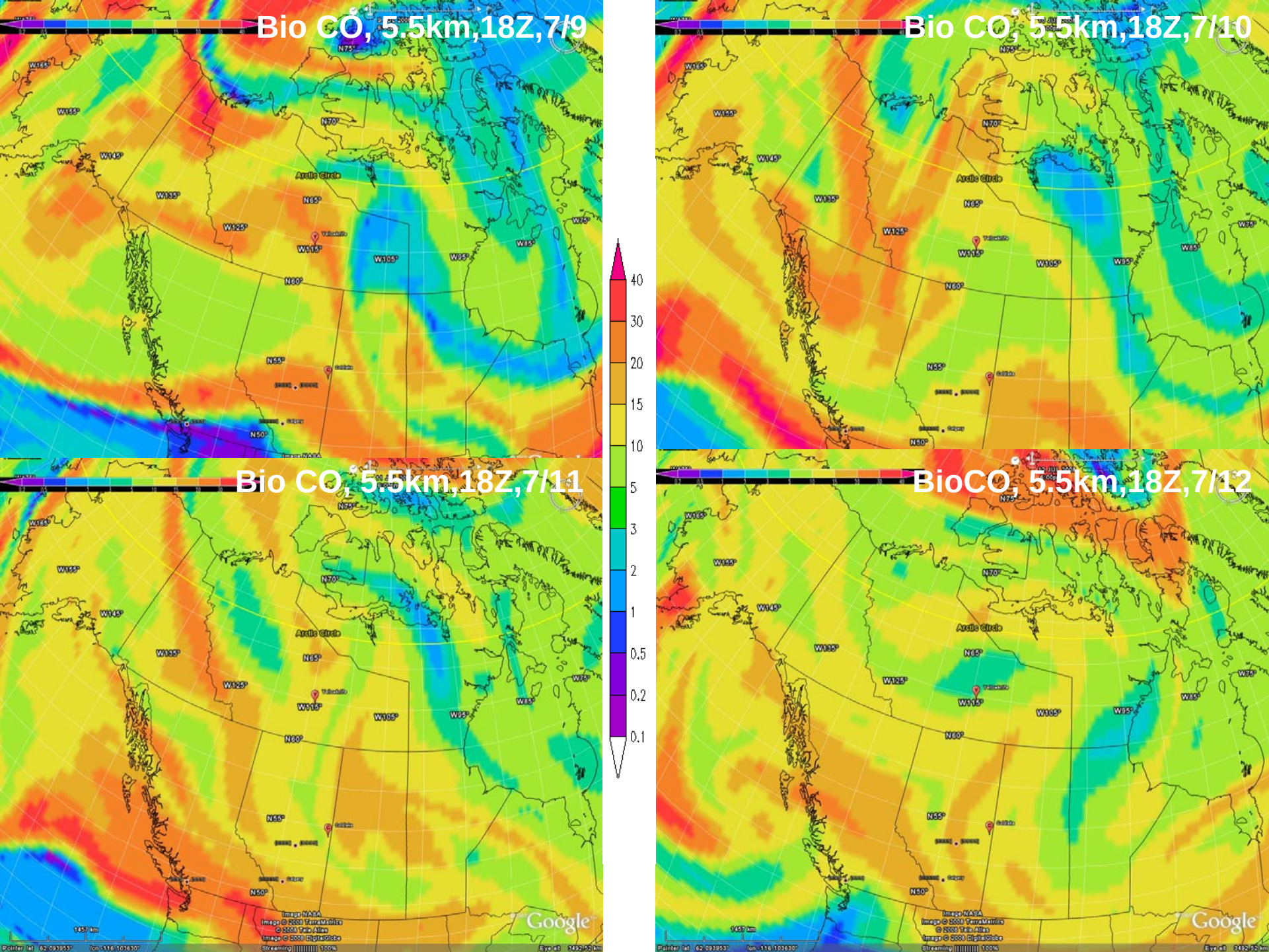


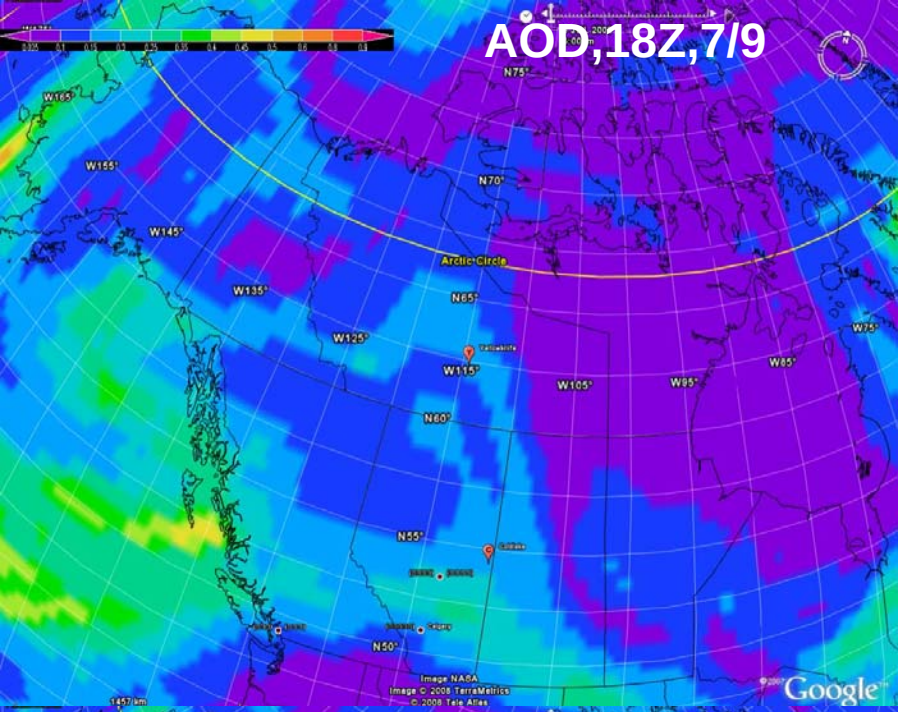
Biomass CO, 18Z, 7/9

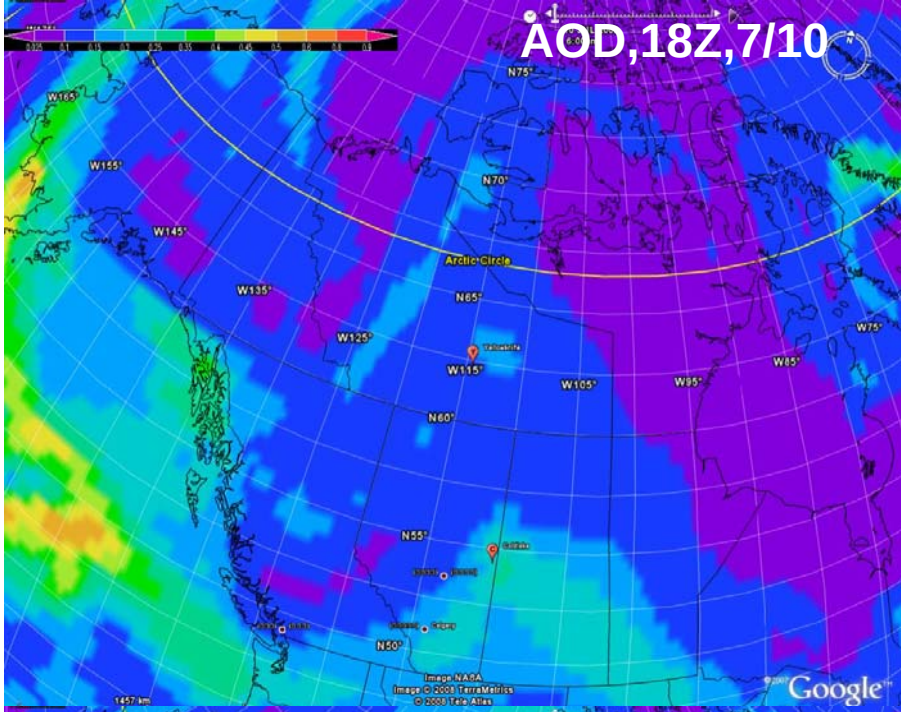
Anthropogenic CO, 18Z, 7/9


AOD, 18Z 7/9
Antimeridian
0.025 0.1 0.15 0.2 0.25 0.35 0.4 0.45 0.5 0.6 0.8 0.9
9 JUL 2008
6:00pm
W170°
W150°
W130°
W110°
W90°
W70°
W50°
W30°
W10°
E10°
Prime Meridian
N85°
N75°
N65°
N55°
Arctic Circle
1
2
4
5
6
7
8
9
10
11
Image NASA
Image © 2008 TerraMetrics
©2007 Google
Pointer lat 70.850297° lon -82.391395°
Streaming 100%
Eye alt 4839.88 km


Simulated BiomassCO (ppbv) along the DC8-V4 Flight plan on 07/09/2008
Simulated Total Sulfate (μg/m³) along the DC8-V4 Flight Path on 07/09/2008
Simulated Relative Humidity(%) along the DC8-V4 Flight Path on 07/09/2008
Simulated China CO (ppbv) along the DC8-V4 Flight Path on 07/09/2008
Altitude Above Ground (meter)
TIME (UTC)


Bio CO, 5.5km,18Z,7/9
Bio CO, 5.5km,18Z,7/10
Bio CO, 5.5km,18Z,7/11
BioCO, 5.5km,18Z,7/12
40
30
20
15
10
5
3
2
1
0.5
0.2
0.1
Arctic Circle
Google


AOD,18Z,7/9
Arctic Circle
Yellowknife
Image NASA
Image © 2008 TerraMetrics
© 2008 Tele Atlas
Google


AOD,18Z,7/10
Arctic Circle
Yellowknife
Image NASA
Image © 2008 TerraMetrics
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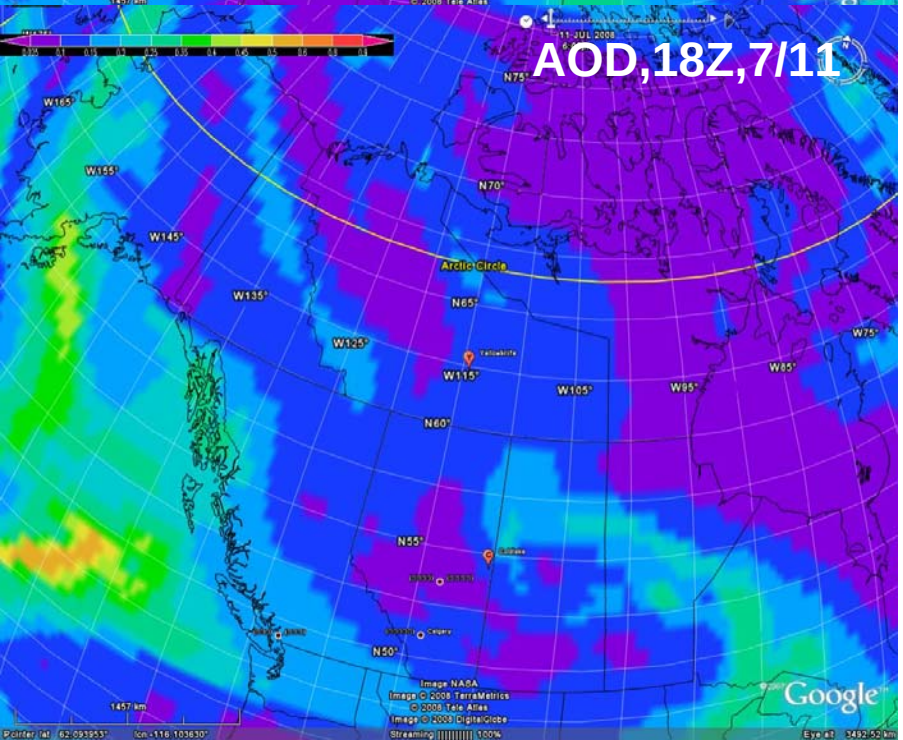
AOD,18Z,7/11
Arctic Circle
Yellowknife
Image NASA
Image © 2008 TerraMetrics
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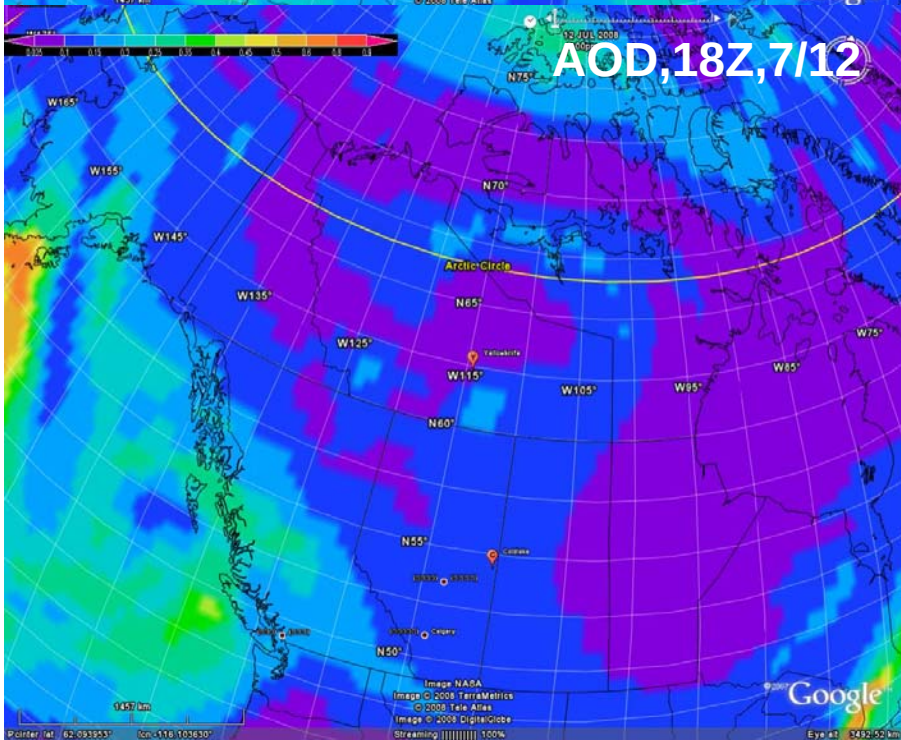
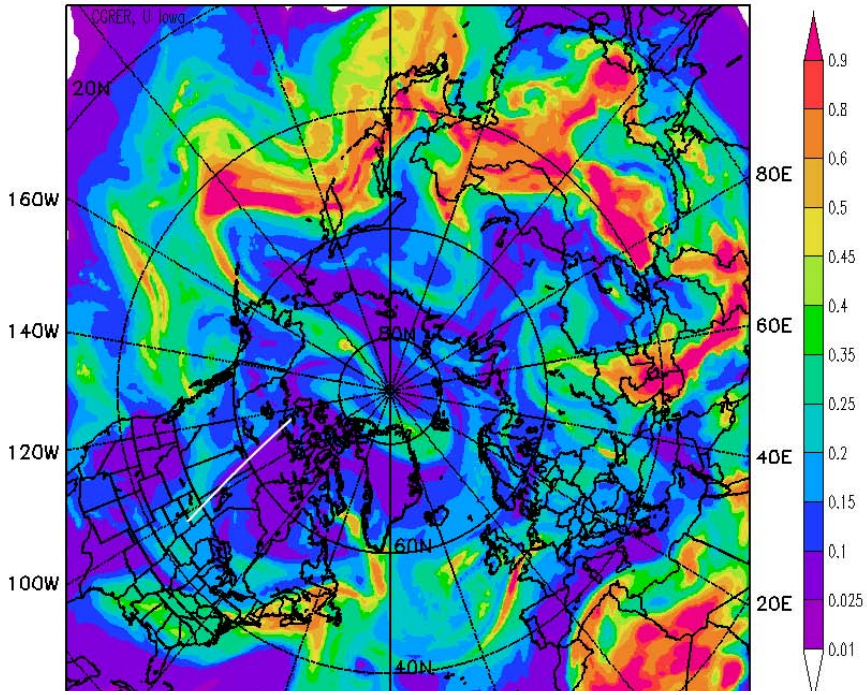
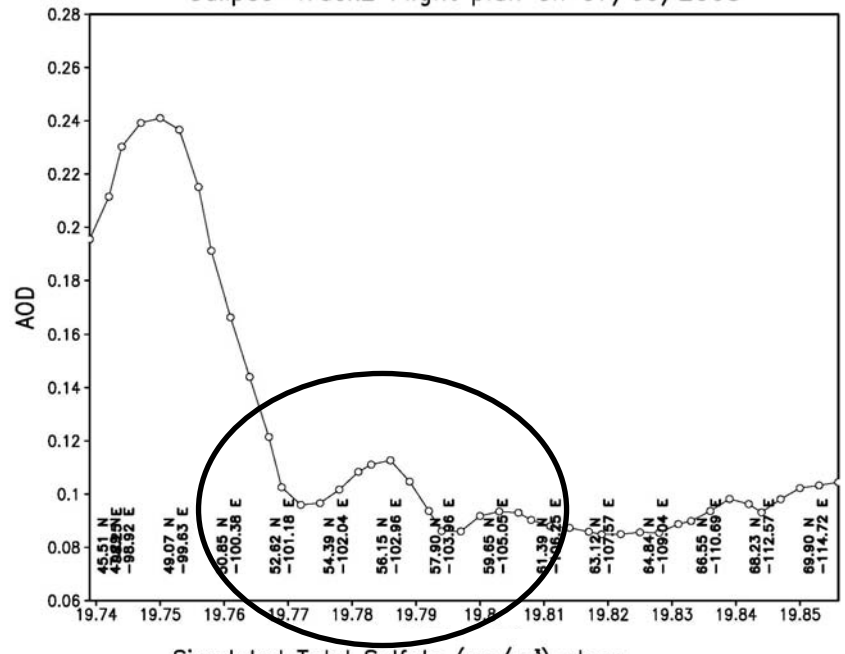

AOD,18Z,7/12
Arctic Circle
Yellowknife
Image NASA
Image © 2008 TerraMetrics
© 2008 Tele Atlas
Image © 2008 DigitalGlobe
Google

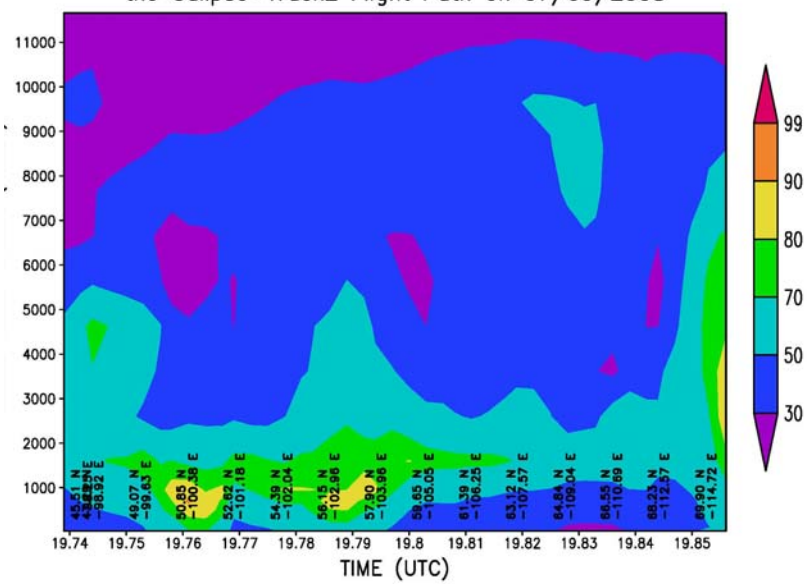
Simulated Column TOTAL_Aerosol_Optical_Depth
at 18UTC, 07/9/2008



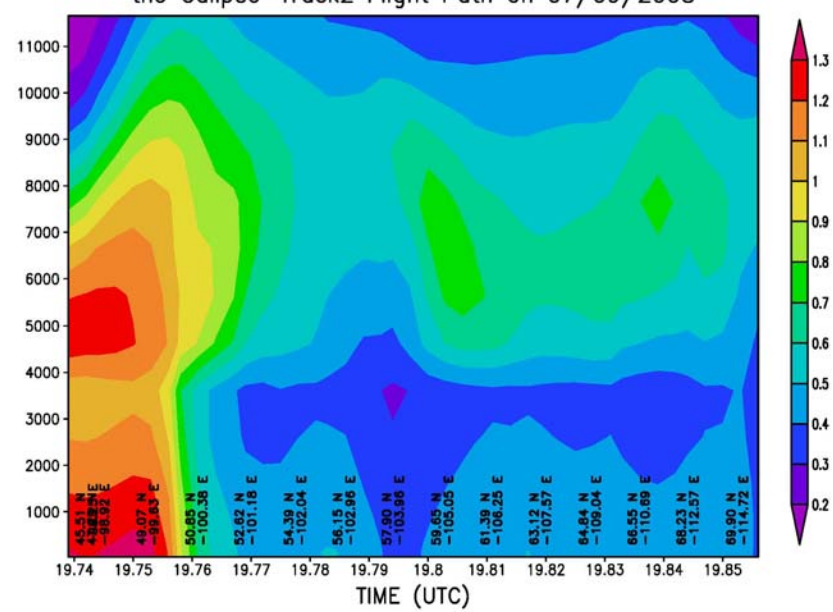
Simulated AOD along the
Calipso–Track2 Flight plan on 07/09/2008



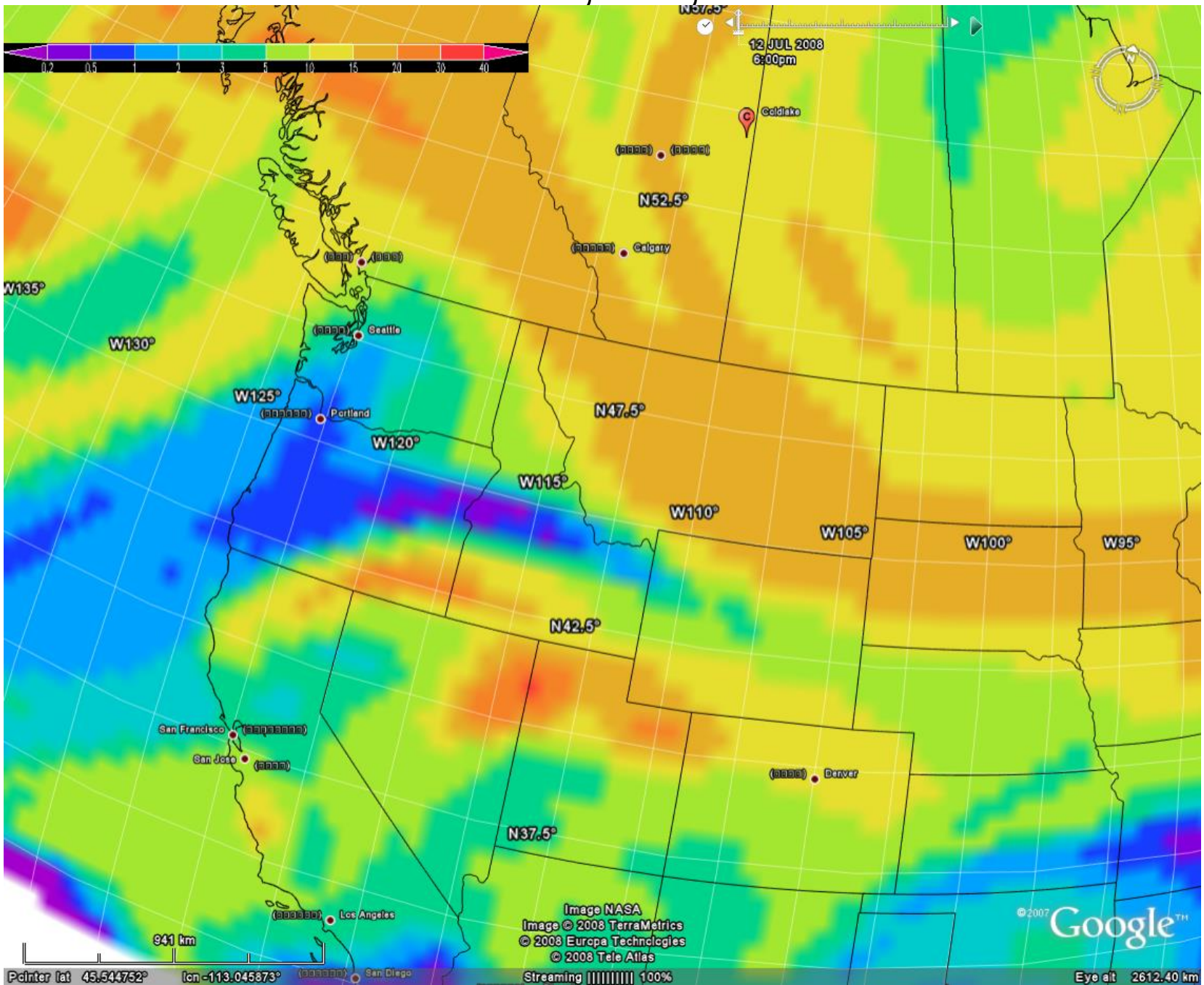
Simulated Relative_Humidity(%) along
the Calipso–Track2 Flight Path on 07/09/2008



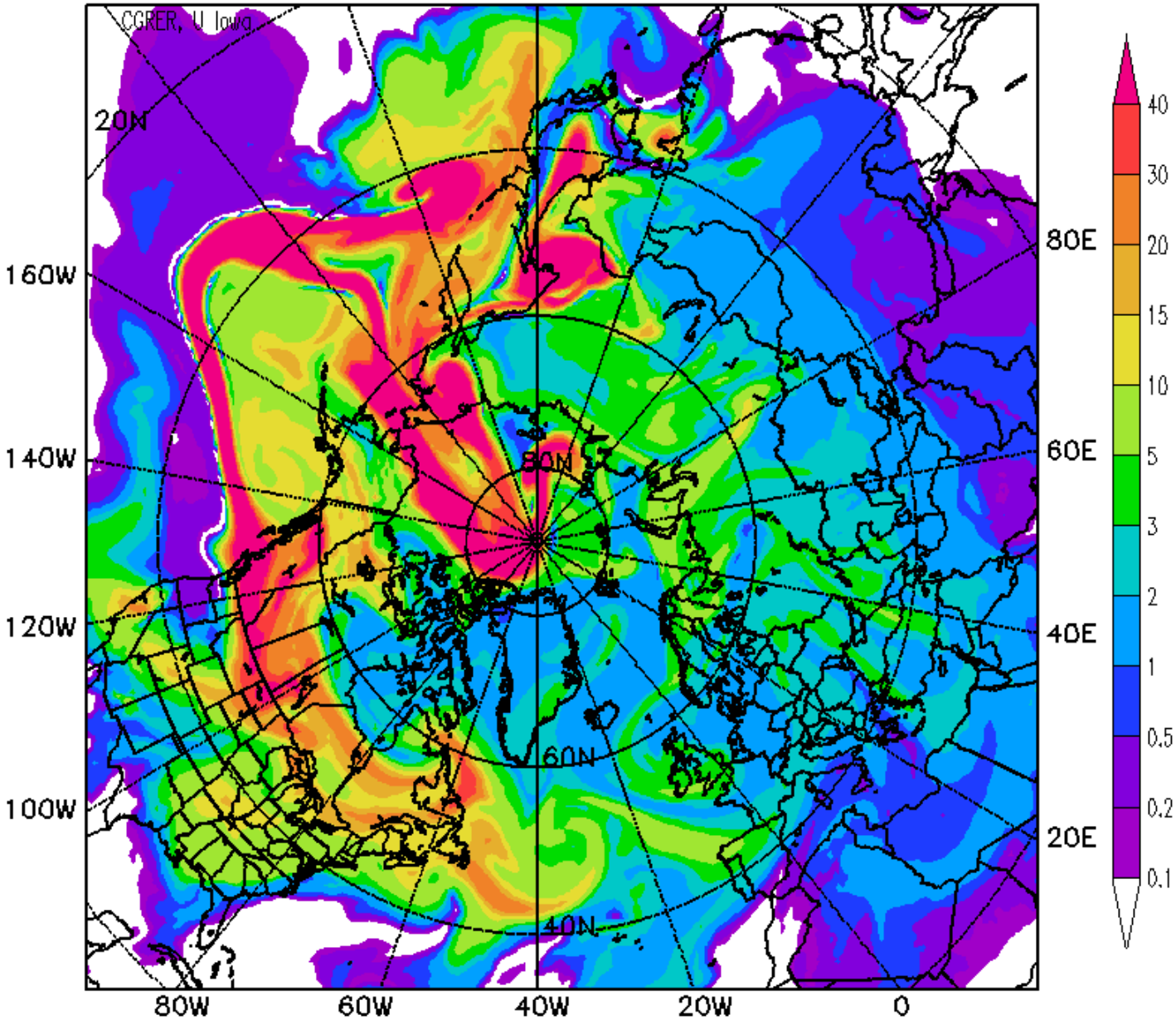
Simulated Total Sulfate ($\mu g/m^3$) along
the Calipso–Track2 Flight Path on 07/09/2008



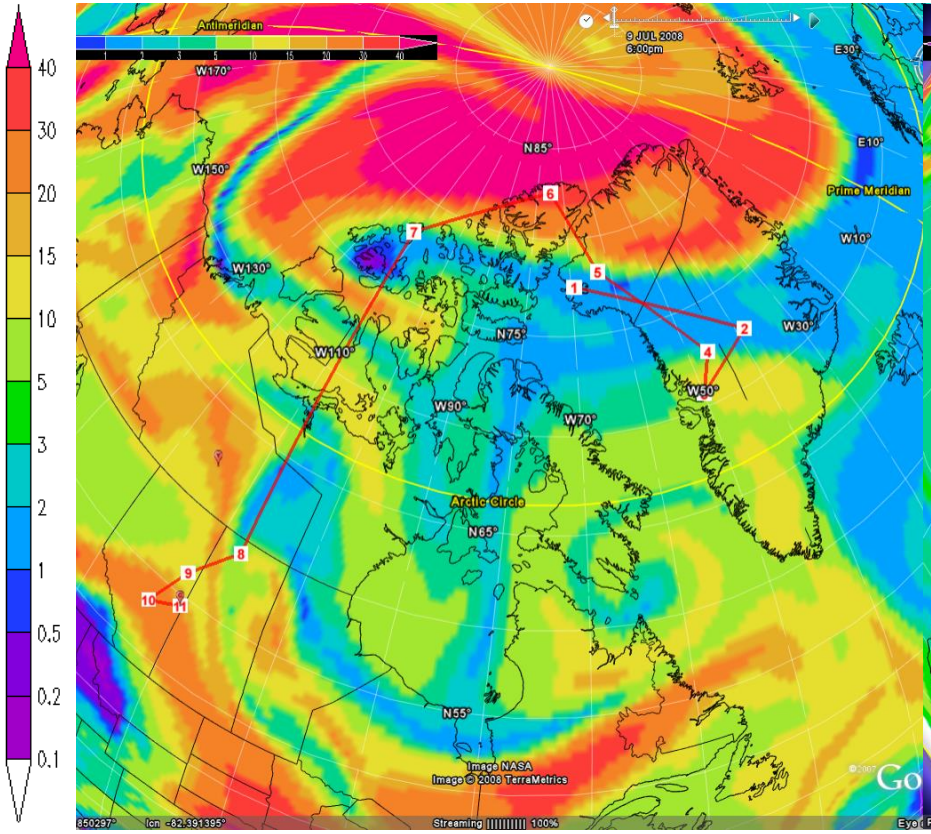
Transit home: 7/12, 18Z, Biomass CO

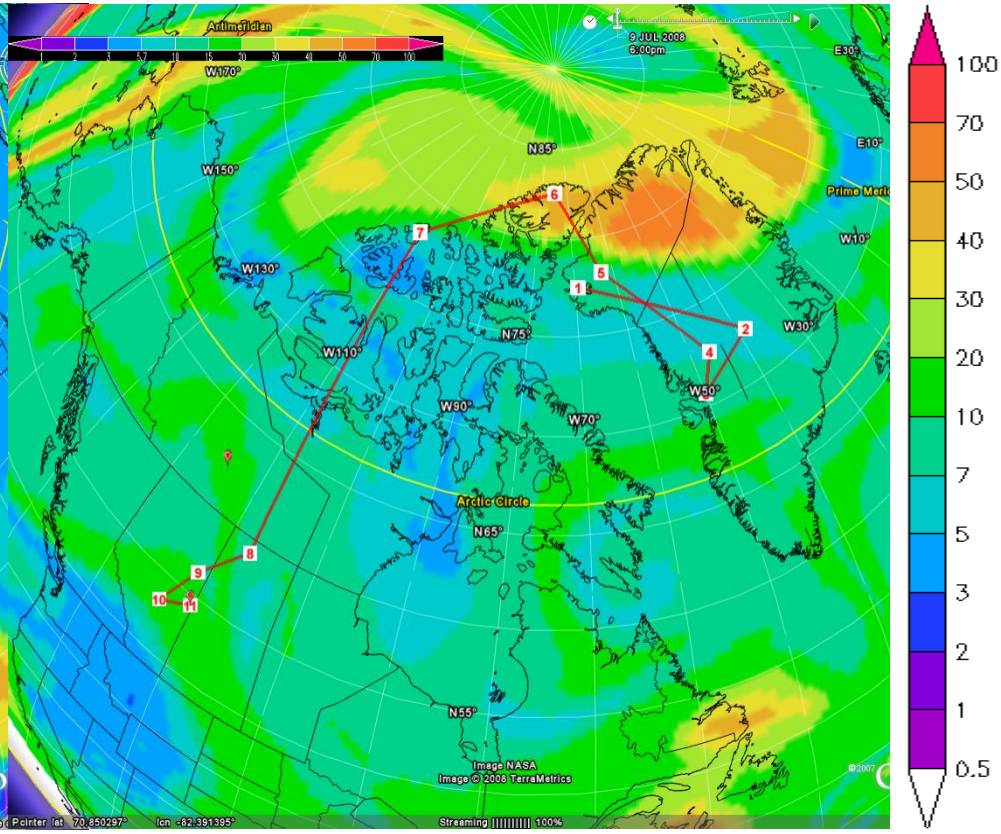


Simulated BB_CO (ppbv) in the 5.5km layer
at 0UTC, 07/08/2008



5.5km layer

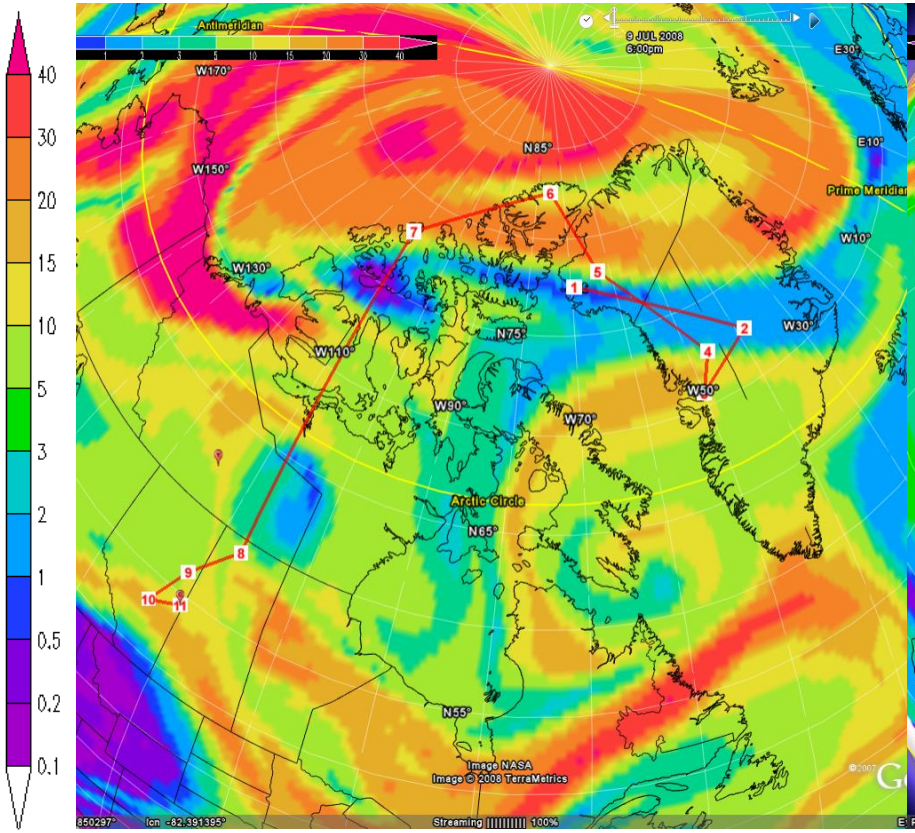


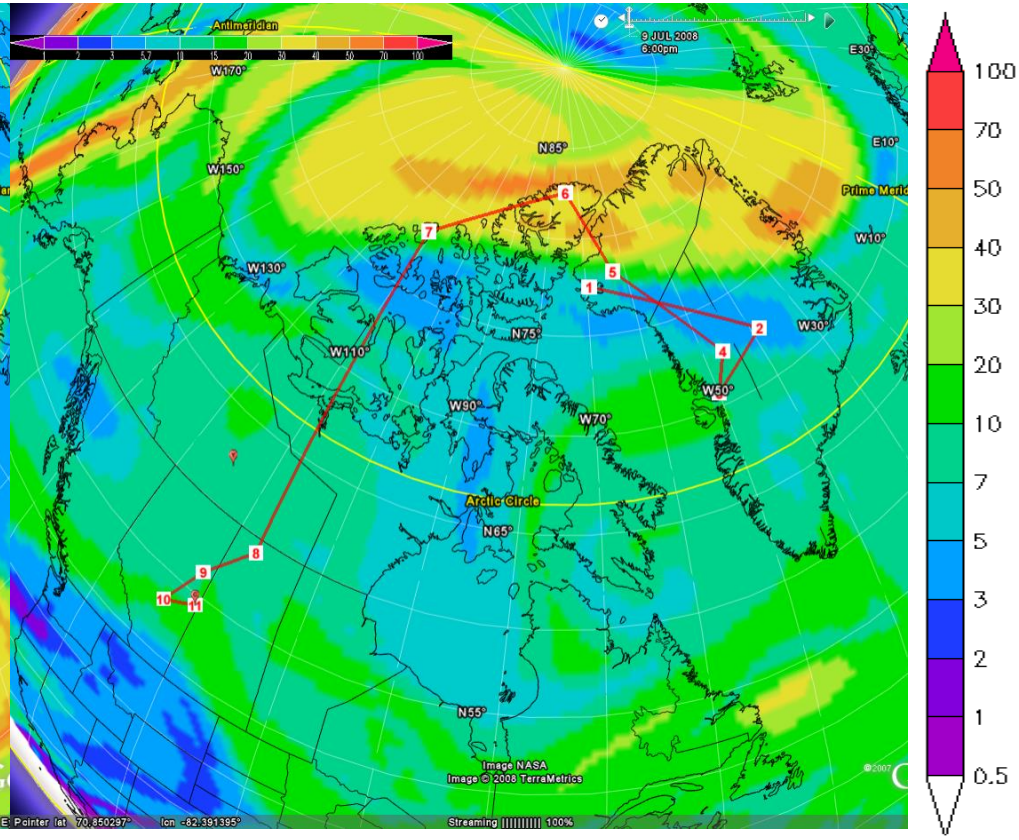


Biomass CO, 18Z, 7/9

Anthropogenic CO, 18Z, 7/9

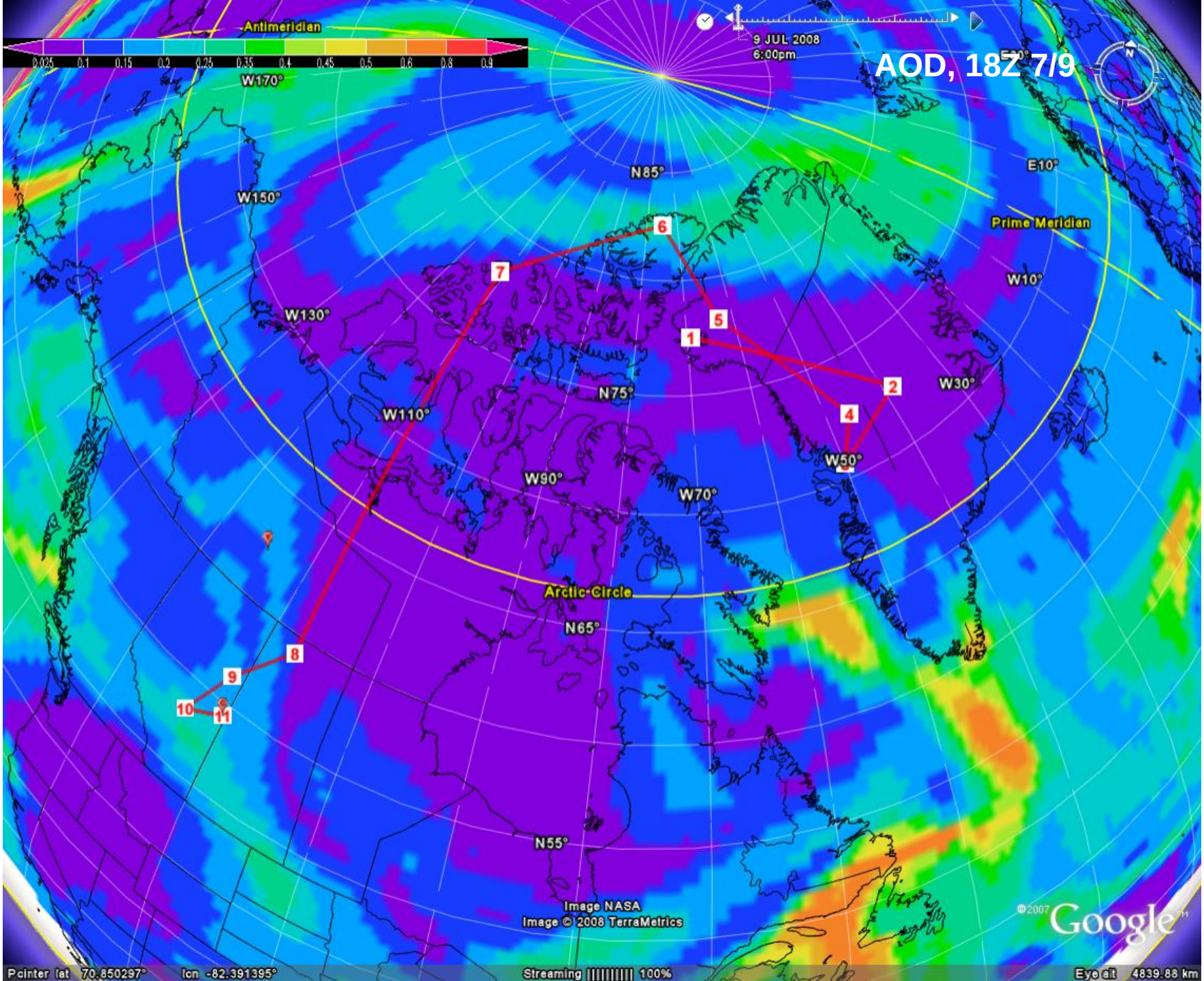
8.4 km layer

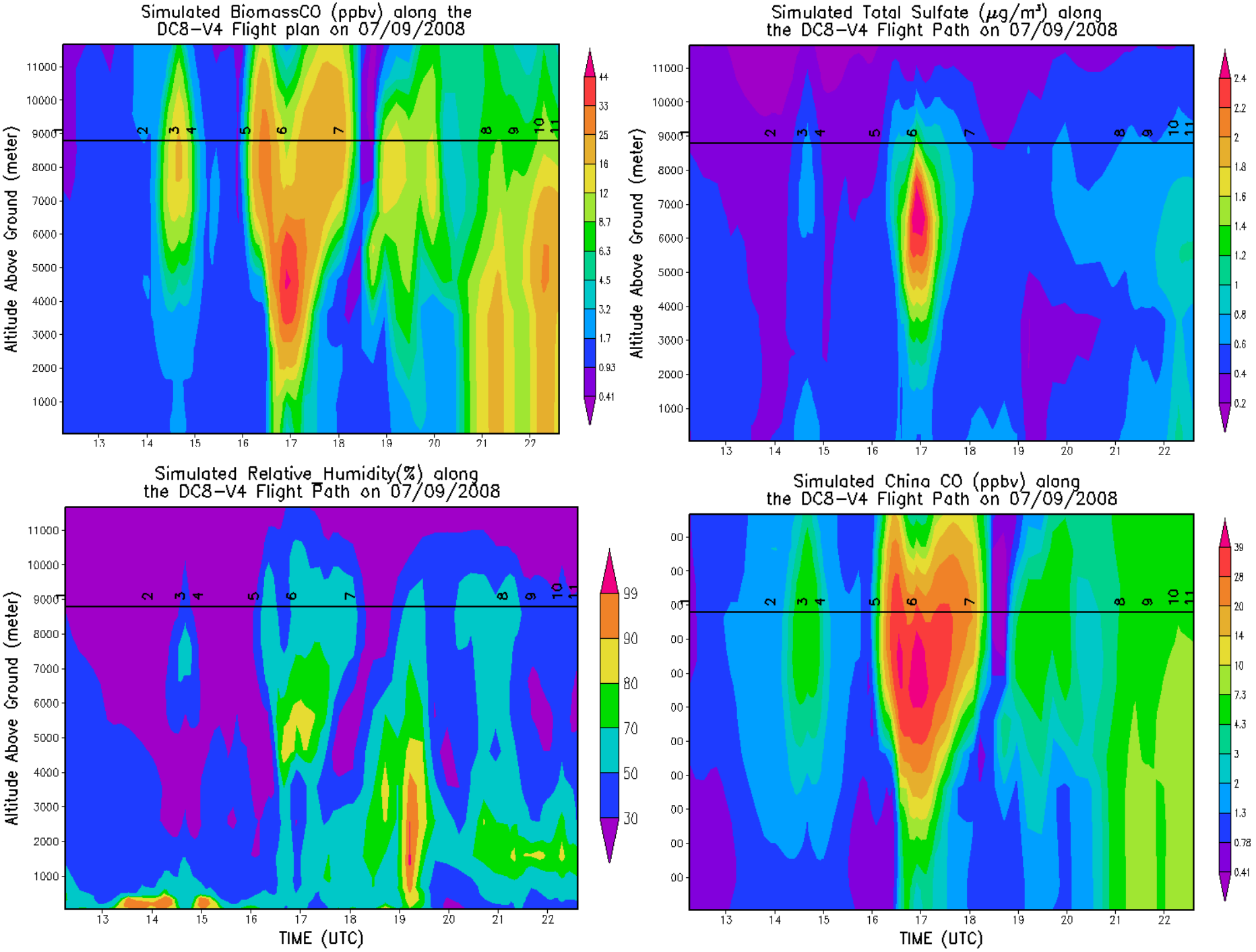


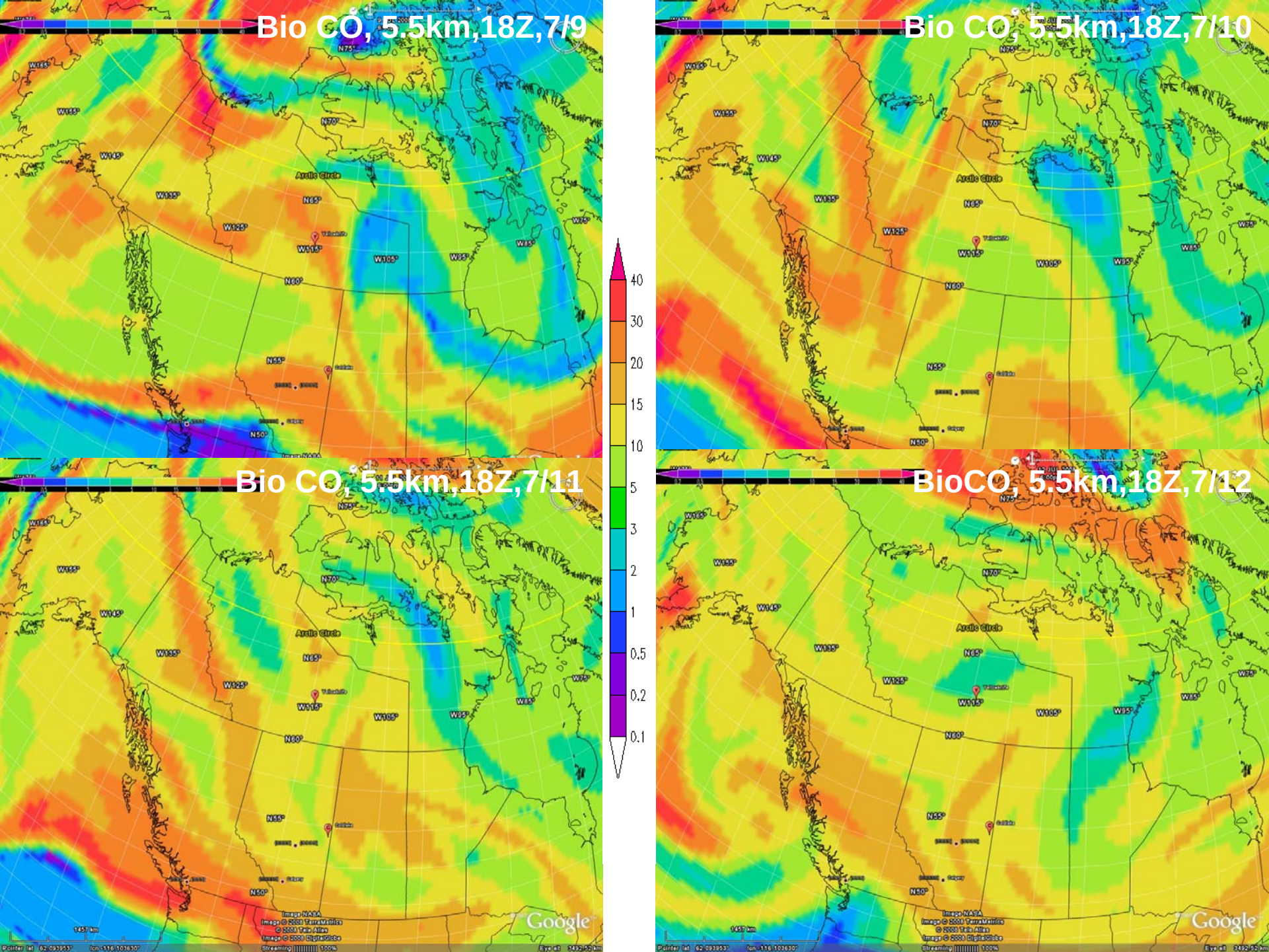


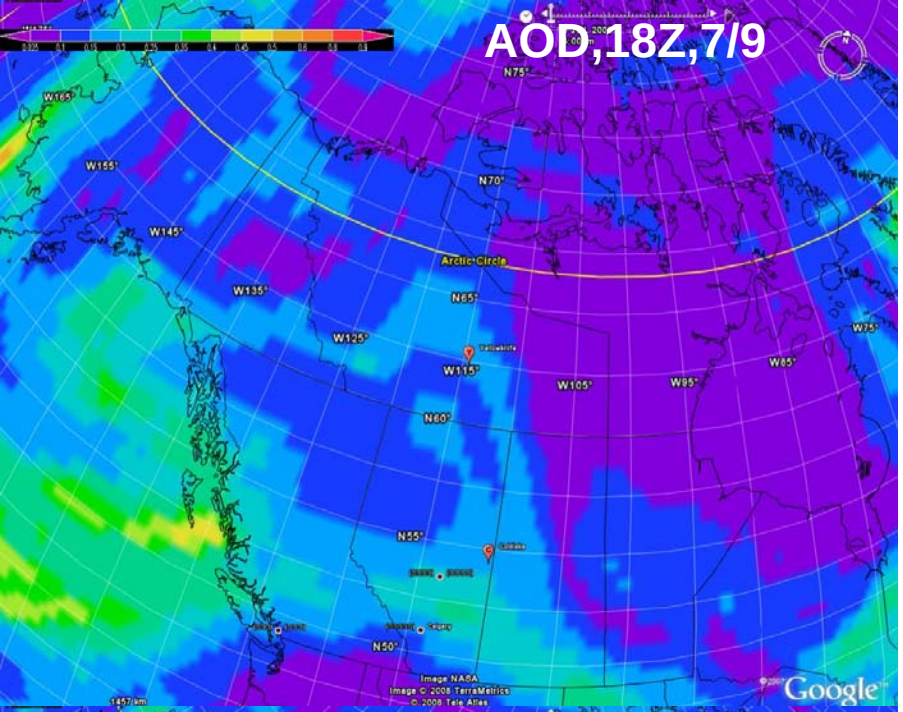
Biomass CO, 18Z, 7/9

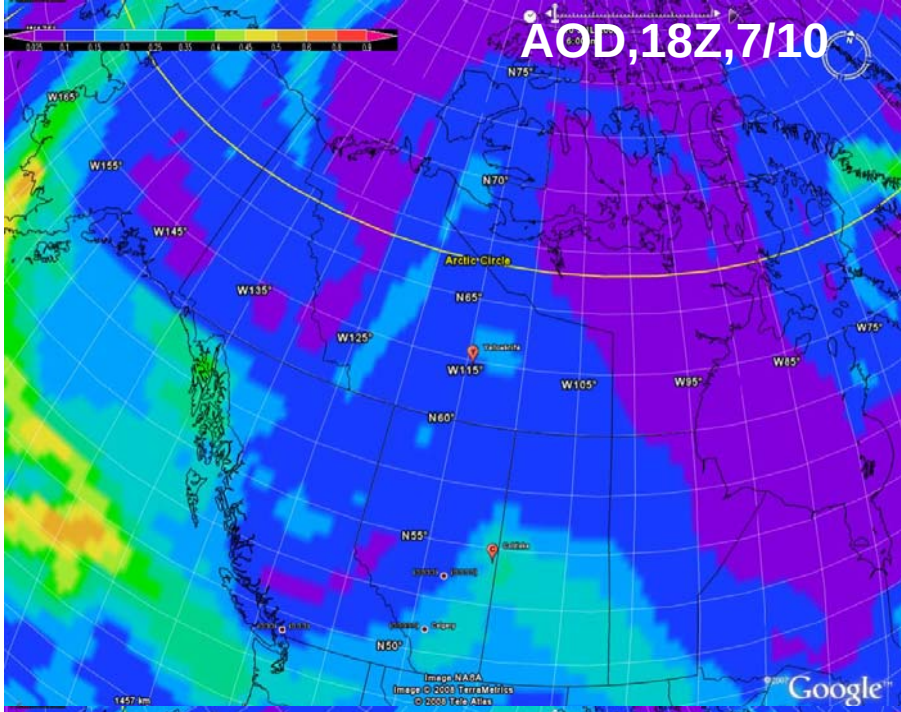
Anthropogenic CO, 18Z, 7/9


AOD, 18Z 7/9
Antimeridian
0.025 0.1 0.15 0.2 0.25 0.35 0.4 0.45 0.5 0.6 0.8 0.9
9 JUL 2008
6:00pm
W170°
W150°
W130°
W110°
W90°
W70°
W50°
W30°
W10°
E10°
Prime Meridian
N85°
N75°
N65°
N55°
Arctic Circle
1
2
4
5
6
7
8
9
10
11
Image NASA
Image © 2008 TerraMetrics
©2007 Google
Pointer lat 70.850297° lon -82.391395°
Streaming 100%
Eye alt 4839.88 km


Simulated BiomassCO (ppbv) along the DC8-V4 Flight plan on 07/09/2008
Simulated Total Sulfate (μg/m³) along the DC8-V4 Flight Path on 07/09/2008
Simulated Relative Humidity(%) along the DC8-V4 Flight Path on 07/09/2008
Simulated China CO (ppbv) along the DC8-V4 Flight Path on 07/09/2008
Altitude Above Ground (meter)
TIME (UTC)


Bio CO, 5.5km,18Z,7/9
Bio CO, 5.5km,18Z,7/10
Bio CO, 5.5km,18Z,7/11
BioCO, 5.5km,18Z,7/12
40
30
20
15
10
5
3
2
1
0.5
0.2
0.1
Arctic Circle
Google


AOD,18Z,7/9
Arctic Circle
Yellowknife
Image NASA
Image © 2008 TerraMetrics
© 2008 Tele Atlas
Google


AOD,18Z,7/10
Arctic Circle
Yellowknife
Image NASA
Image © 2008 TerraMetrics
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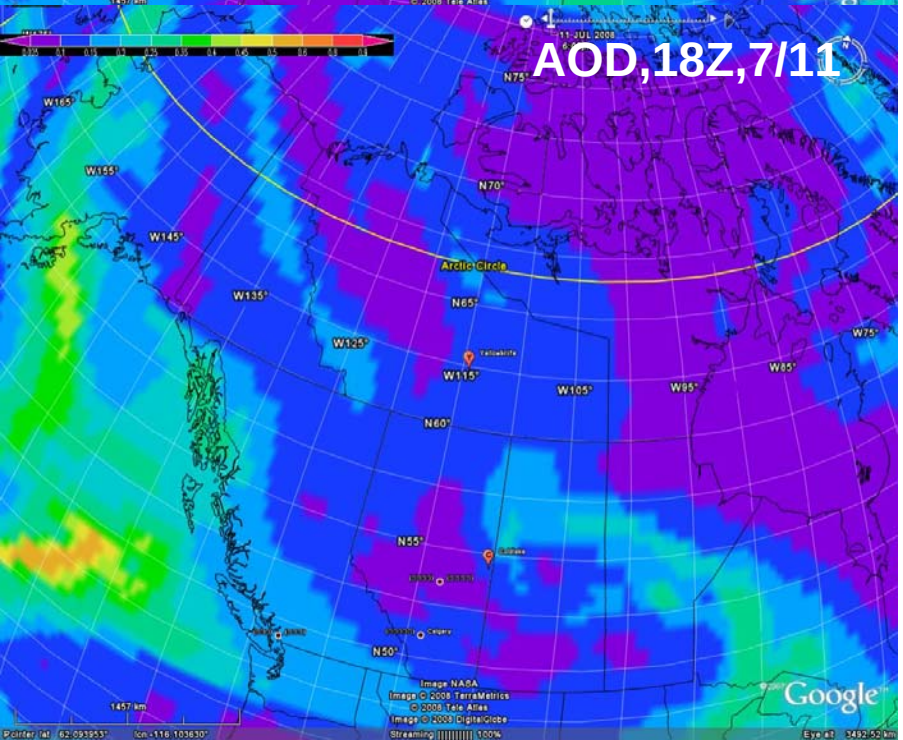
AOD,18Z,7/11
Arctic Circle
Yellowknife
Image NASA
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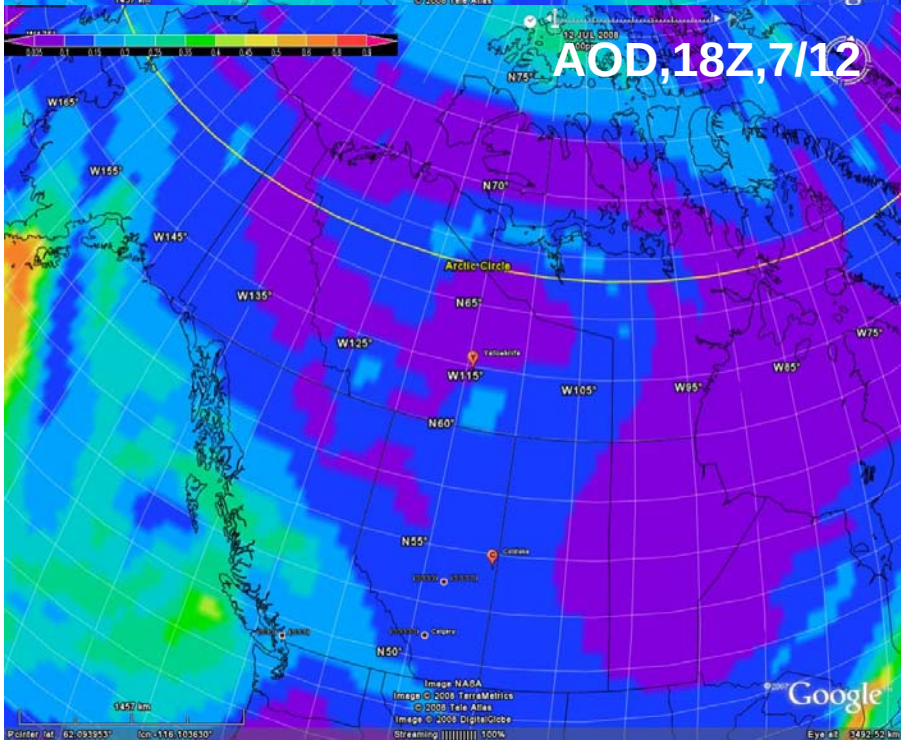
Google


AOD,18Z,7/12
Arctic Circle
Yellowknife
Image NASA
Image © 2008 TerraMetrics
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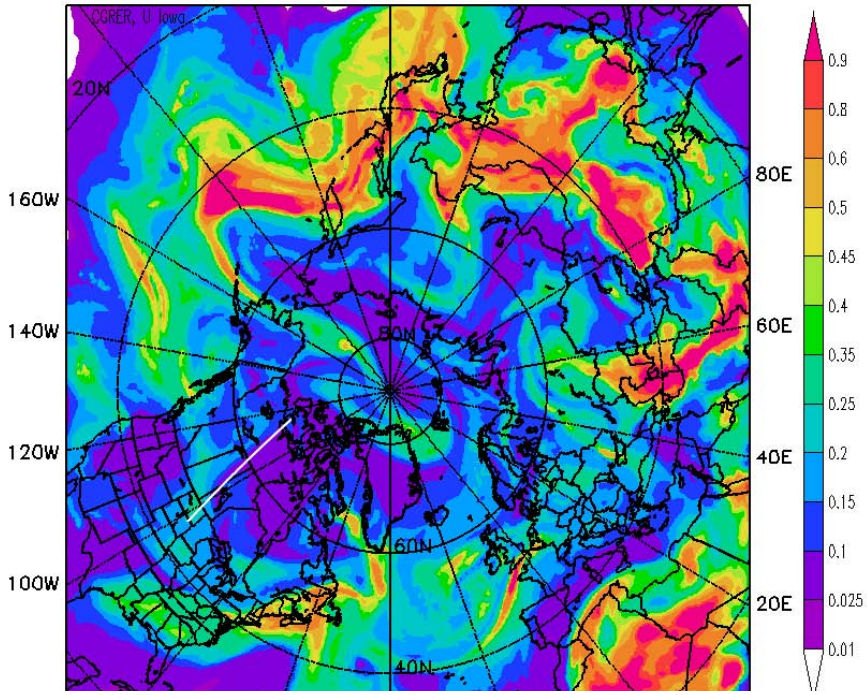
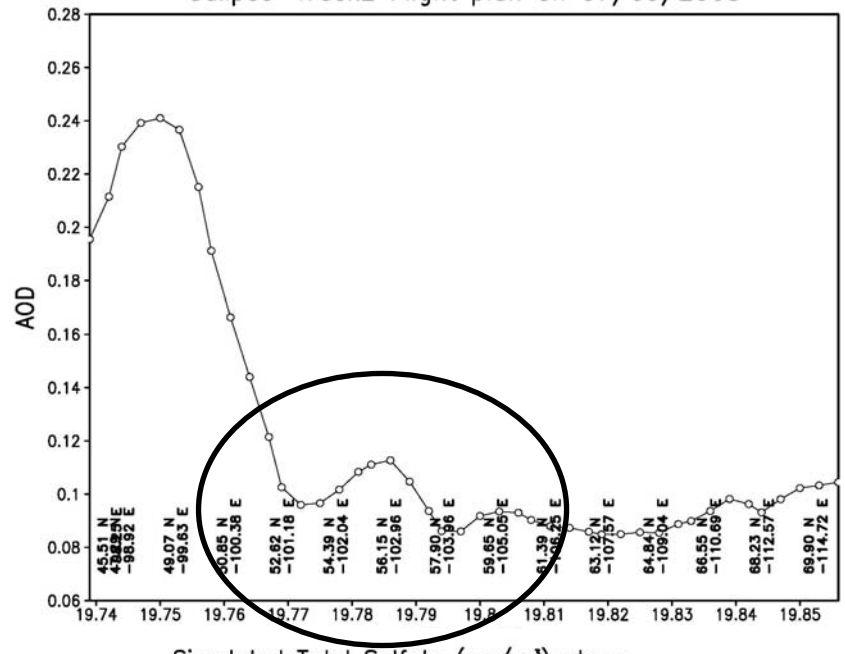
Google

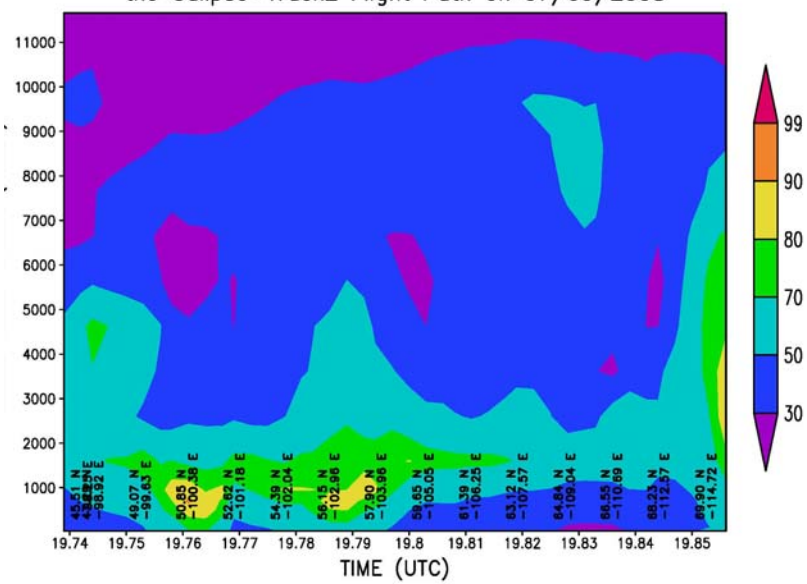
Simulated Column TOTAL_Aerosol_Optical_Depth
at 18UTC, 07/9/2008



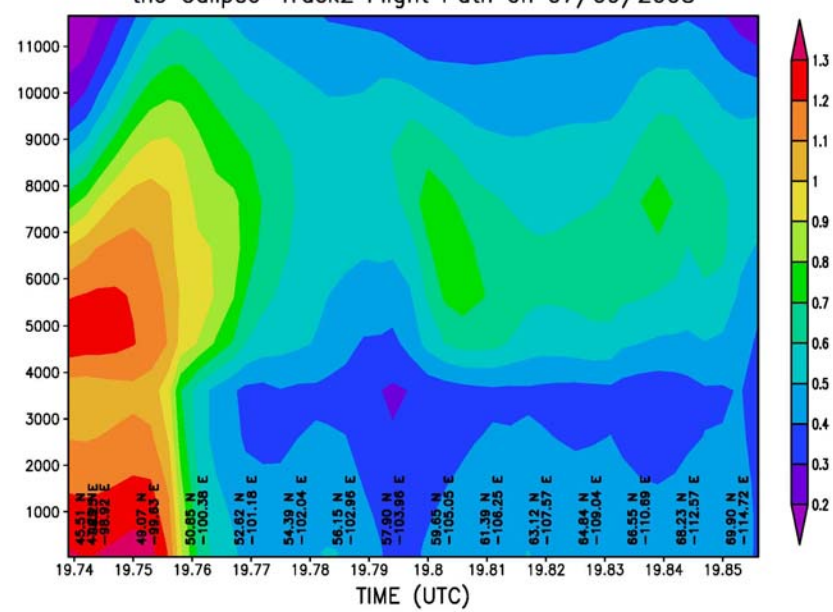
Simulated AOD along the
Calipso–Track2 Flight plan on 07/09/2008



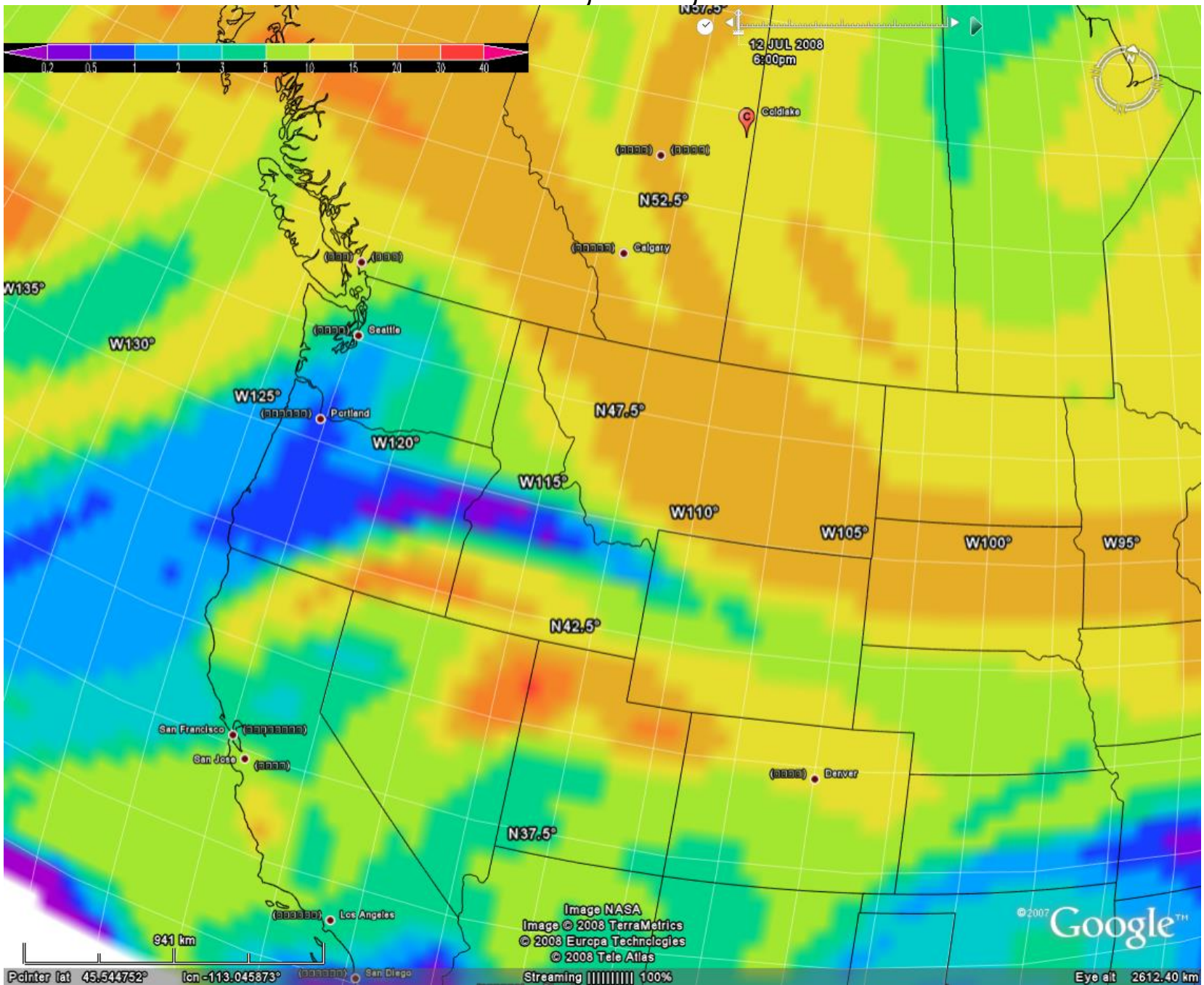
Simulated Relative_Humidity(%) along
the Calipso–Track2 Flight Path on 07/09/2008



Simulated Total Sulfate ($\mu g/m^3$) along
the Calipso–Track2 Flight Path on 07/09/2008

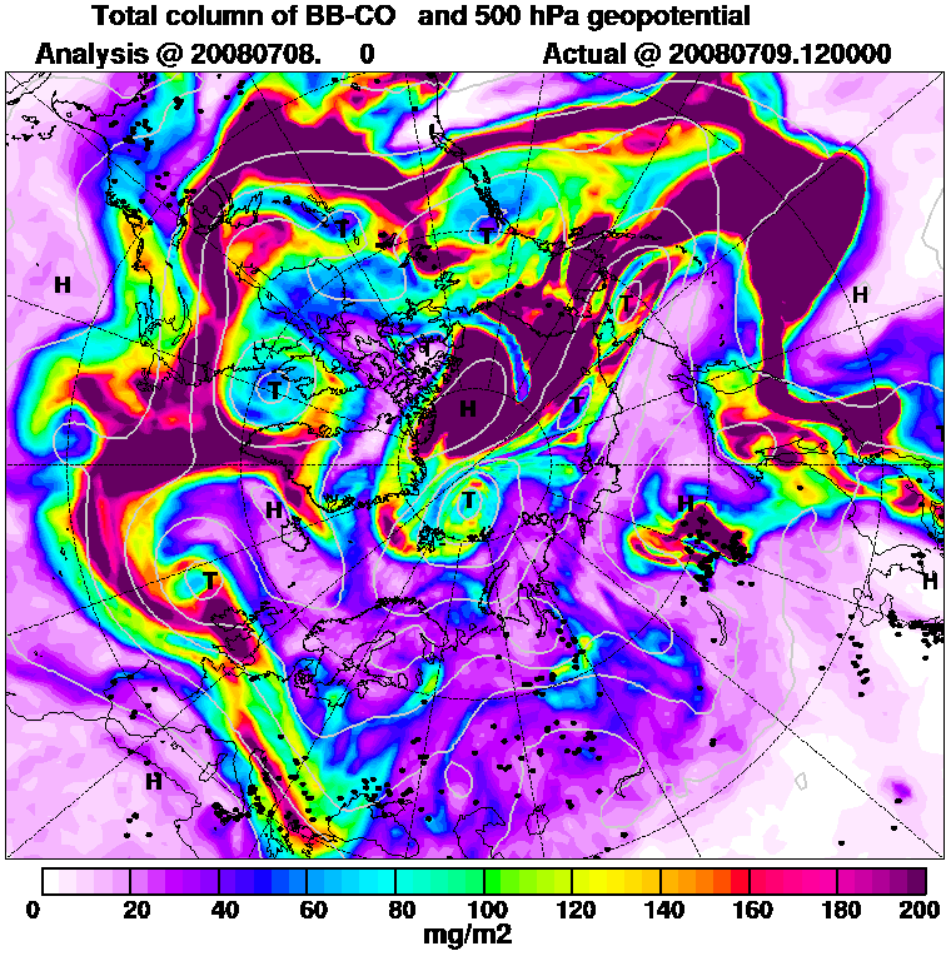


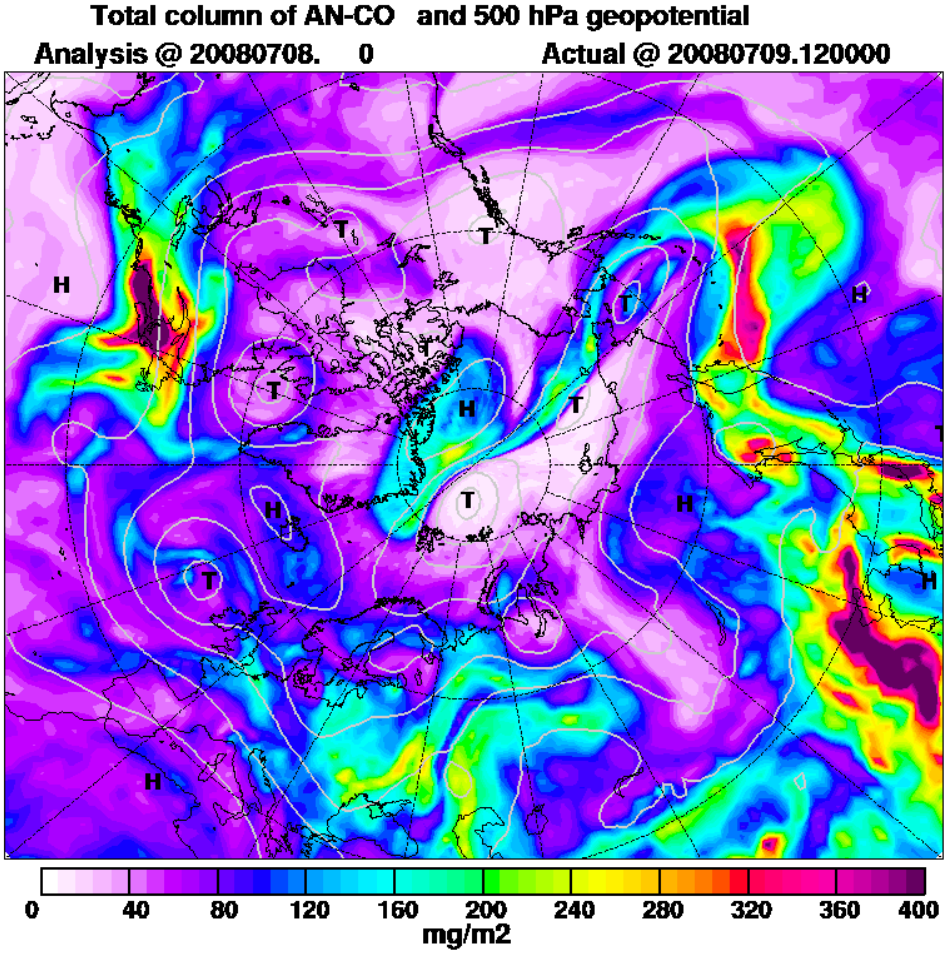
Transit home: 7/12, 18Z, Biomass CO



Biomass and Anthropogenic CO Tracers

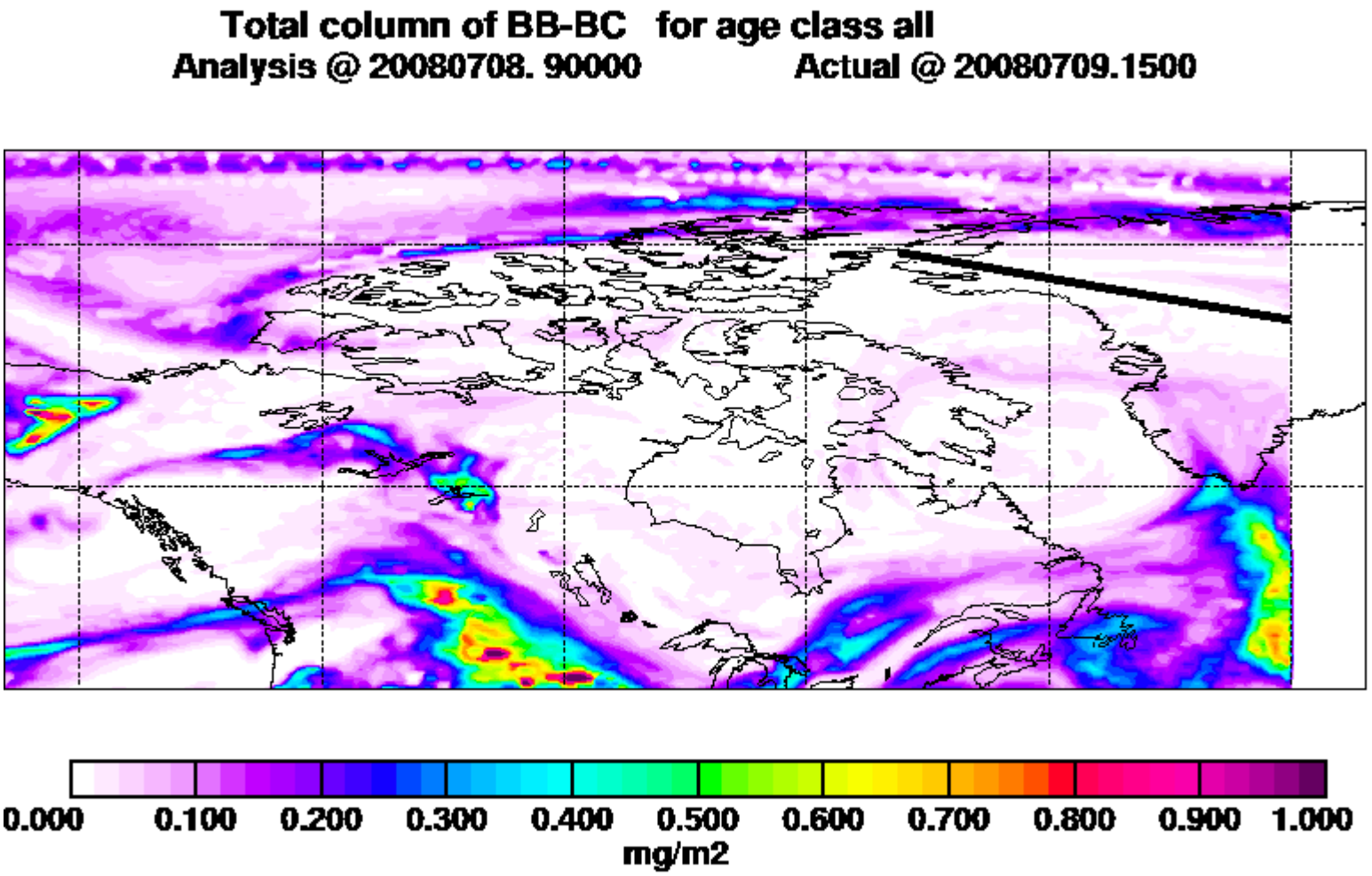
CAN, CA, ASIA export NE-US. BBCO Plume ***leads*** Anthro plume into CAN ARCTIC





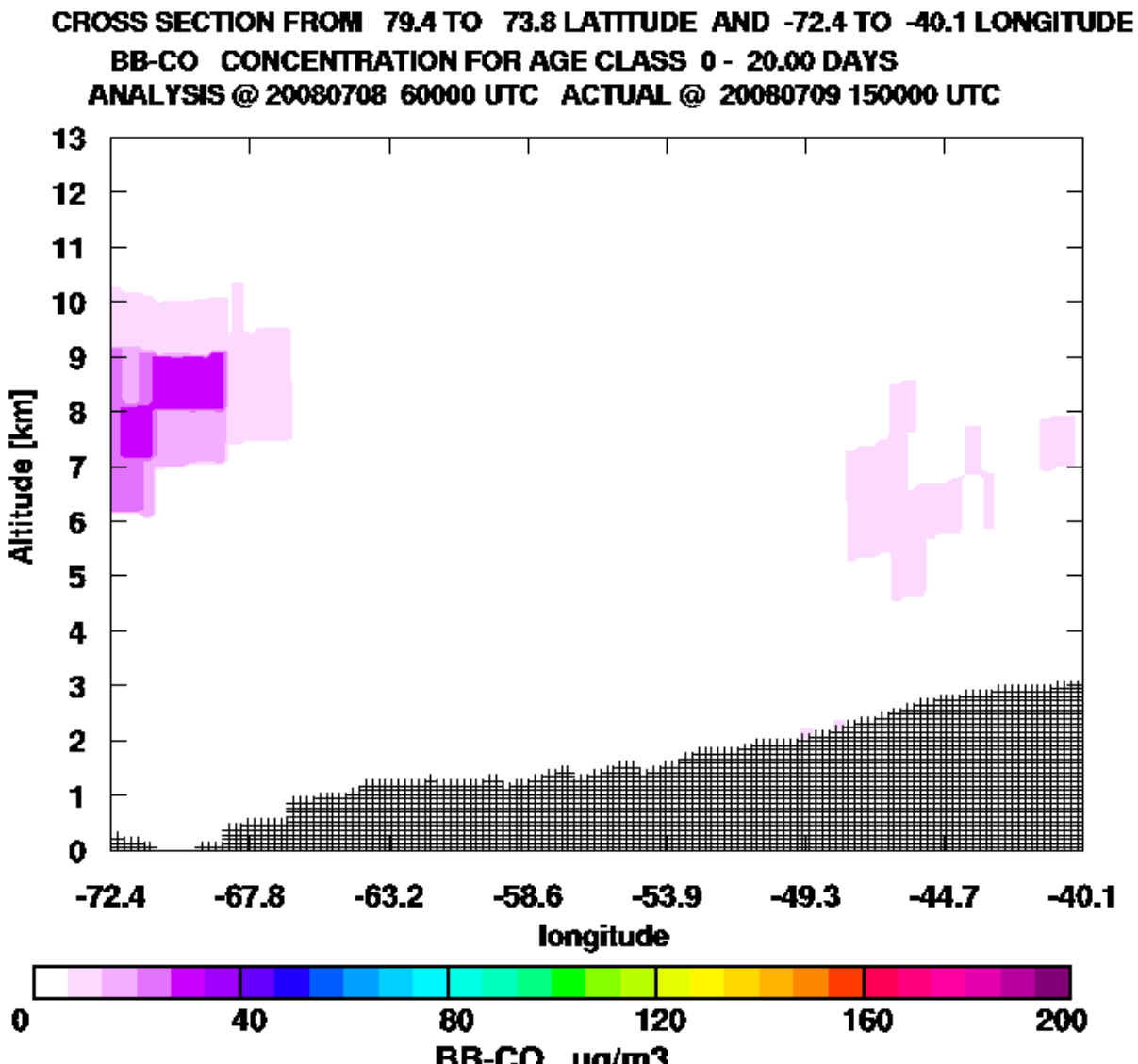
Profile

Significantly different situation for aerosol tracers



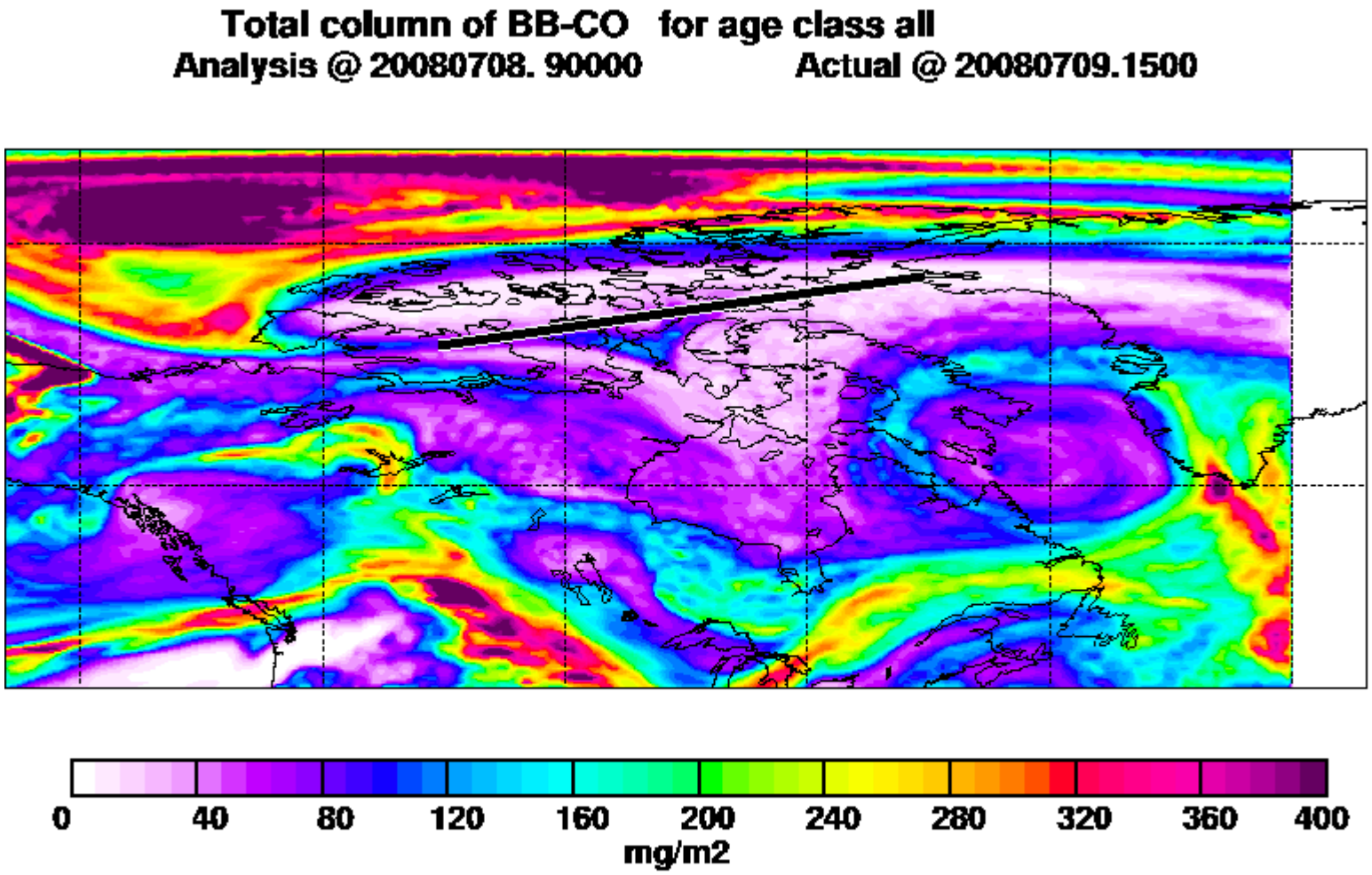
Profile

Significantly different situation for aerosol tracers



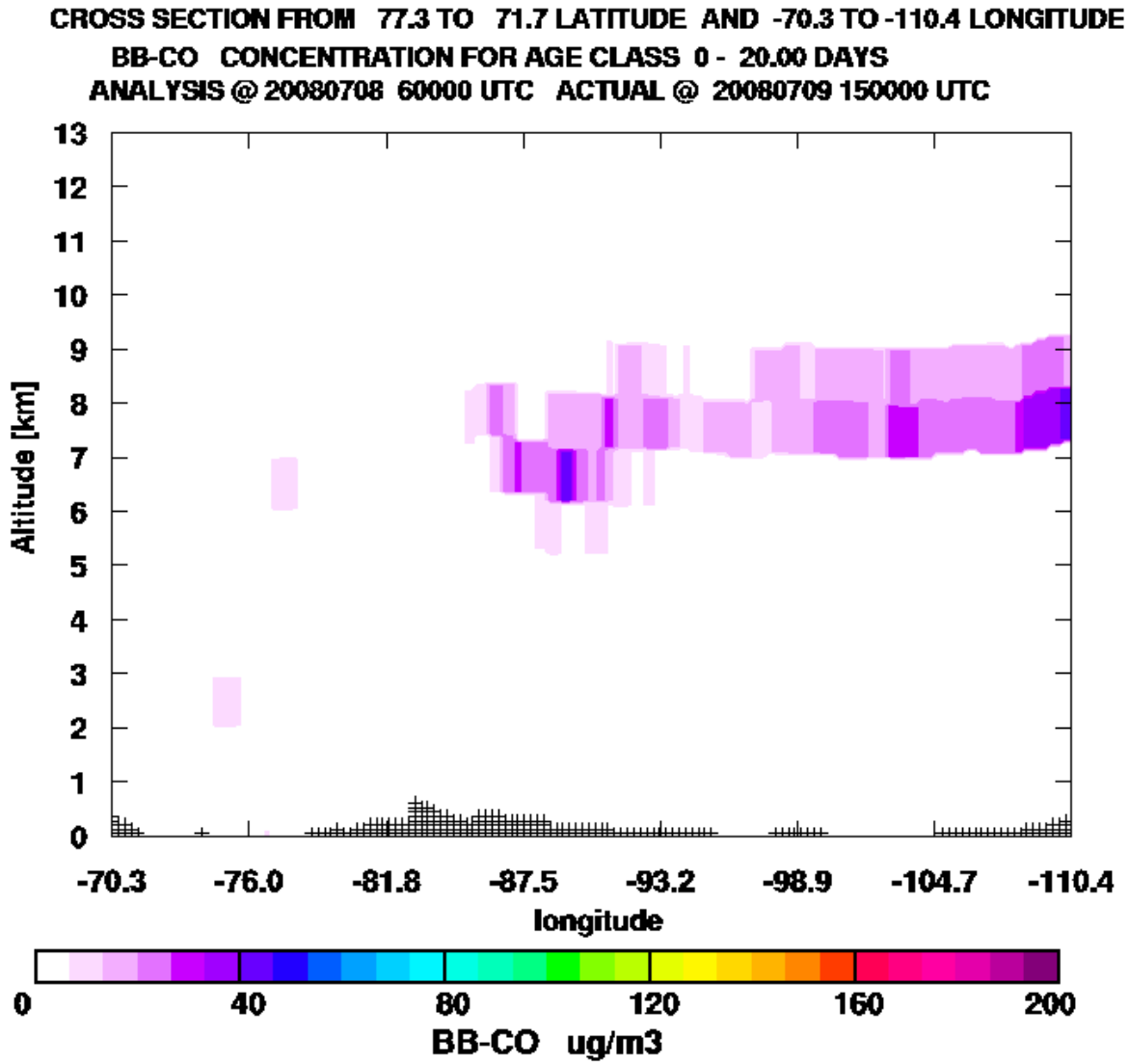
Profile

Significantly different situation for aerosol tracers



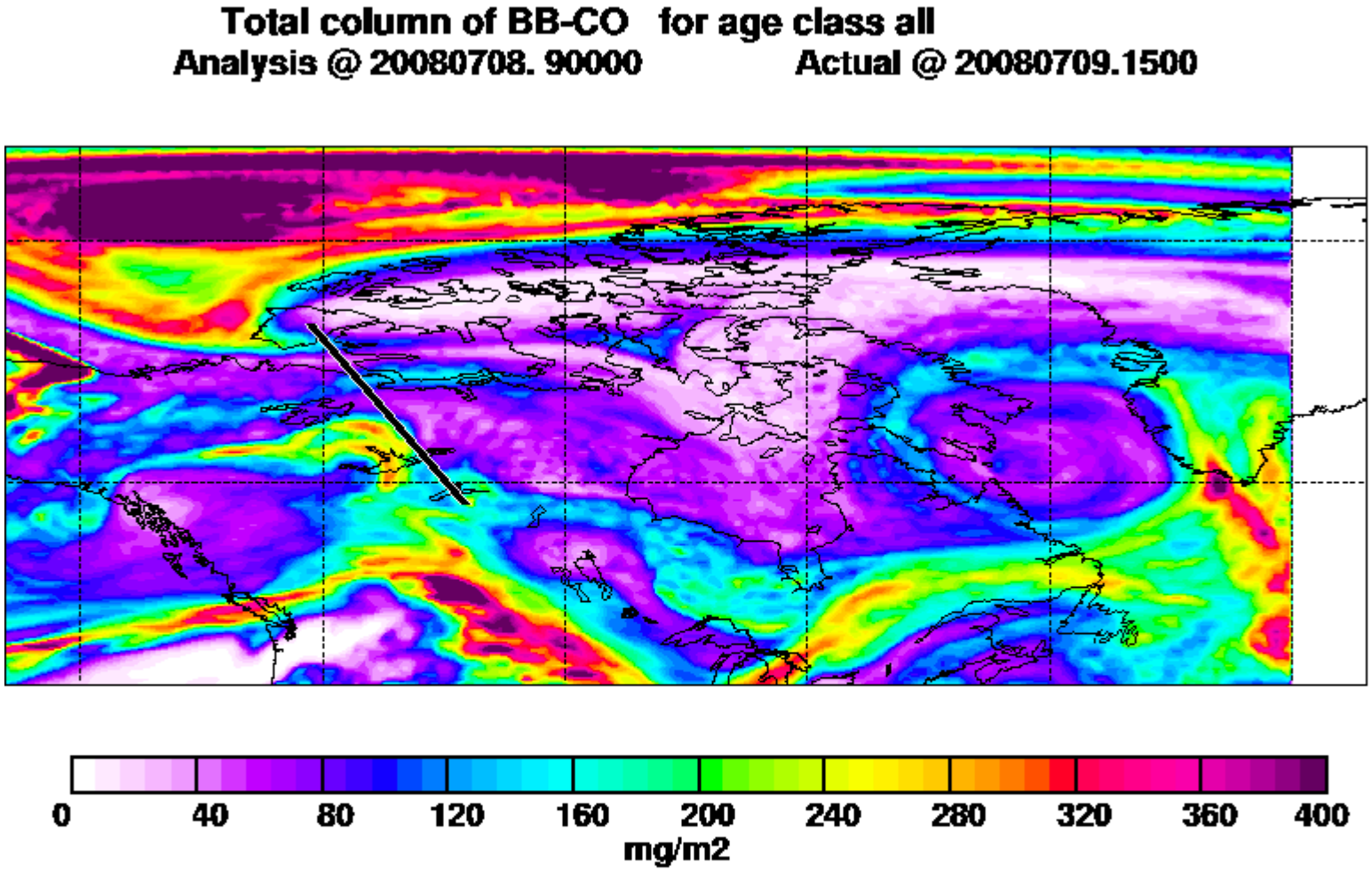
Profile

Significantly different situation for aerosol tracers



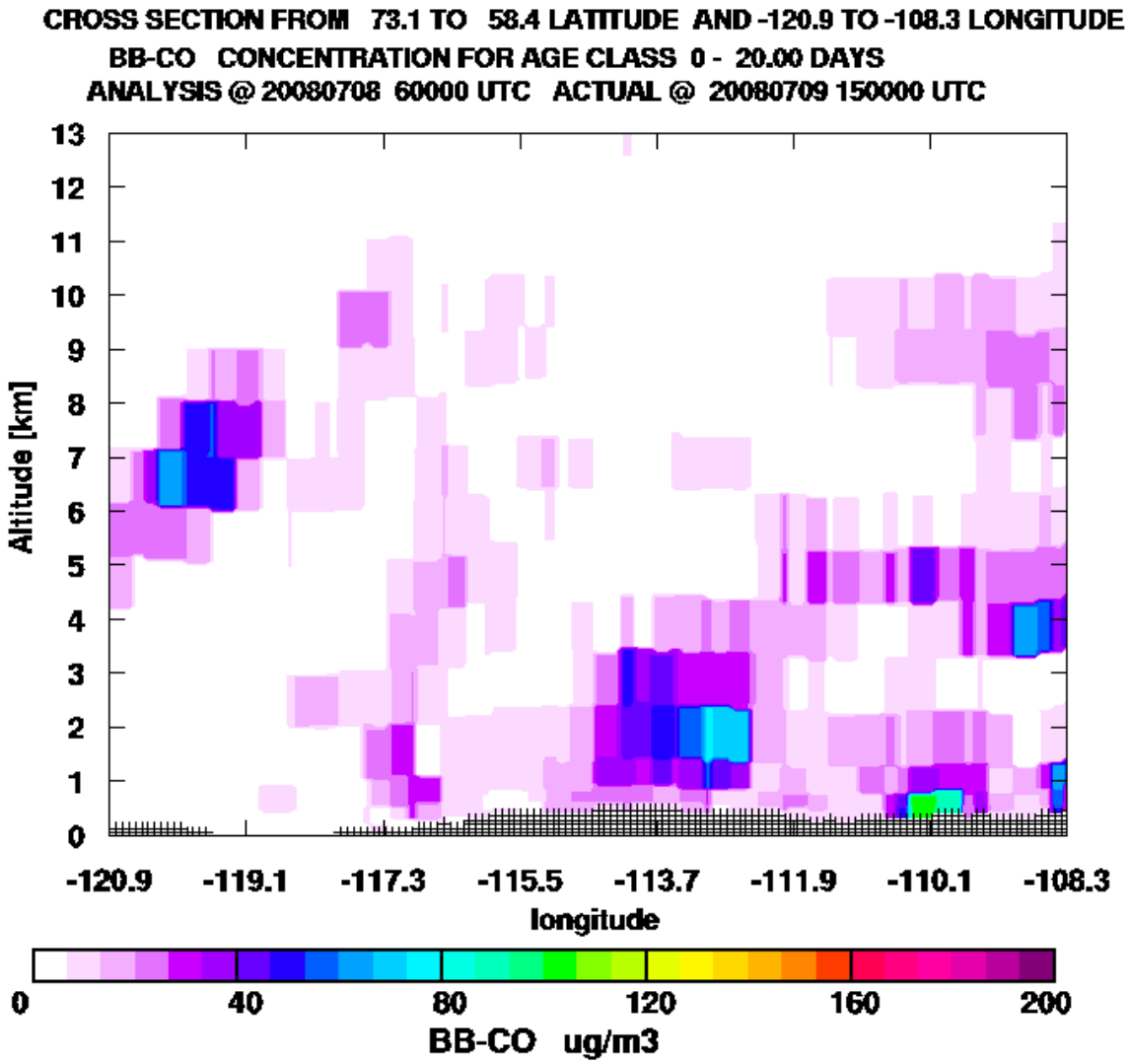
Profile

Significantly different situation for aerosol tracers



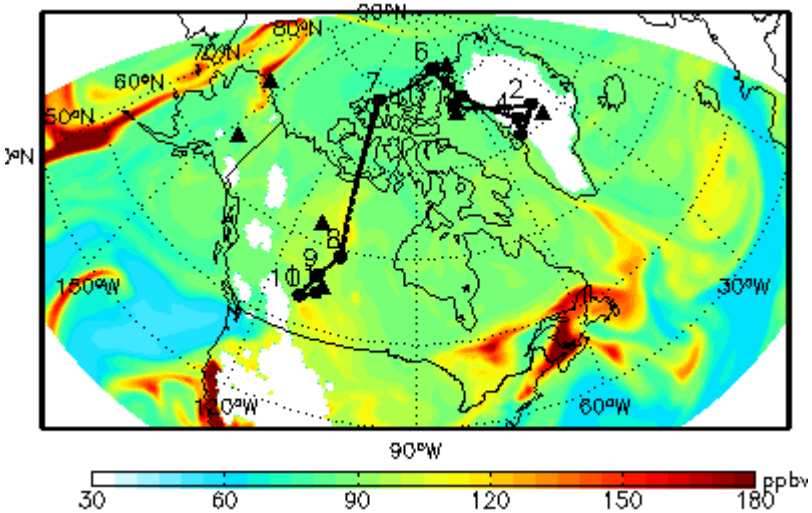
Profile

Significantly different situation for aerosol tracers

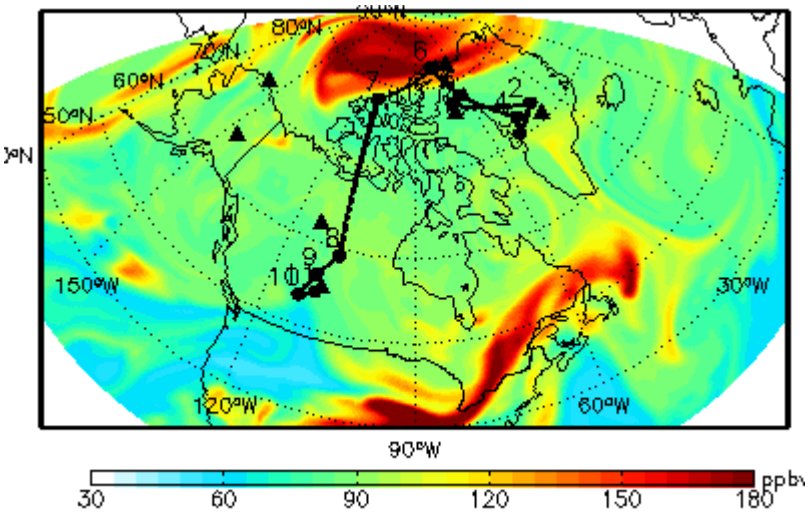


GEOS5 DC-8 Flight from Thule: July 9th 16:30Z (July 9th 06Z forecast)

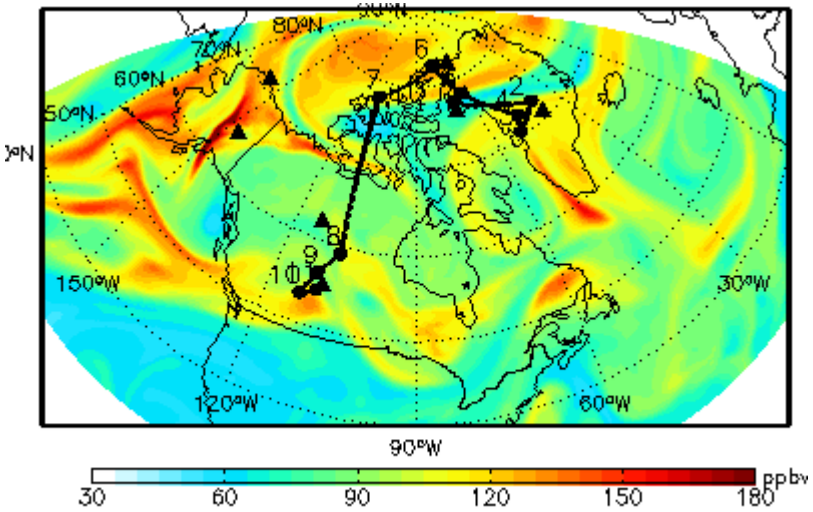
Total CO 850 mb



Total CO 500 mb



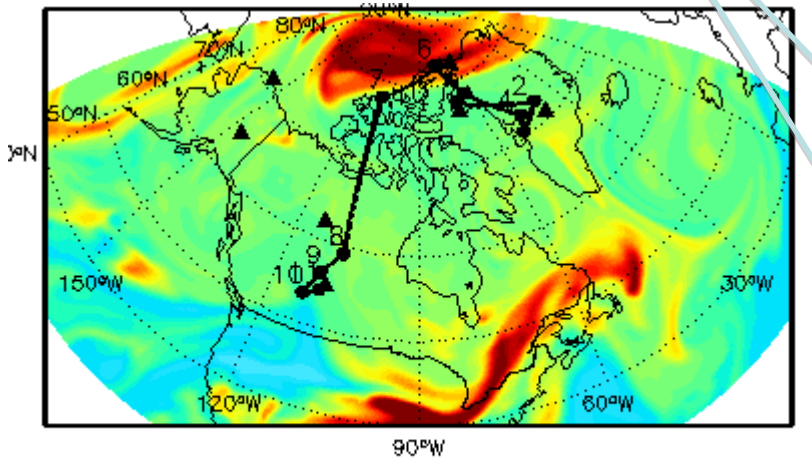
Total CO 300 mb

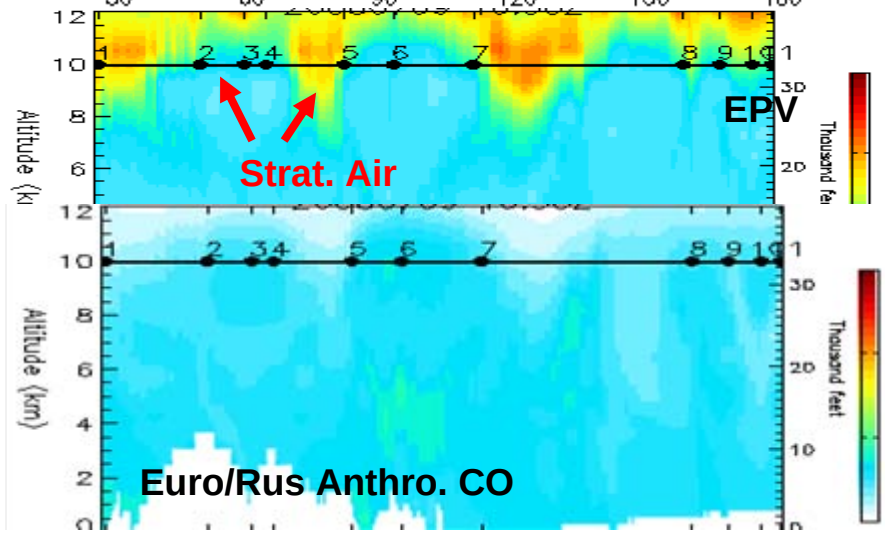


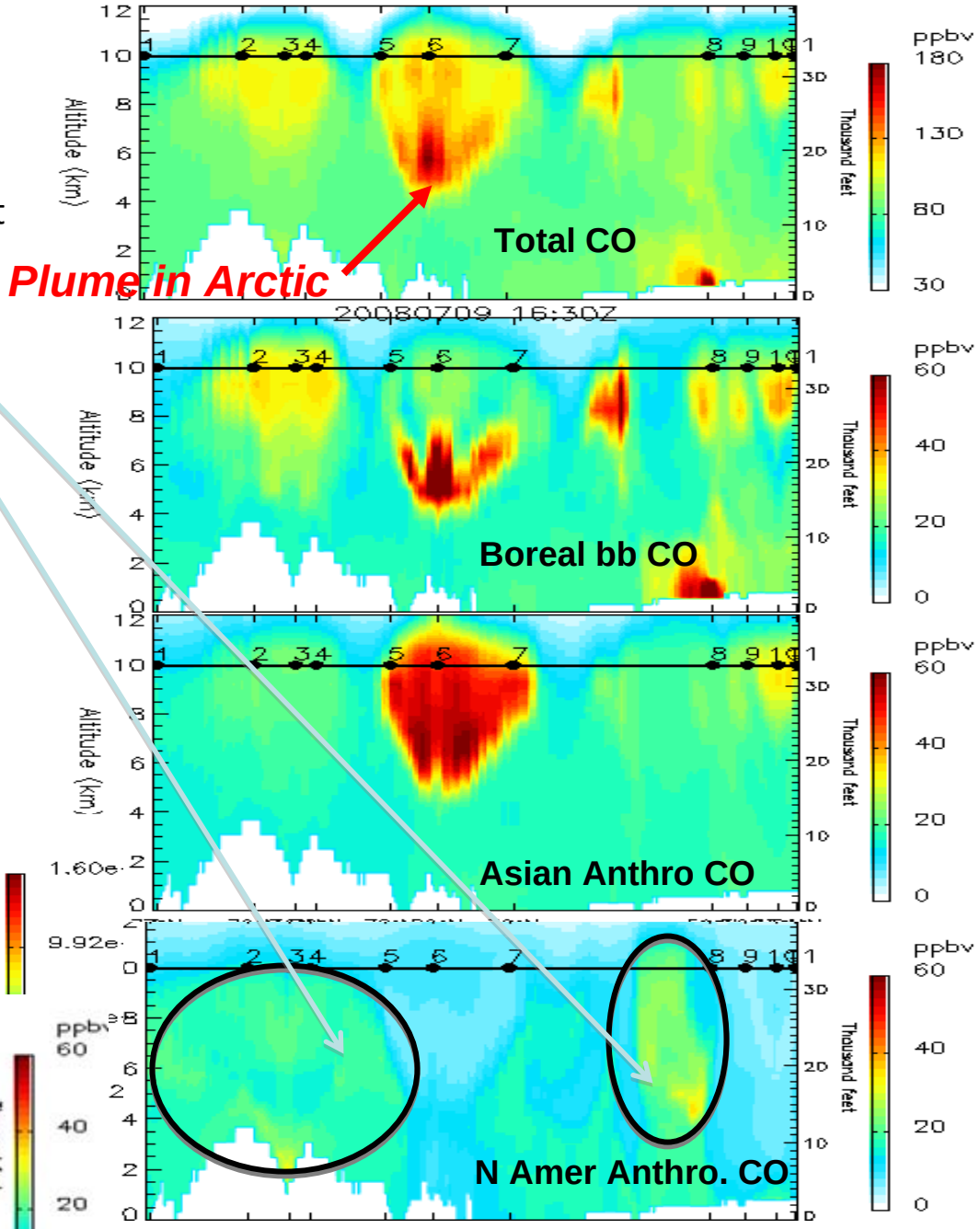
GEOS5 Forecast: July 9 DC-8 Flight

- Asian anthro in Arctic region, 5 to >10 km
- Siberia smoke plume just below Asian plume but mixed with it too
- North American anthro also significant except in Arctic

Total CO 500 mb



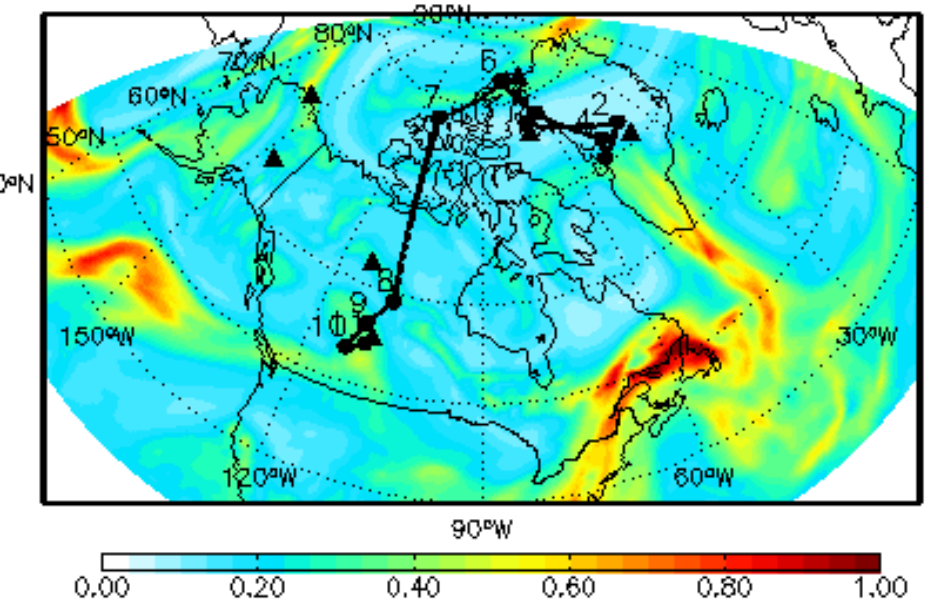




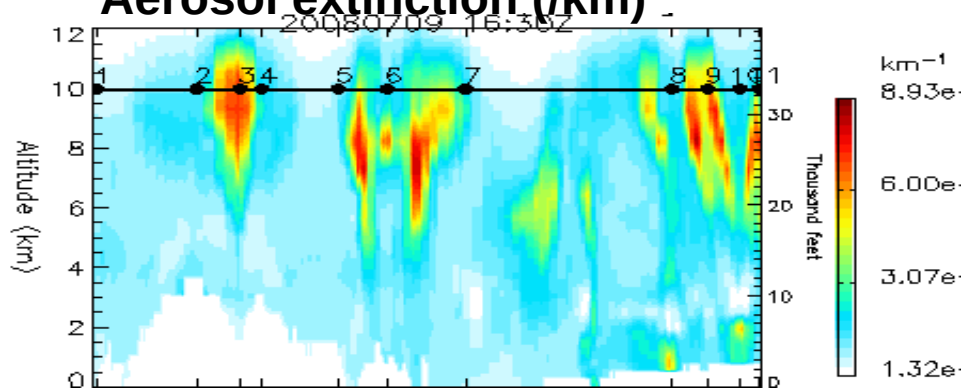
GEOS5 Forecast: July 9 DC-8 Flight 16:30Z

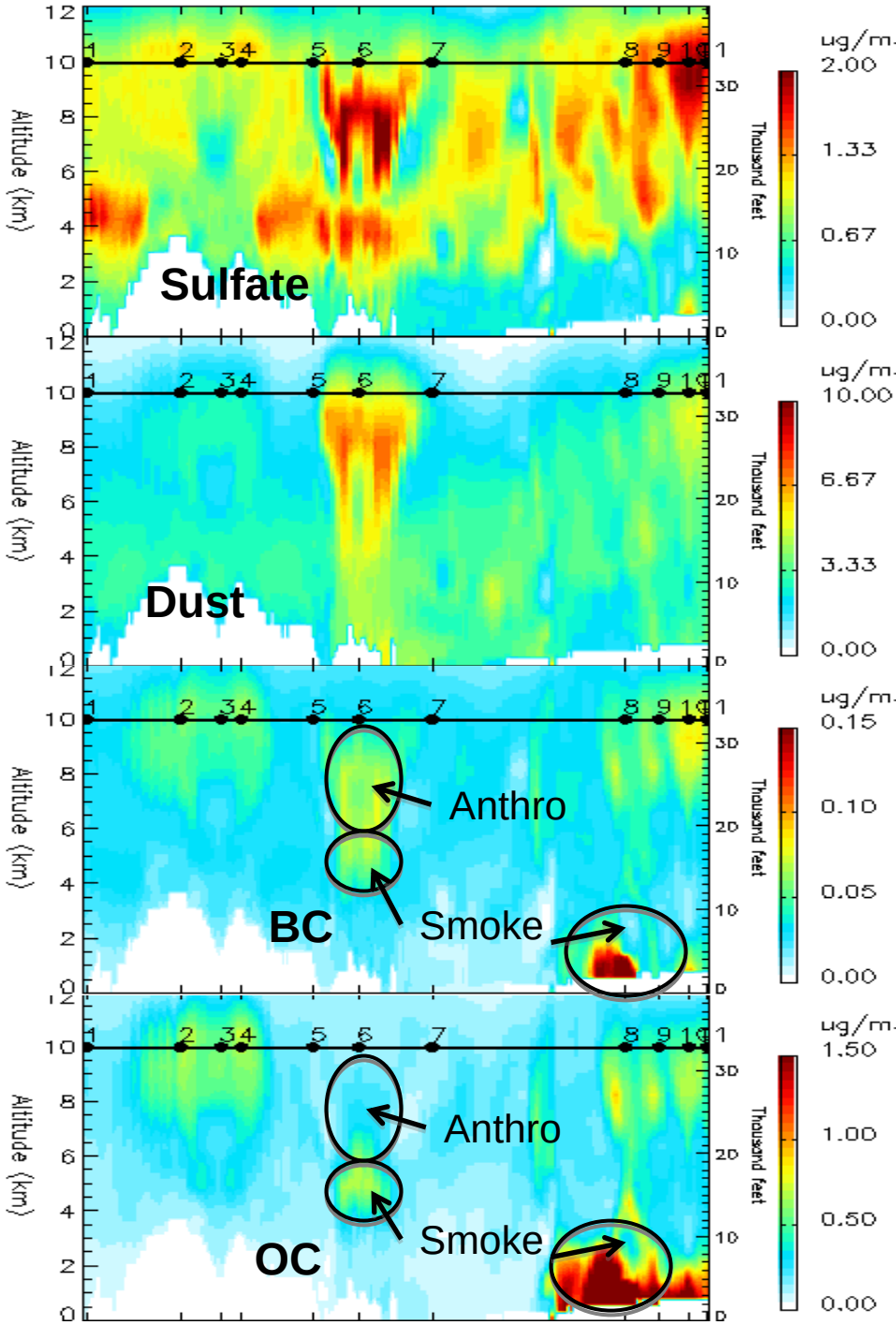
oTransported sulfate, dust, carbonaceous in polar region (pt. #5-#7)
o Higher OC/BC ratio: smoke; lower OC/BC ratio: anthropogenic

AOT 550 nm



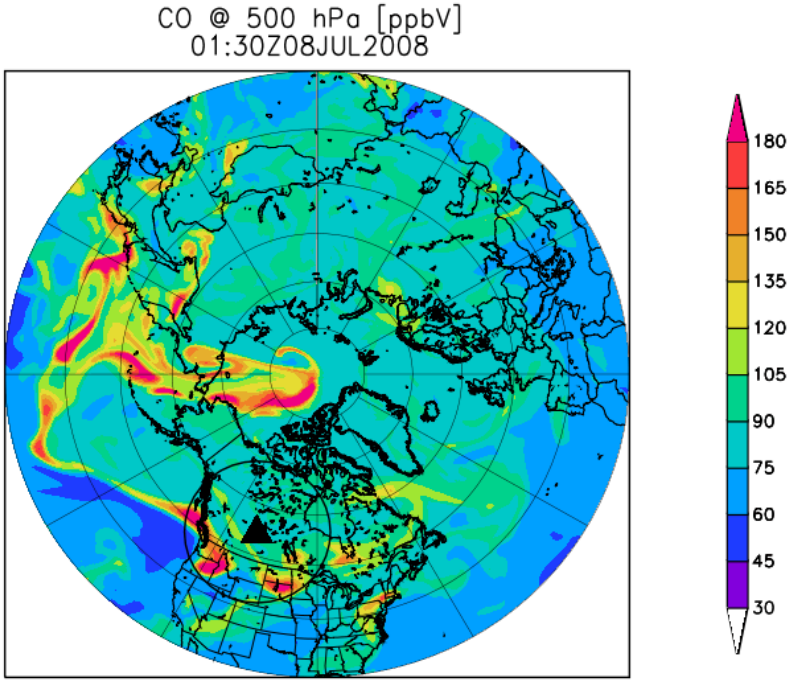
Aerosol extinction (/km)



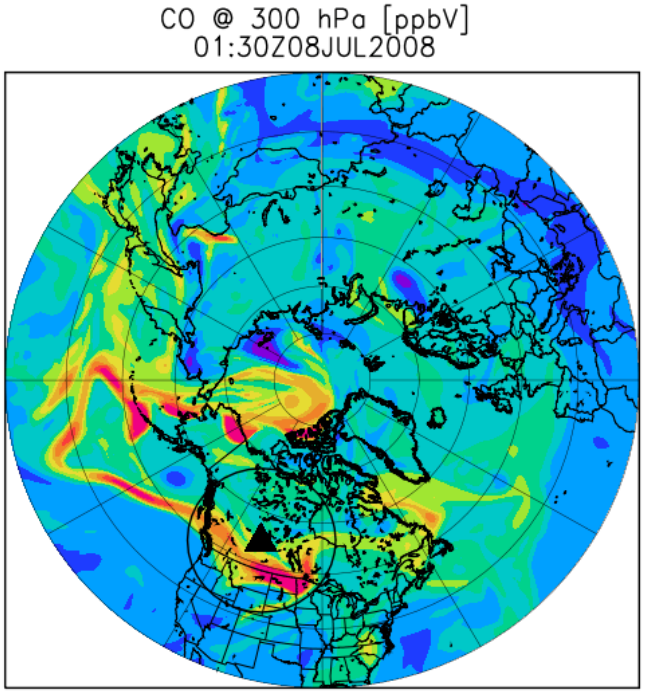


5-day Animation for CO (00Z)

500 mb

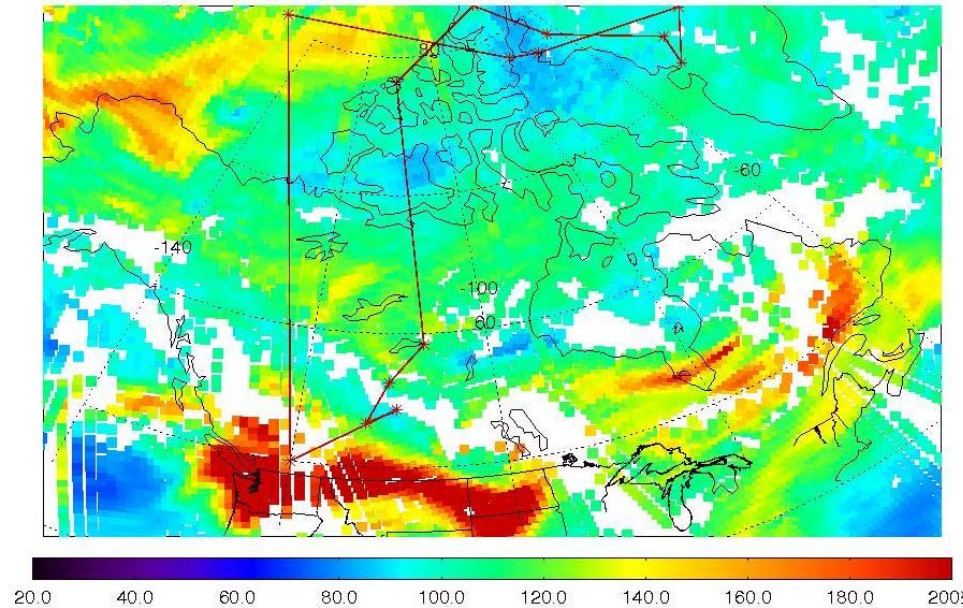


300 mb

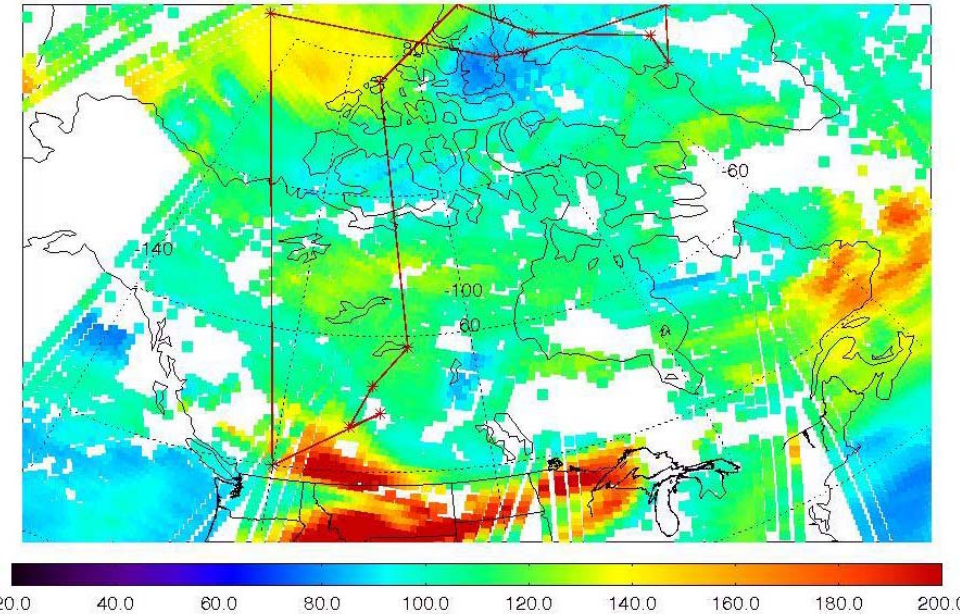


AIRS Support for ARCTAS

AIRS CO VMR (ppbv) at 500mb on 20080707 for ARCTAS

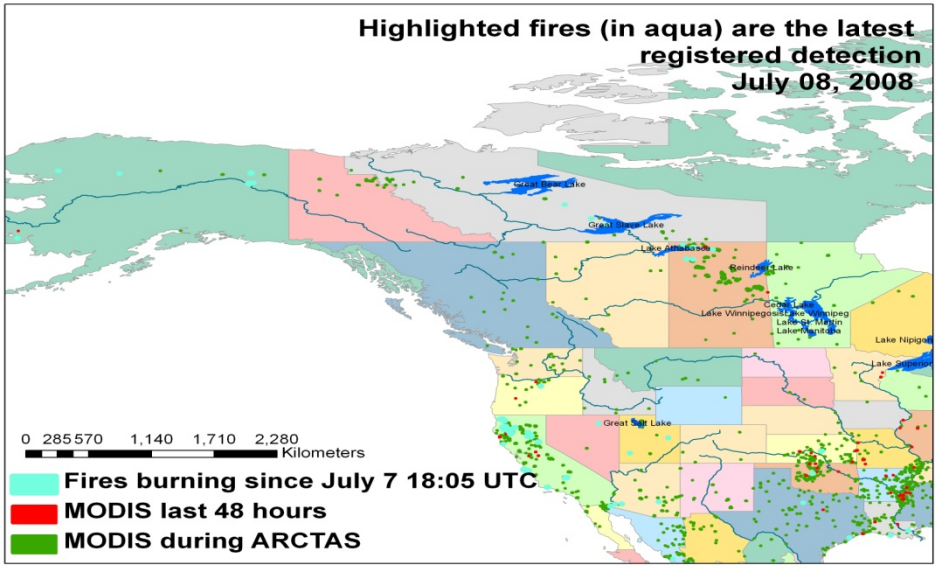


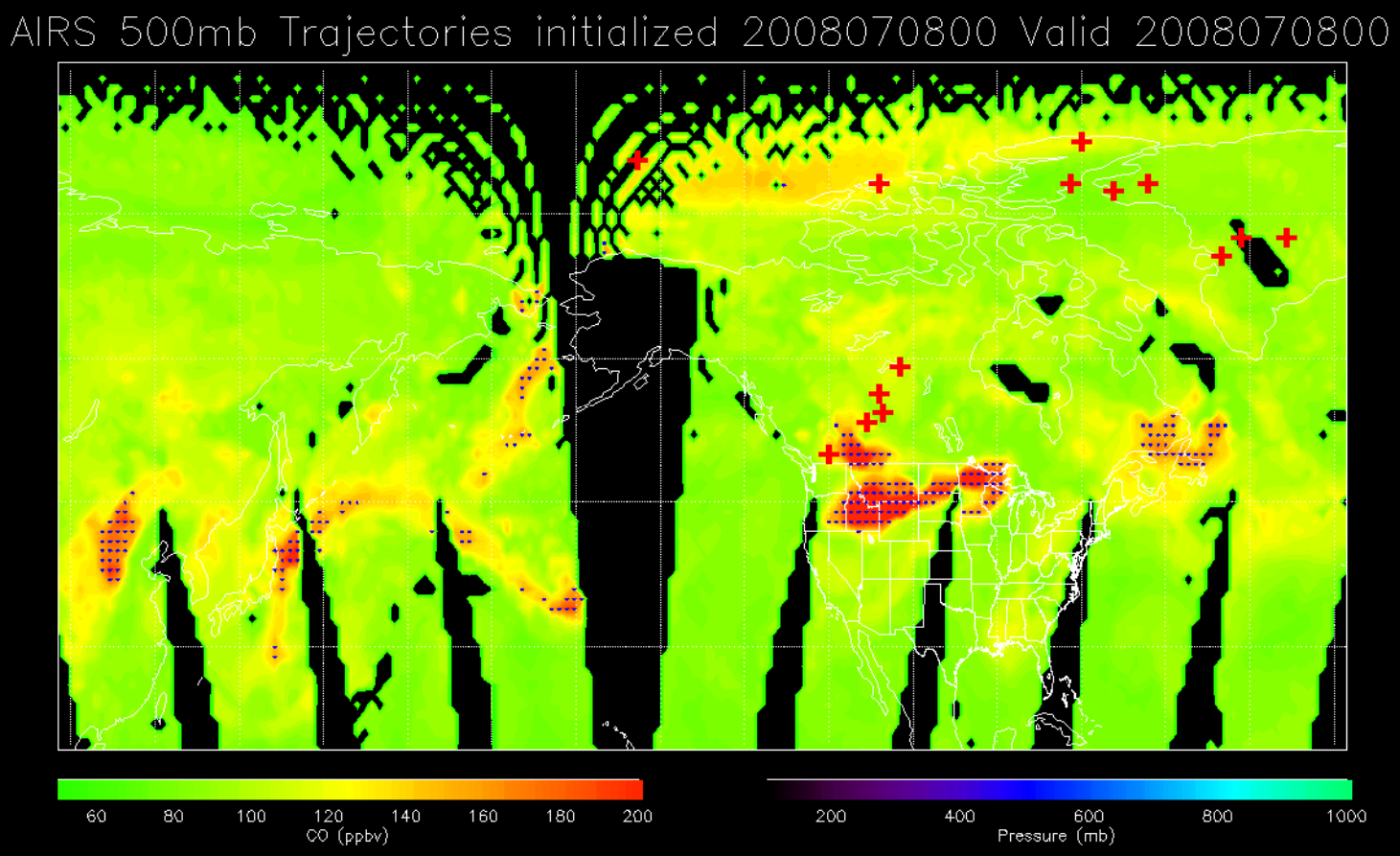
AIRS CO VMR (ppbv) at 500mb on 20080708 for ARCTAS



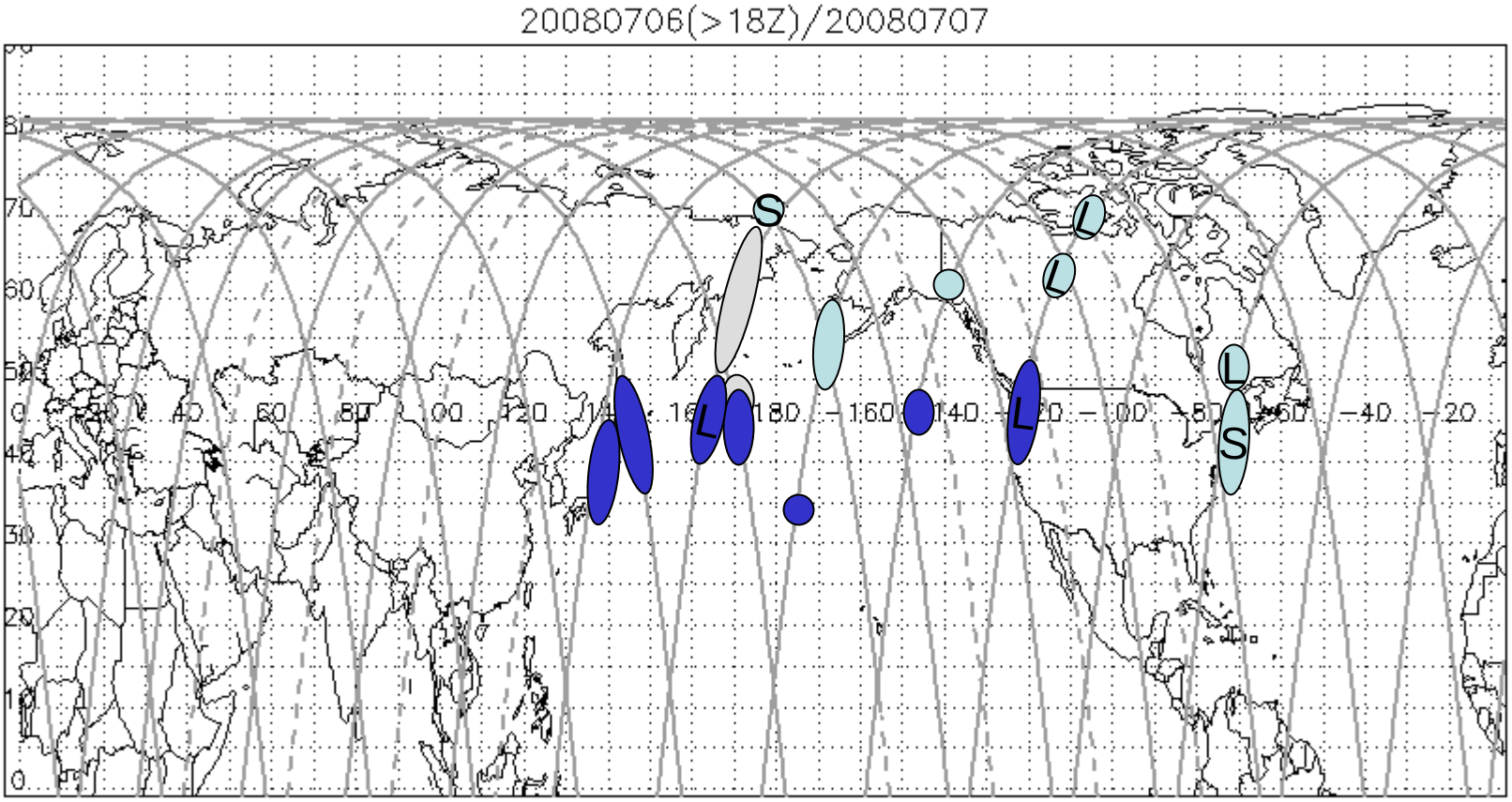
ACKNOWLEDGEMENT: AIRS NRT products by NASA DAAC

- Long-range transported plumes show high CO due to dynamical uplifting.
- High CO below Hudson Bay may be a mixed transport and local fire emissions.
- Some signatures of Alaskan fire emission, but too low in altitude to show strongly.




AIRS 500mb Trajectories initialized 2008070800 Valid 2008070800
60
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)

Aerosol Layer Locations based on CALIPSO Observations on 7/7



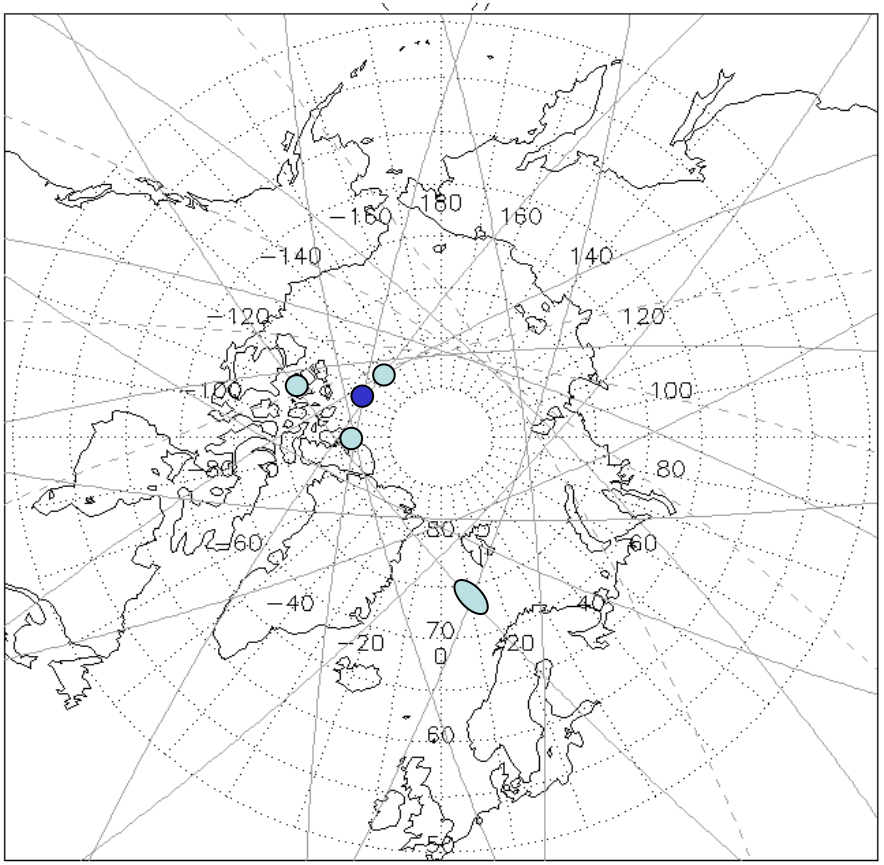
Cloud

Aerosol Layer- low aerosol loading

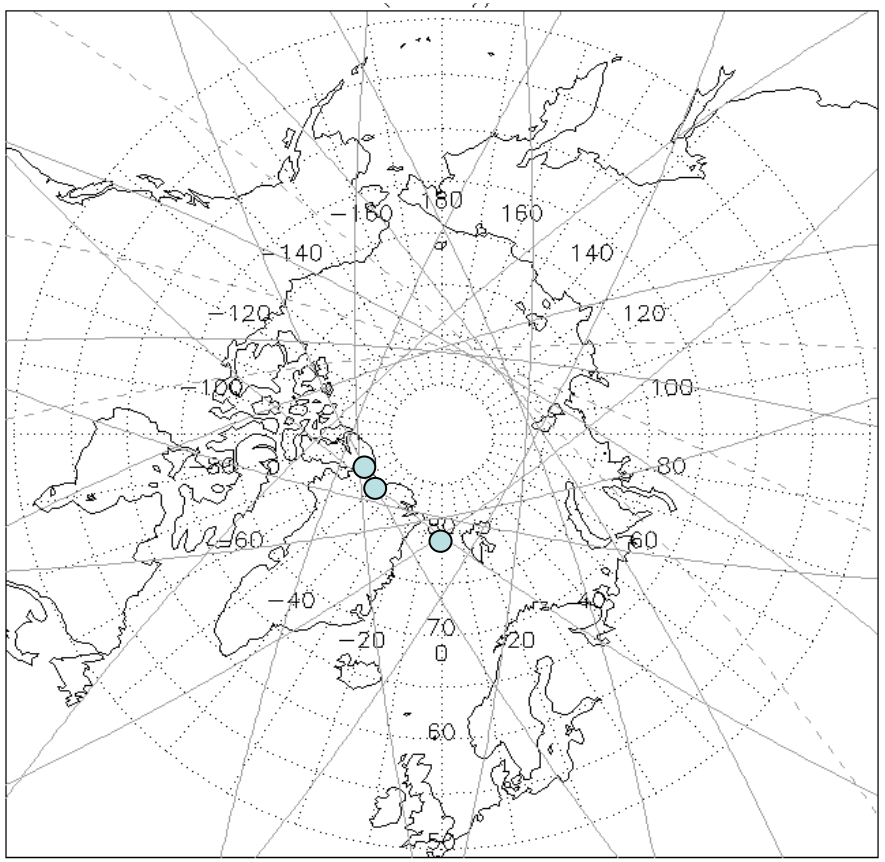
Aerosol Layer- medium aerosol loading

Aerosol Layer- high aerosol loading

7/6/2008

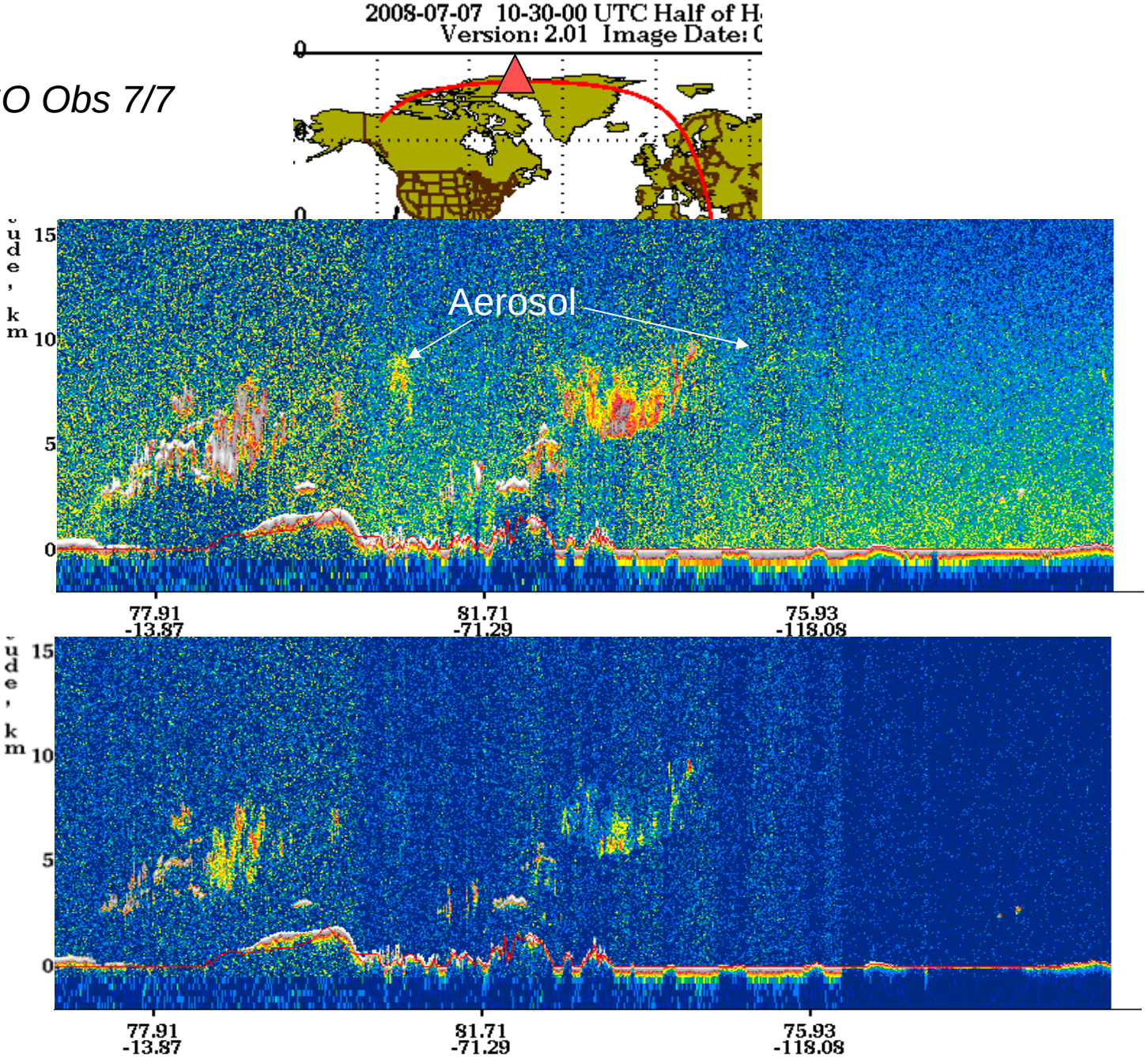


7/7/2008

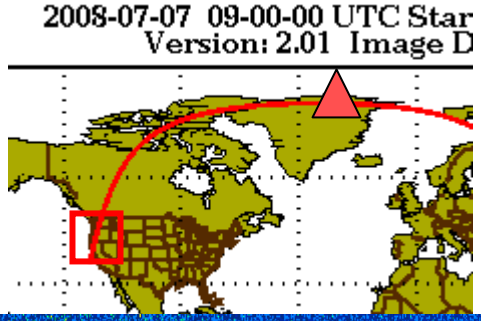


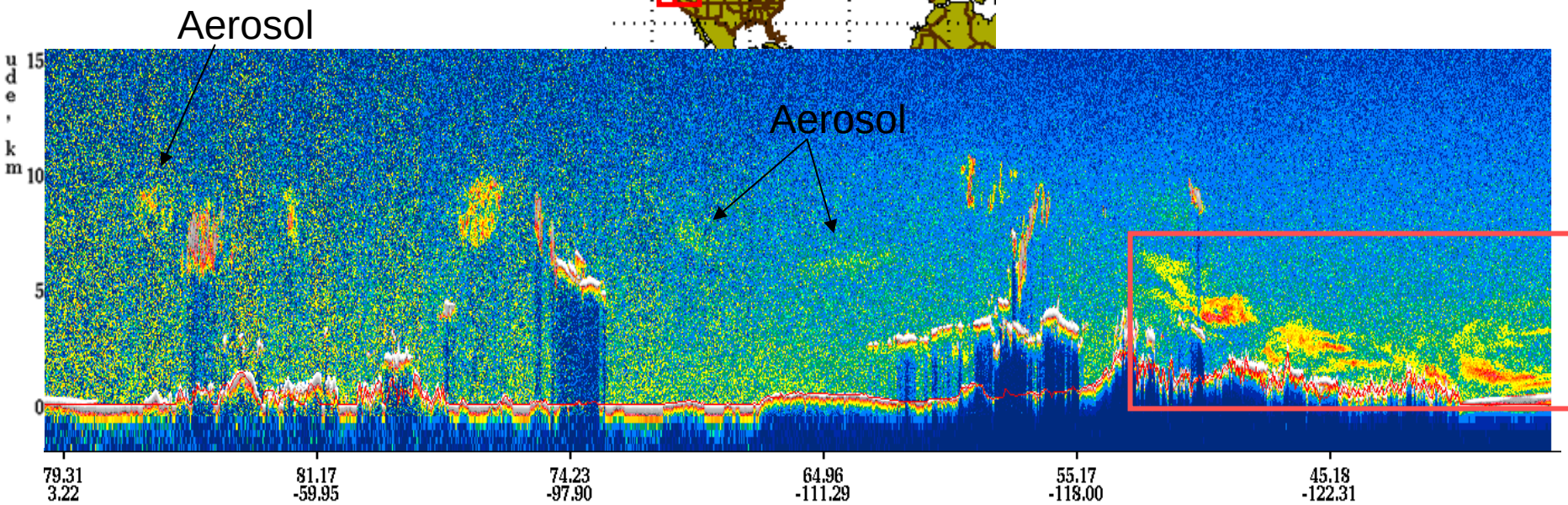
Aerosol Layer Height
~ 8-10km

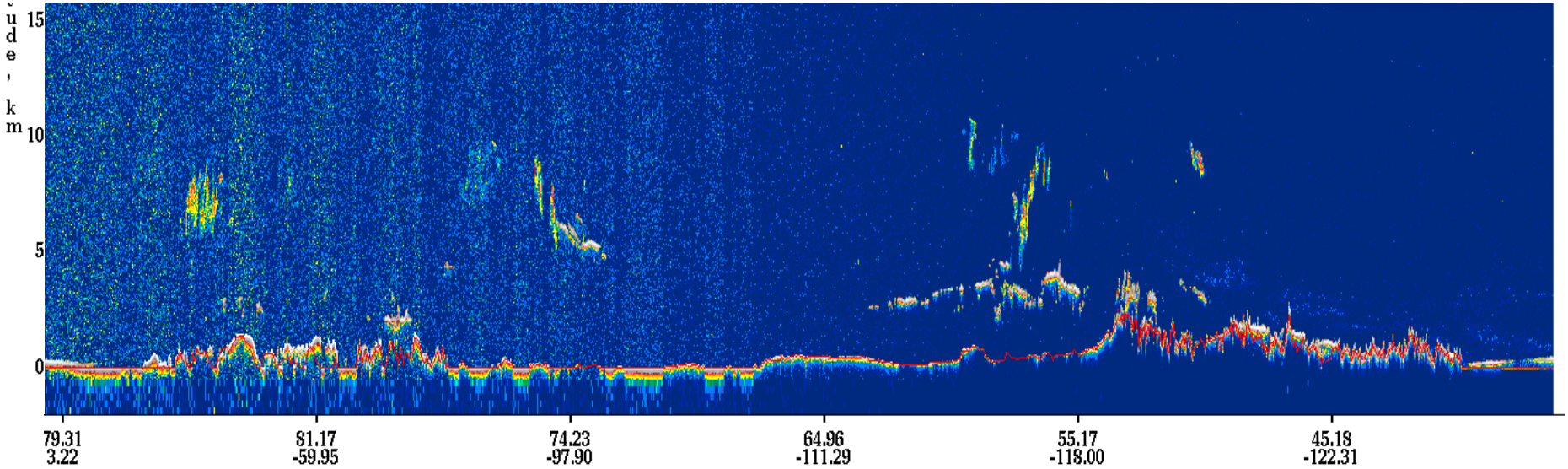
CALIPSO Obs 7/7



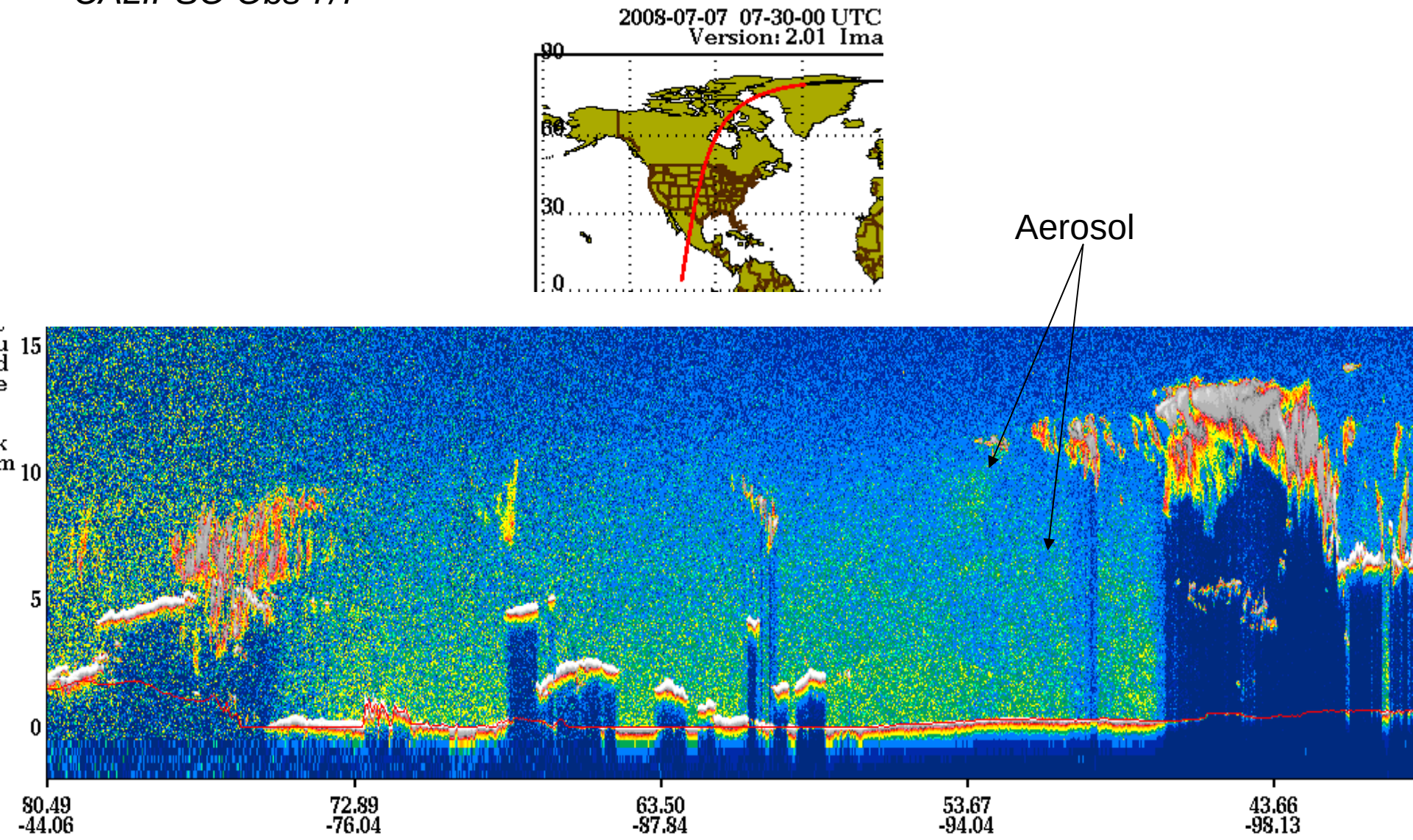
CALIPSO Obs 7/7







CALIPSO Obs 7/7



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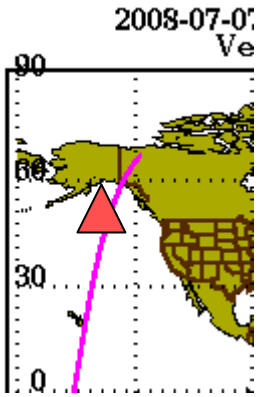
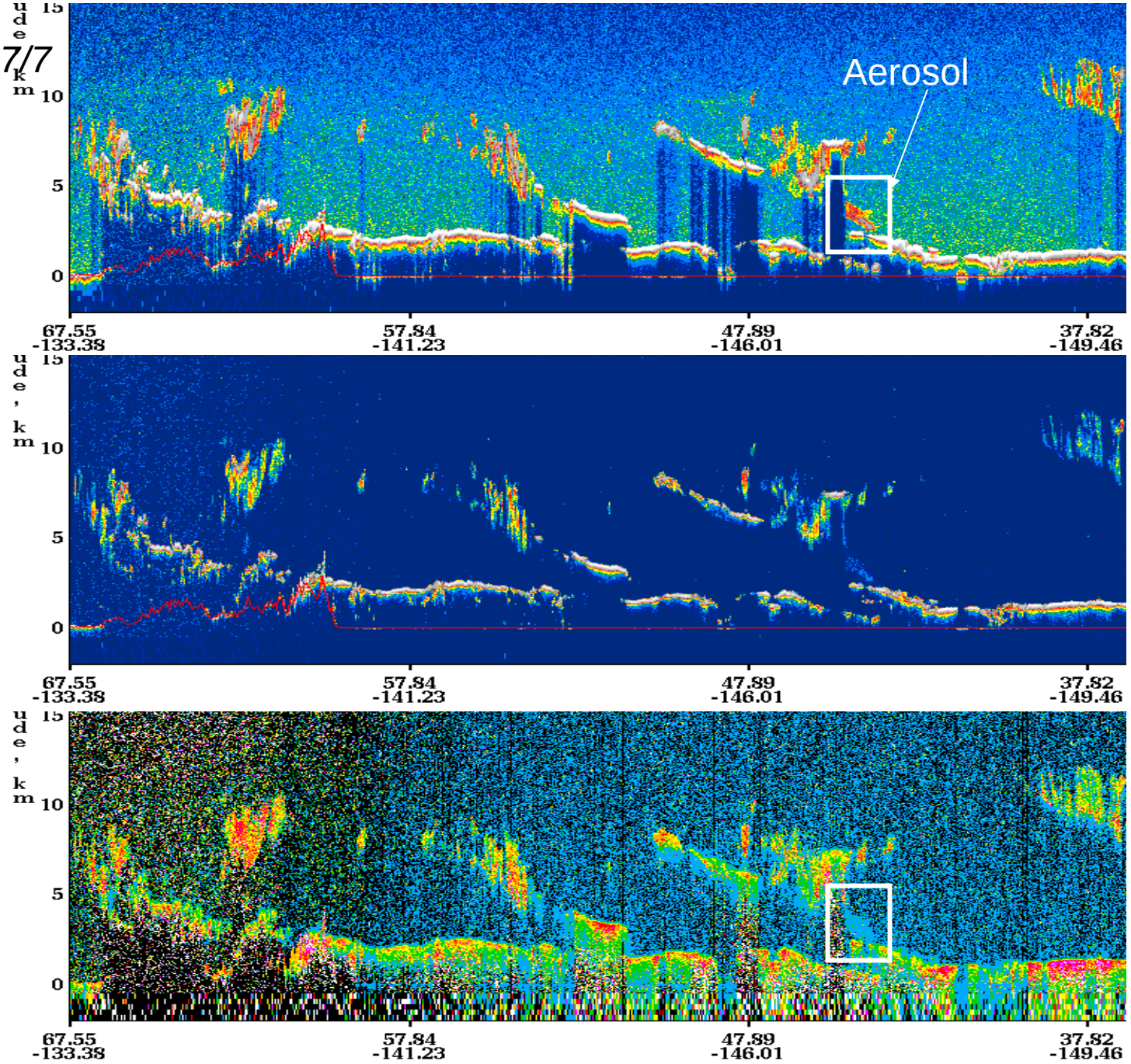
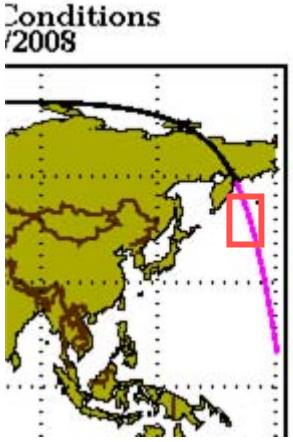
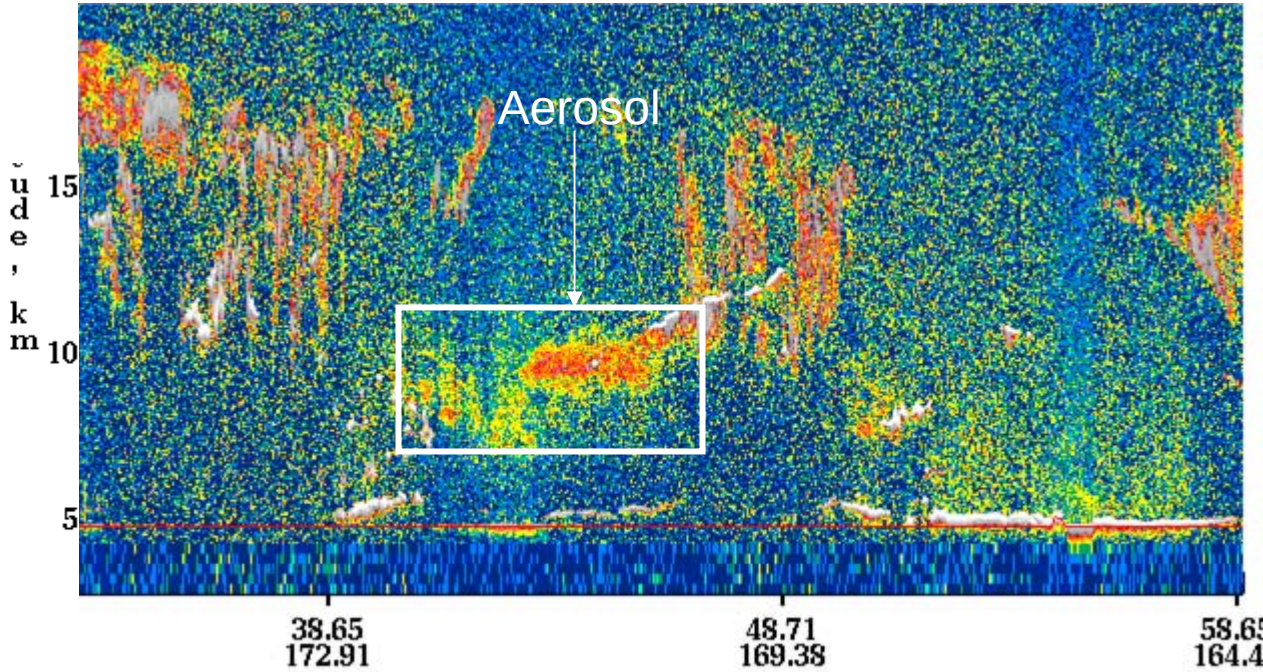


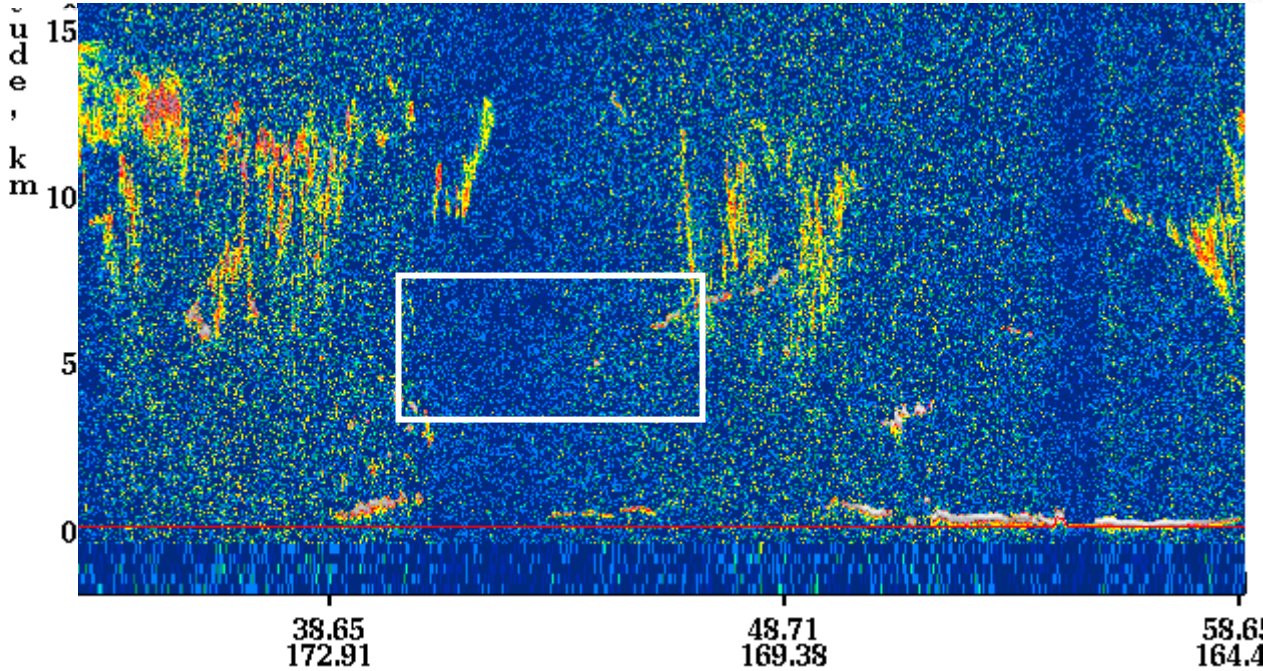


CALIPSO Obs 7/7

1:30Z

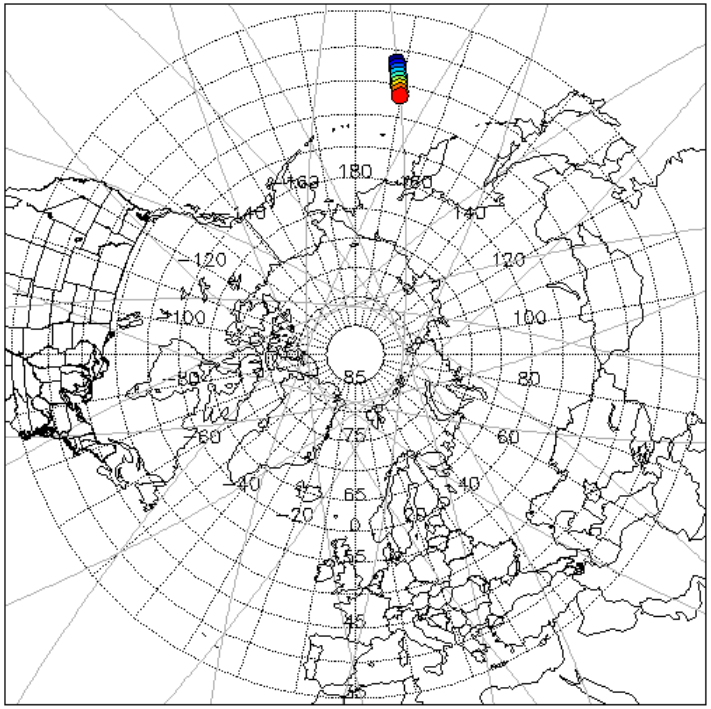




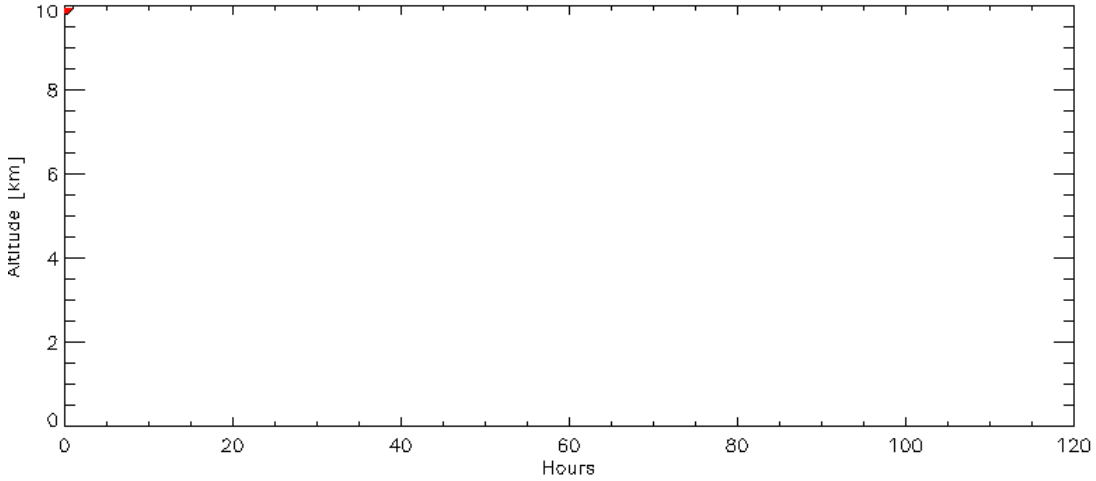


0hr CALIPSO Trajectories Initialized 2008070700 Valid 2008070700

Initial Altitude: 10000m

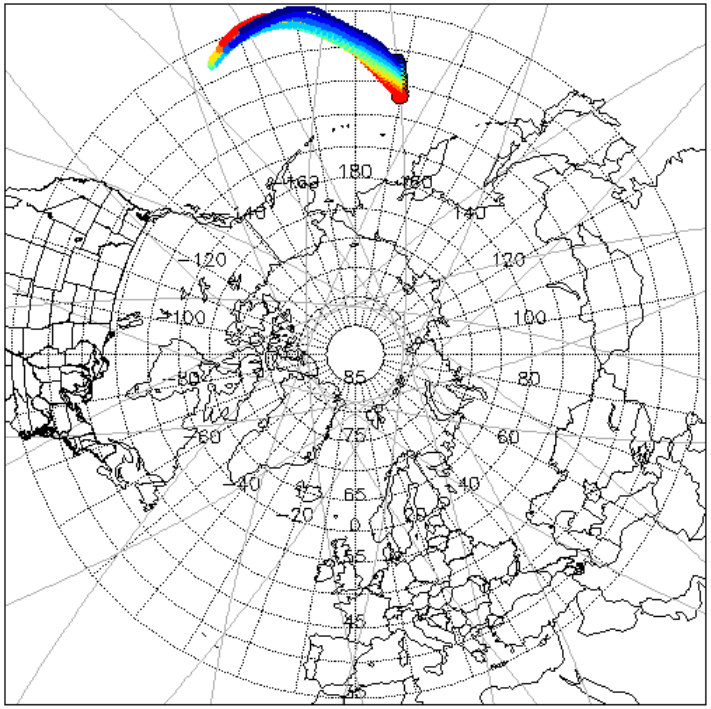


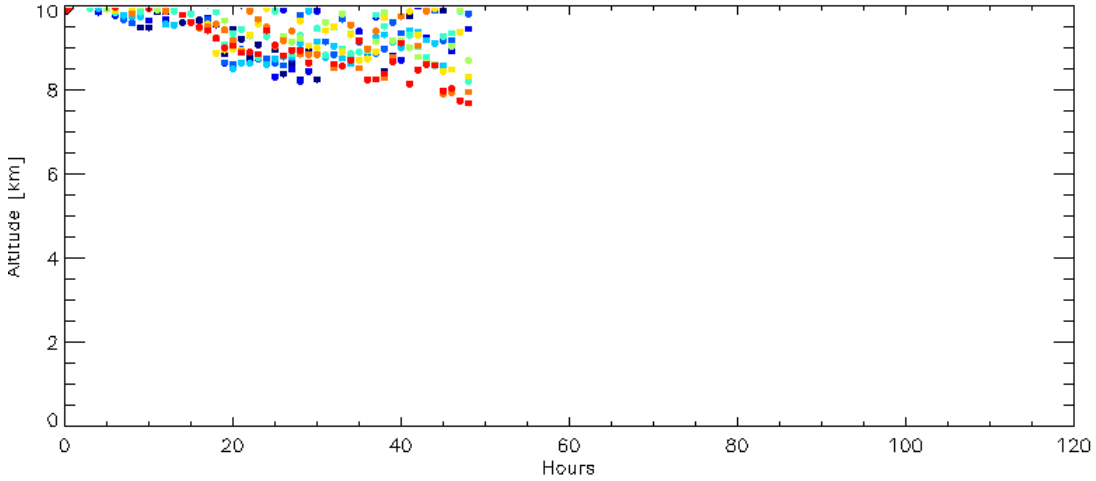
Trajectory Analysis provided by
Brad Pierce (NOAA/NESDIS)



48hr CALIPSO Trajectories Initialized 2008070700 Valid 2008070900

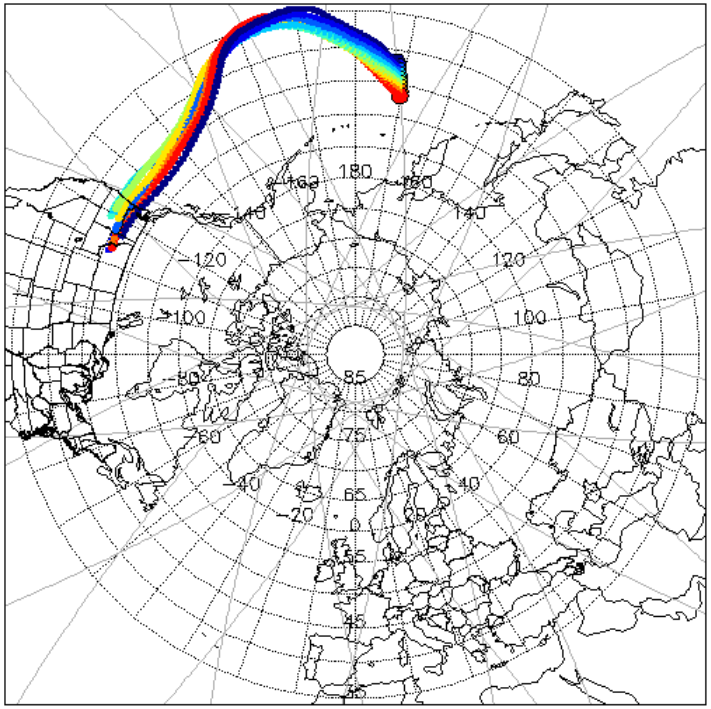
Initial Altitude: 10000m

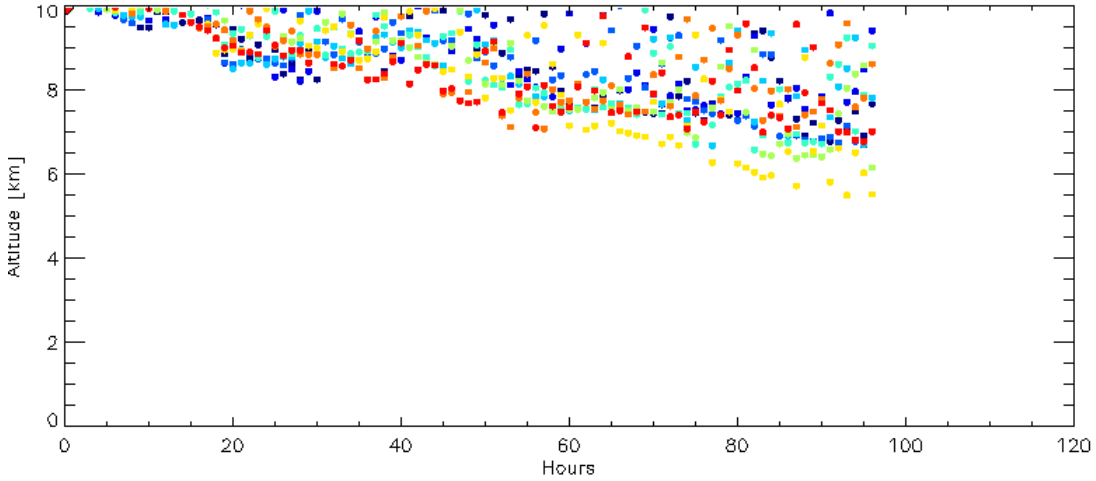




96hr CALIPSO Trajectories Initialized 2008070700 Valid 2008071100

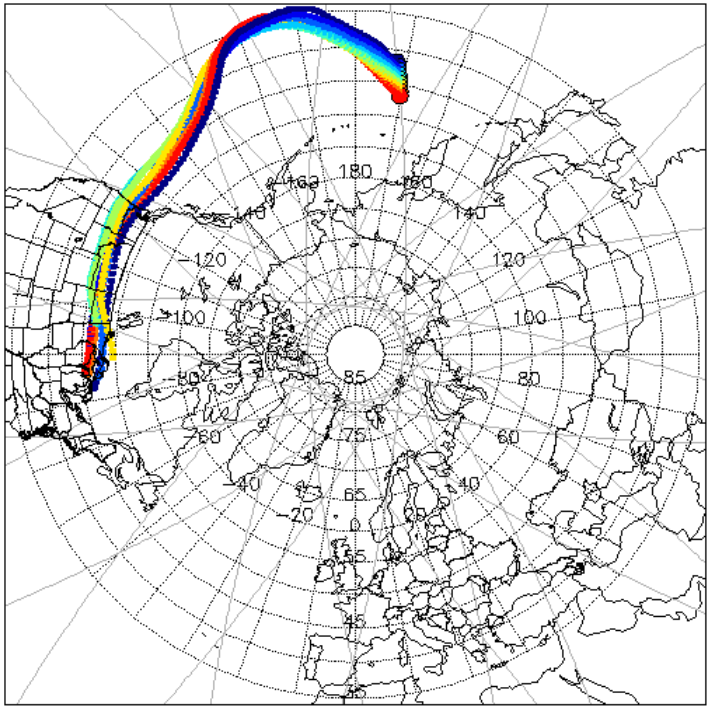
Initial Altitude: 10000m

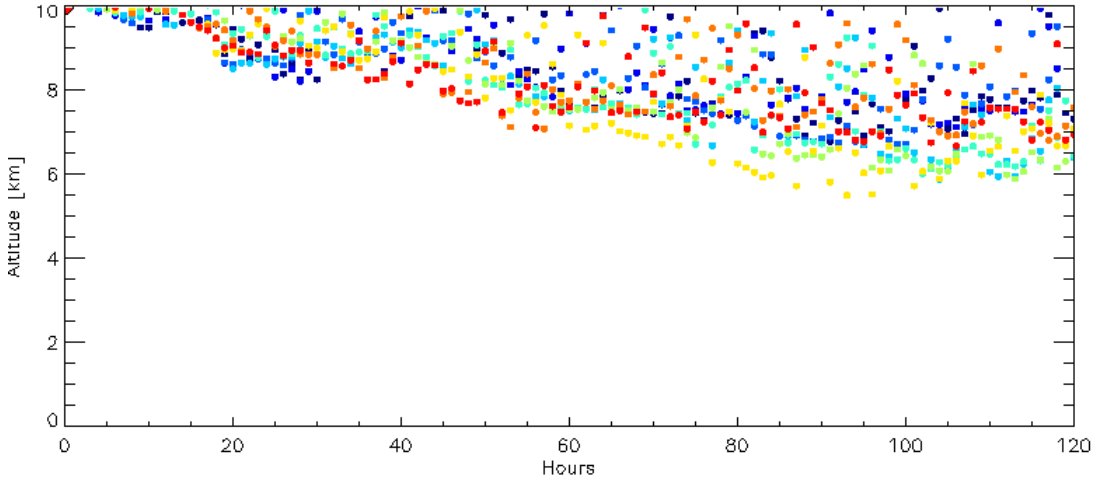


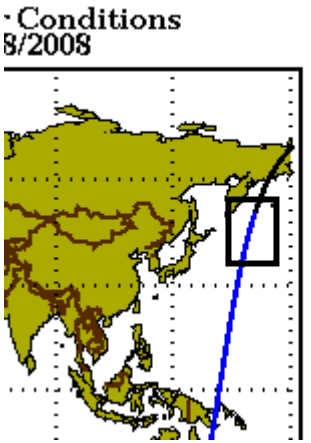
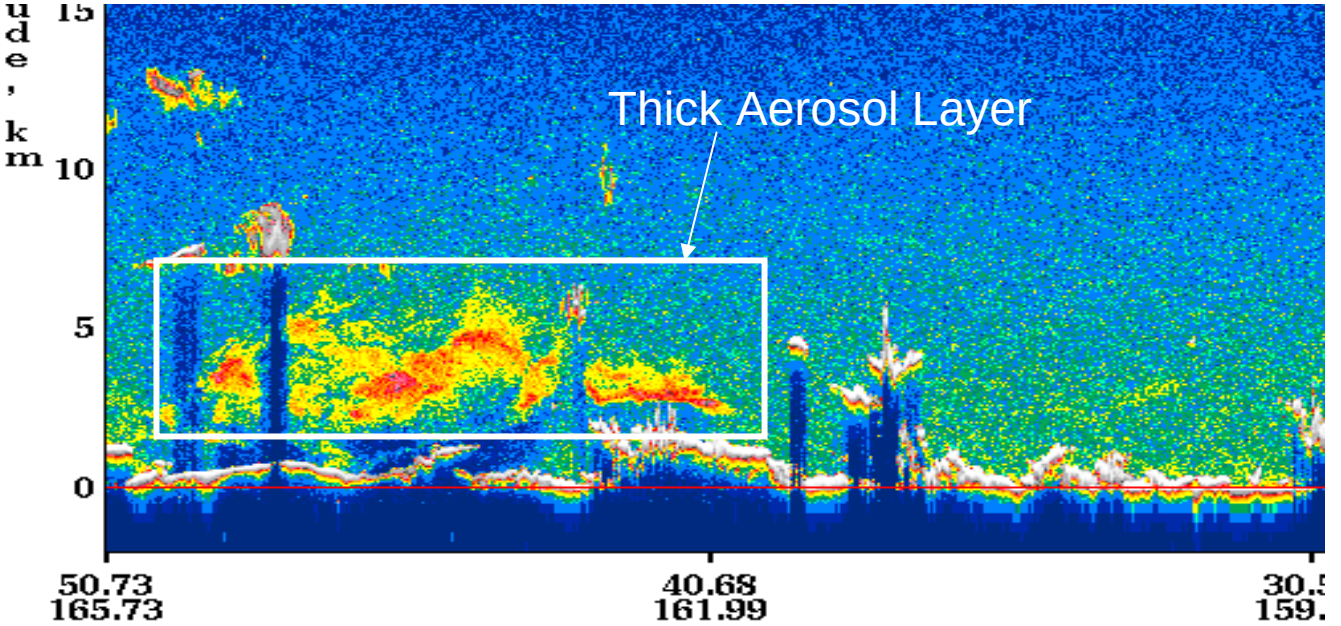
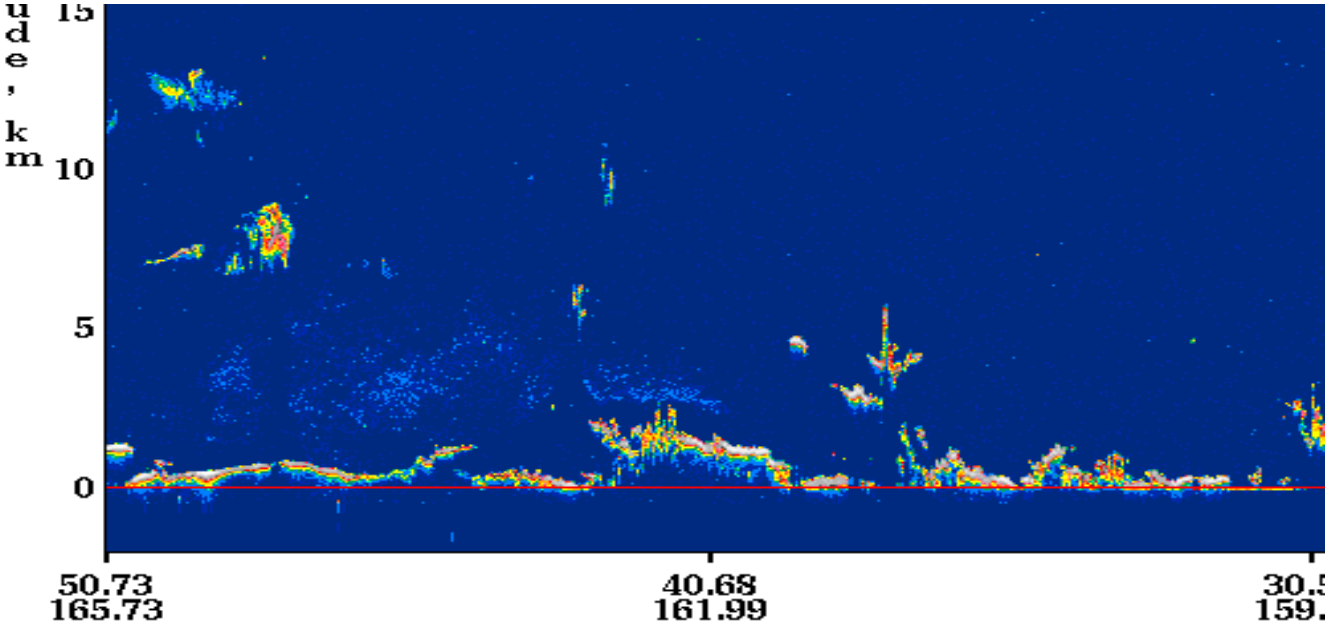


120hr CALIPSO Trajectories Initialized 2008070700 Valid 2008071200

Initial Altitude: 10000m





CALIPSO Obs 7/7

15Z