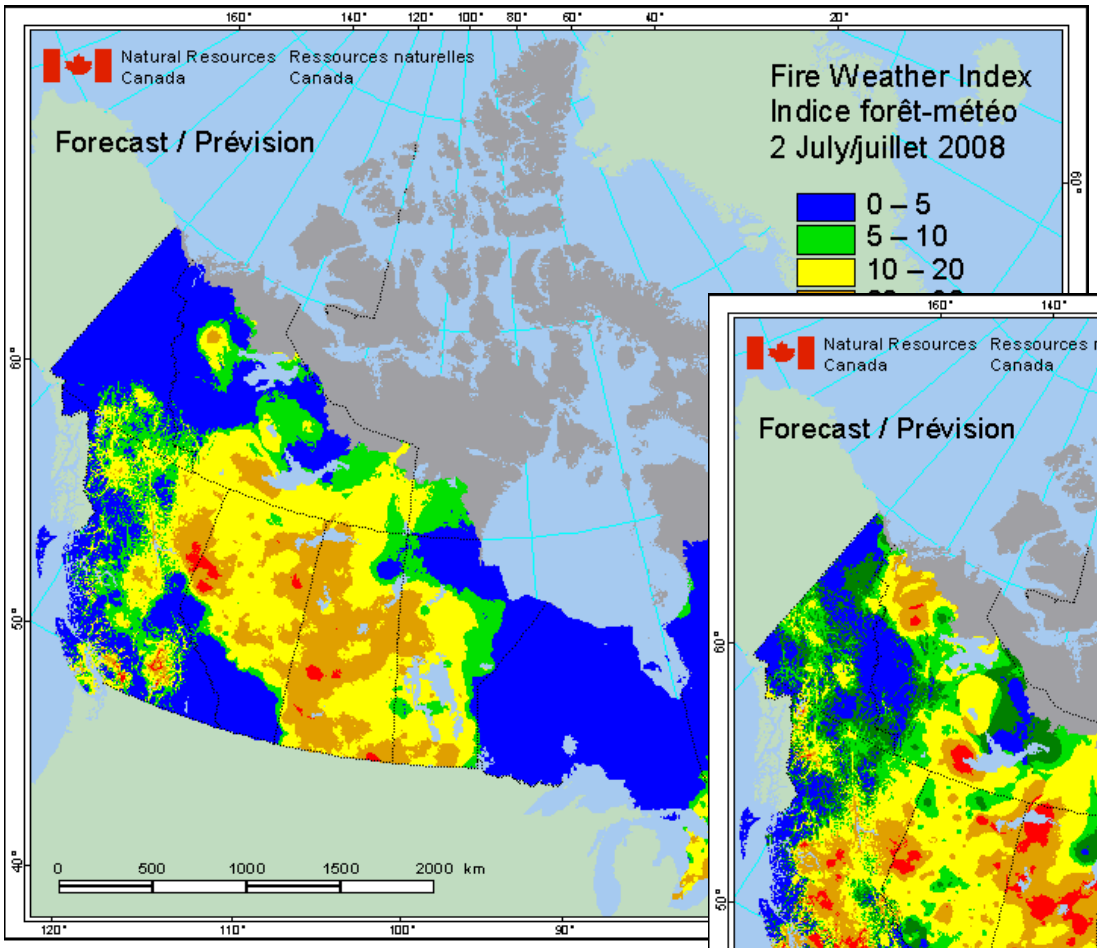
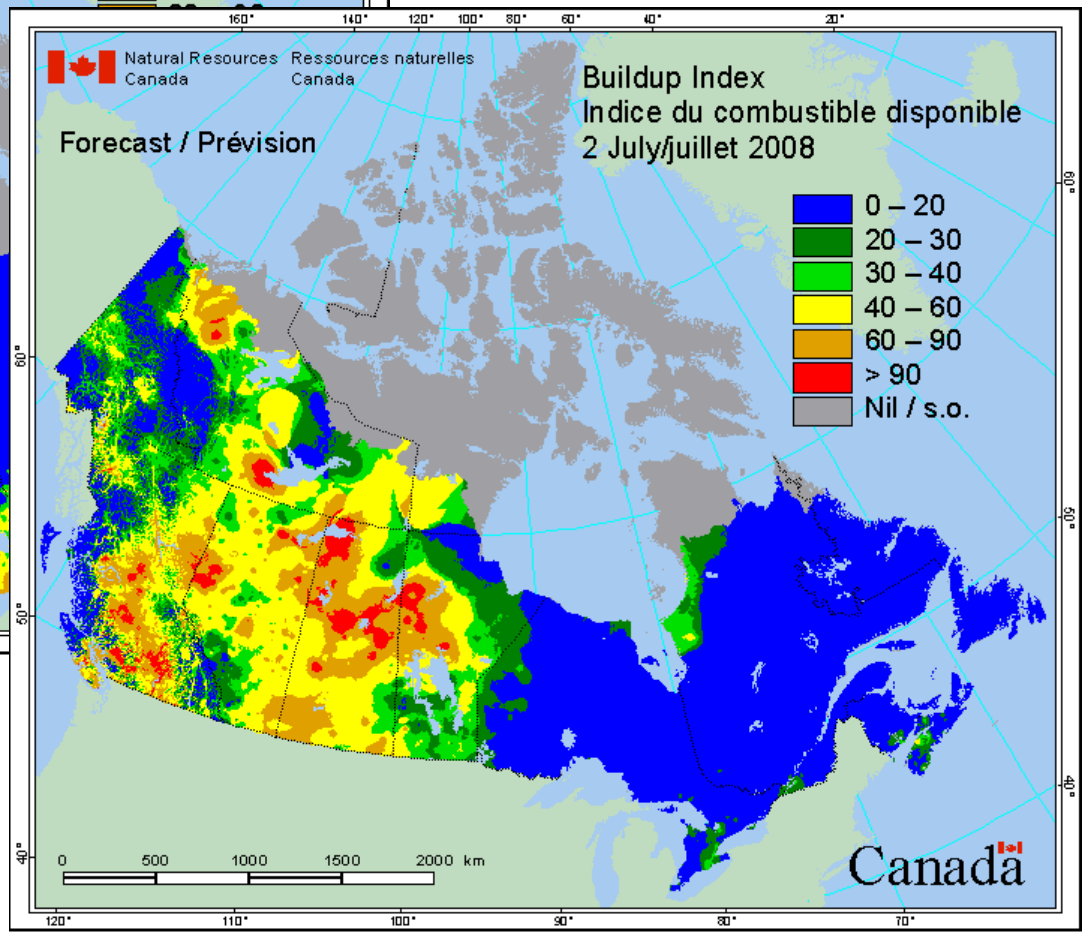
July 2 Fire Situation

- 400,000 ha in SK to date
- 45 active fires
- Scattered showers yesterday not a factor
- Fire potential remains high
- Fire danger building until cold front passage late in the week

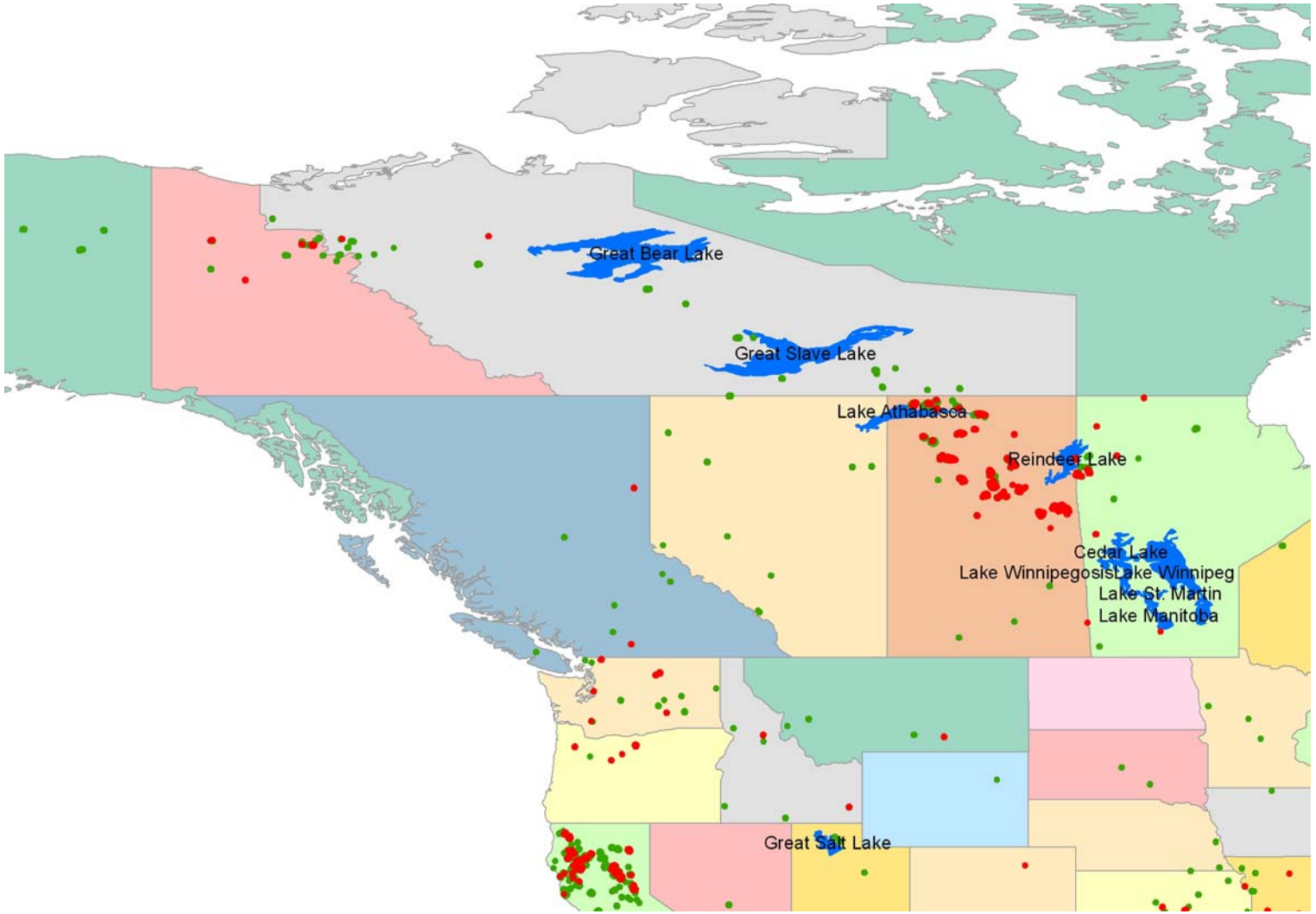

Natural Resources Canada
Ressources naturelles Canada
Forecast / Prévision
Fire Weather Index
Indice forêt-météo
2 July/juillet 2008
0 – 5
5 – 10
10 – 20
0 500 1000 1500 2000 km

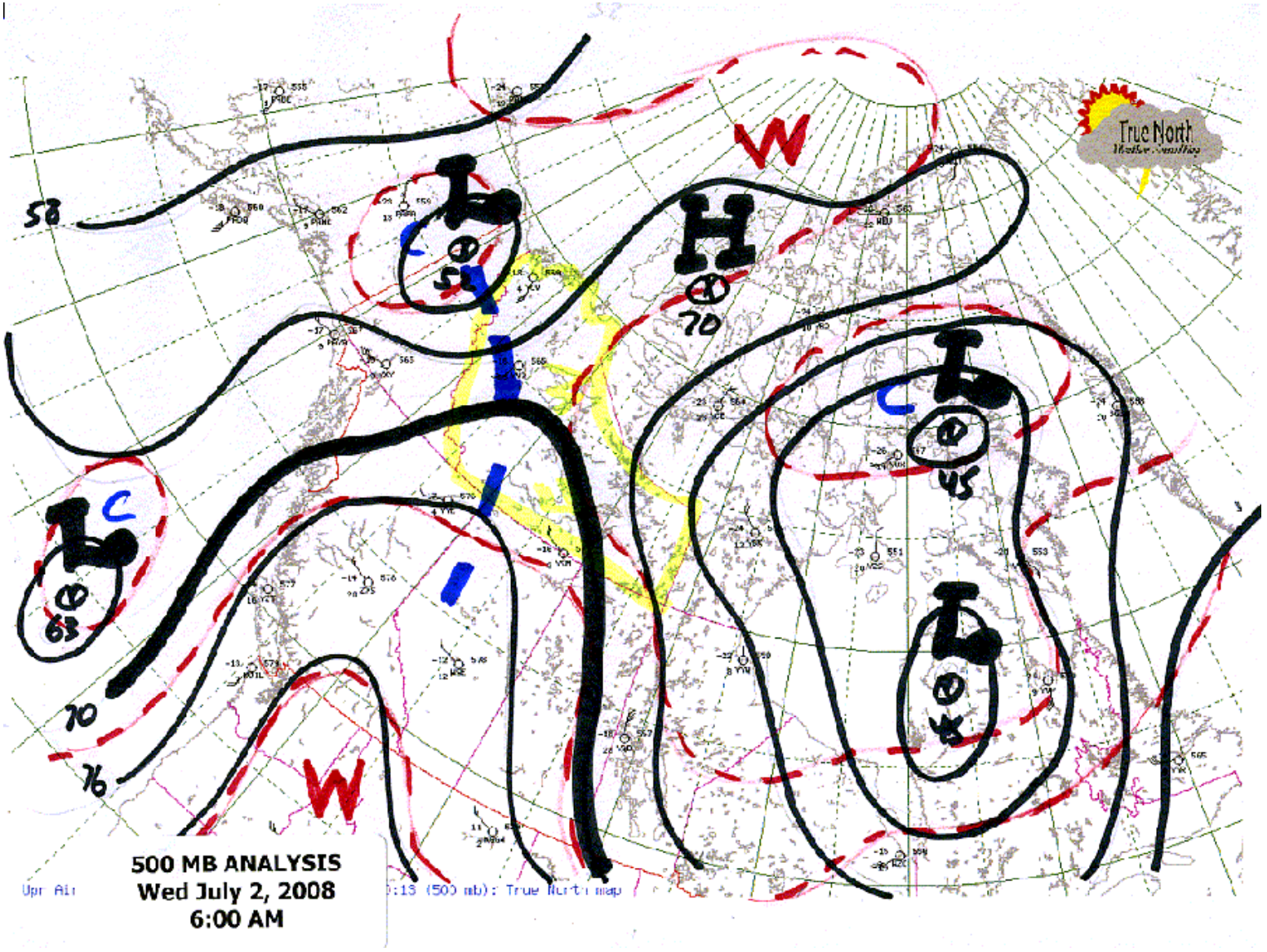

Natural Resources Canada
Ressources naturelles Canada
Forecast / Prévision
Buildup Index
Indice du combustible disponible
2 July/juillet 2008
0 – 20
20 – 30
30 – 40
40 – 60
60 – 90
> 90
Nil / s.o.
0 500 1000 1500 2000 km
Canada

Daily Fire/Wx Outlook

- July 2: Nrn AB, SK, Western MB (especially eastern SK – Pelican Narrows). Keep an eye on the Norman Wells fire as well today and tomorrow
- July 3: Nrn AB, SK, Western MB
- July 4: Srn NWT, Nrn AB, SK and MB
- July 5: SK and MB (especially Ern SK and MB) though it depends on the timing of the trough
- July 6: NW ON, Nrn AB and Srn NWT
- July 7: Srn NWT, Nrn AB, SK
- July 8 SK, MB, NWRN ON
- July 9 Ern SK, MB, NWRN ON

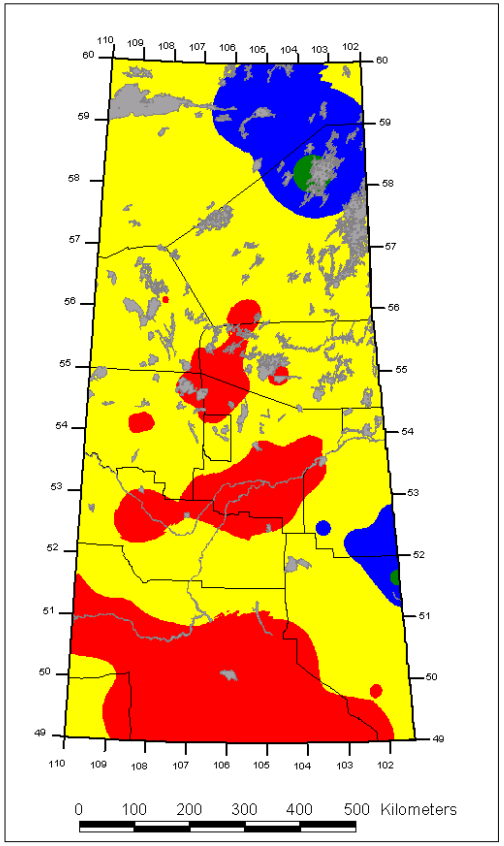
- Friday - Saturday options for the DC-8…depends on the timing on the trough and the location of interest. For Pelican Narrows right now it looks like Saturday is the best day.


Great Bear Lake
Great Slave Lake
Lake Athabasca
Reindeer Lake
Cedar Lake
Lake Winnipegosis
Lake Winnipeg
Lake St. Martin
Lake Manitoba
Great Salt Lake


True North
500 MB ANALYSIS
Wed July 2, 2008
6:00 AM

Saskatchewan

Spatial Fire Management System



N
W E
S

Noon Actuals issued on 1 Jul 2008

Fire Weather Index
- 0 - 5 / LOW
- 6 - 16 / MODERATE
- 17 - 30 / HIGH
- 30 + / EXTREME

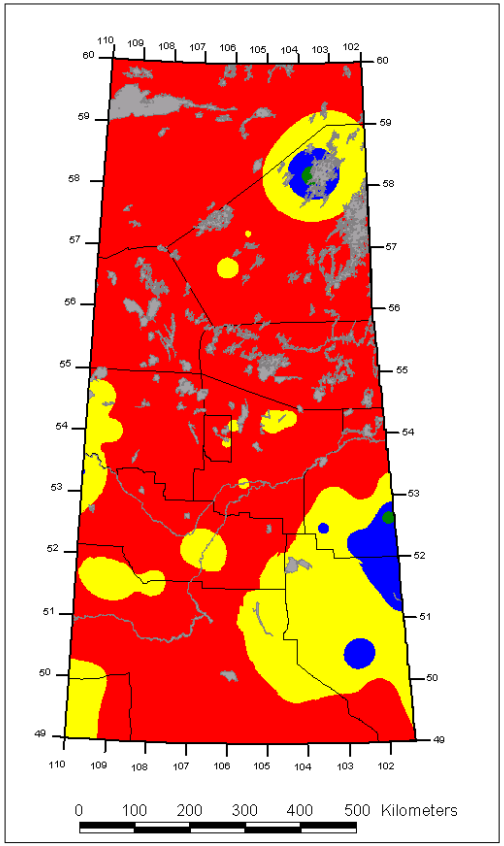
Prepared By:

Ministry of
Saskatchewan Environment
Fire Management and
Forest Protection Branch

GIS Services

Saskatchewan

Spatial Fire Management System



N
W E
S

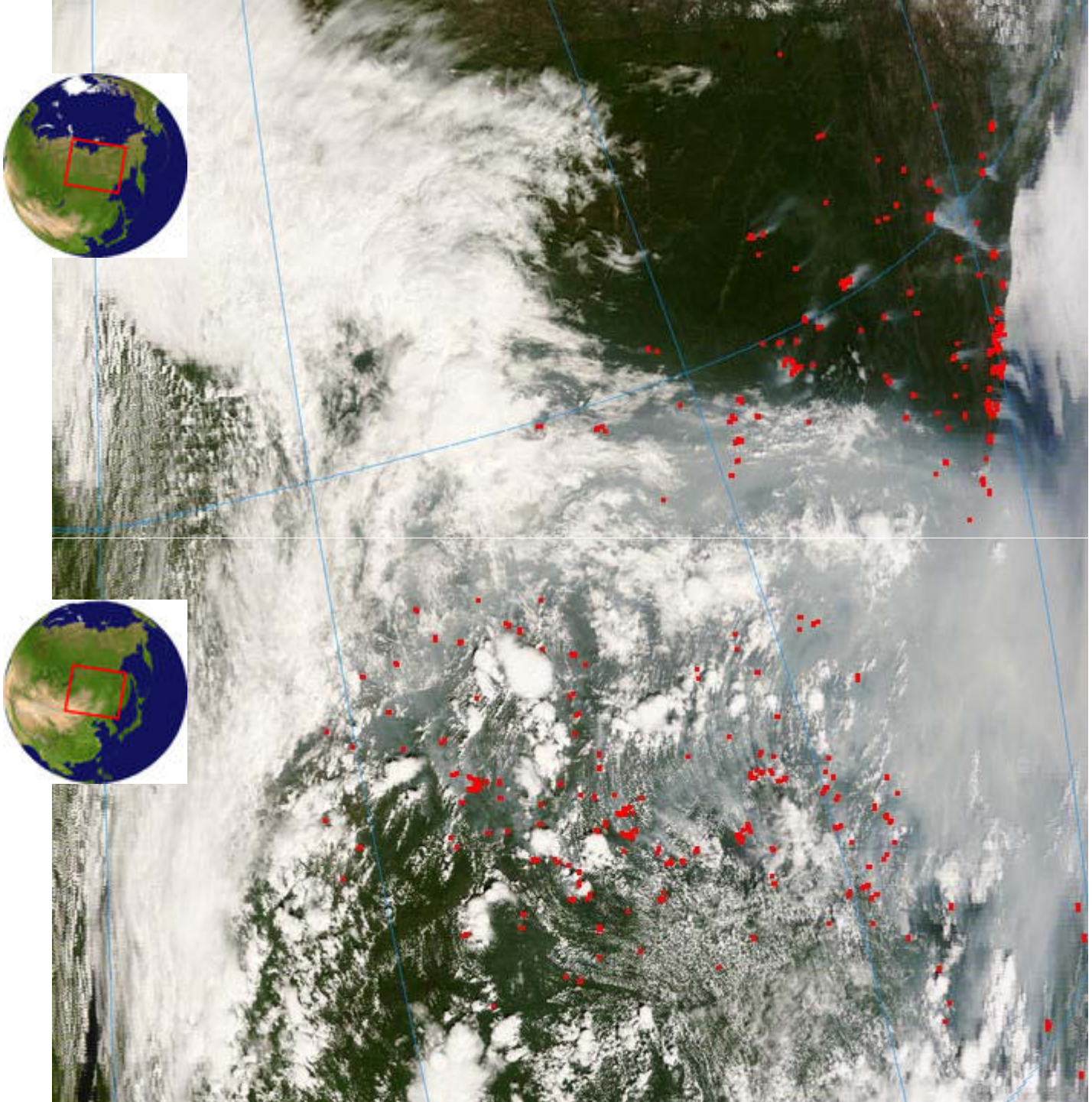
Noon Actuals issued on 1 Jul 2008

Buildup Index
- 0 - 24
- 25 - 40
- 41 - 60
- 60 +

Prepared By:

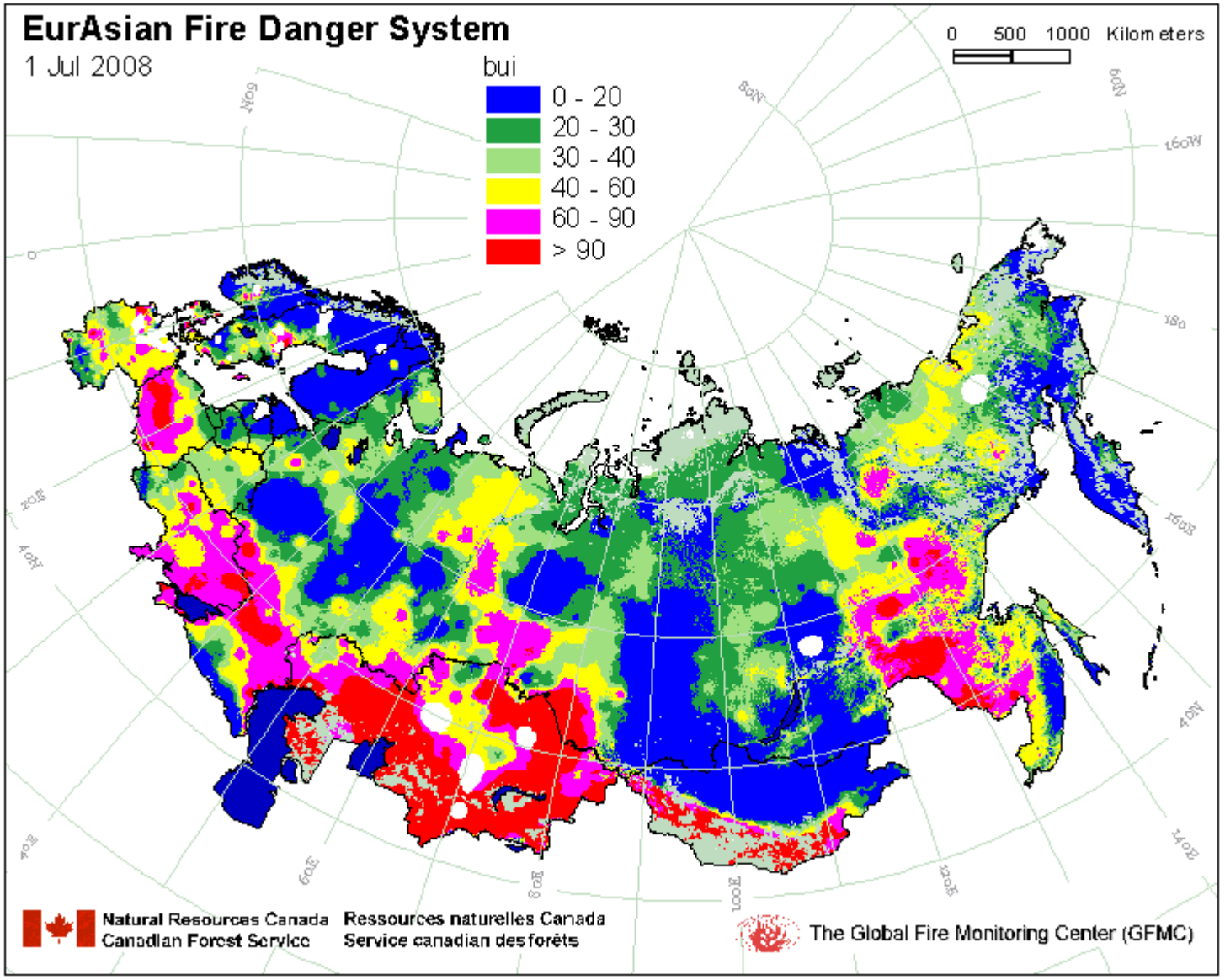
Ministry of
Saskatchewan Environment
Fire Management and
Forest Protection Branch

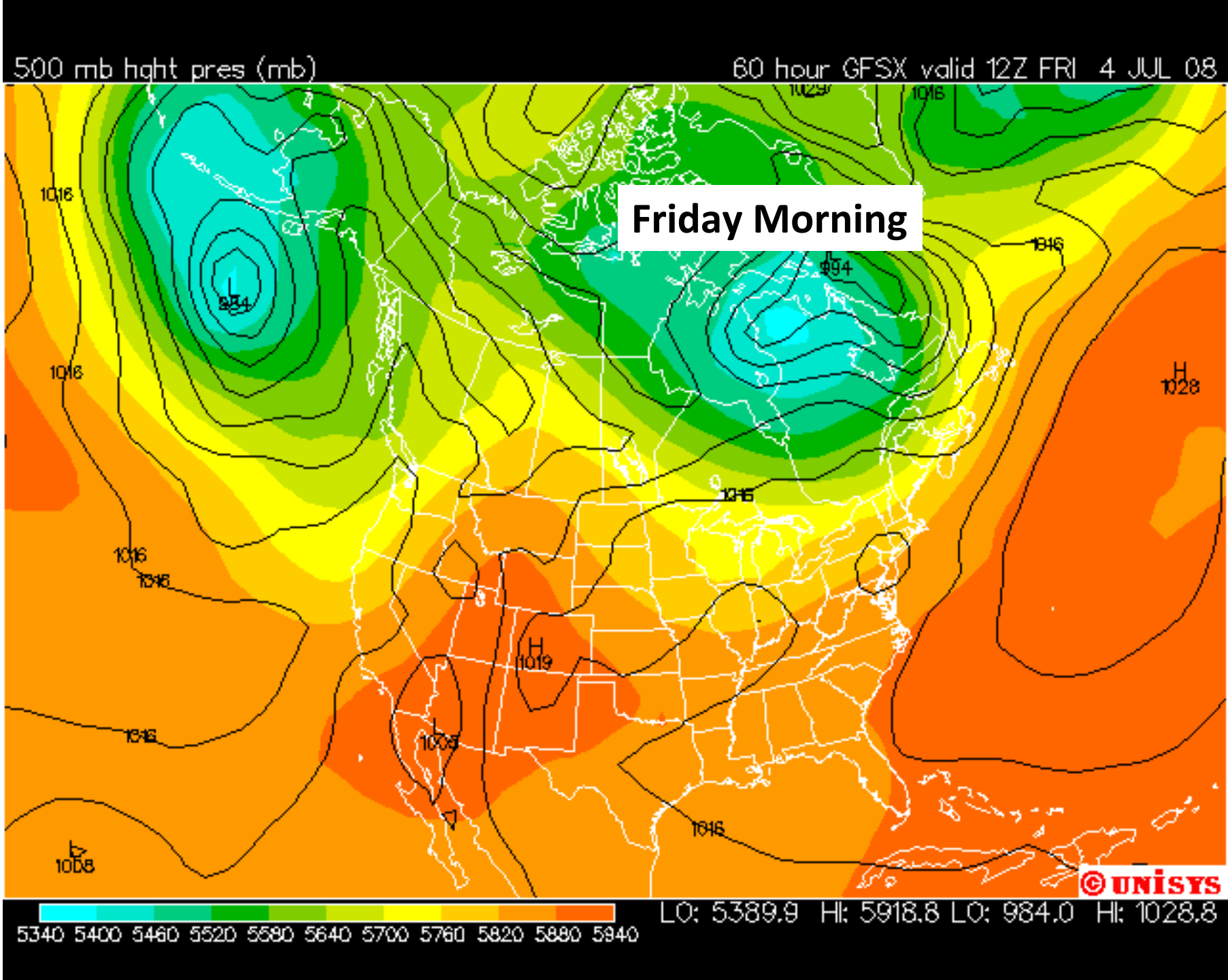
GIS Services



MODIS Terra
July 02 2008
2:55 UTC

3:00 UTC


EurAsian Fire Danger System
1 Jul 2008
bui
0 - 20
20 - 30
30 - 40
40 - 60
60 - 90
> 90
0 500 1000 Kilometers
Natural Resources Canada
Canadian Forest Service
Ressources naturelles Canada
Service canadian des forêts
The Global Fire Monitoring Center (GFMC)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60 hour GFSX valid 12Z FRI 4 JUL 08
Friday Morning
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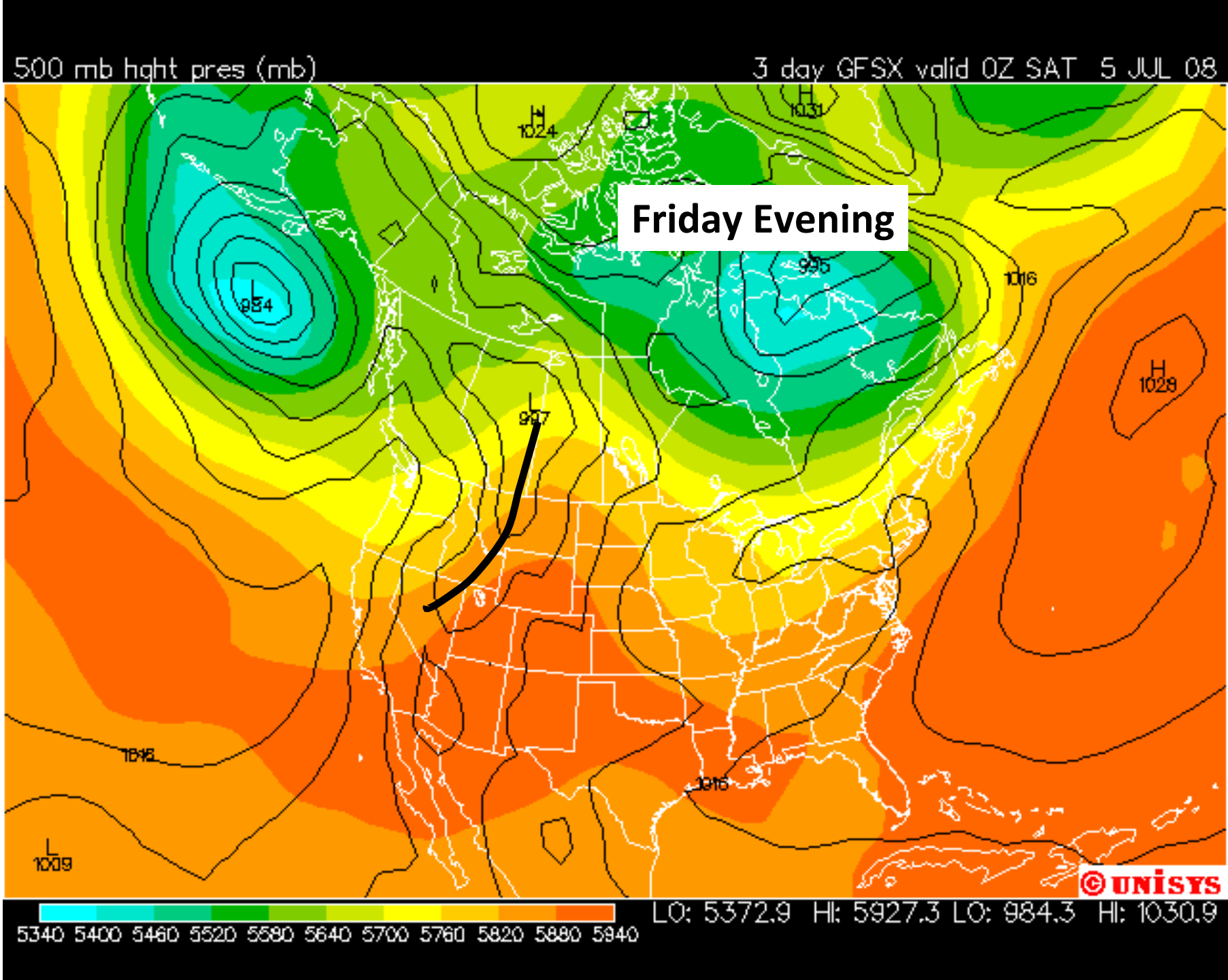
LO: 5389.9 HI: 5918.8 LO: 984.0 HI: 1028.8
©UNISYS


500 mb hght pres (mb)
3 day GFSX valid 0Z SAT 5 JUL 08
Friday Evening
1024
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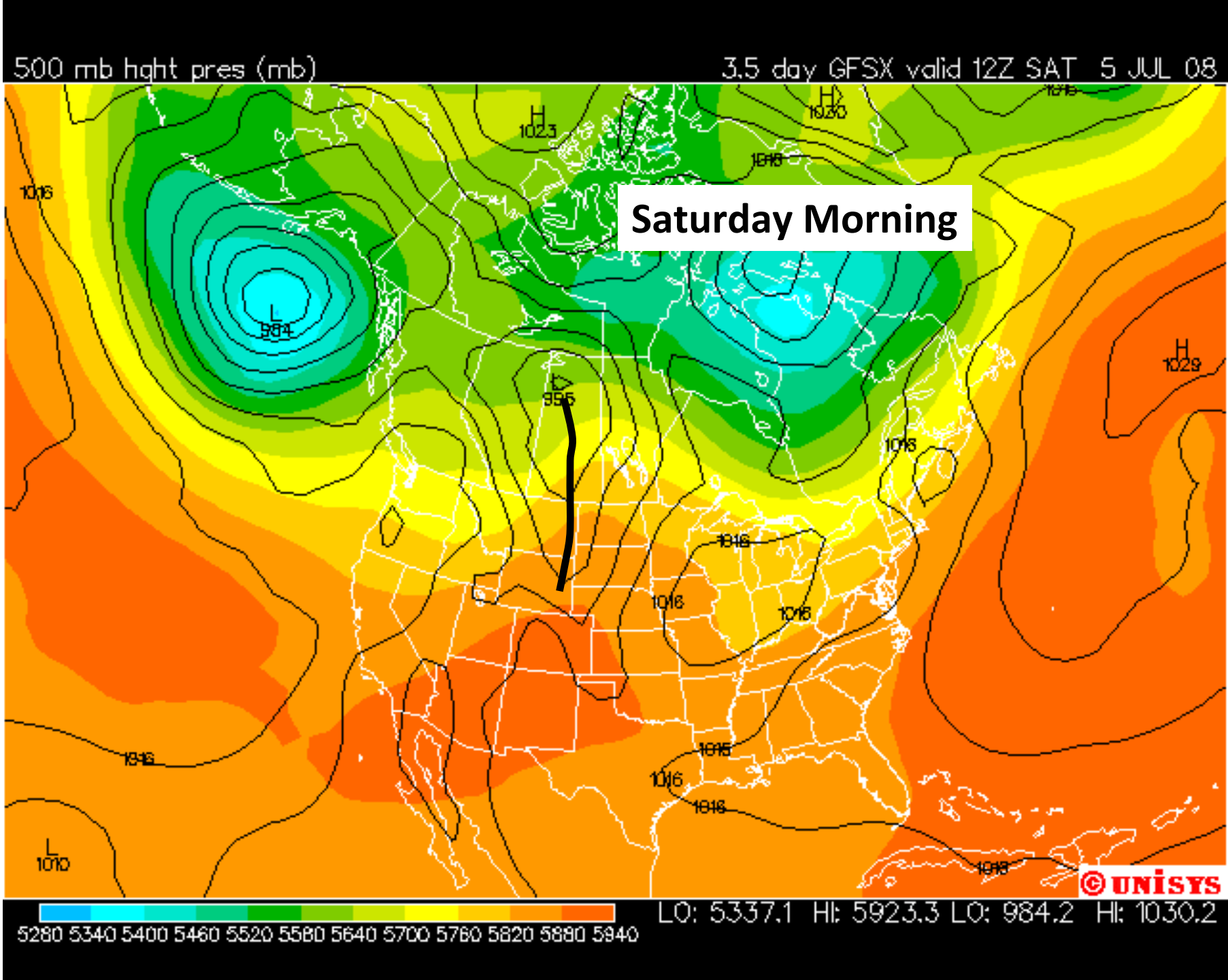
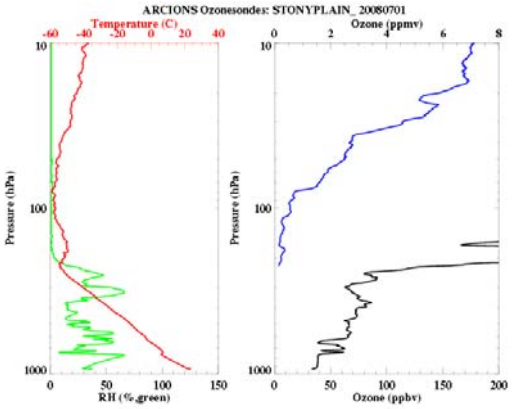
954
995
1016
1028
997
1012
1016
1009
©UNISYS
5340 5400 5460 5520 5580 5640 5700 5760 5820 5880 5940
LO: 5372.9 HI: 5927.3 LO: 984.3 HI: 1030.9

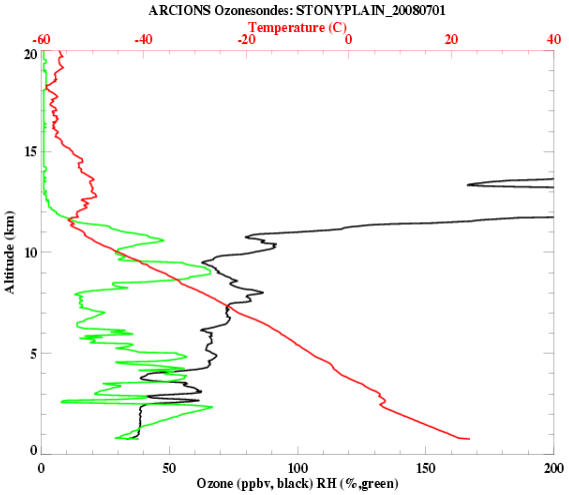

500 mb hght pres (mb)
3.5 day GFSX valid 12Z SAT 5 JUL 08
Saturday Morning
5280 5340 5400 5460 5520 5580 5640 5700 5760 5820 5880 5940
LO: 5337.1 HI: 5923.3 LO: 984.2 HI: 1030.2
©UNISYS

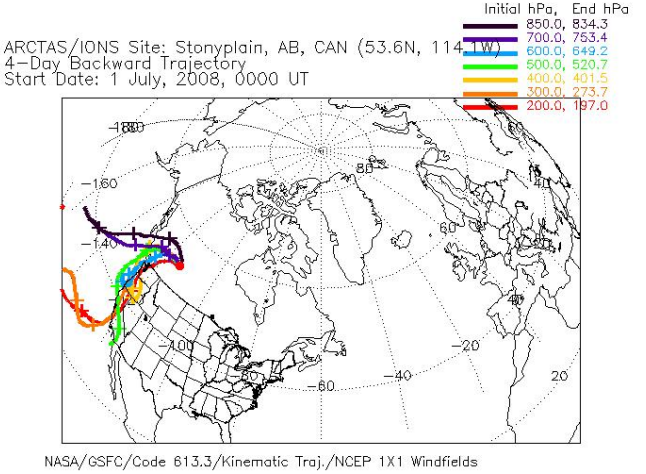
ARC-IONS Pollution Tracing

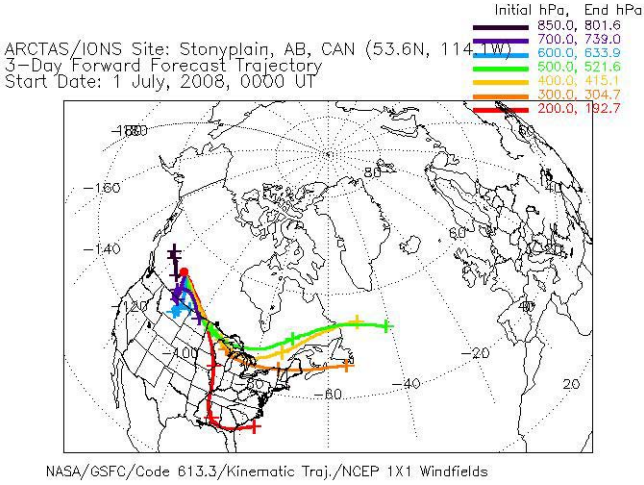
http://croc.gsfc.nasa.gov/arcions

<http://www.meteo.psu.edu/~smiller/amt/arcions>







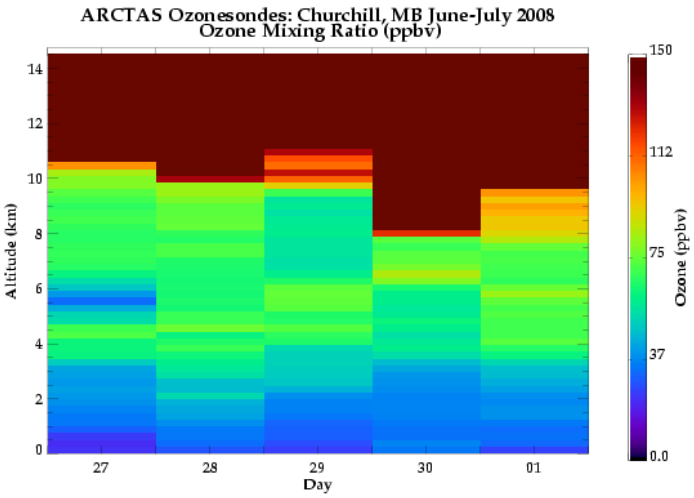


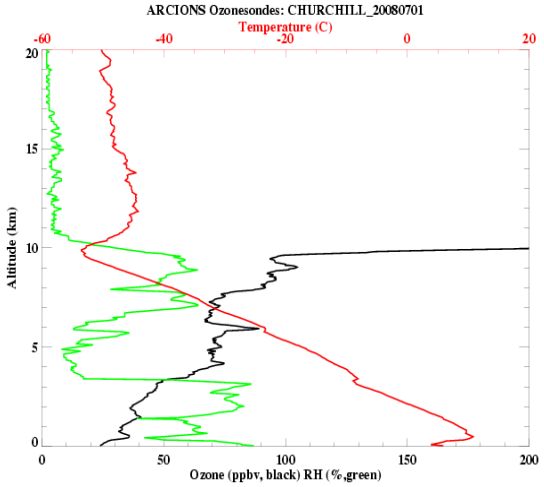
- California fire effects in layers at StonyPlain (=Edmonton; 54N, 114W). Will head east. Both back and forward trajectories shown & Churchill (54N, 94W)

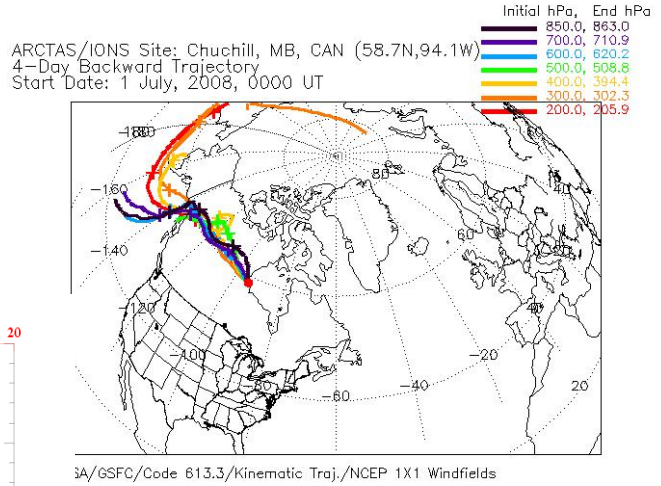
ARC-IONS Pollution Tracing

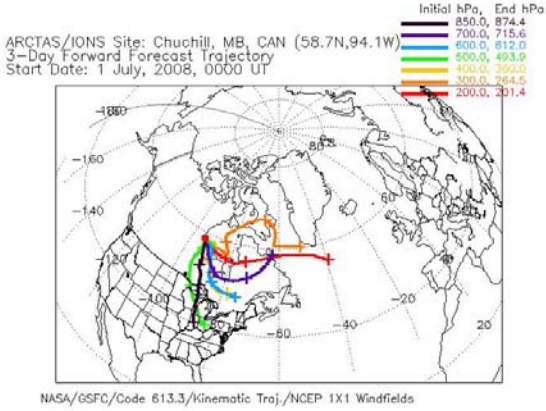
http://croc.gsfc.nasa.gov/arcions

<http://www.meteo.psu.edu/~smiller/amt/arcions>







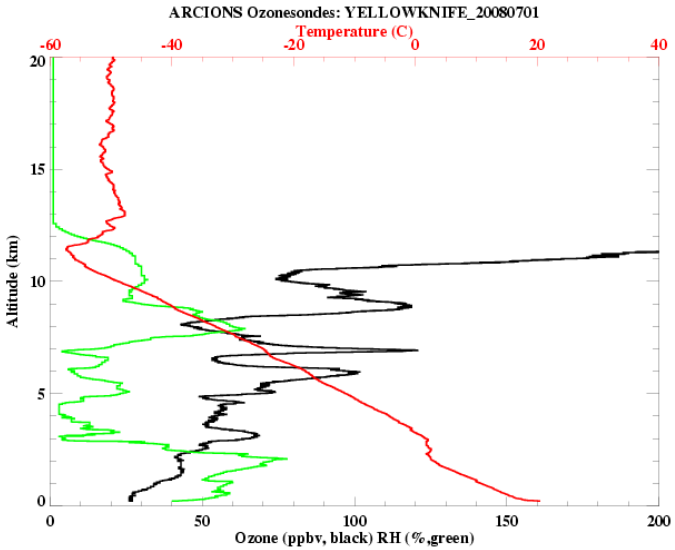


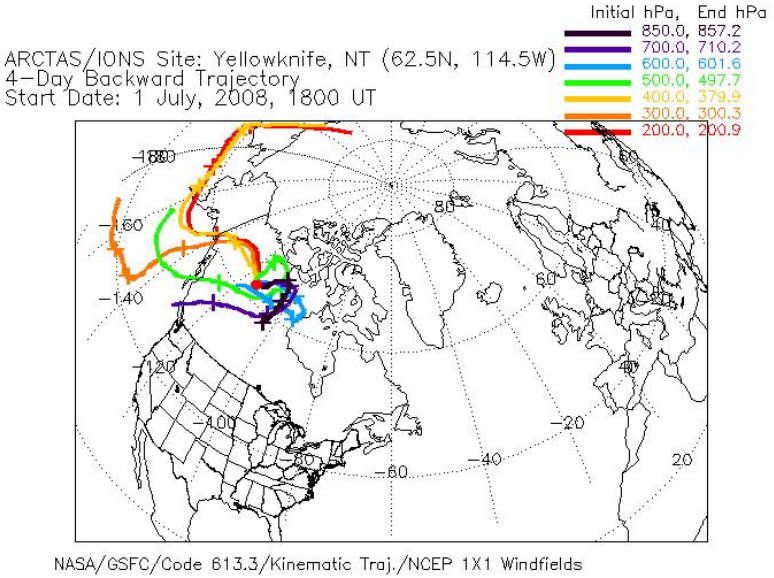
- Saskatchewan fire effects at Churchill (54N, 94W). Heading To Ontario

ARC-IONS Look Ahead

http://croc.gsfc.nasa.gov/arcions

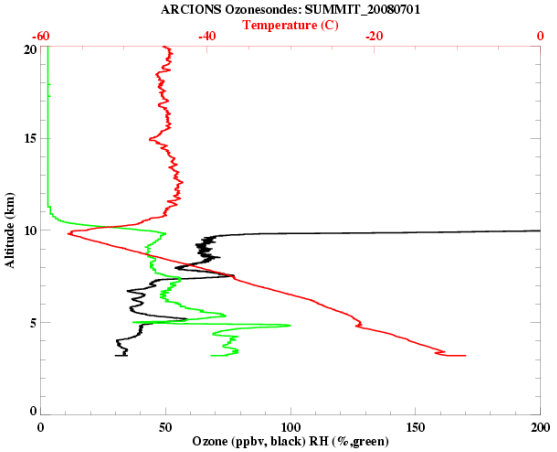
<http://www.meteo.psu.edu/~smiller/amt/arcions>

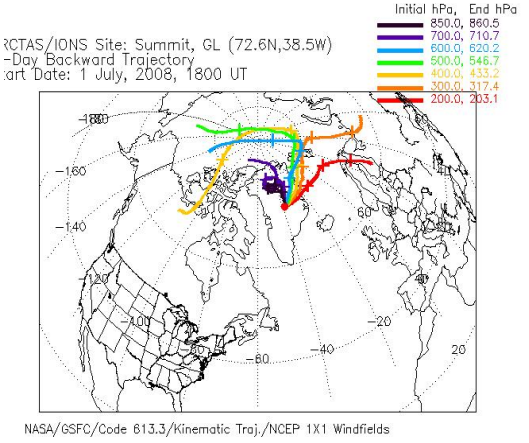




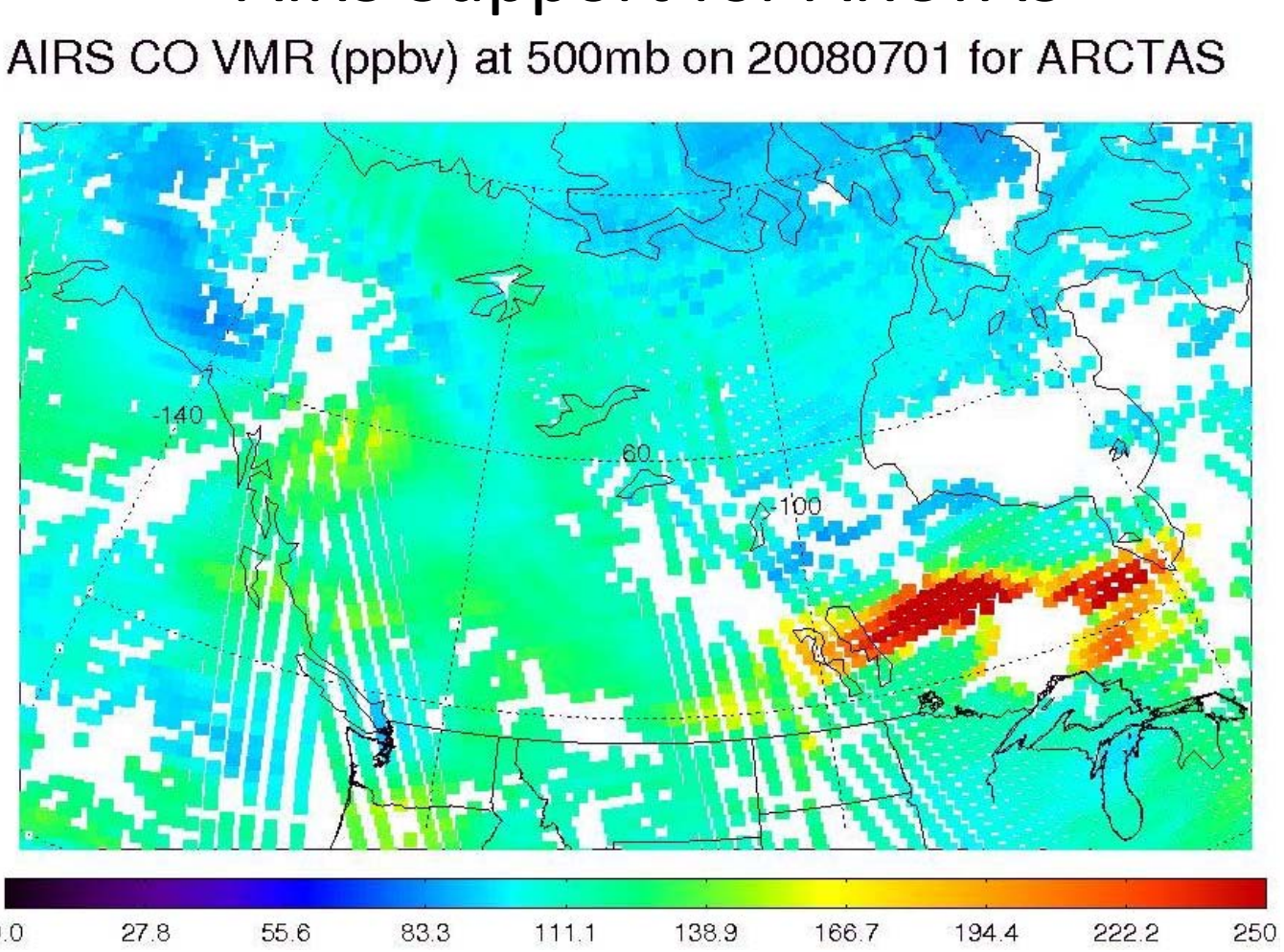
Near/Far for Fire Effects

- Yellowknife (62N, 114W)
- Summit – Looking to next week



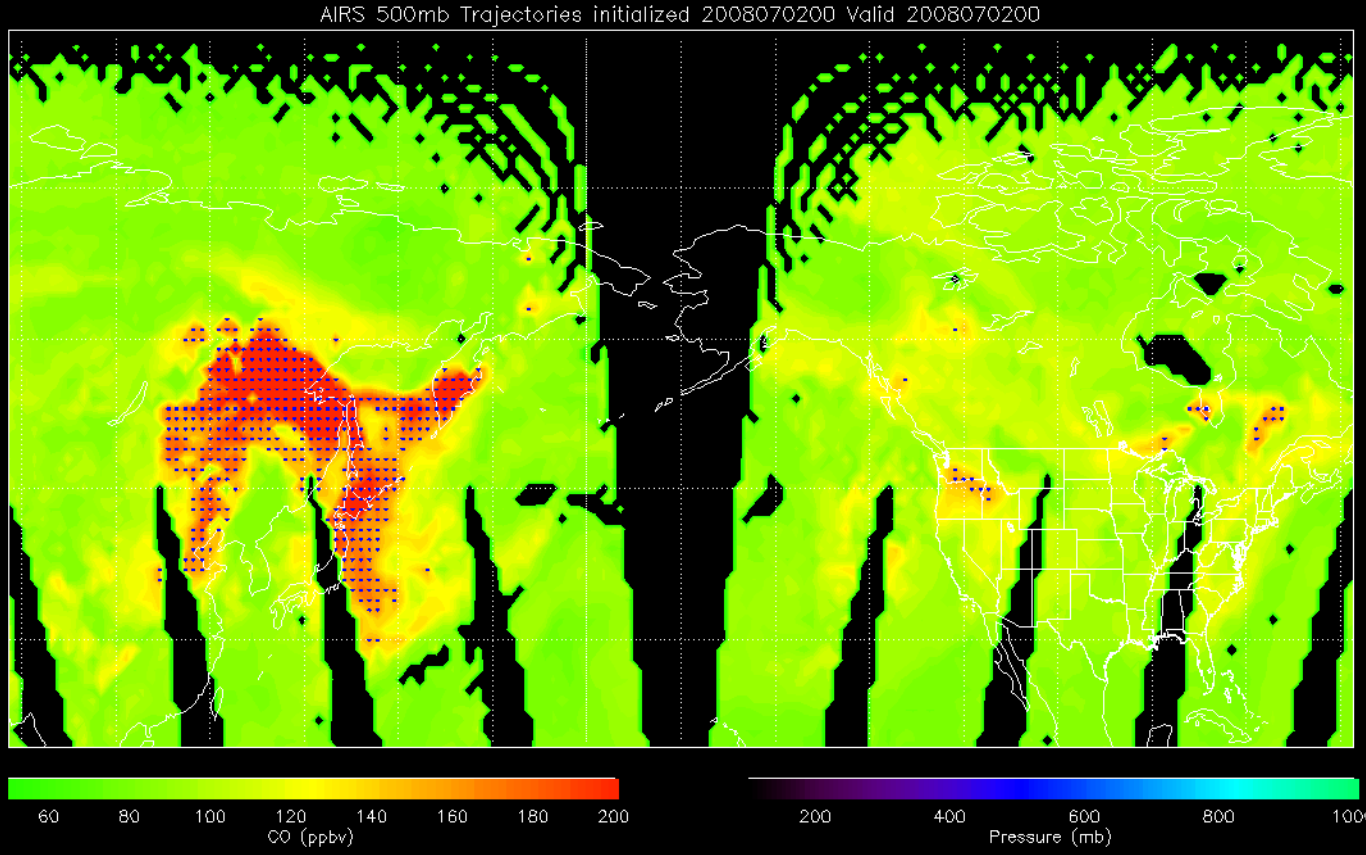


AIRS Support for ARCTAS



Emissions from four locations:

- Siberian long range transport and CA fire transport merged.
- Yukon transported southeastly and merge with Saskatchewan fires.
- Saskatchewan fire emissions reach above 250ppbv.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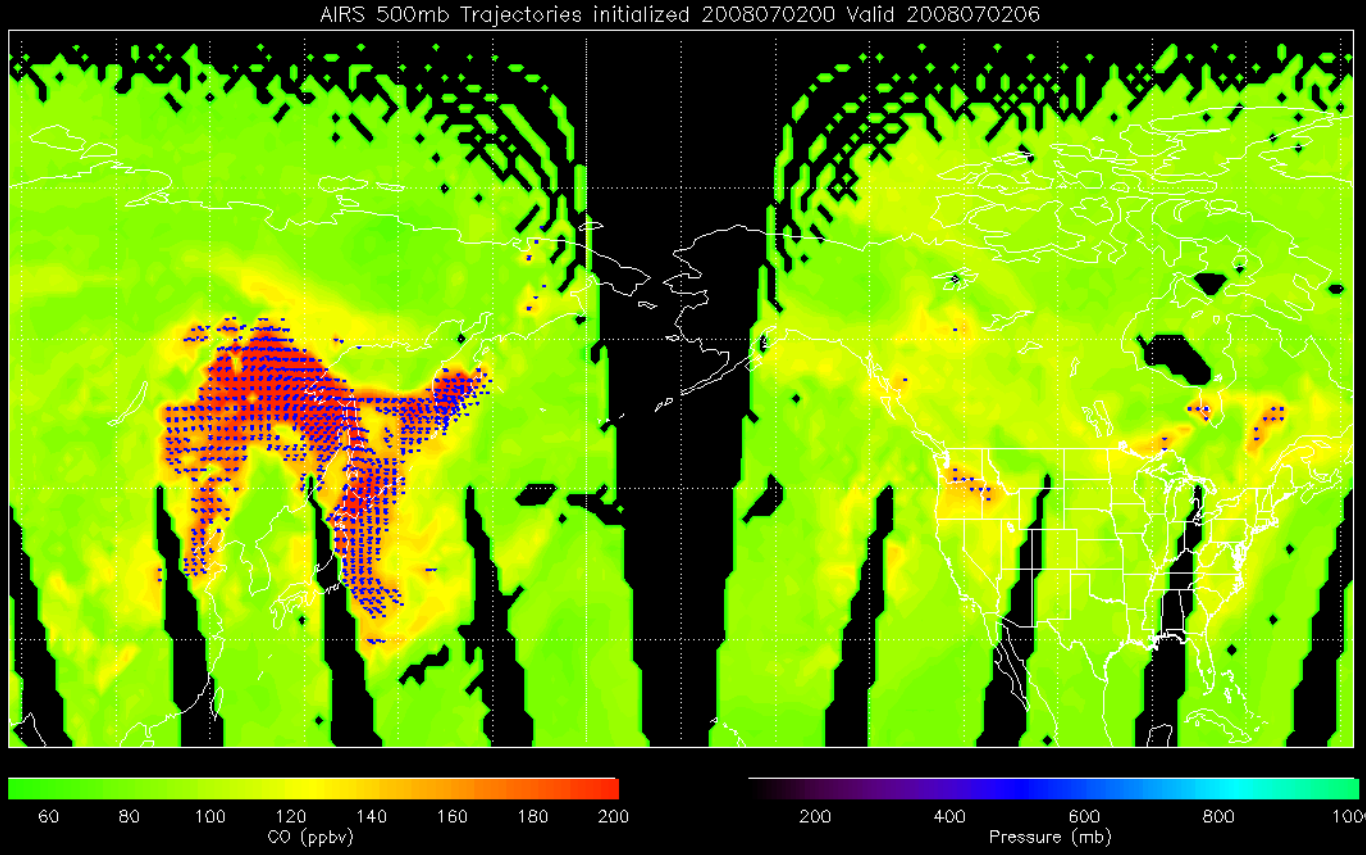
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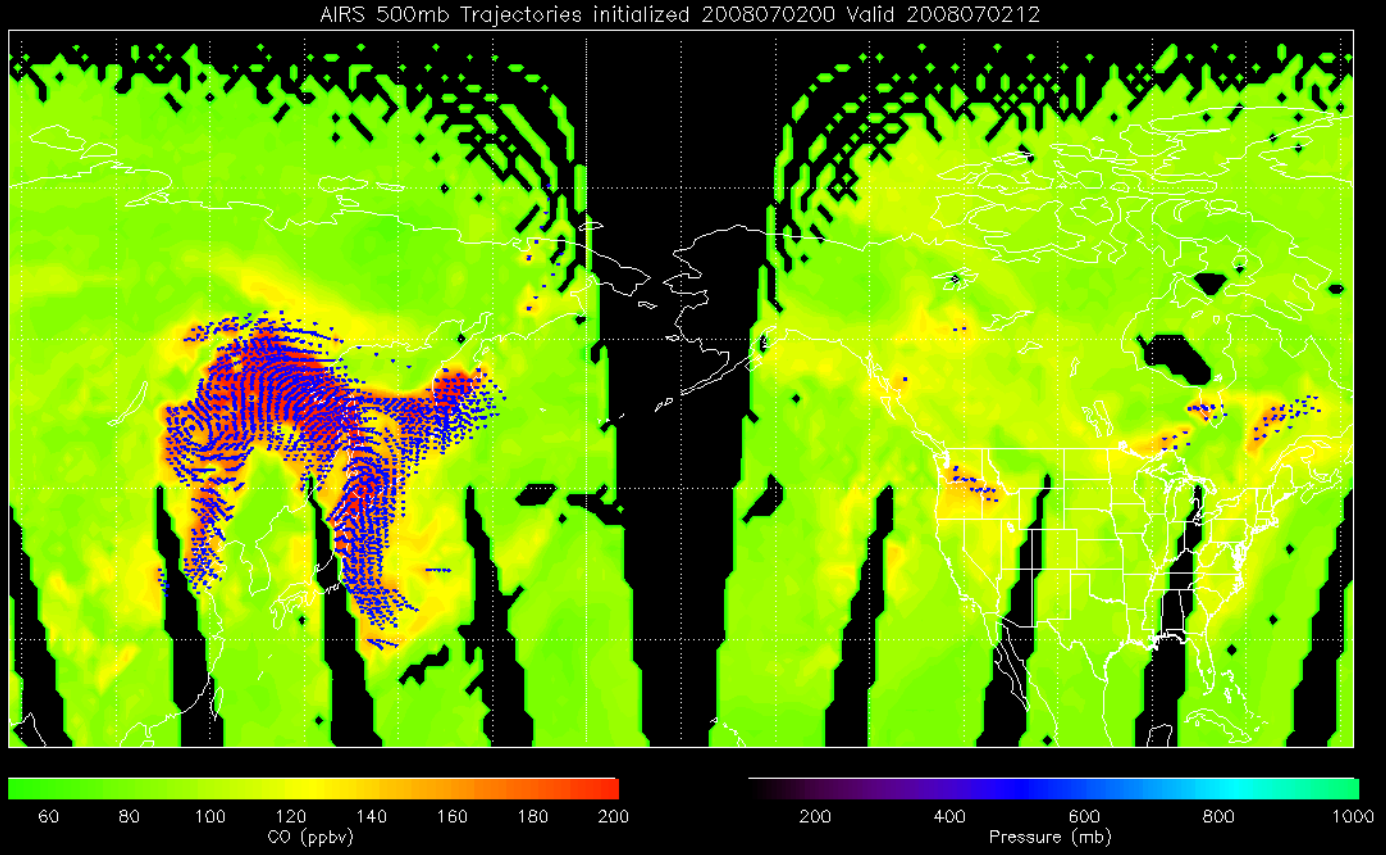
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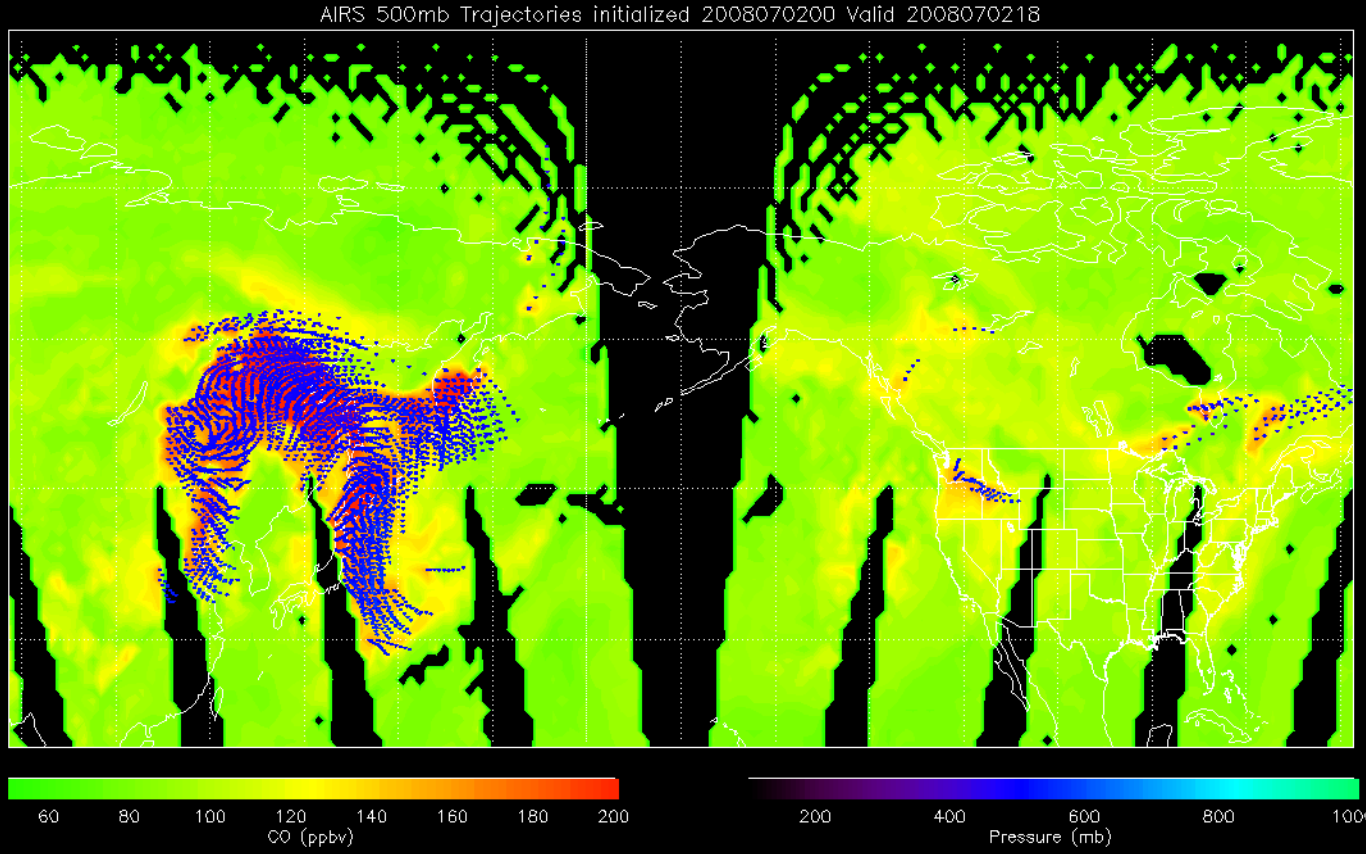
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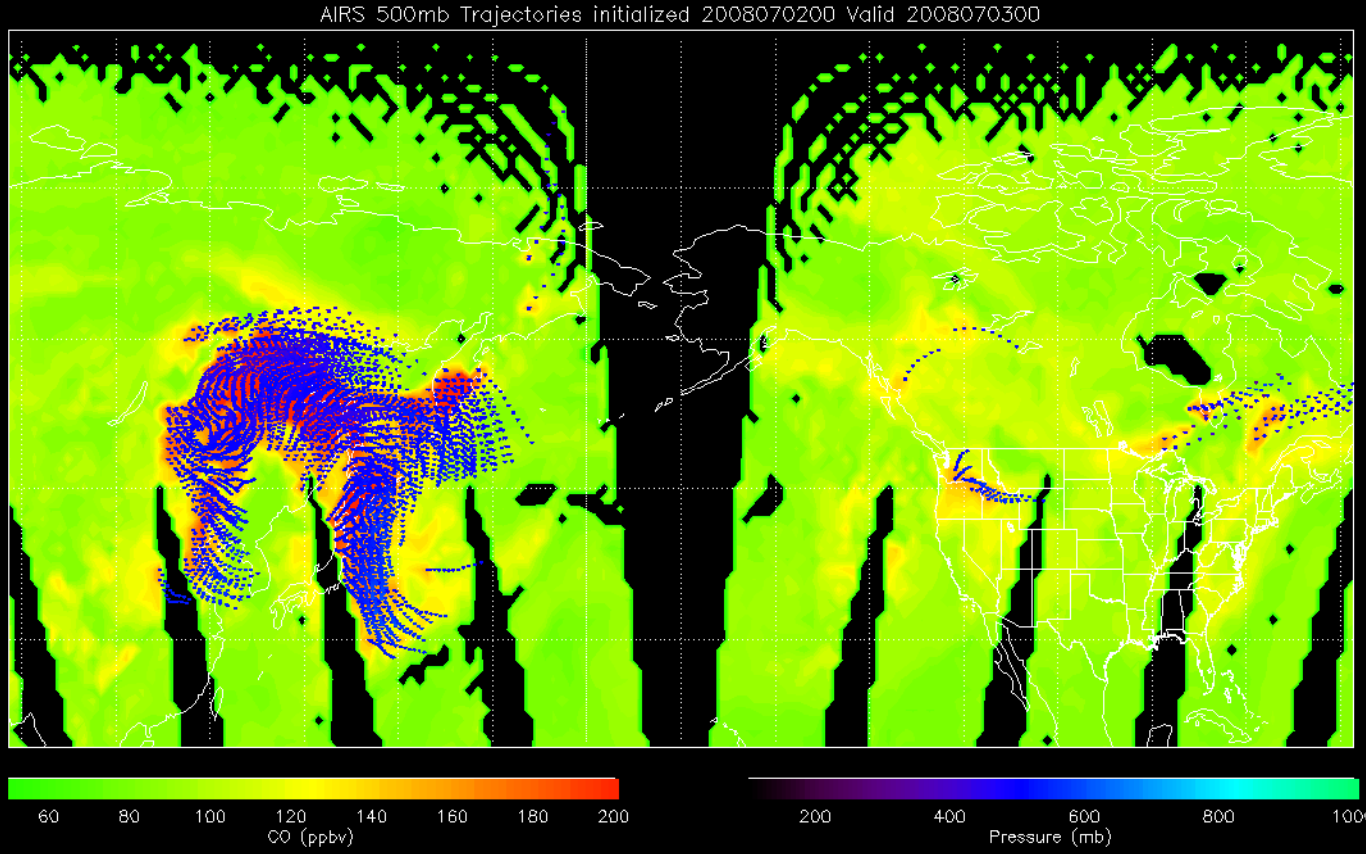
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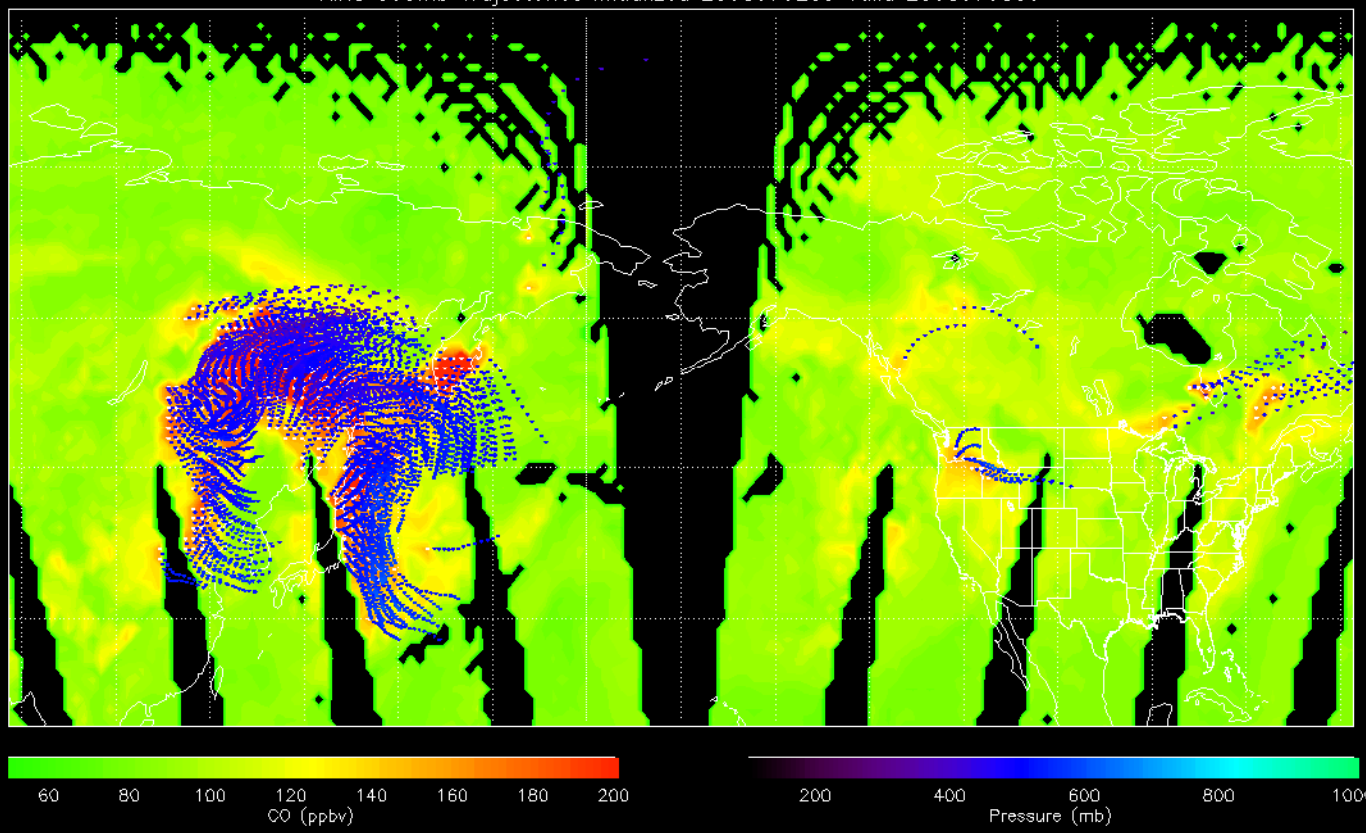
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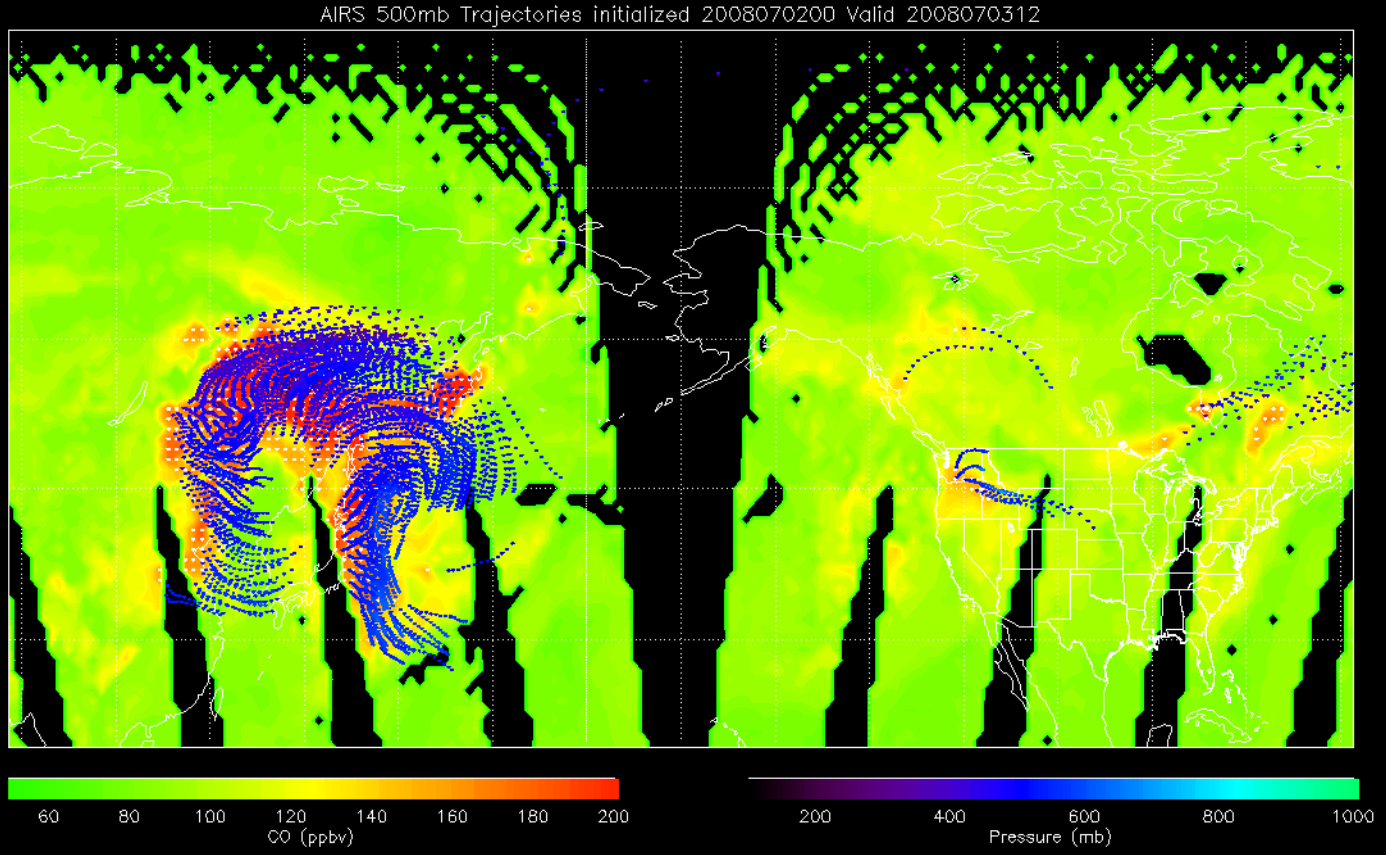
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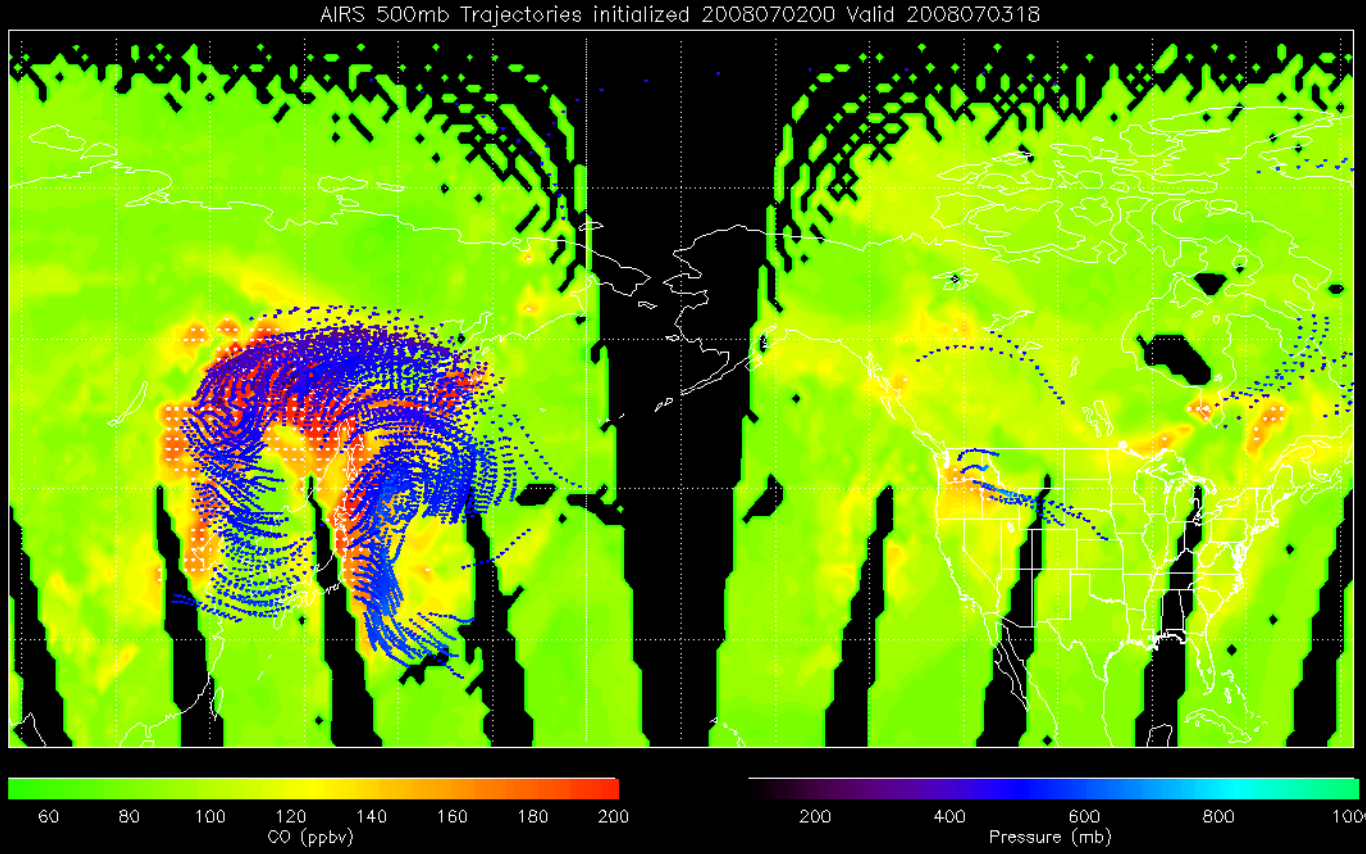
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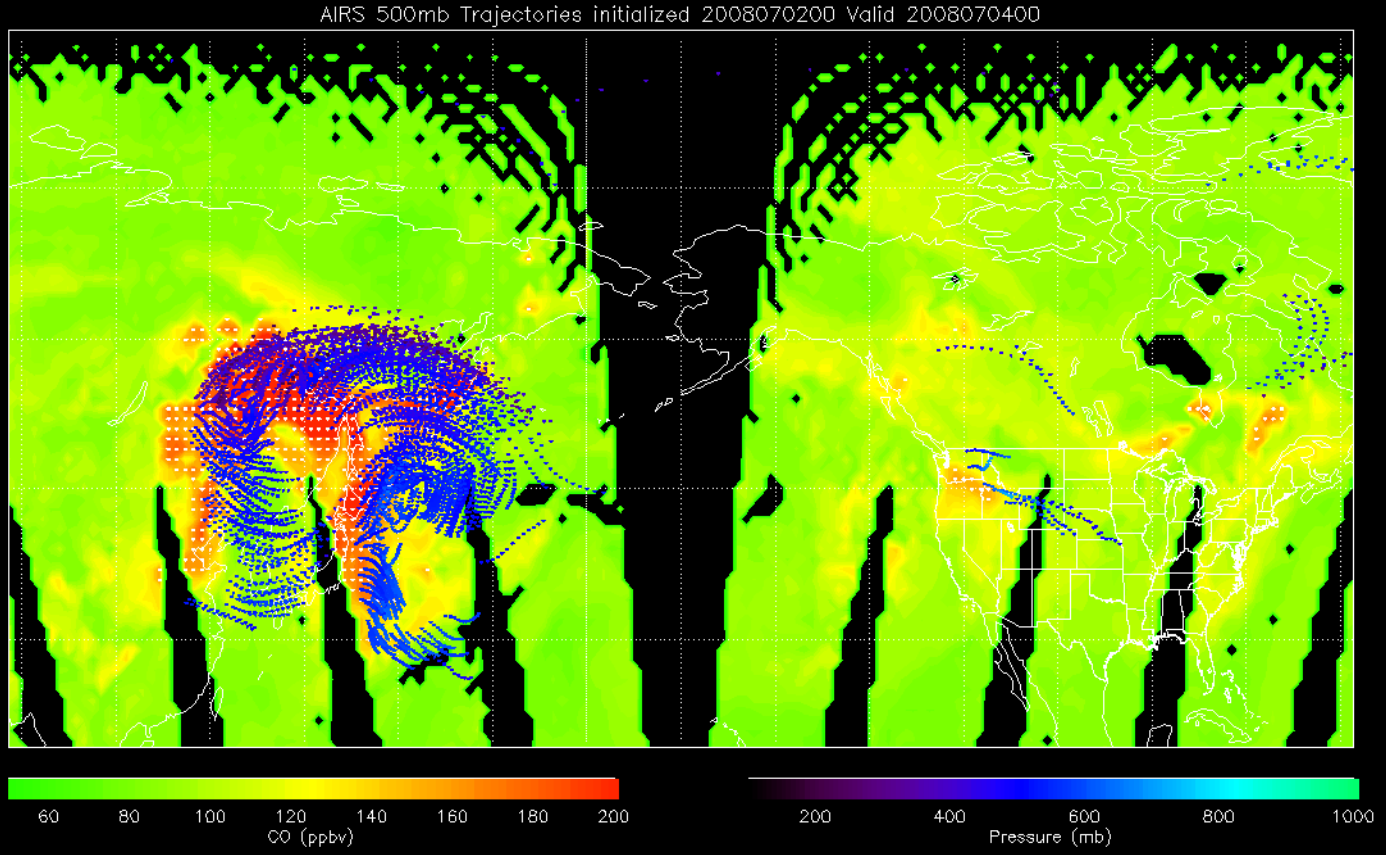
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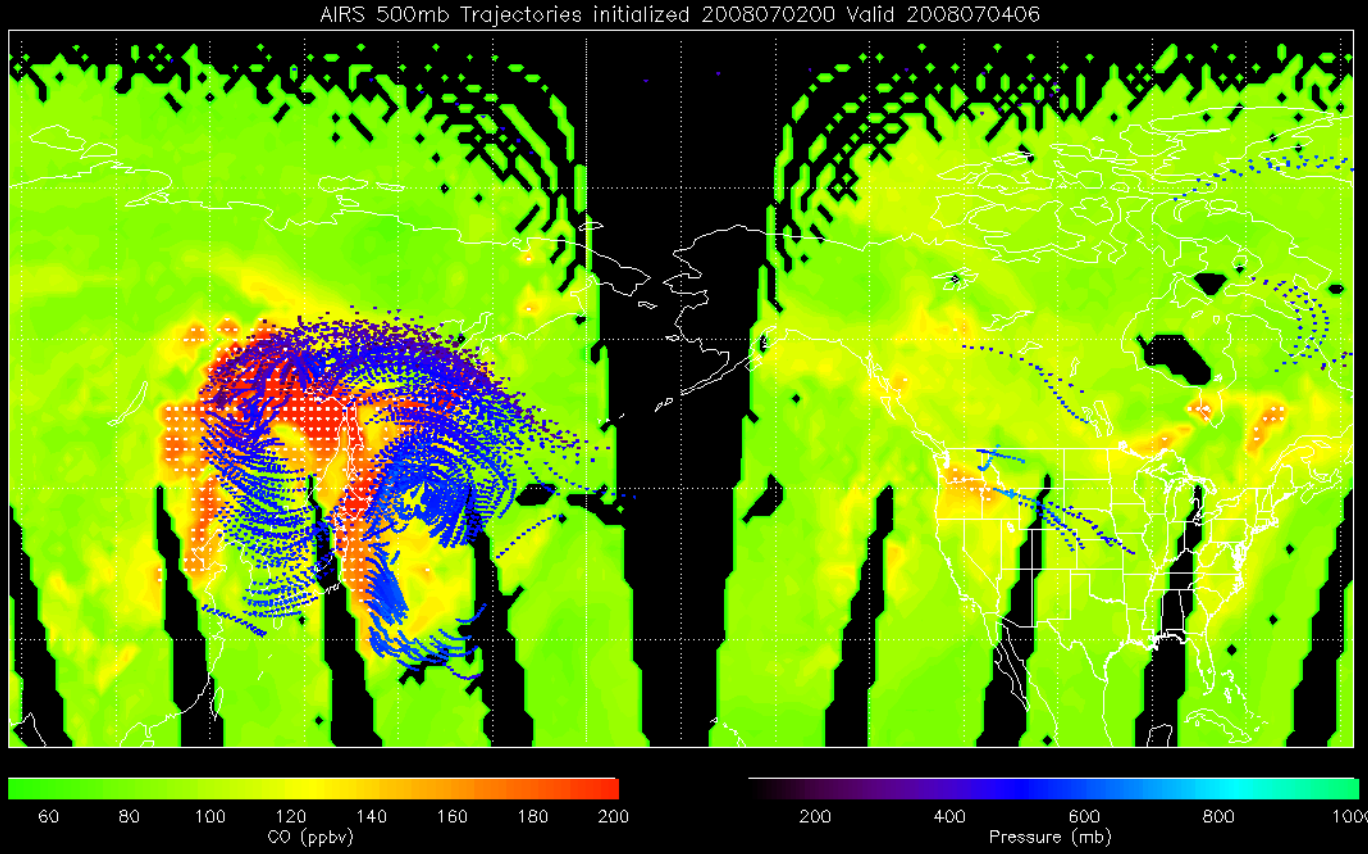
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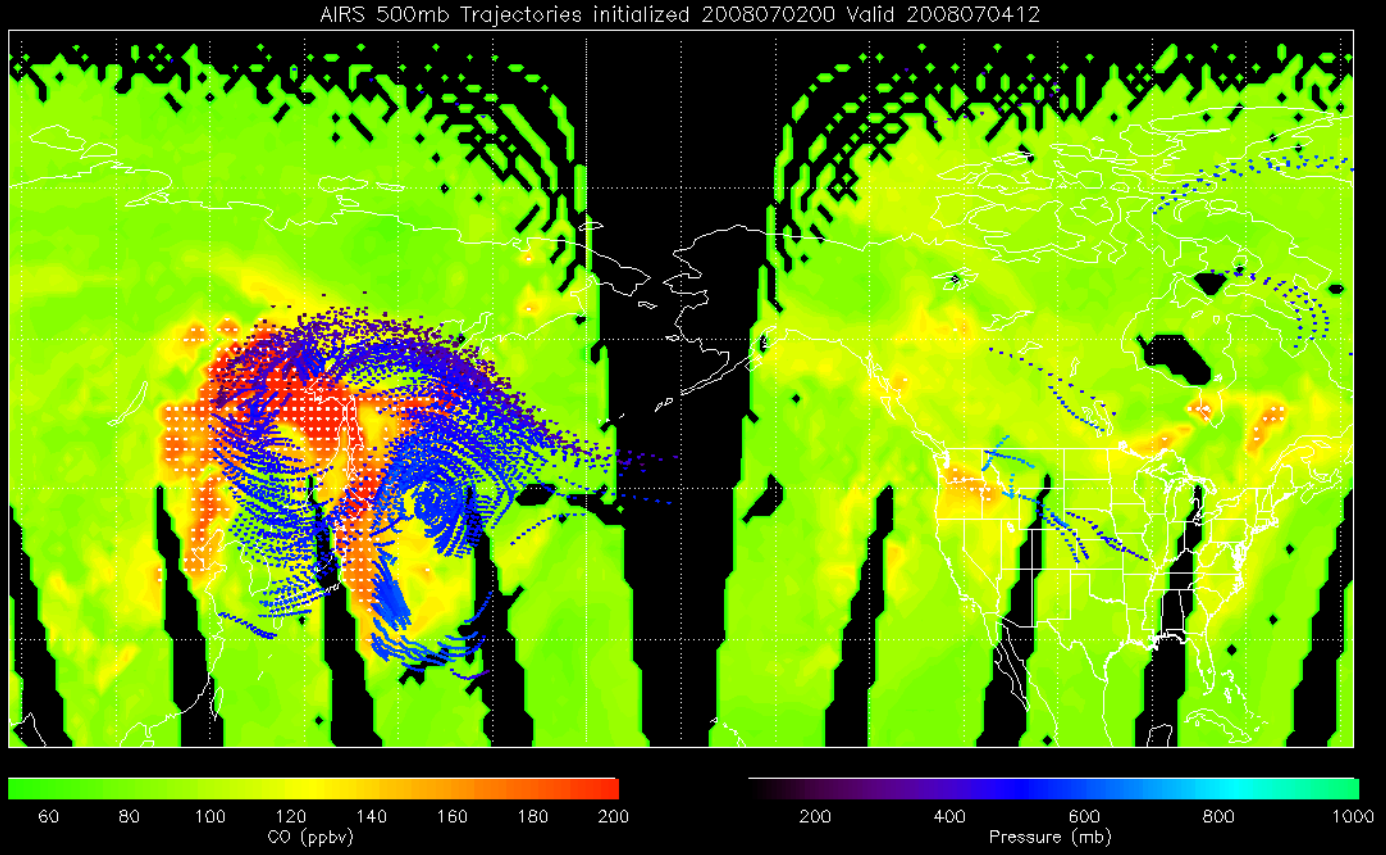
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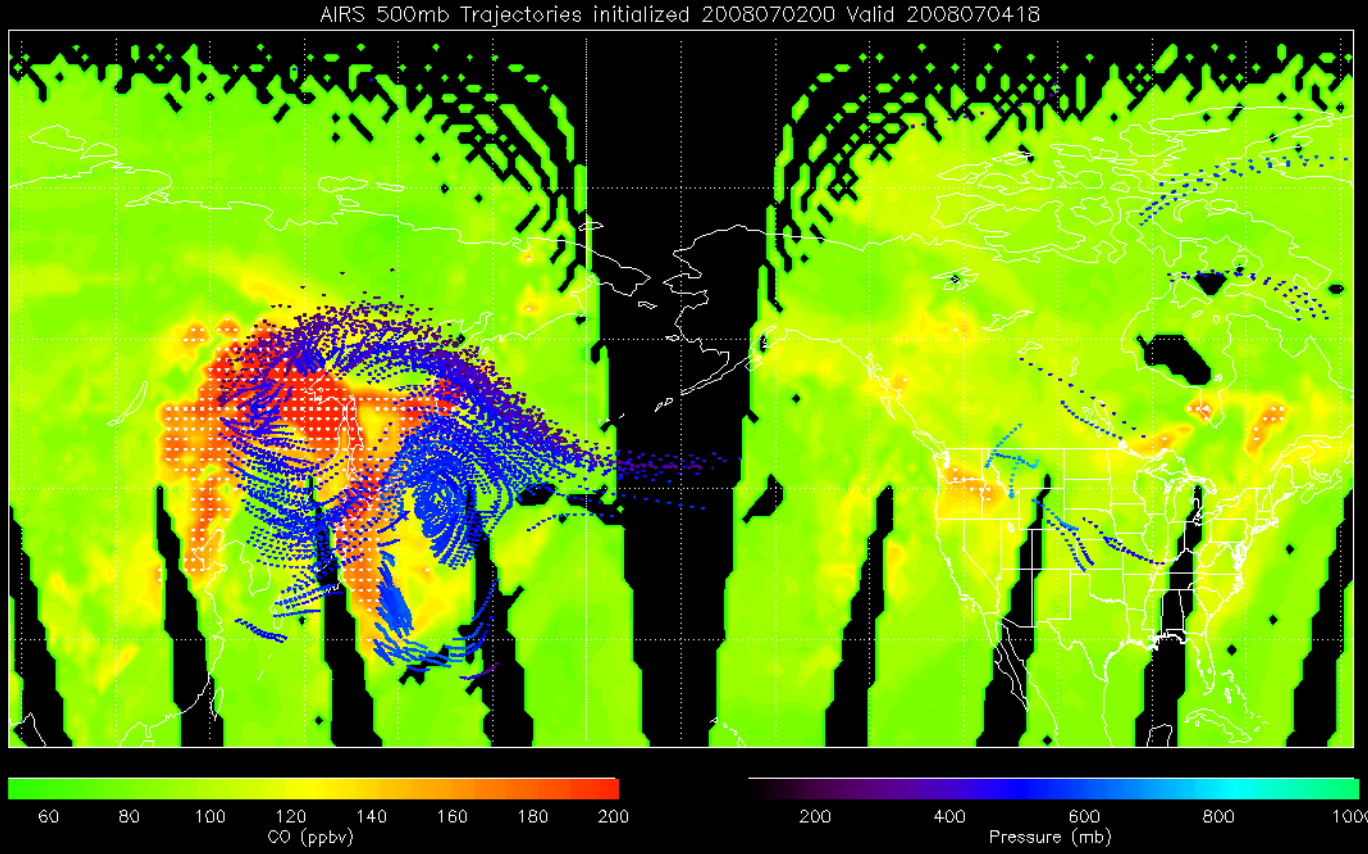
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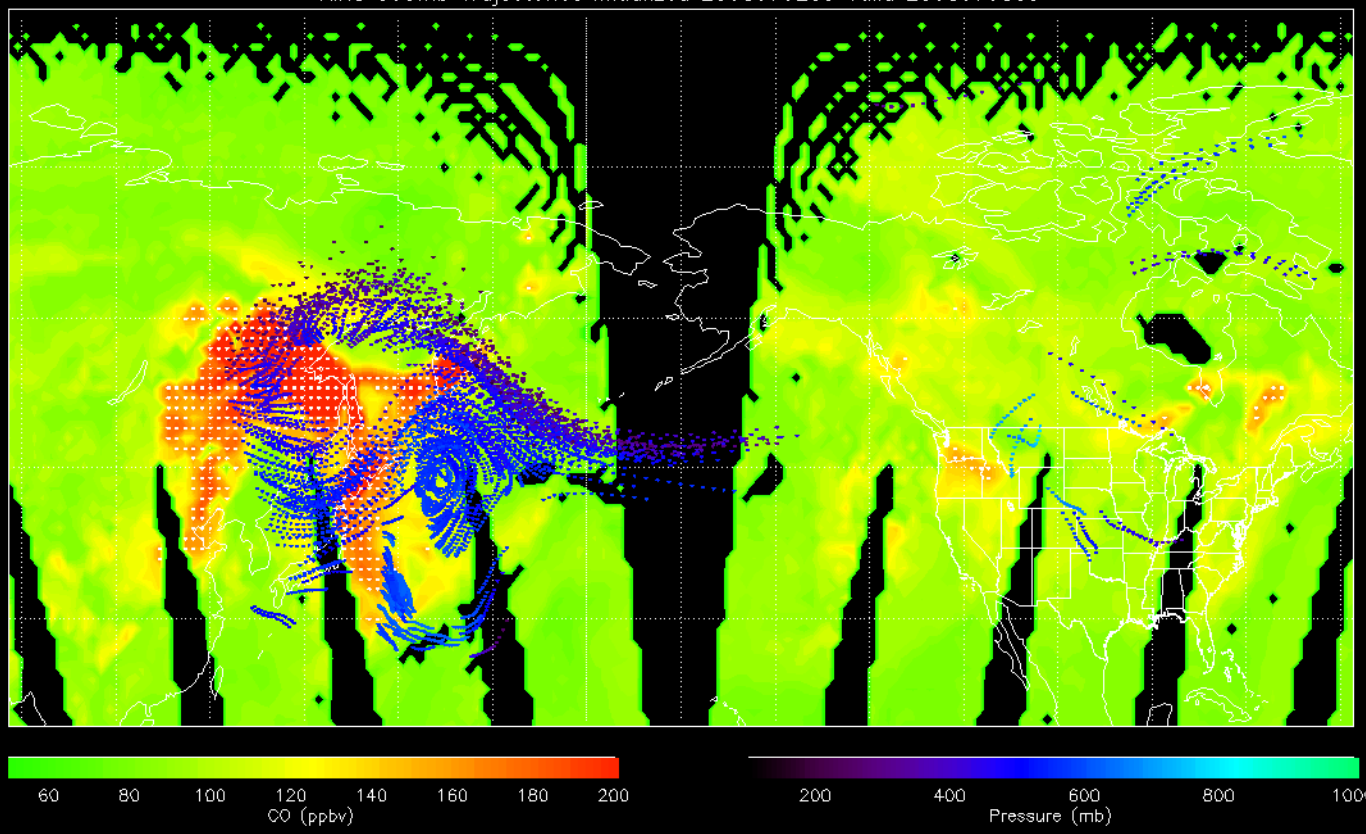
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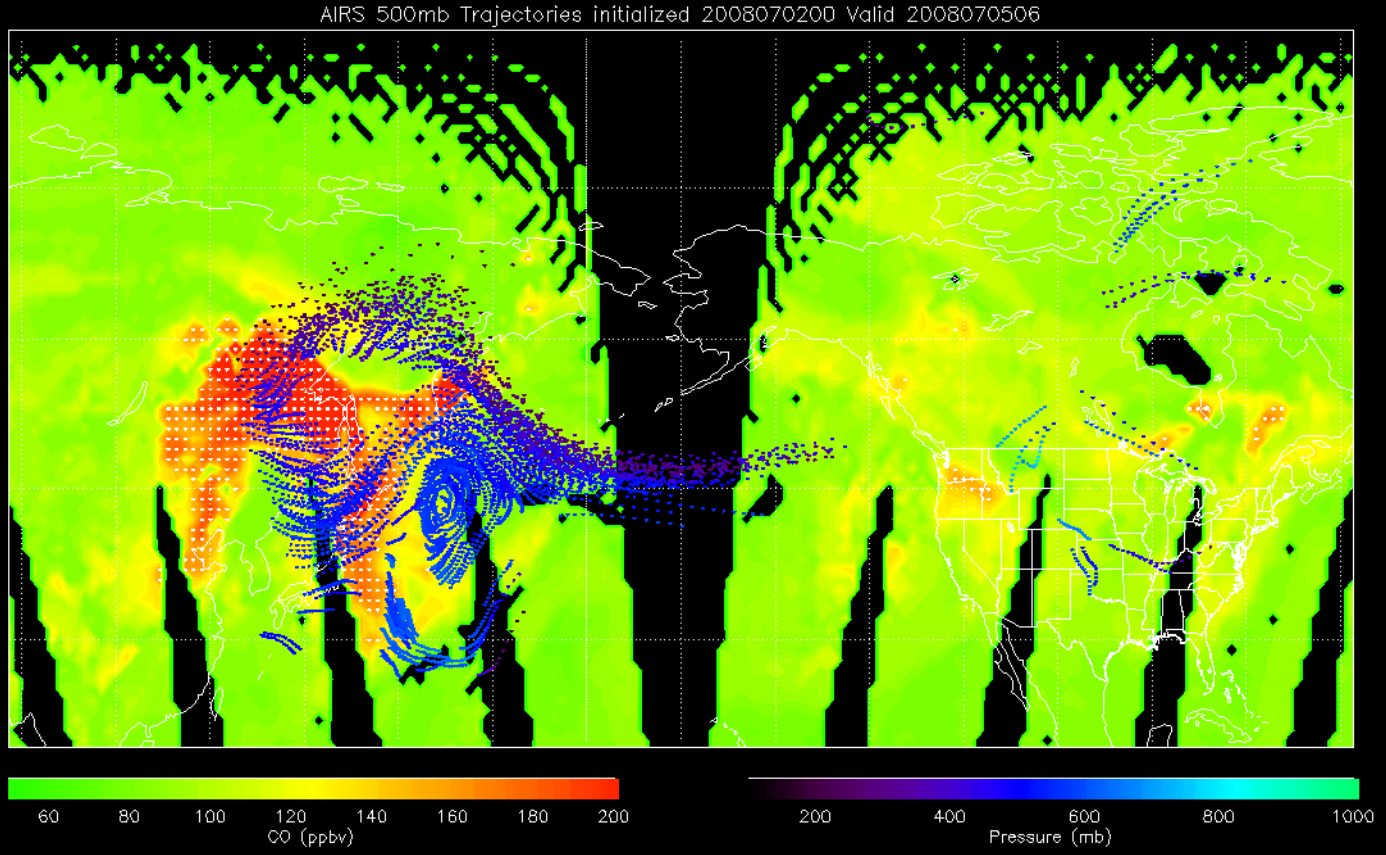
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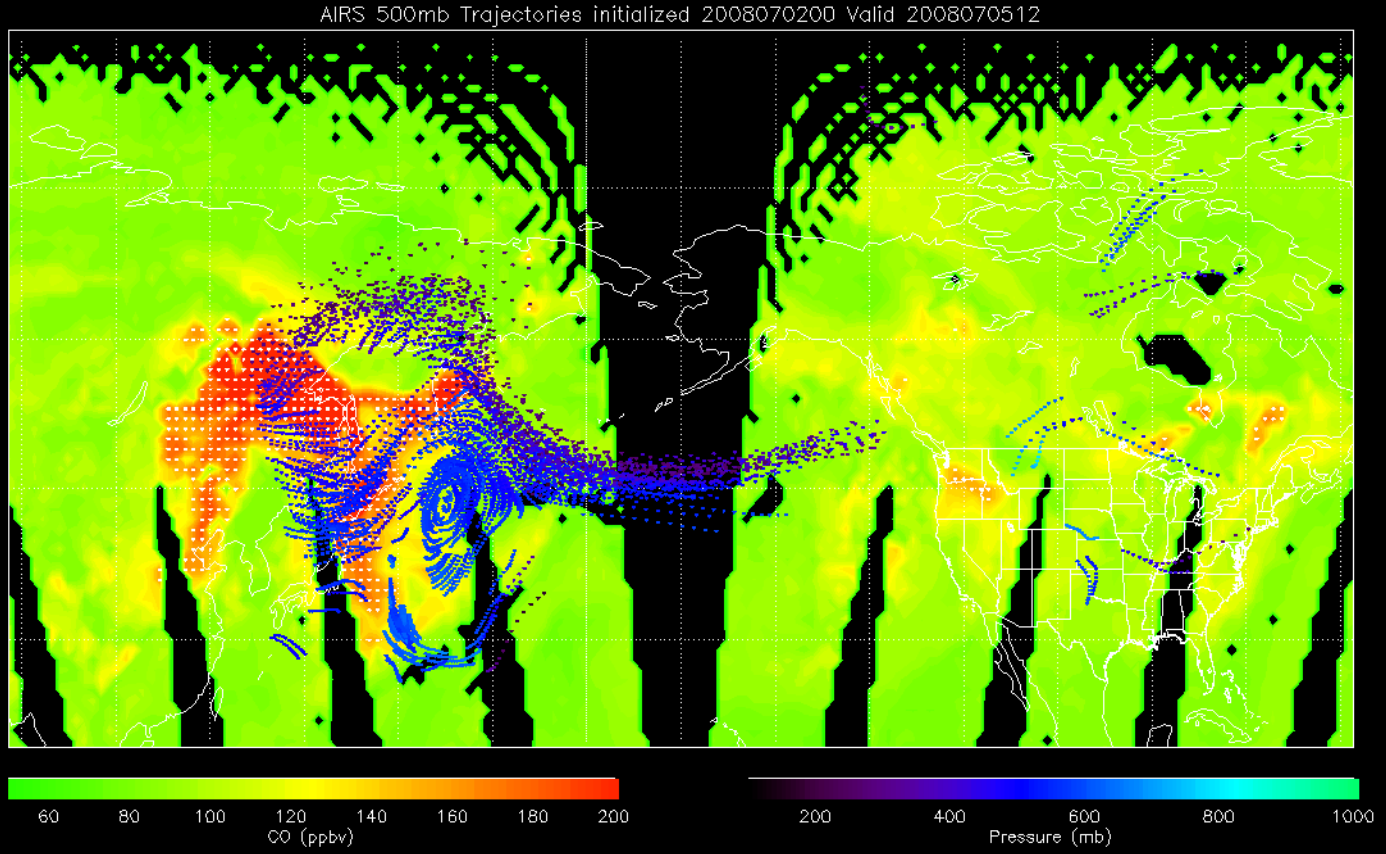
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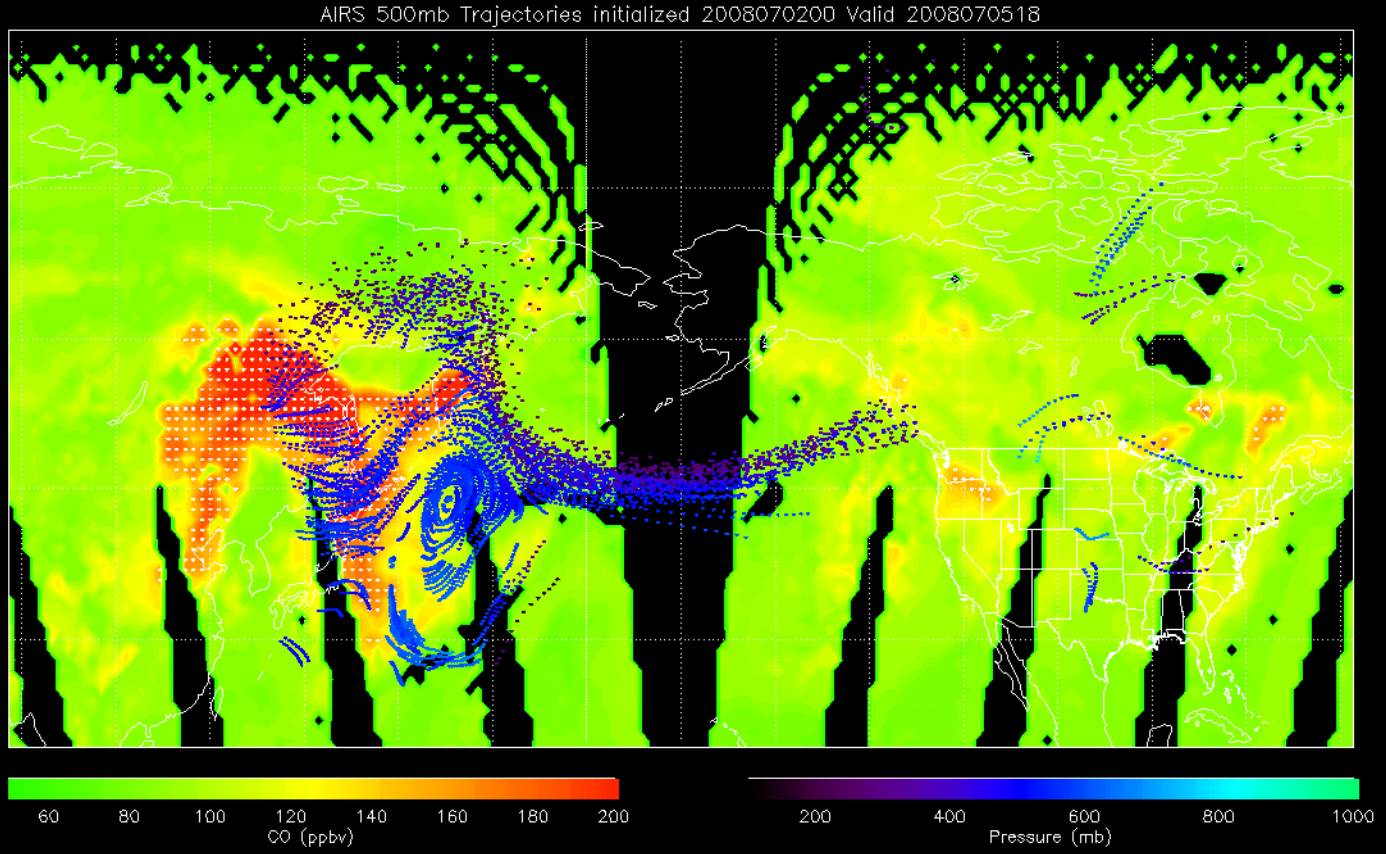
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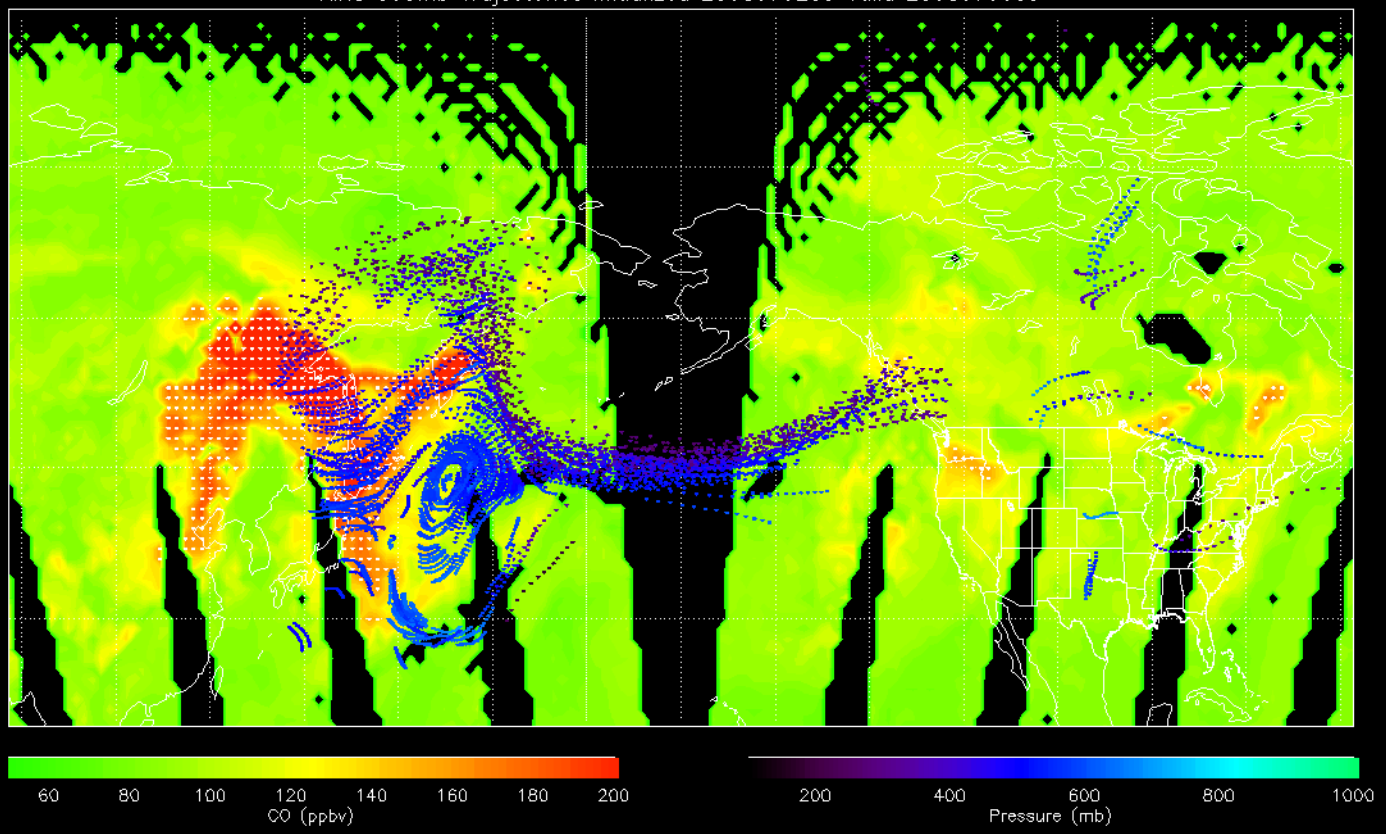
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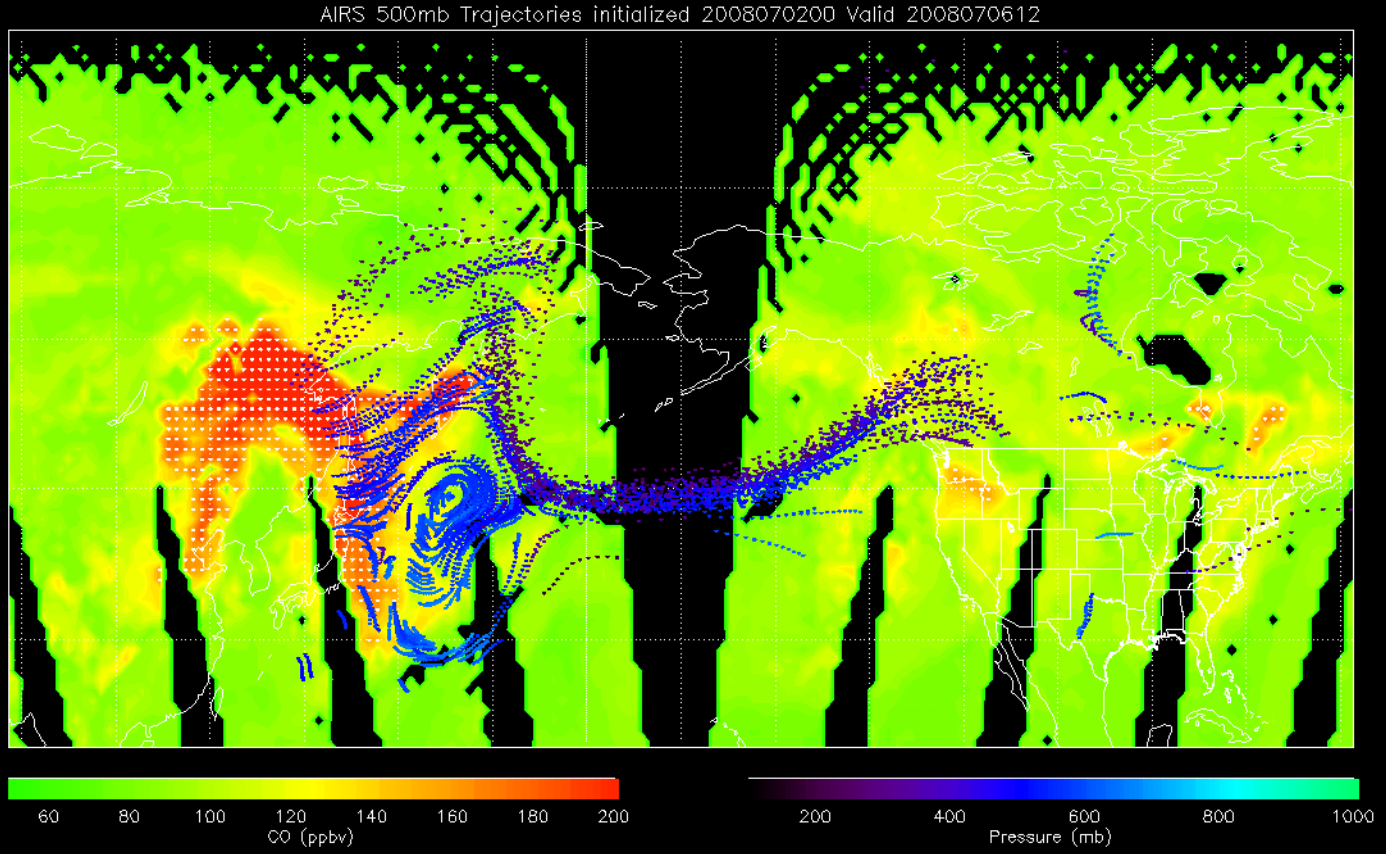
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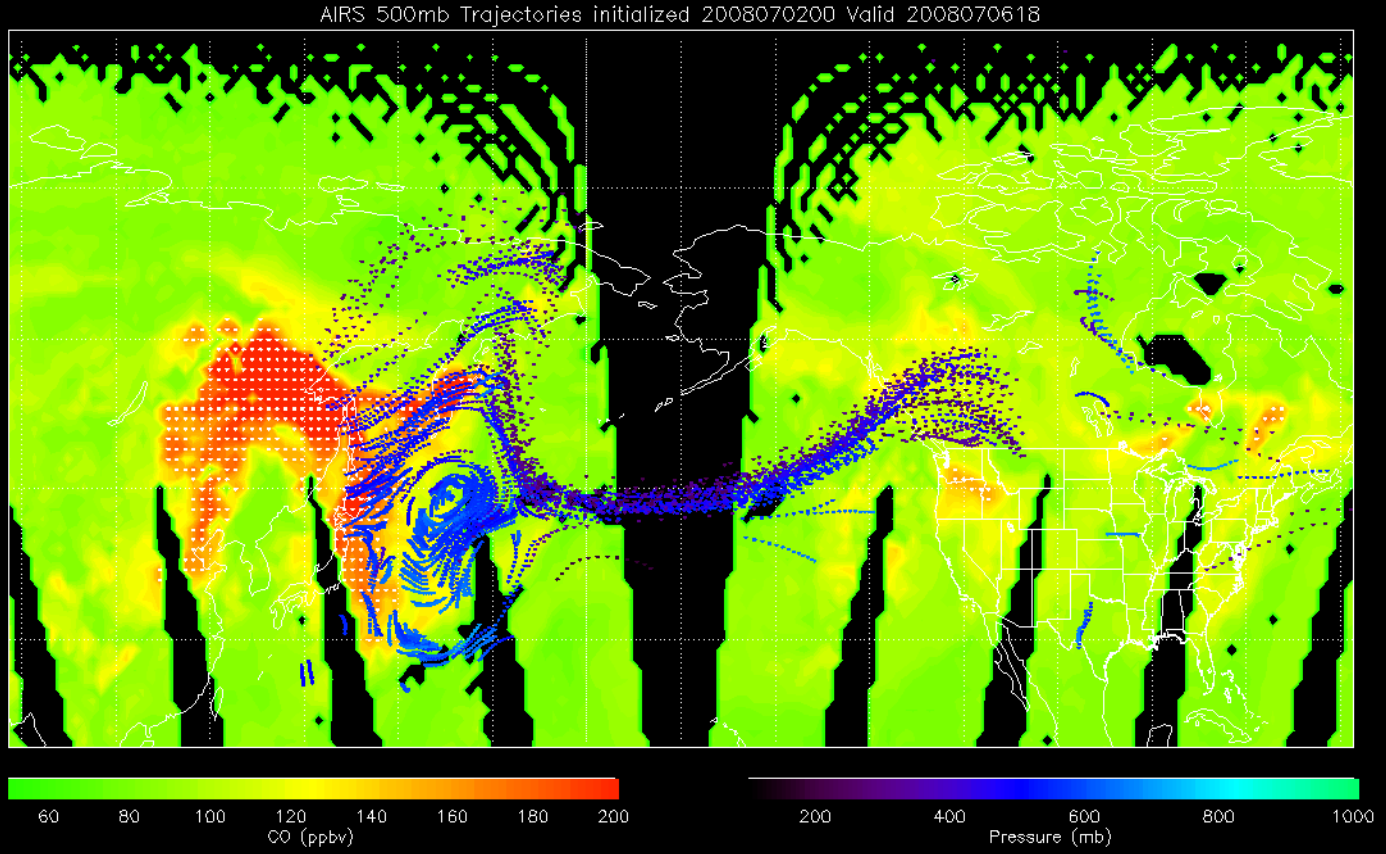
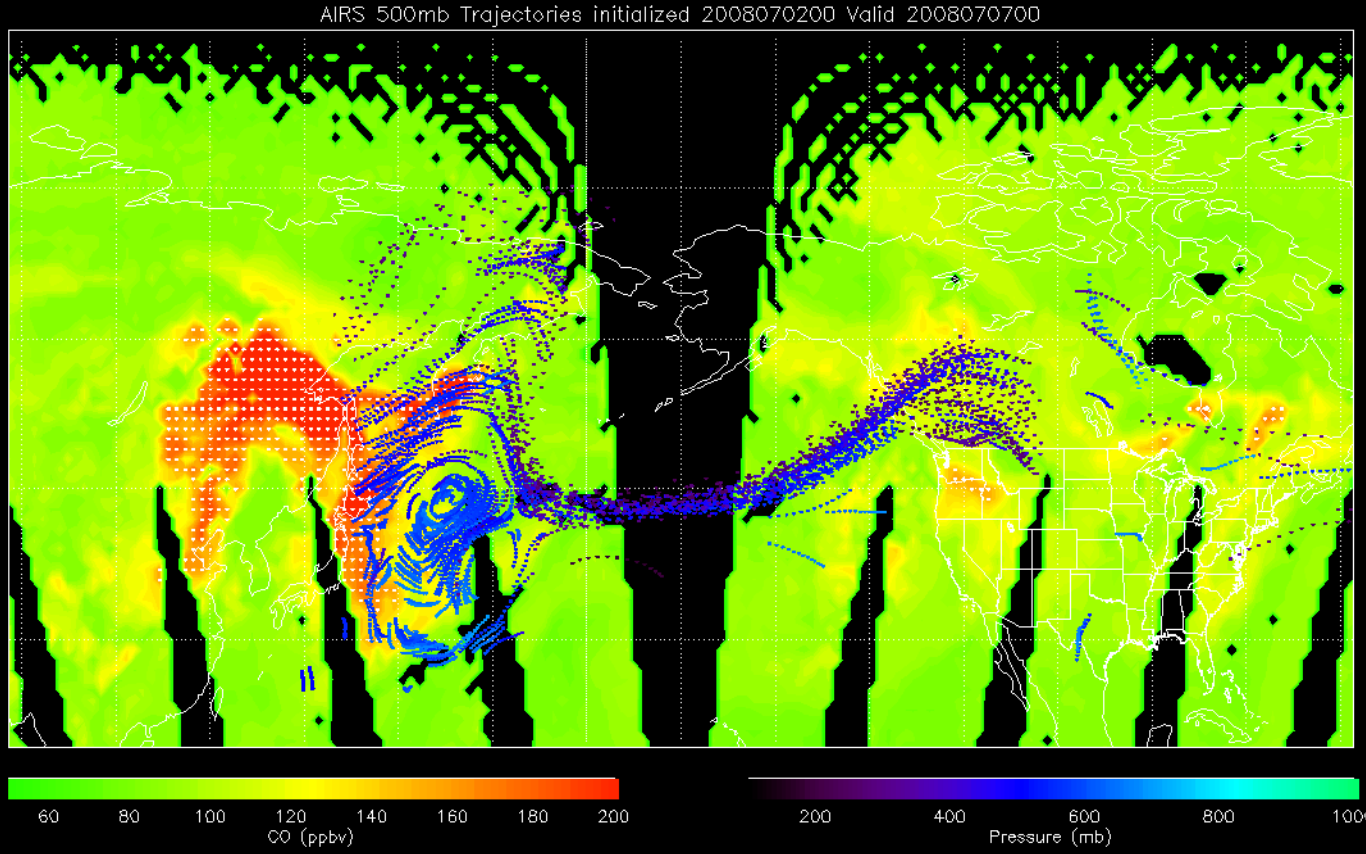
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070618
60
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070700
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80
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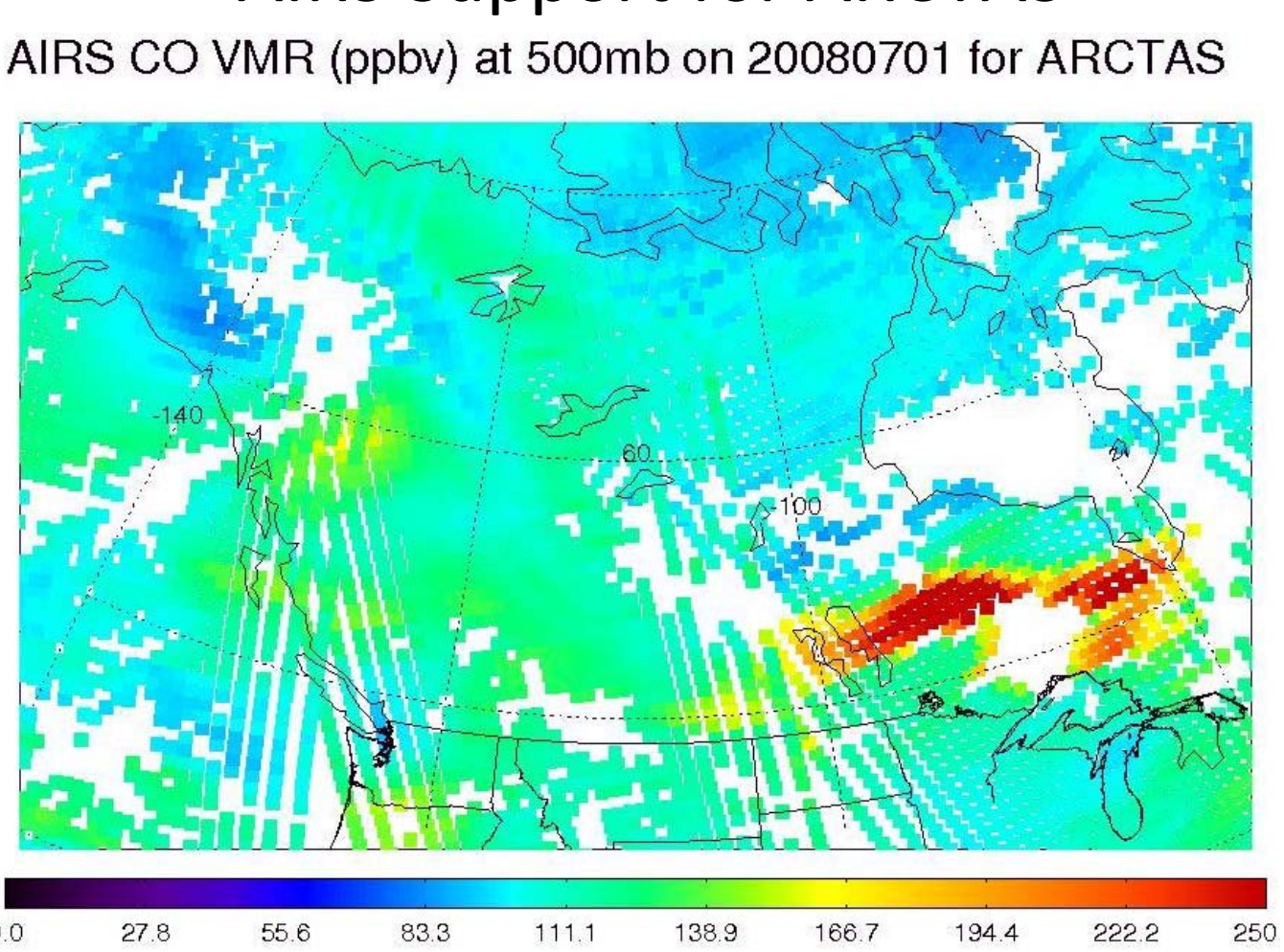
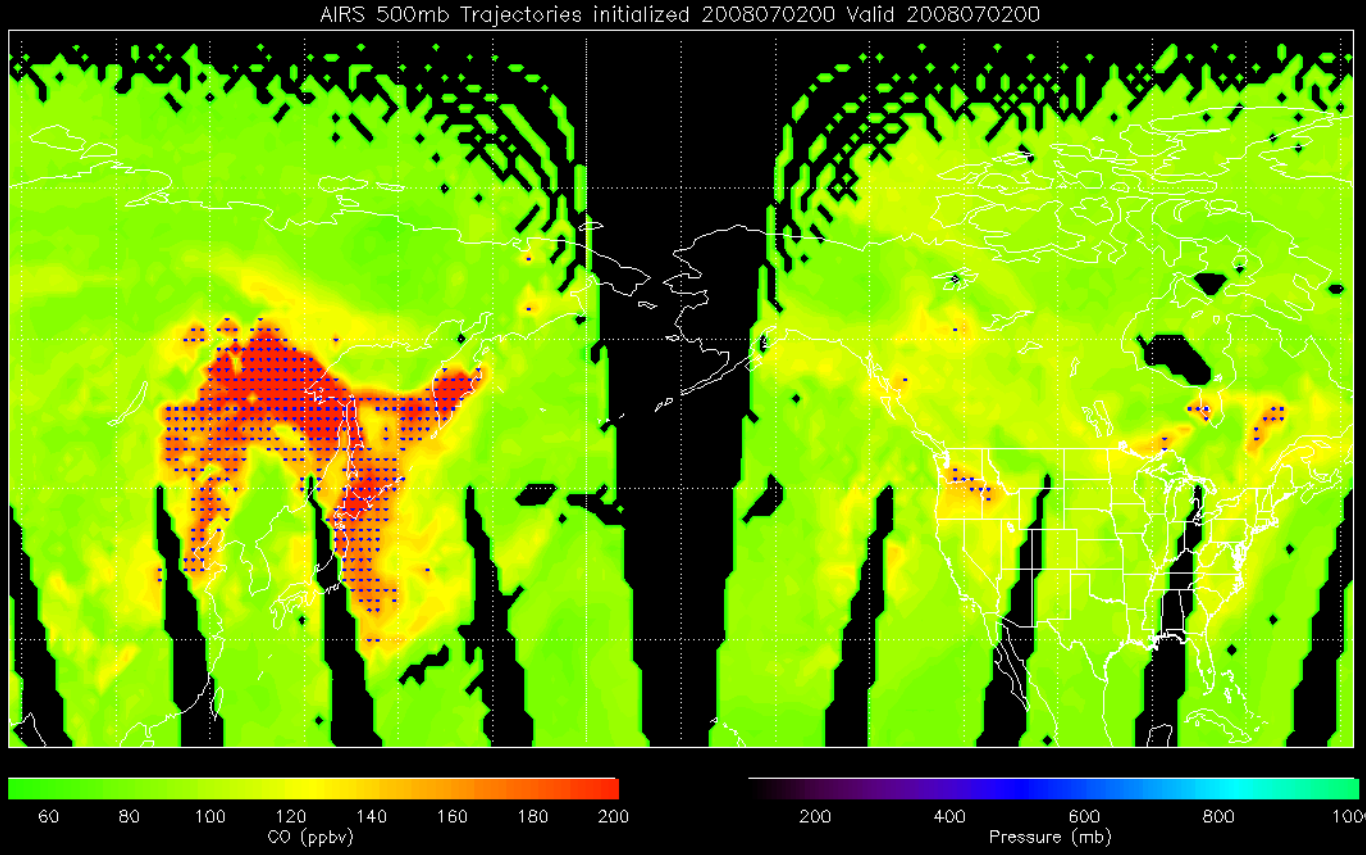
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)

AIRS Support for ARCTAS



Emissions from four locations:

- Siberian long range transport and CA fire transport merged.
- Yukon transported southeastly and merge with Saskatchewan fires.
- Saskatchewan fire emissions reach above 250ppbv.


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070200
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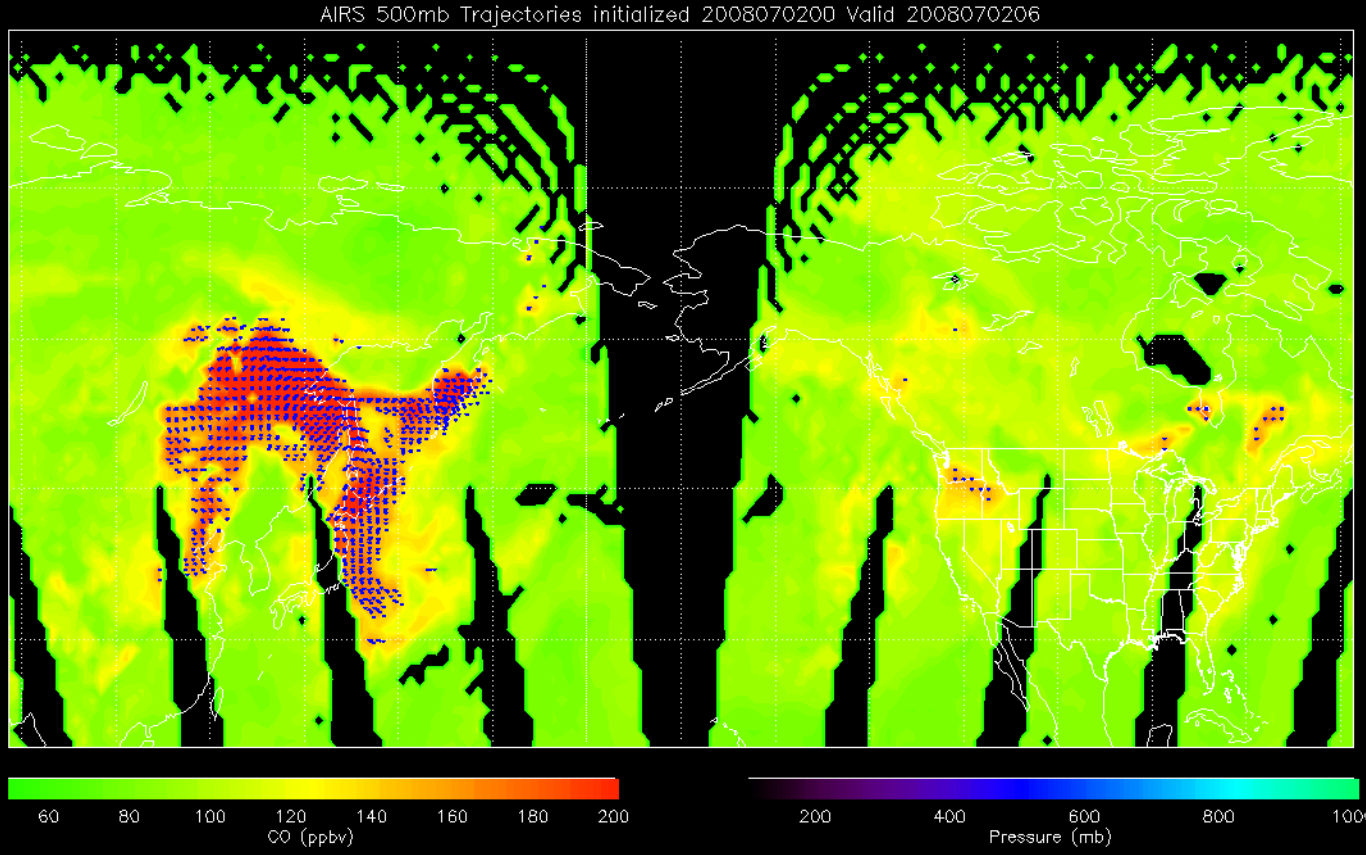
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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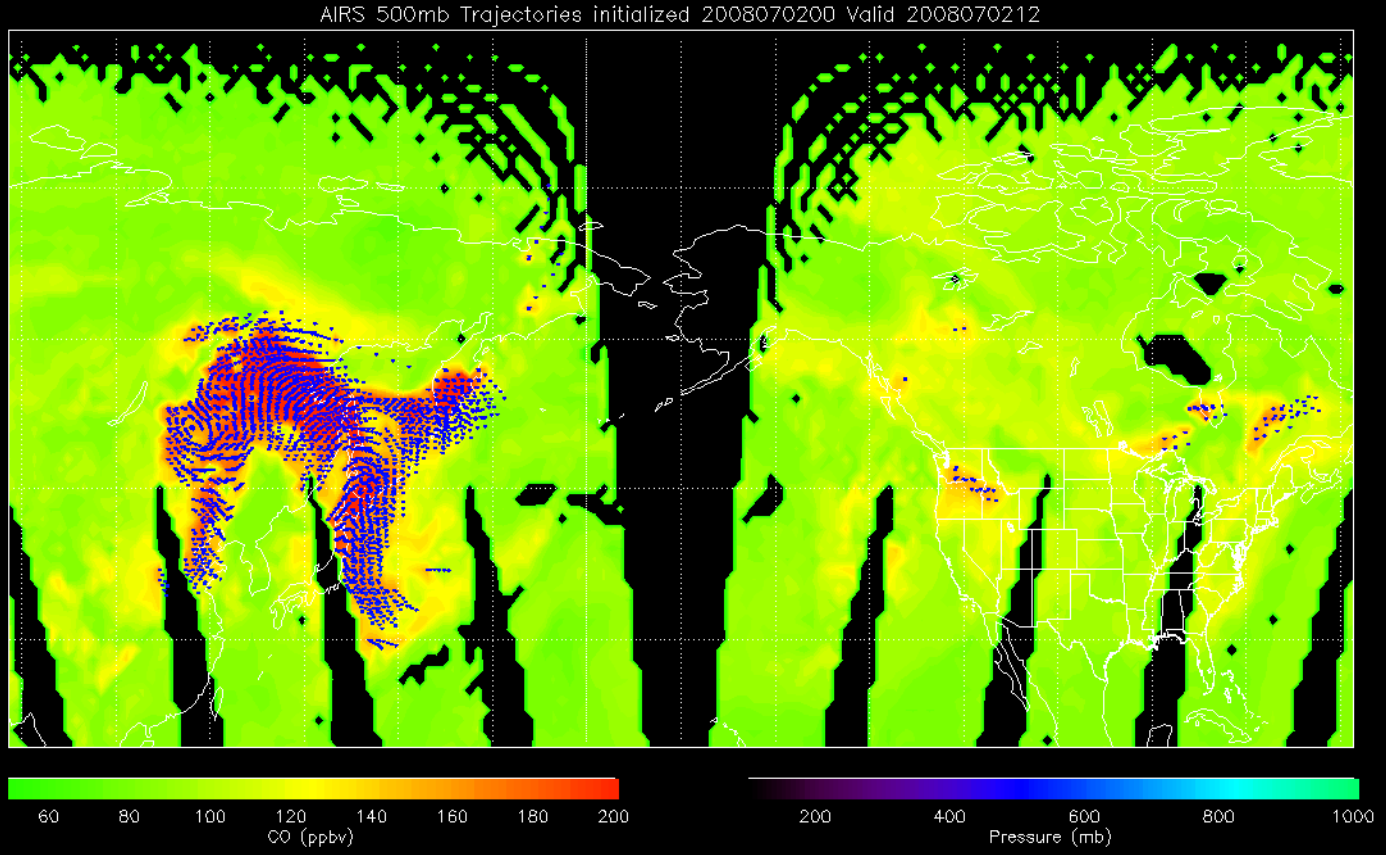
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070212
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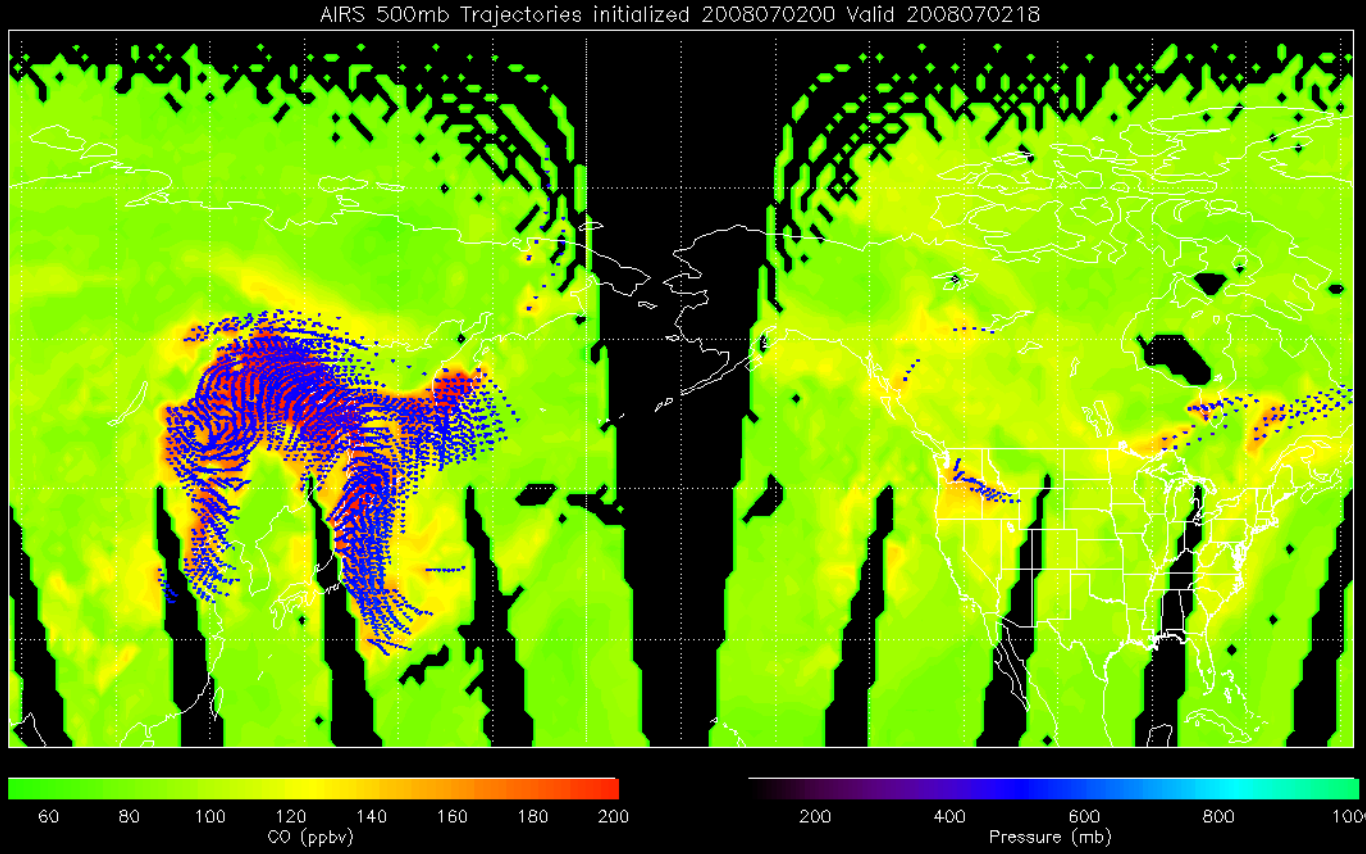
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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100
120
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160
180
200
CO (ppbv)
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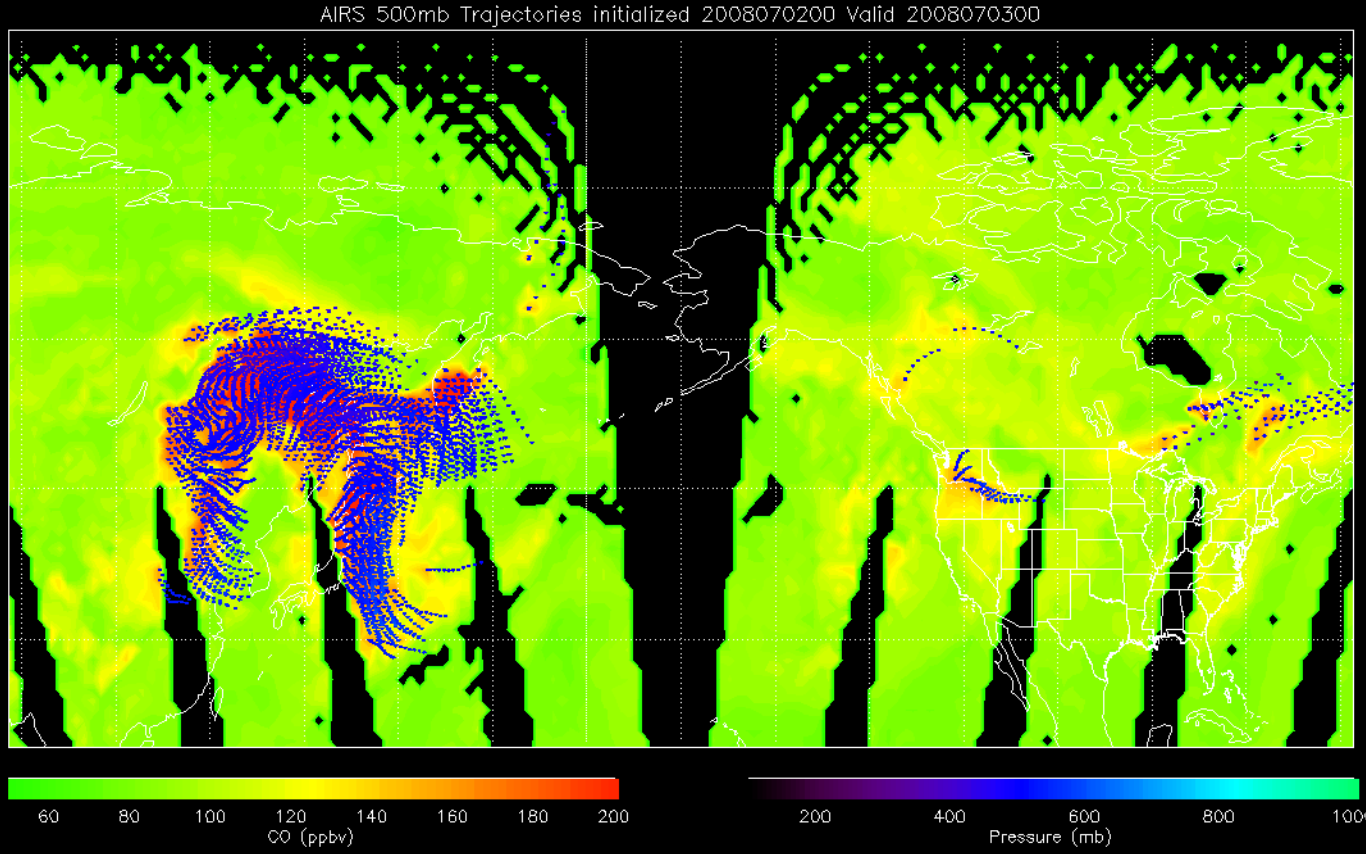
400
600
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070300
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80
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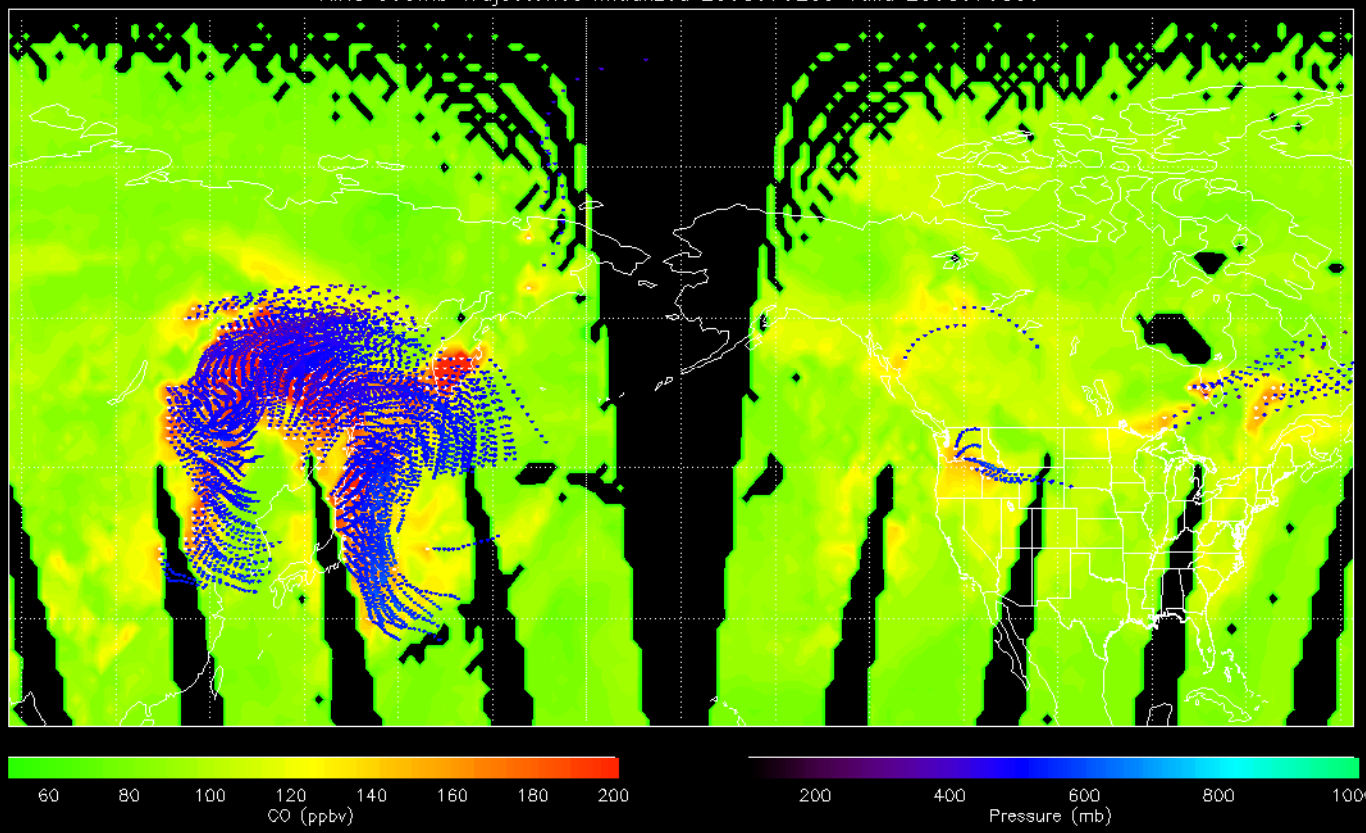
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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80
100
120
140
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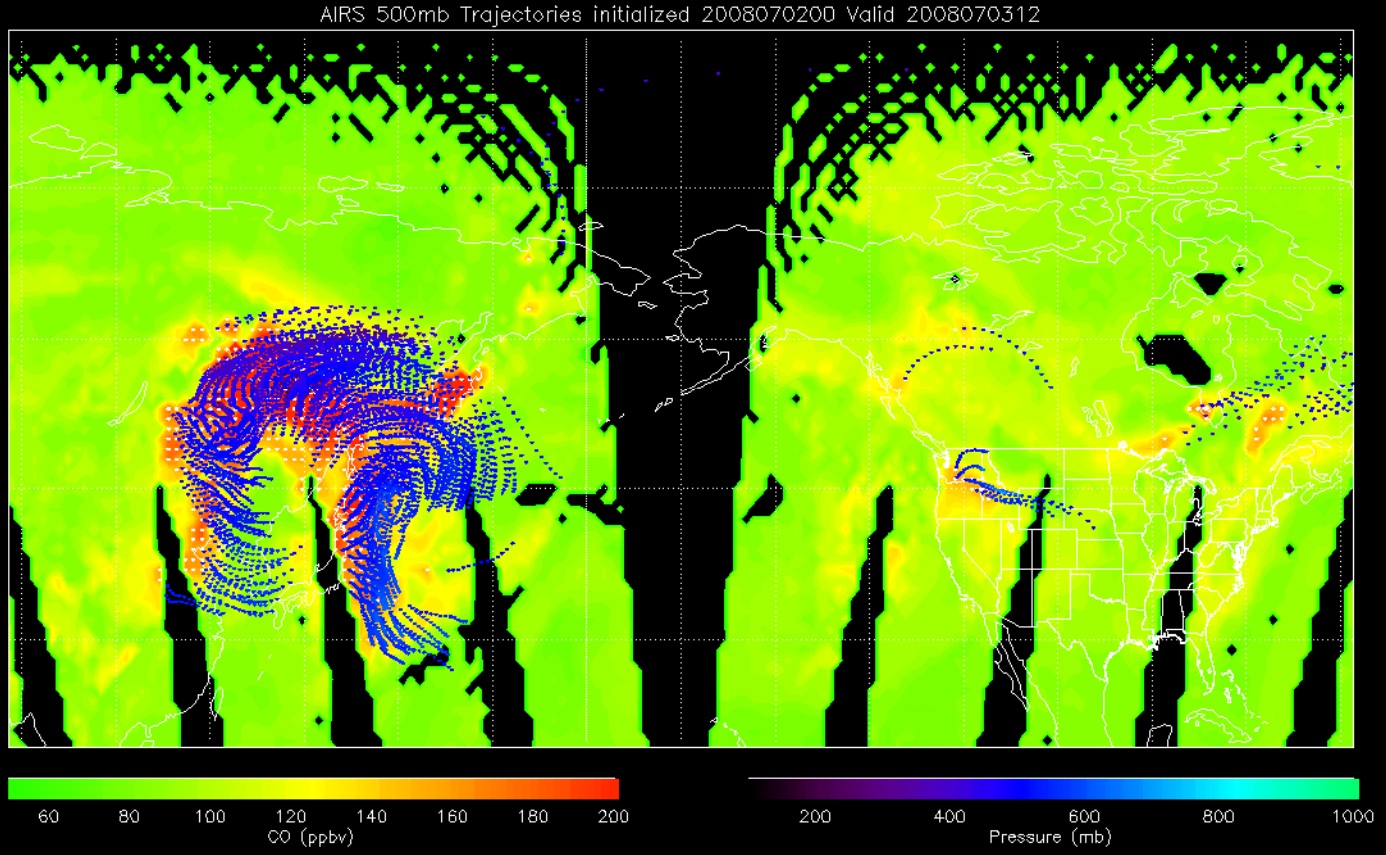
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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80
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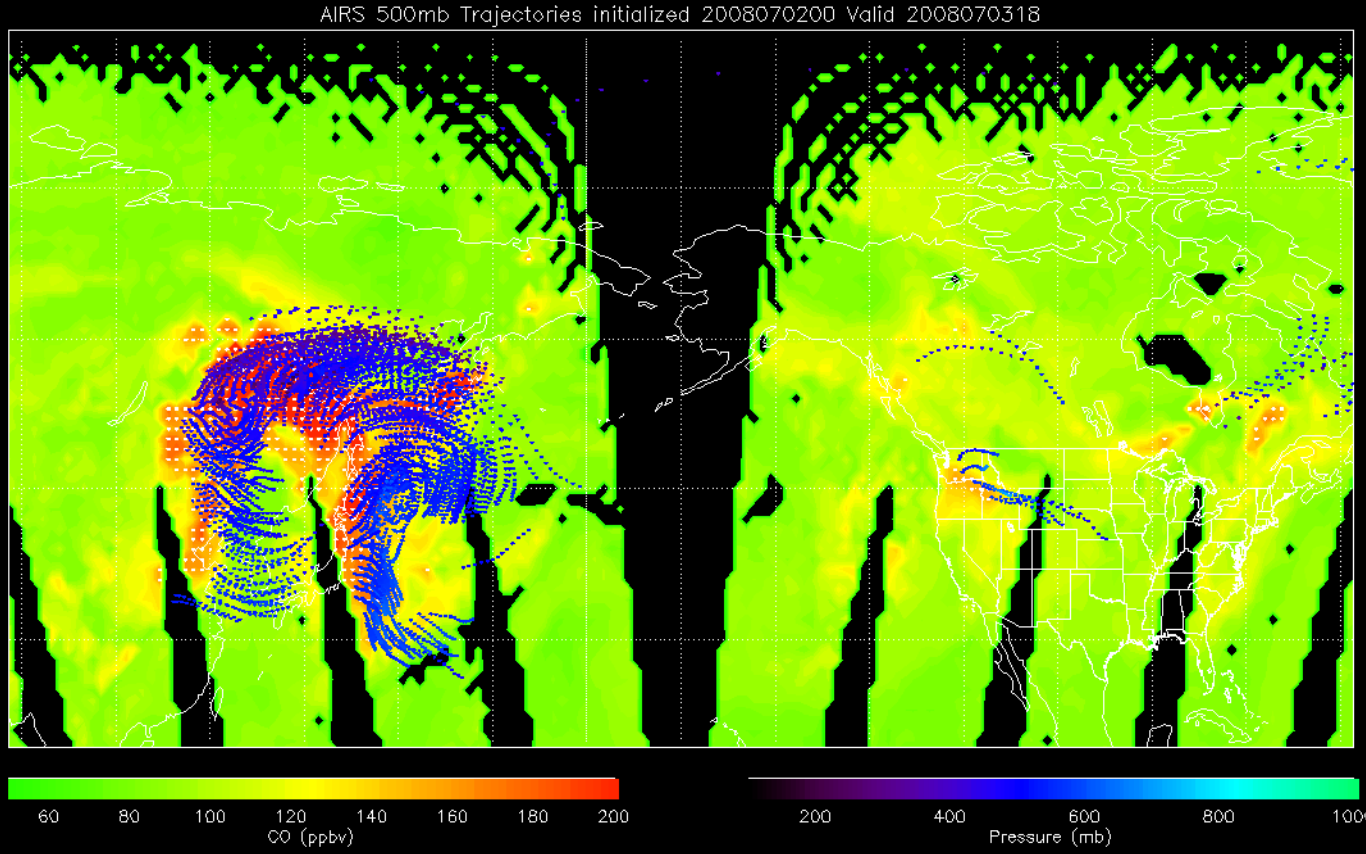
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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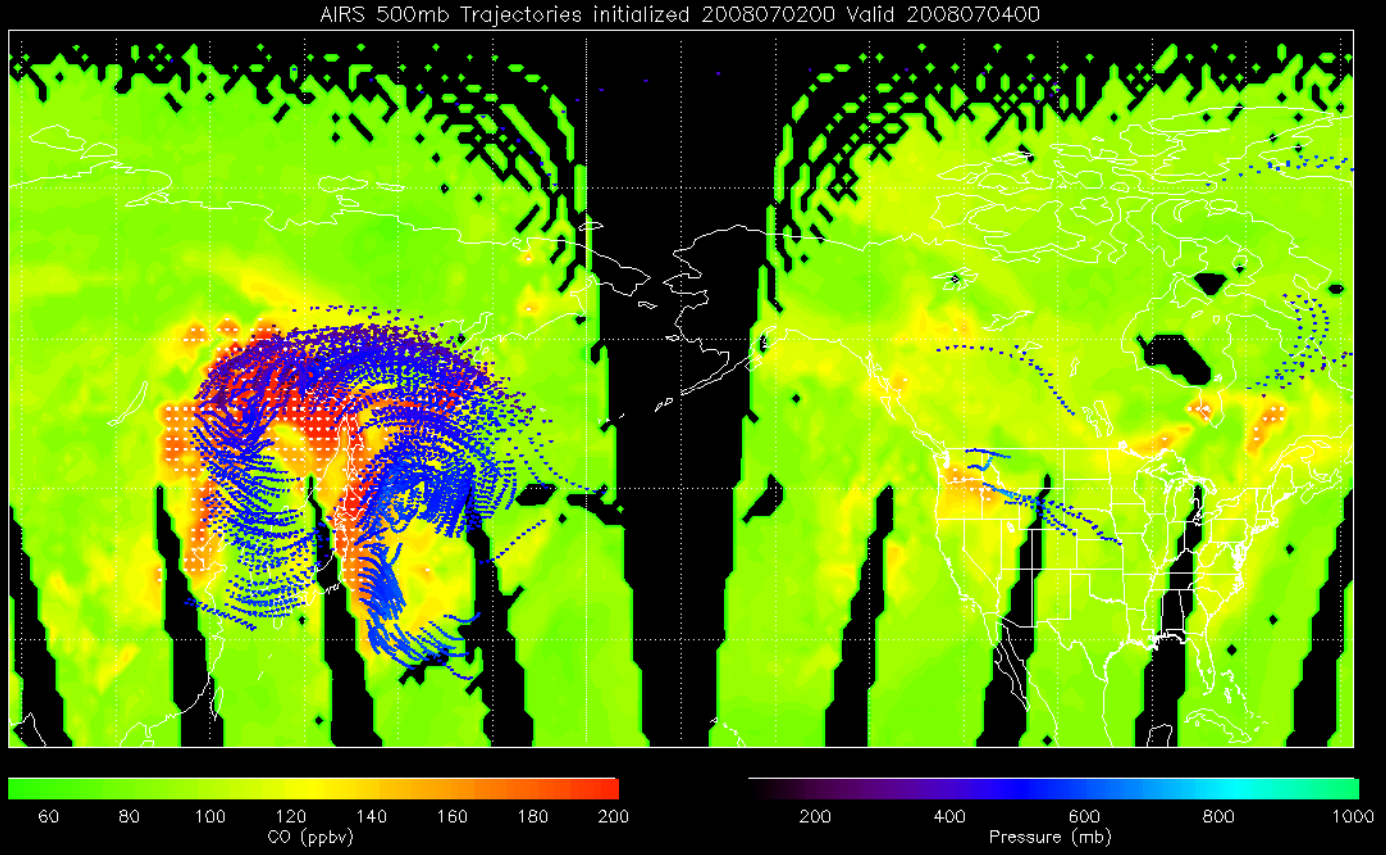
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070400
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80
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120
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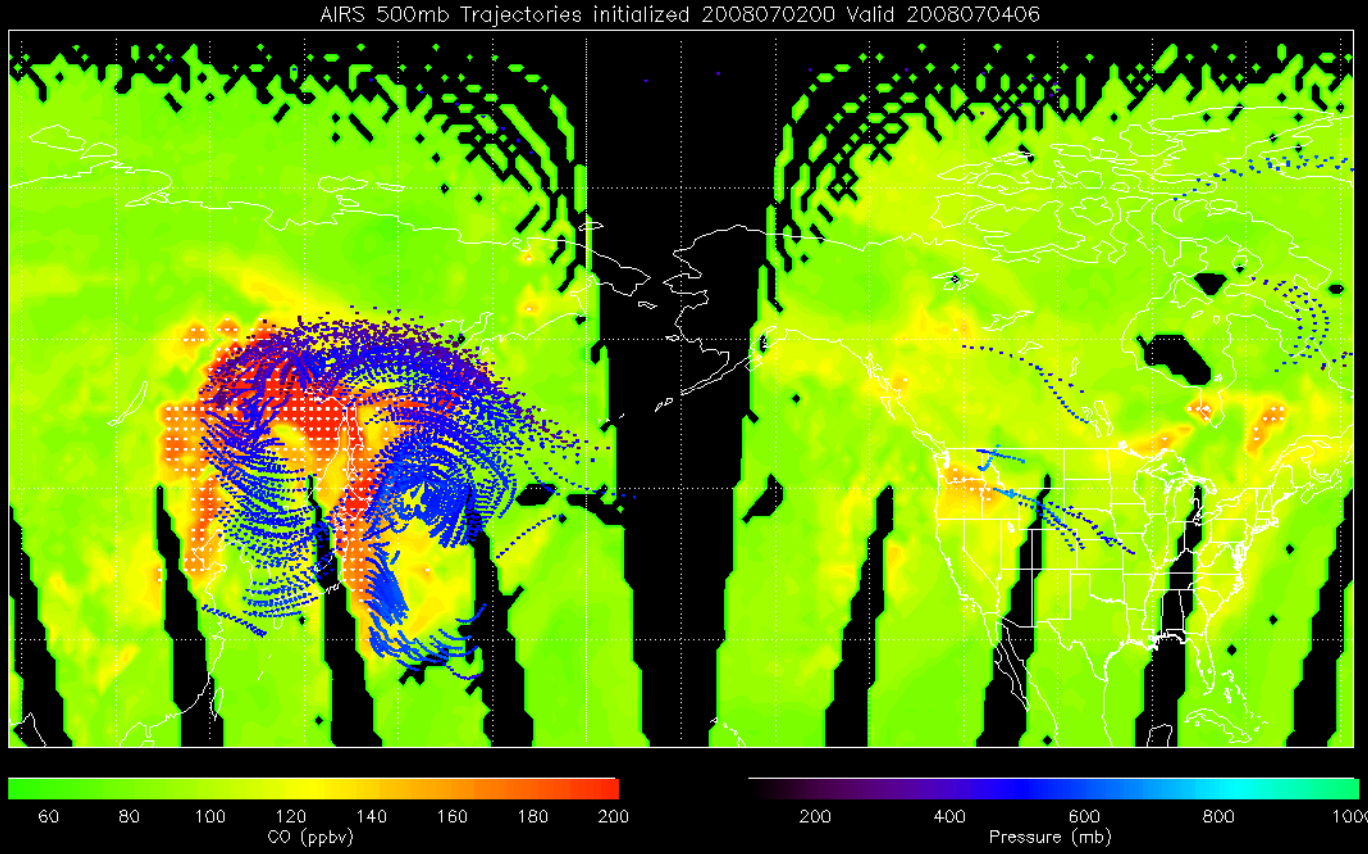
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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120
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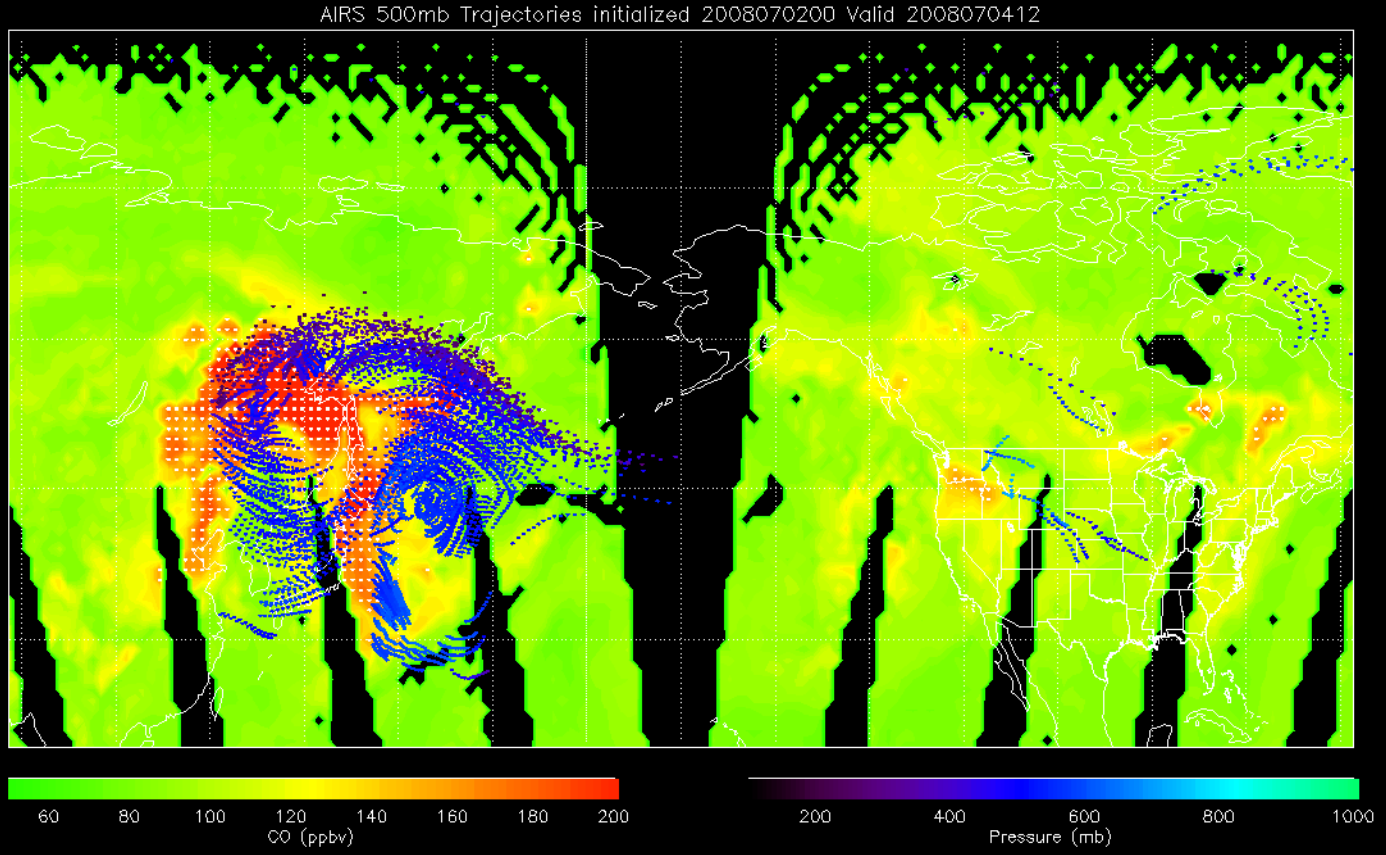
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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80
100
120
140
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180
200
CO (ppbv)
200
400
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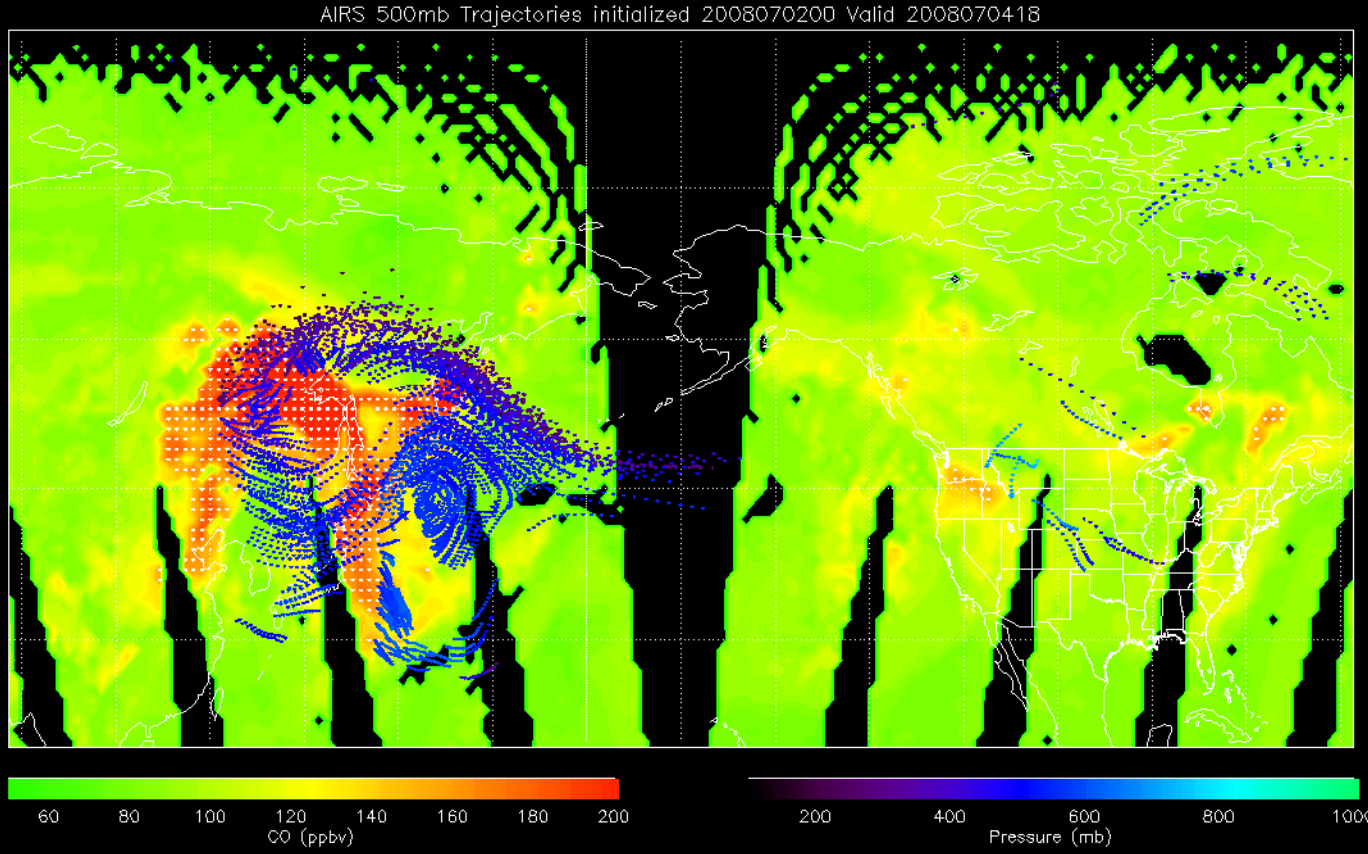
800
1000
Pressure (mb)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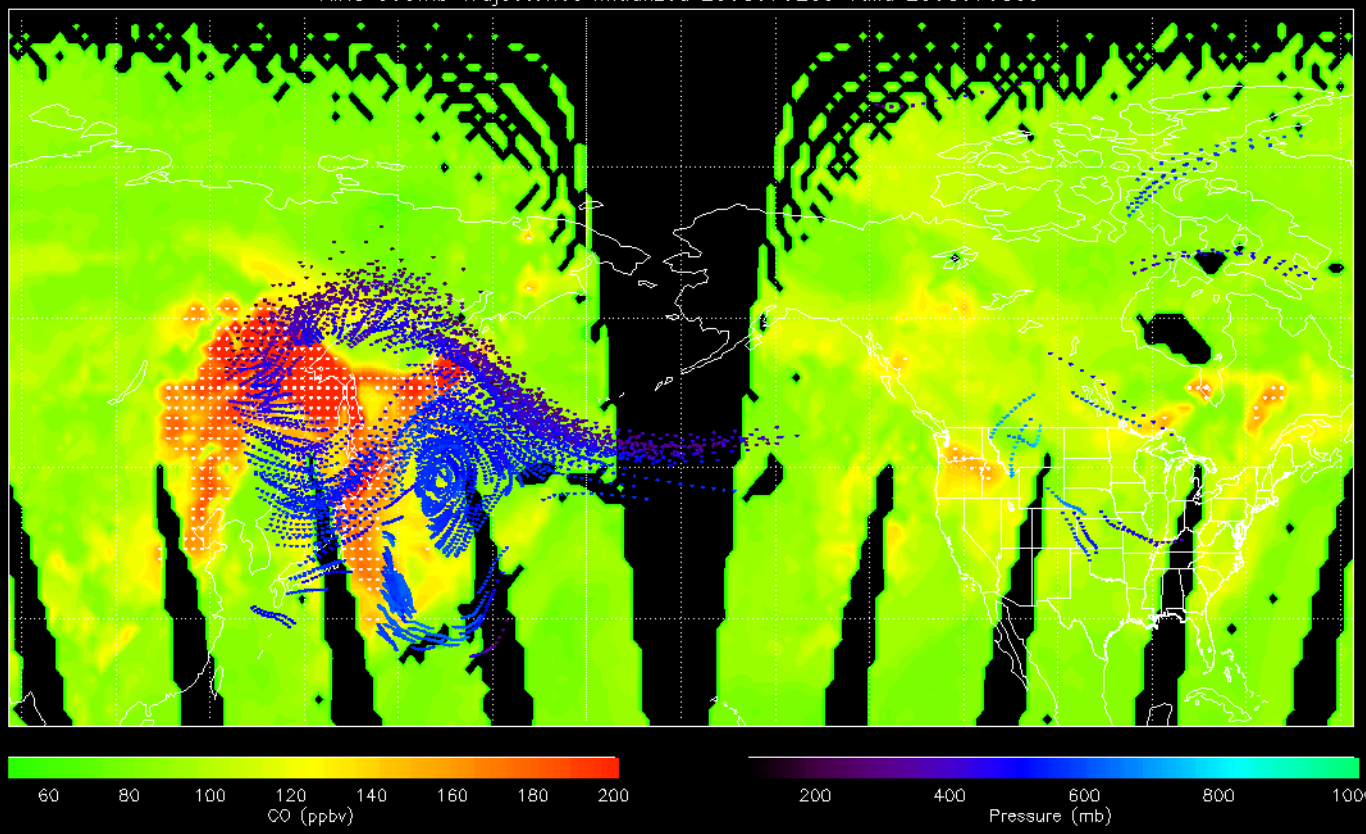
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070500
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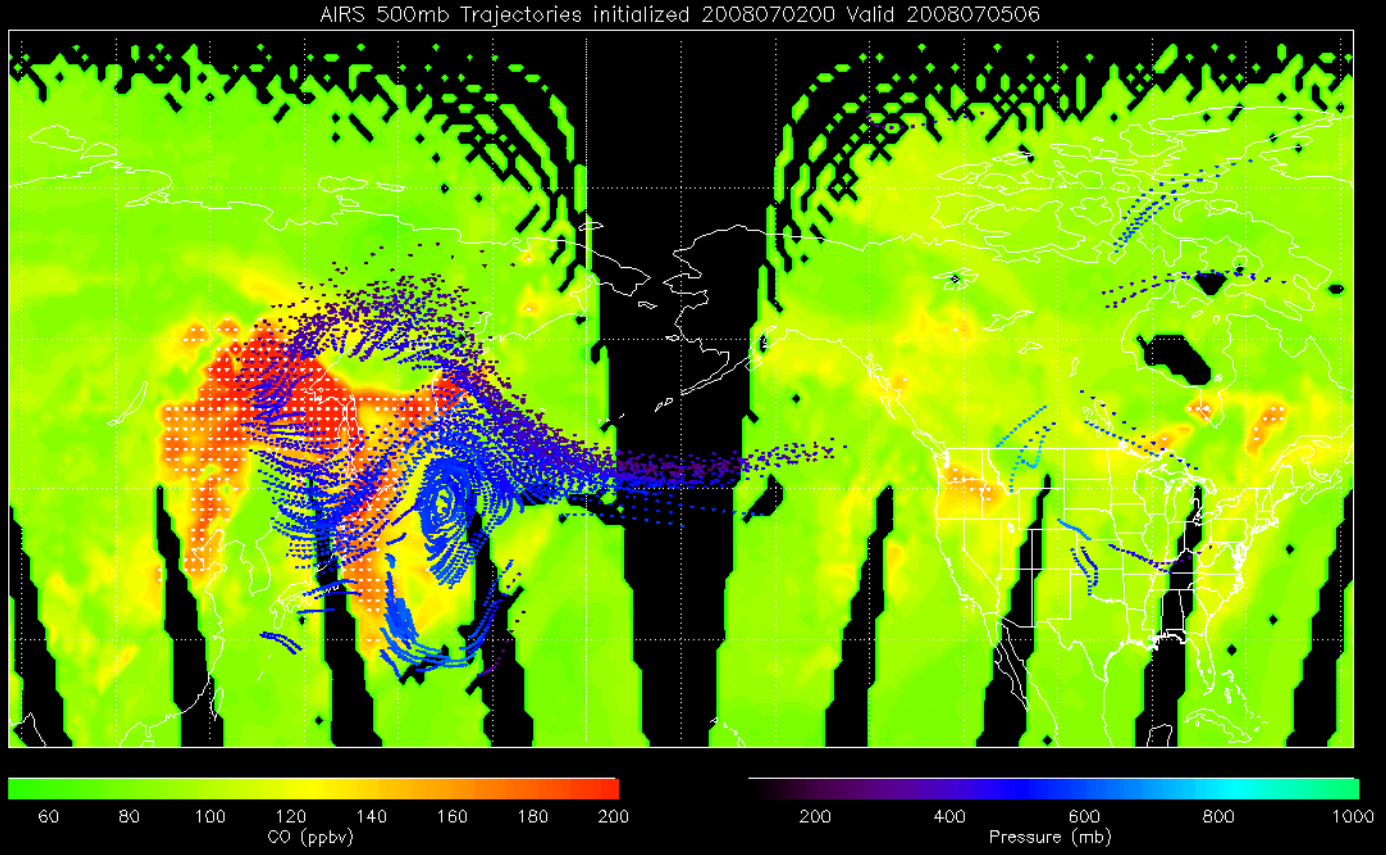
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070506
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80
100
120
140
160
180
200
CO (ppbv)
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400
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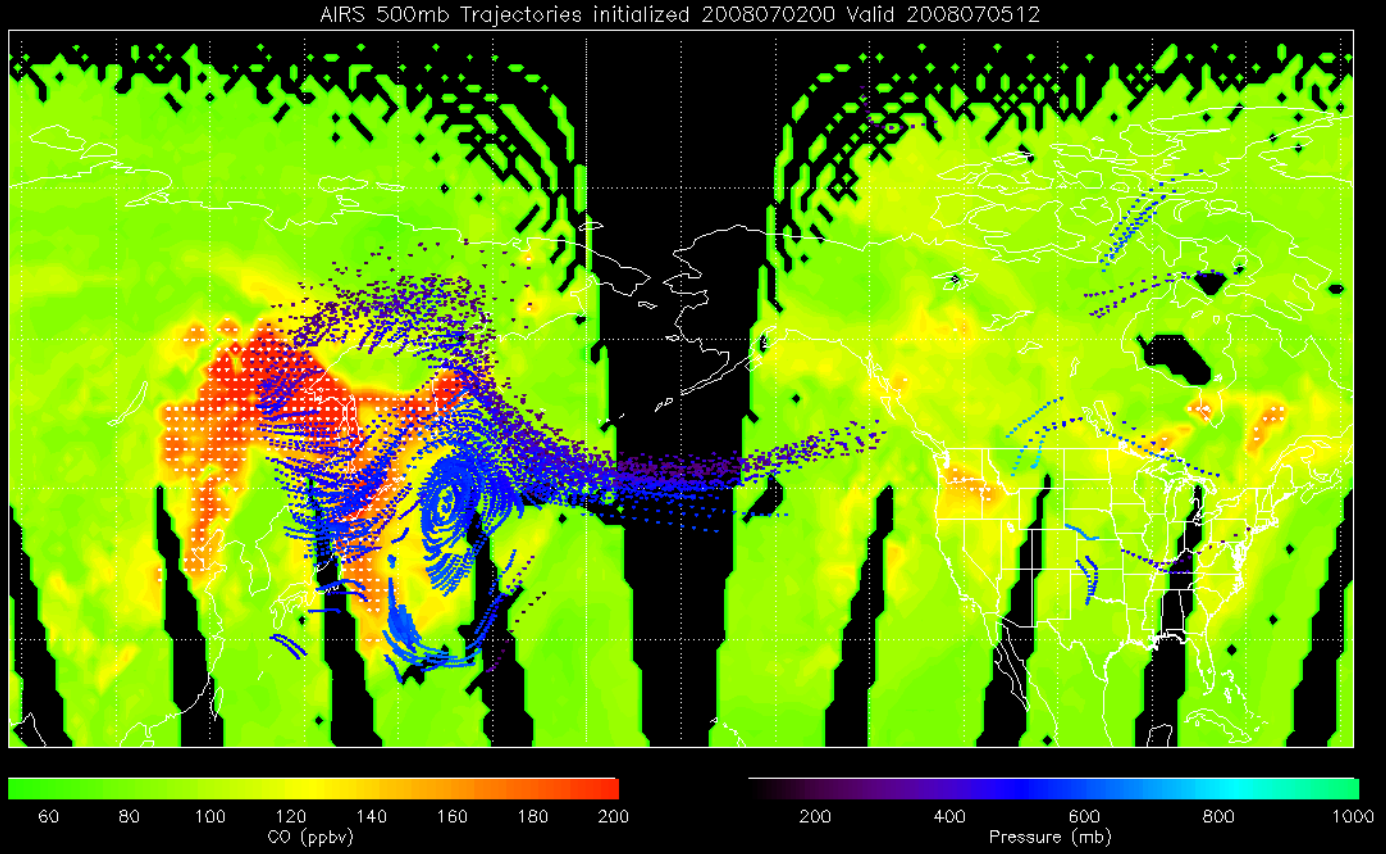
800
1000
Pressure (mb)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80
100
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200
CO (ppbv)
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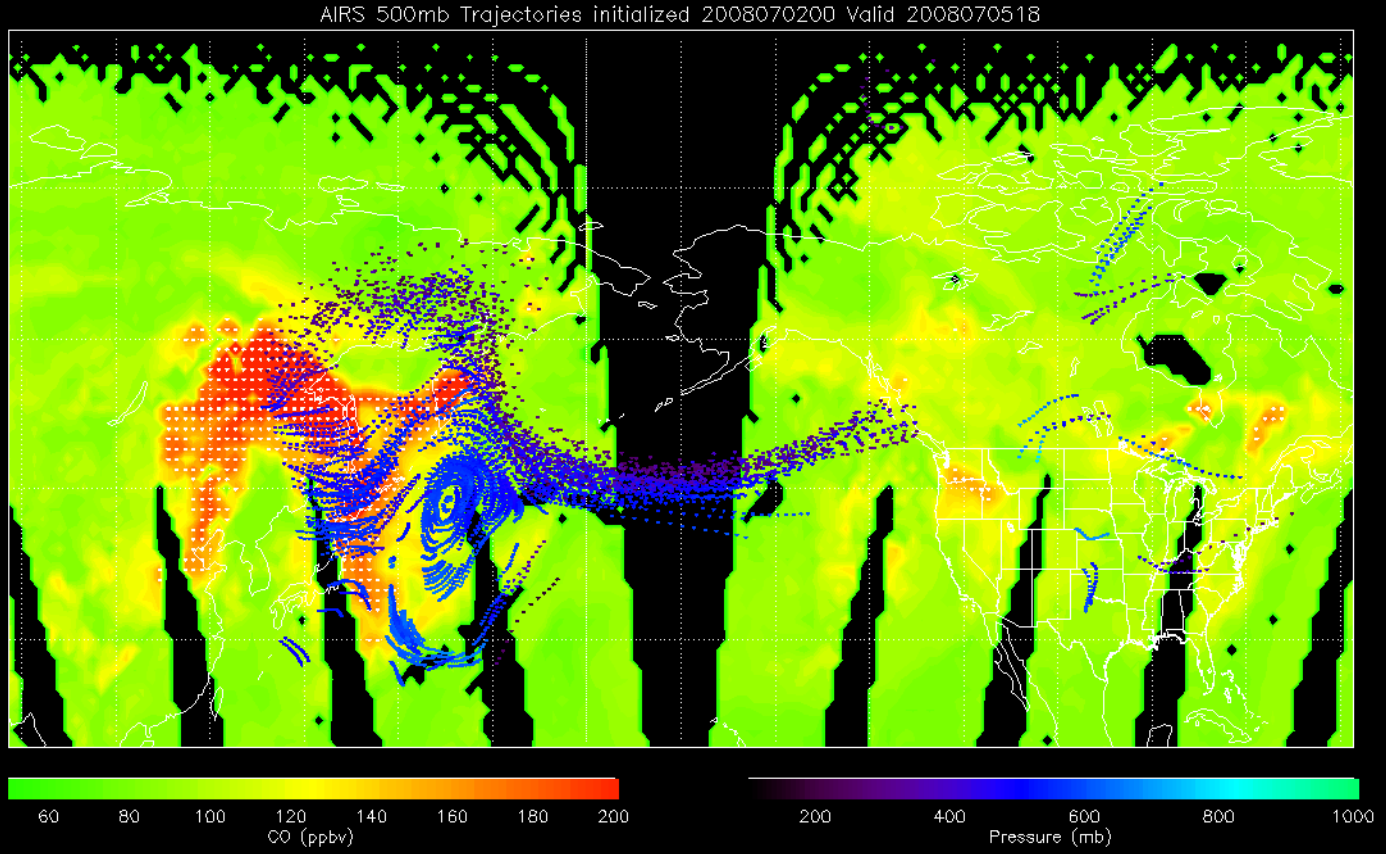
800
1000
Pressure (mb)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80
100
120
140
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180
200
CO (ppbv)
200
400
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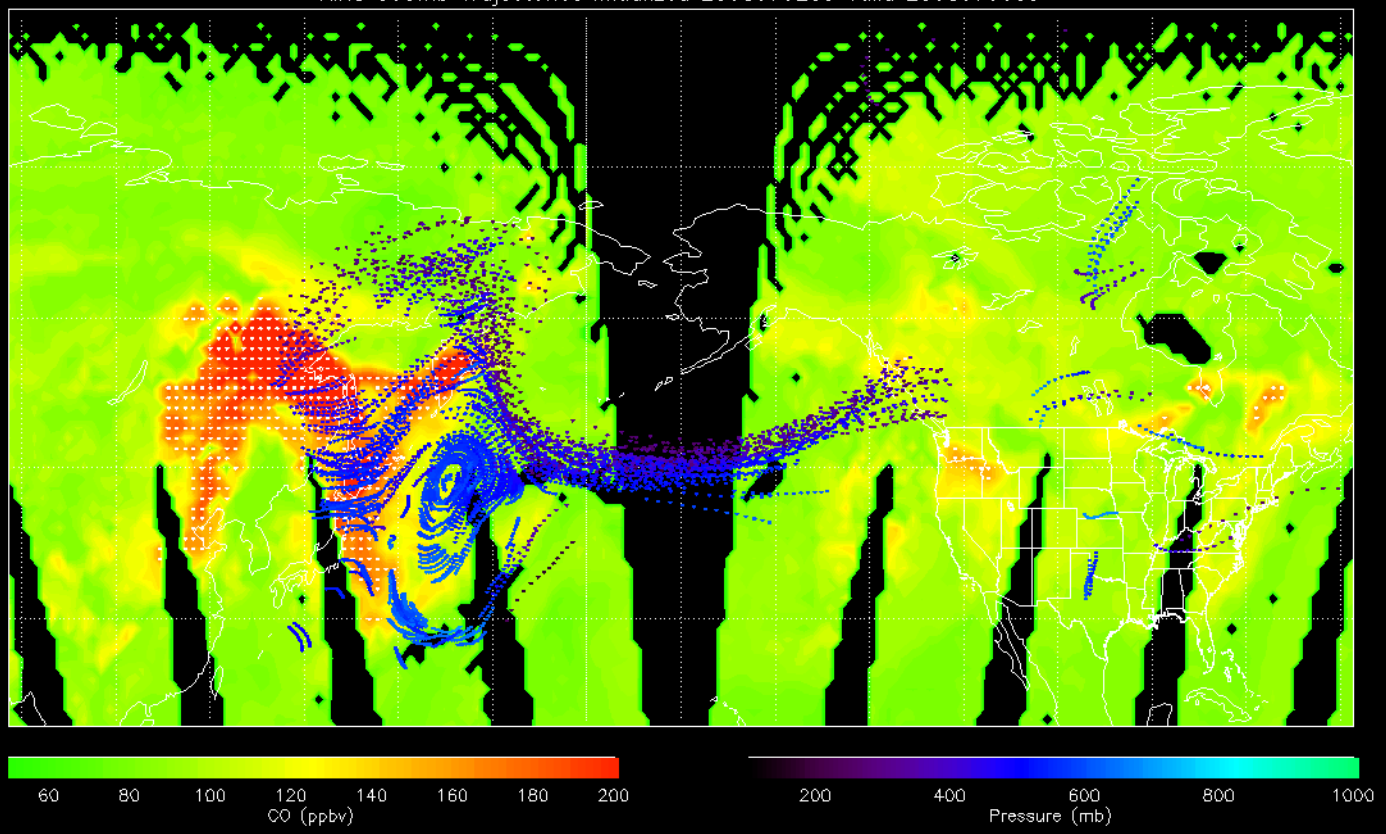
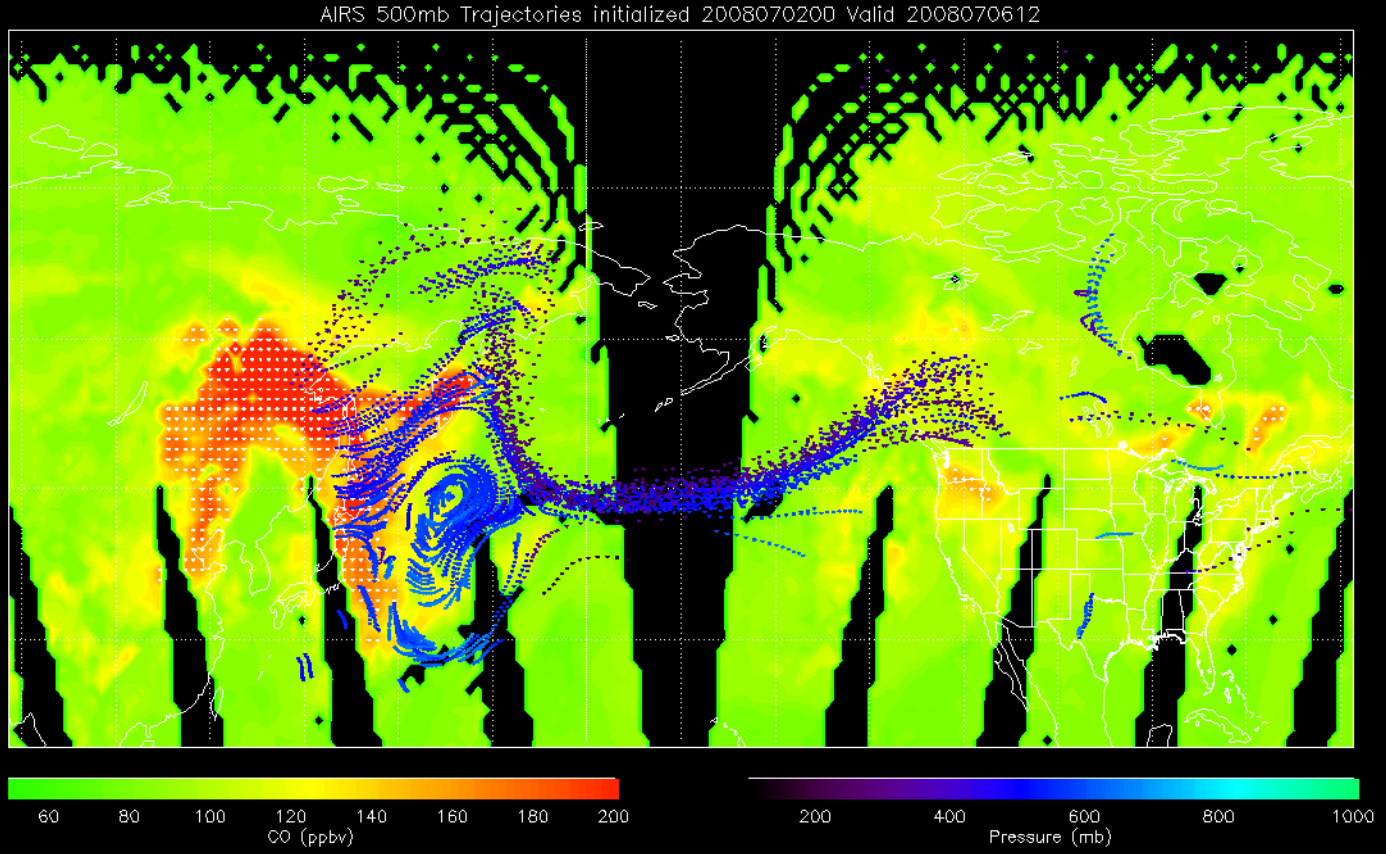
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070600
60
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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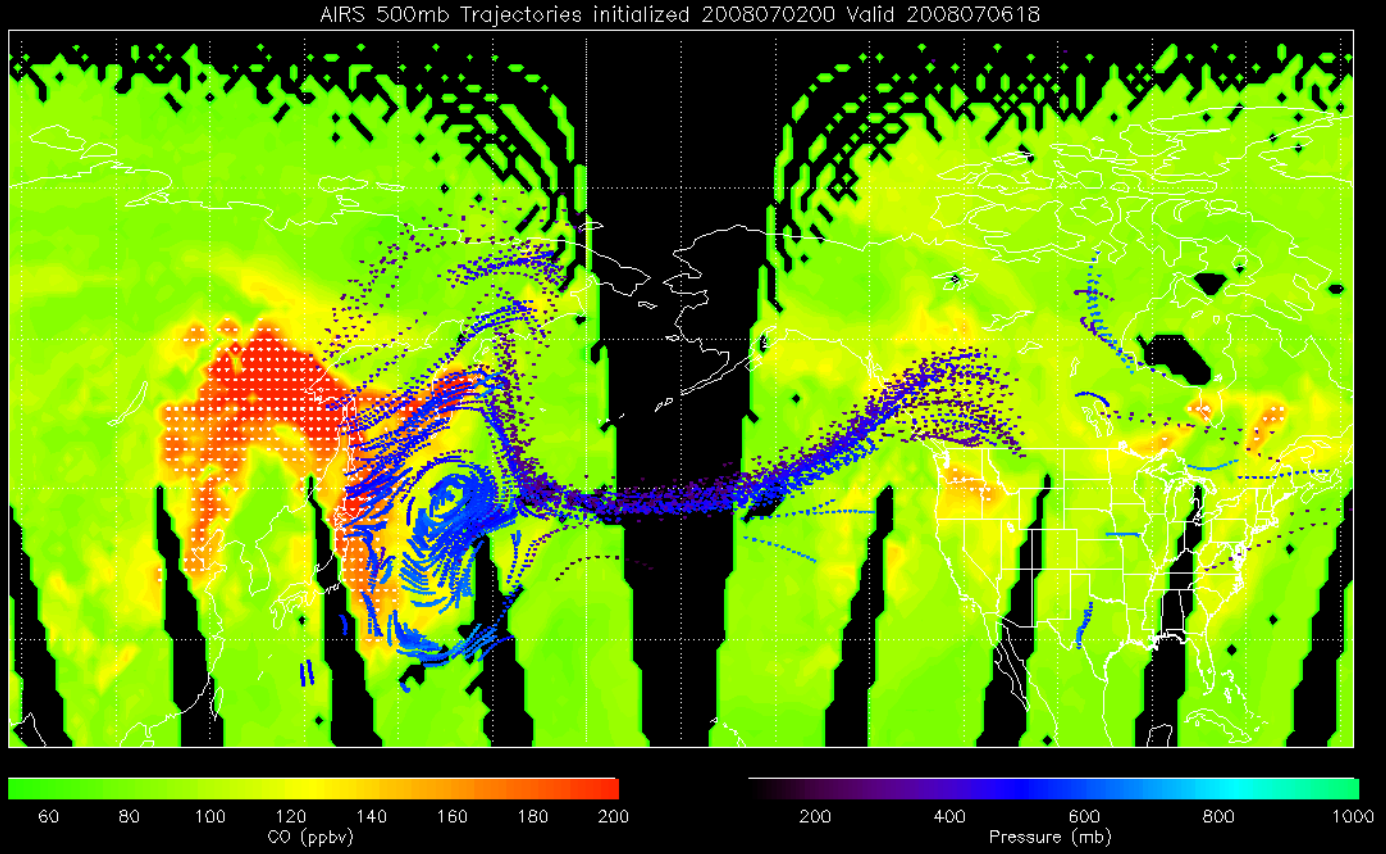
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)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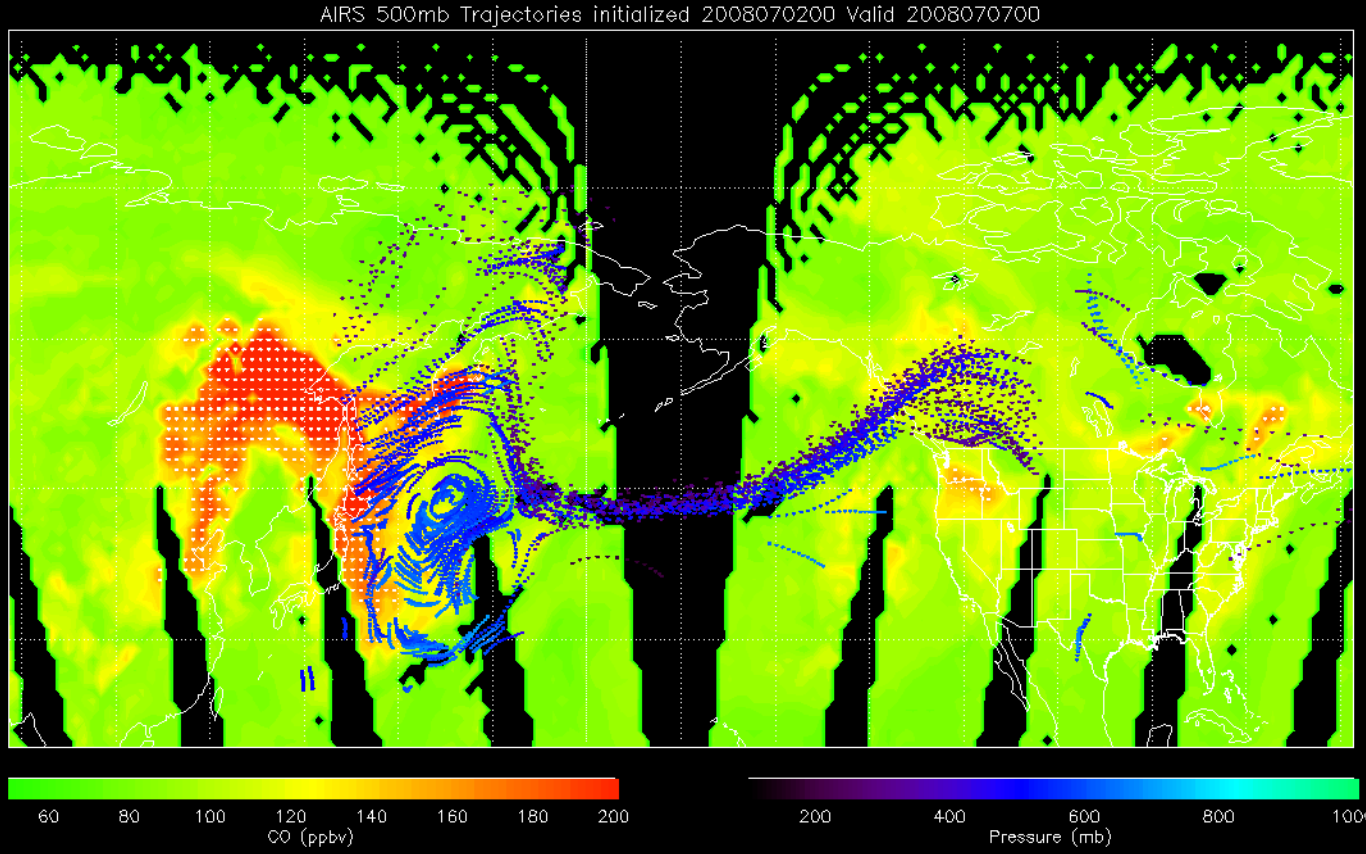
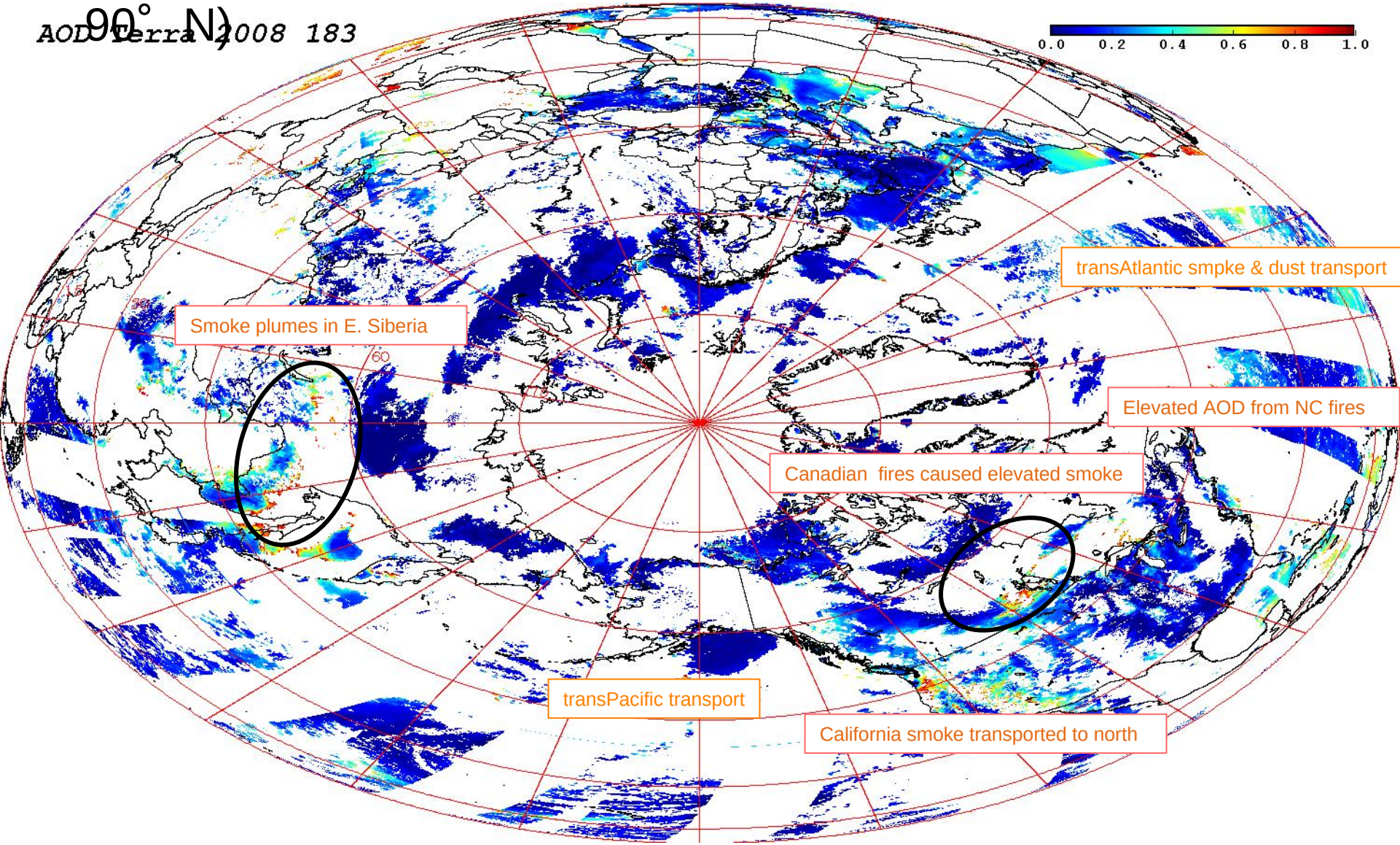
60
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)


AIRS 500mb Trajectories initialized 2008070200 Valid 2008070700
60
80
100
120
140
160
180
200
CO (ppbv)
200
400
600
800
1000
Pressure (mb)

Day 183 (July 1) Tuesday

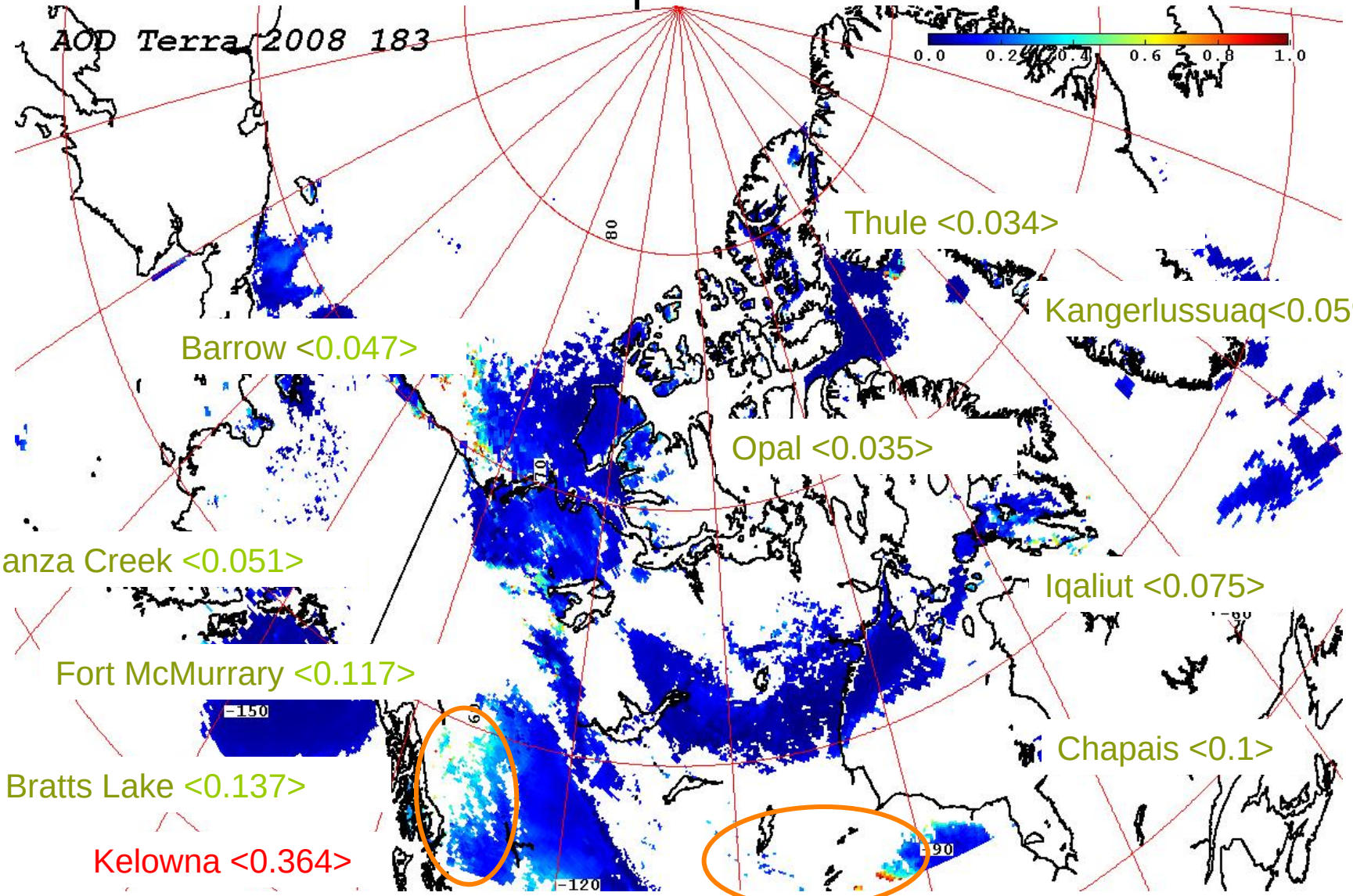
MODIS AOD Hot Spots in Northern Hemisphere (0° - 90° N)



MODIS AOD at 550 nm and AERNOET daily mean <AOD> at 500 nm

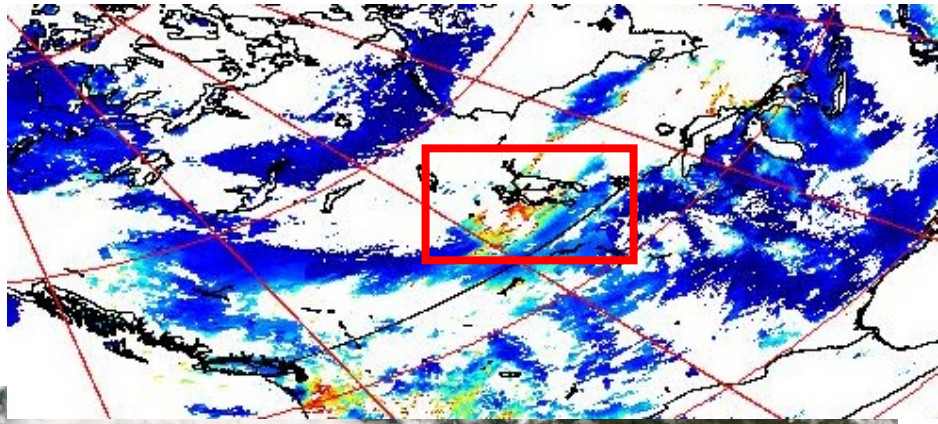
Day 183 (July 1) Tuesday

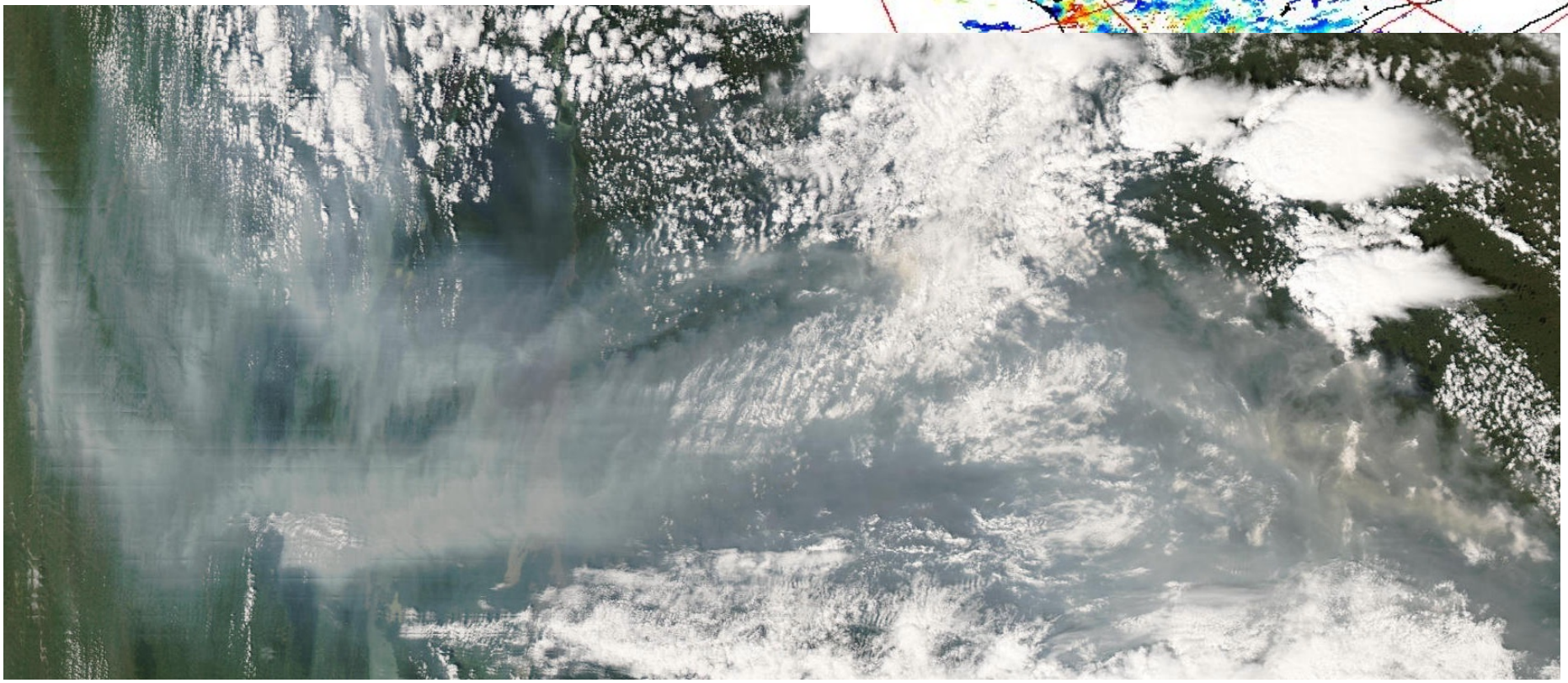
MODIS AOD Hot Spots in Northern America



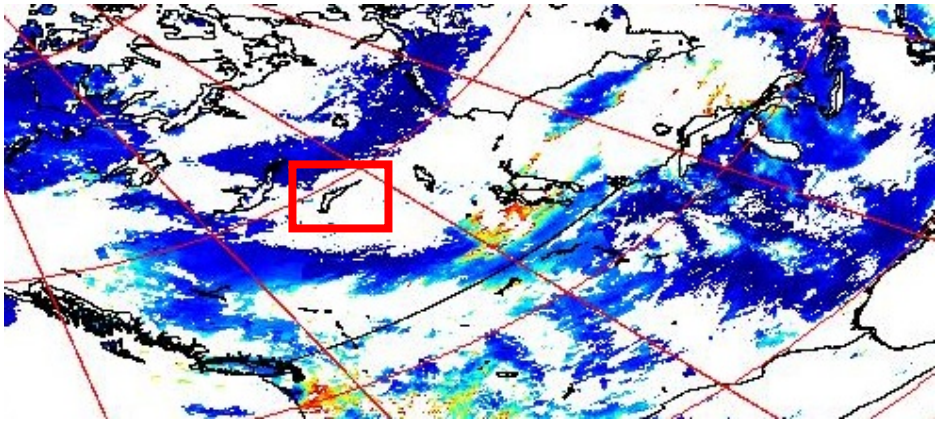
MODIS AOD at 550 nm and AERNOET daily mean <AOD> at 500 nm

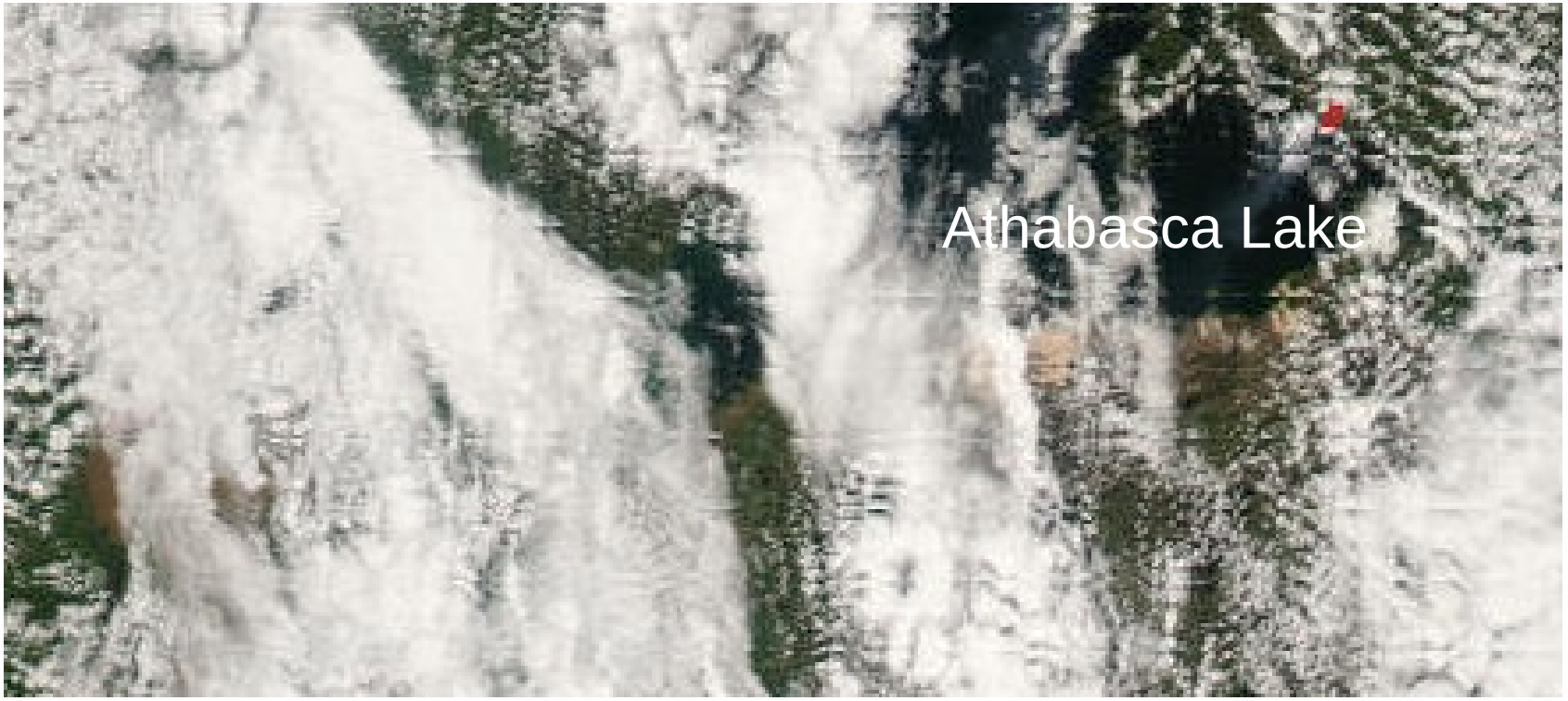
Smoke plumes in Saskatchewan and Manitoba sampled by DC-8

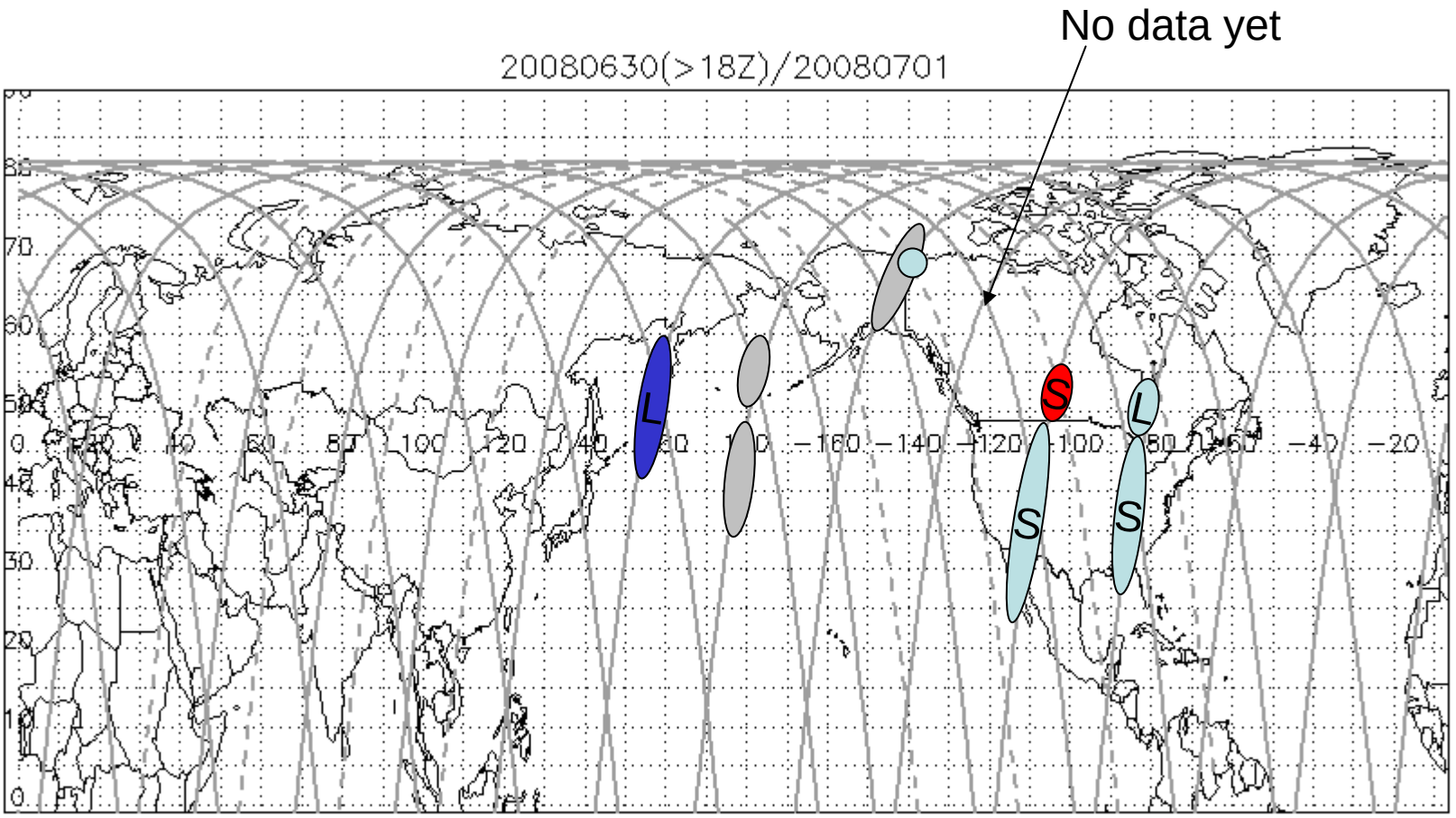


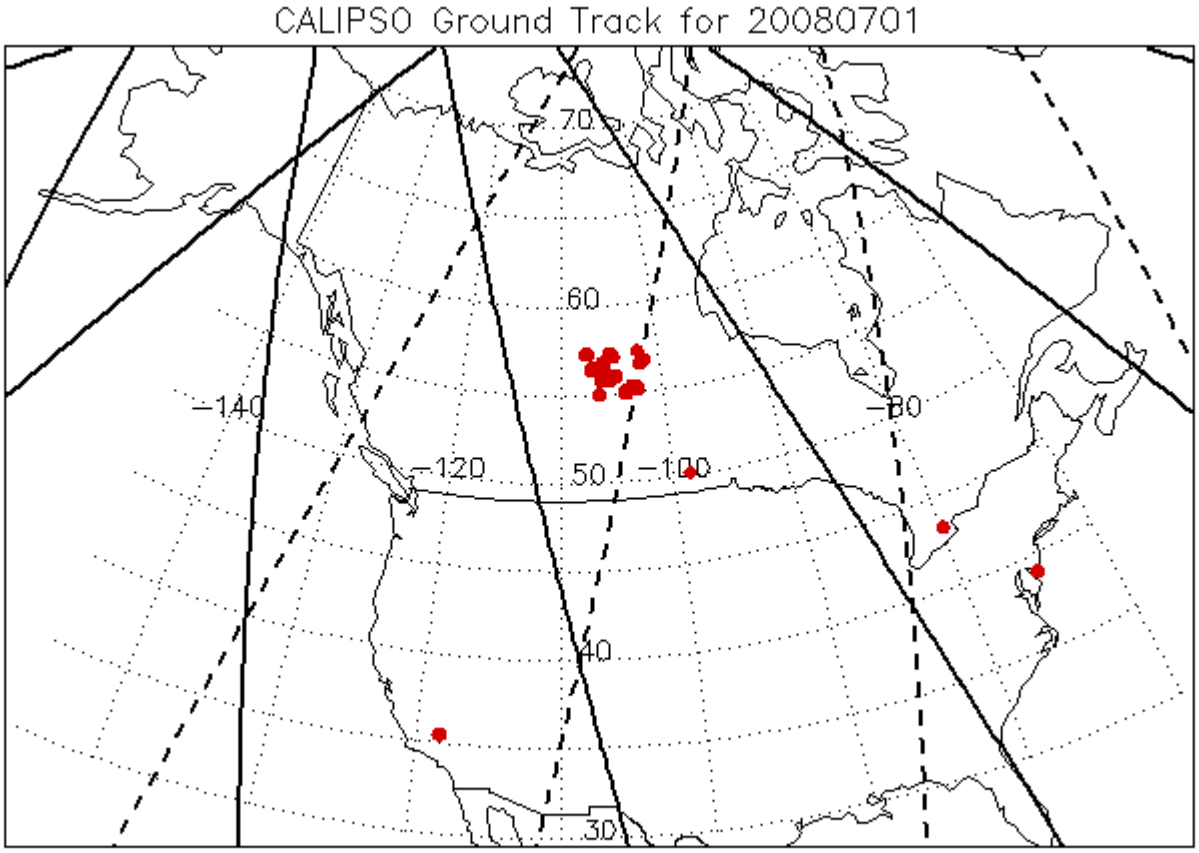


Smoke plumes under clouds in N. Saskatchewan

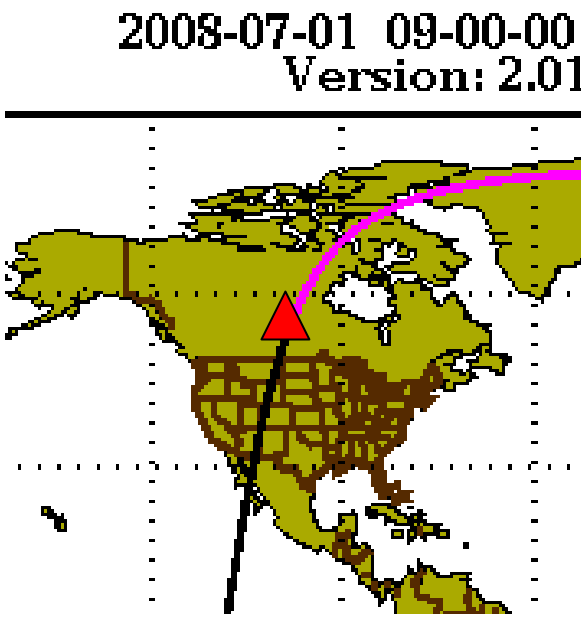


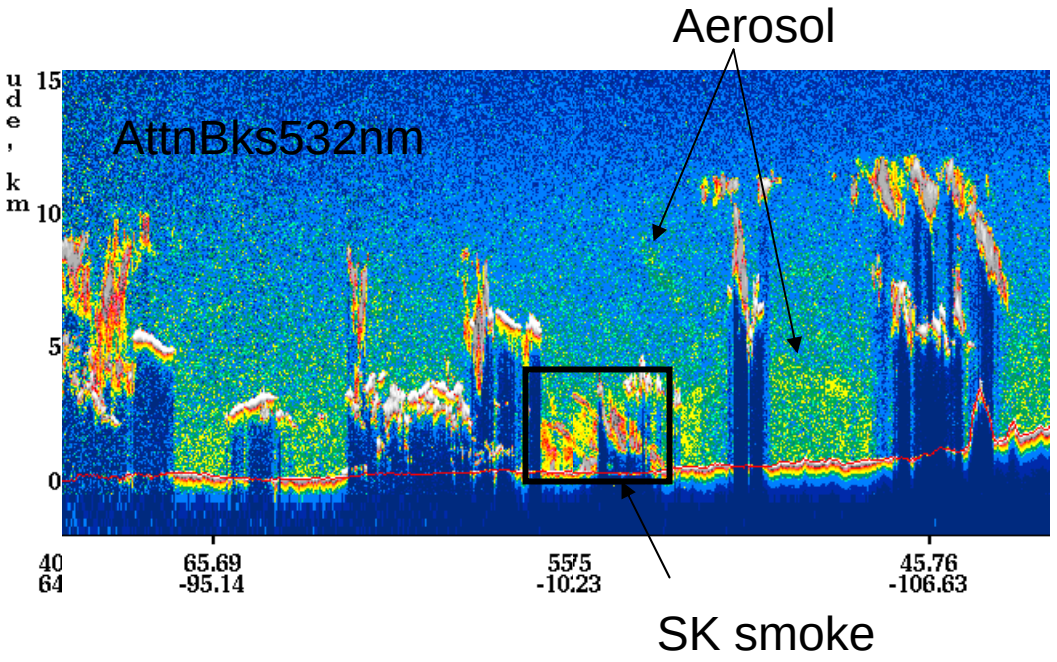


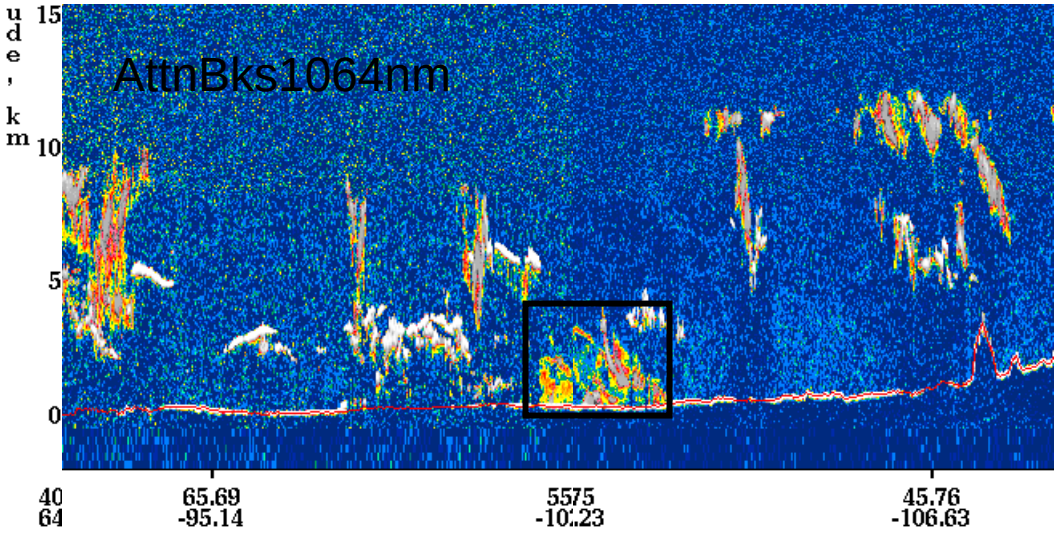

No data yet
20080630(>18Z)/20080701
L
S
L
S
S
Cloud
Aerosol Layer- low aerosol loading
Aerosol Layer- medium aerosol loading
Aerosol Layer- high aerosol loading



Fire locations from MODIS Terra and Aqua


2008-07-01 09-00-00
Version: 2.01


Aerosol
AttnBks532nm
15
10
5
0
km
40
64
65.69
-95.14
5575
-10.23
45.76
-106.63
SK smoke


AttnBks1064nm
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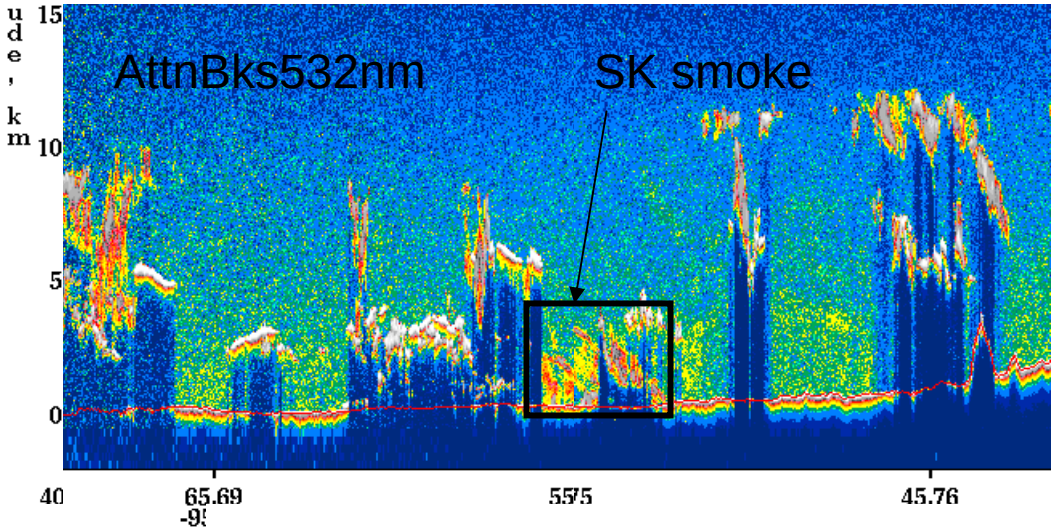
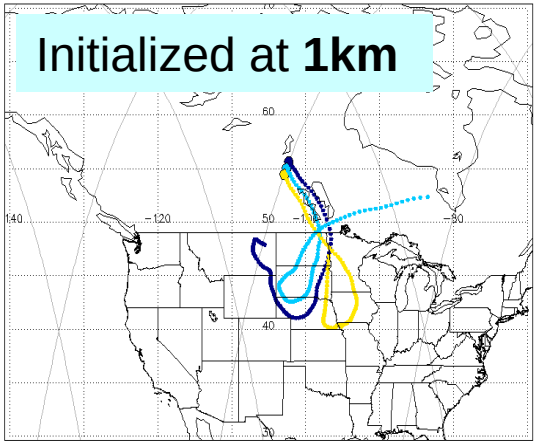
10
5
0
km
40
64
65.69
-95.14
5575
-10.23
45.76
-106.63

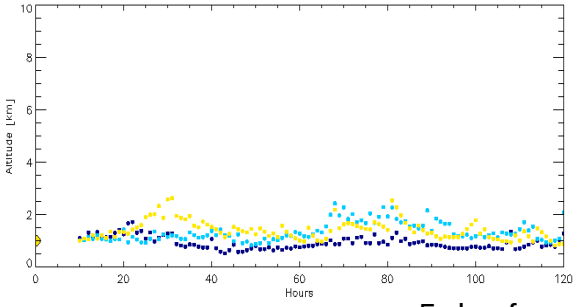


120hr CALIPSO Trajectories Initialized 2008070100 Valid 2008070600

Initial Altitude: 1000m

Initialized at **1km**

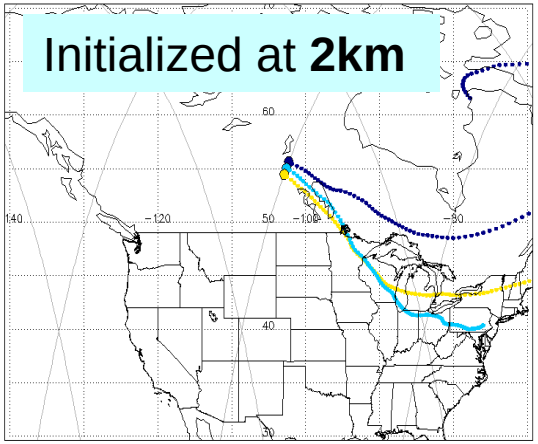


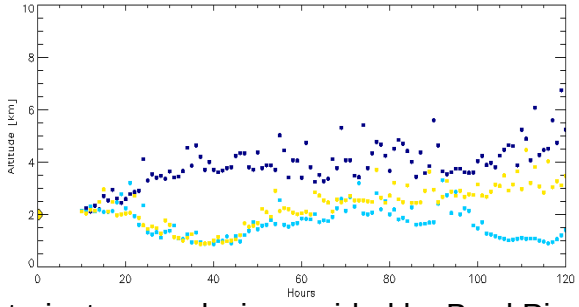


120hr CALIPSO Trajectories Initialized 2008070100 Valid 2008070600

Initial Altitude: 2000m

Initialized at **2km**

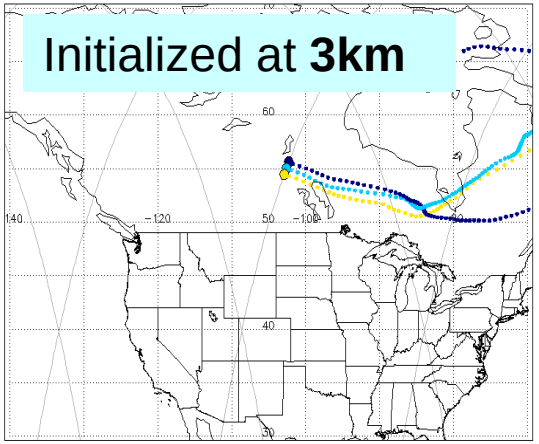


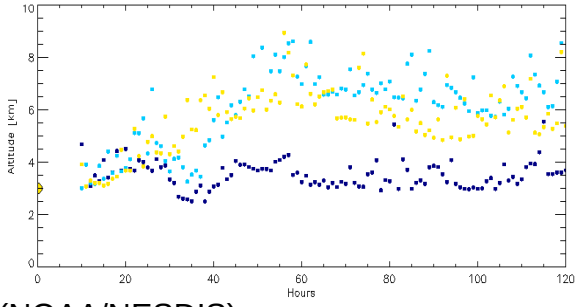


120hr CALIPSO Trajectories Initialized 2008070100 Valid 2008070600

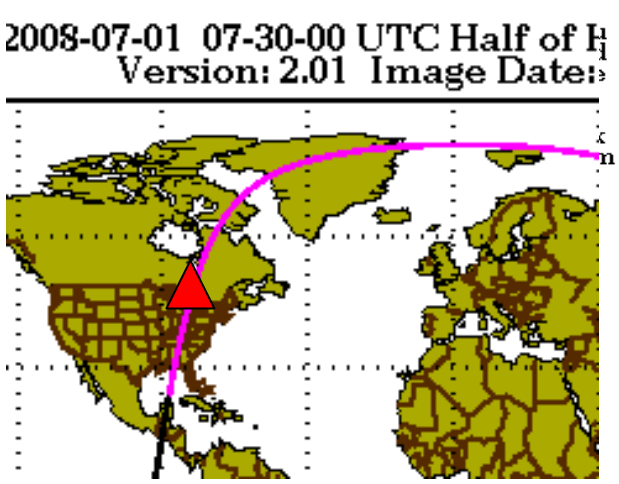
Initial Altitude: 3000m

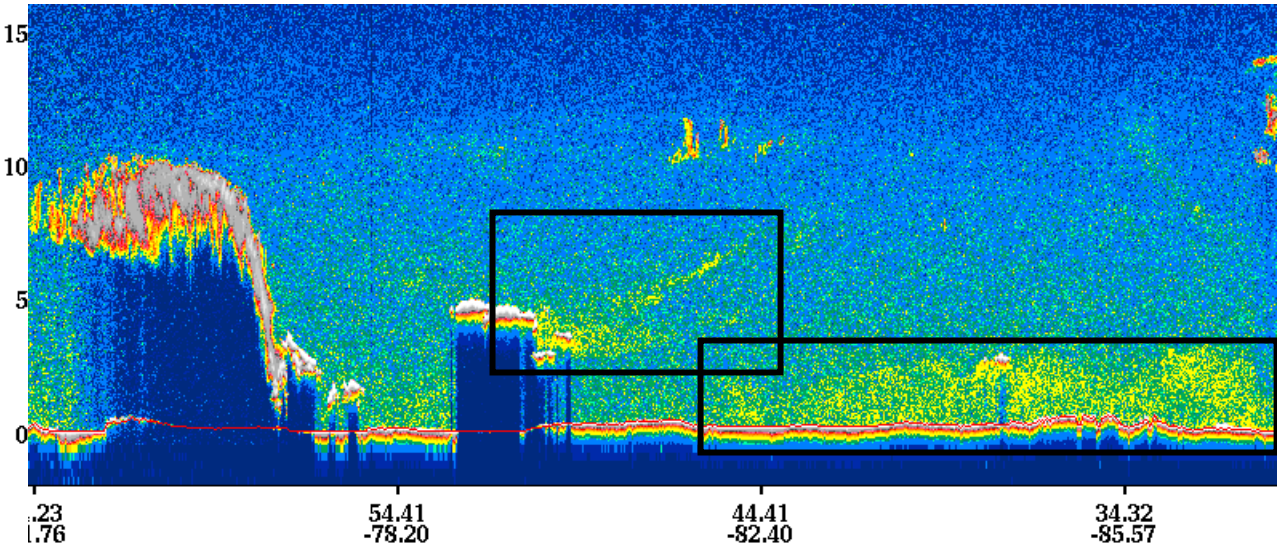
Initialized at **3km**

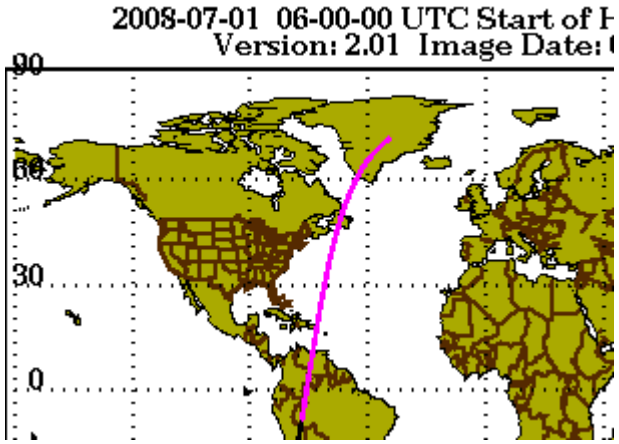




5-day forward trajectory analysis provided by Brad Pierce (NOAA/NESDIS)


2008-07-01 07-30-00 UTC Half of H
Version: 2.01 Image Date:

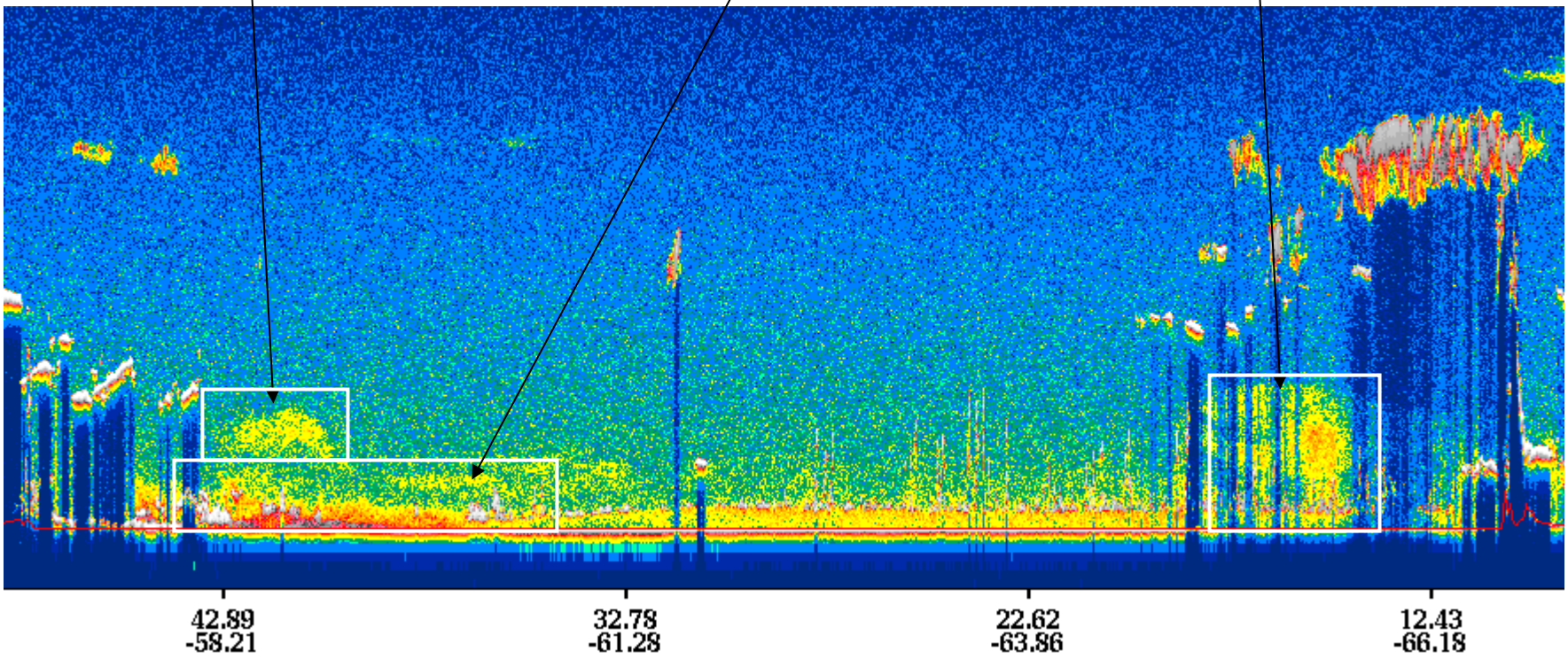

15
10
5
0
.23
.76
54.41
-78.20
44.41
-82.40
34.32
-85.57

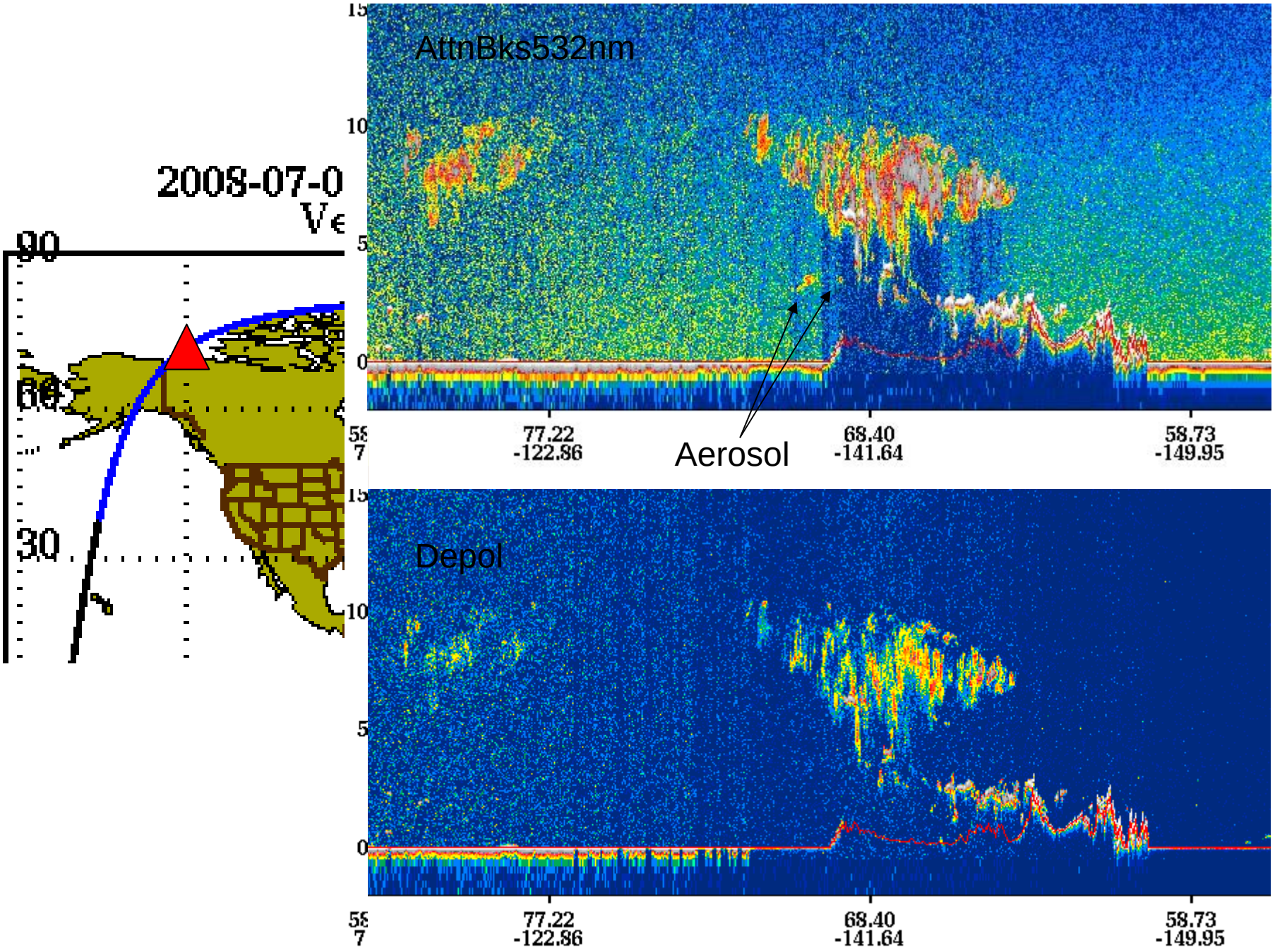


Looks like dust

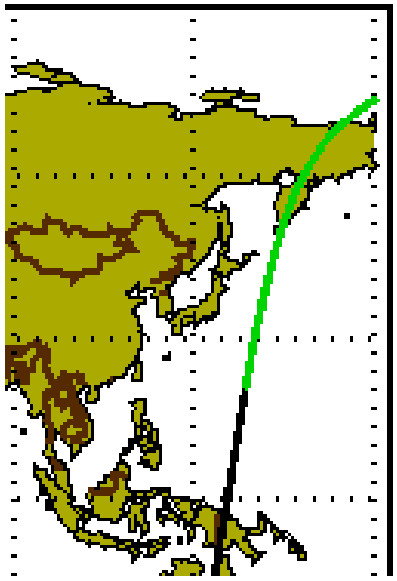
This is interesting! – Lots of stuff: pollution outflow from US?

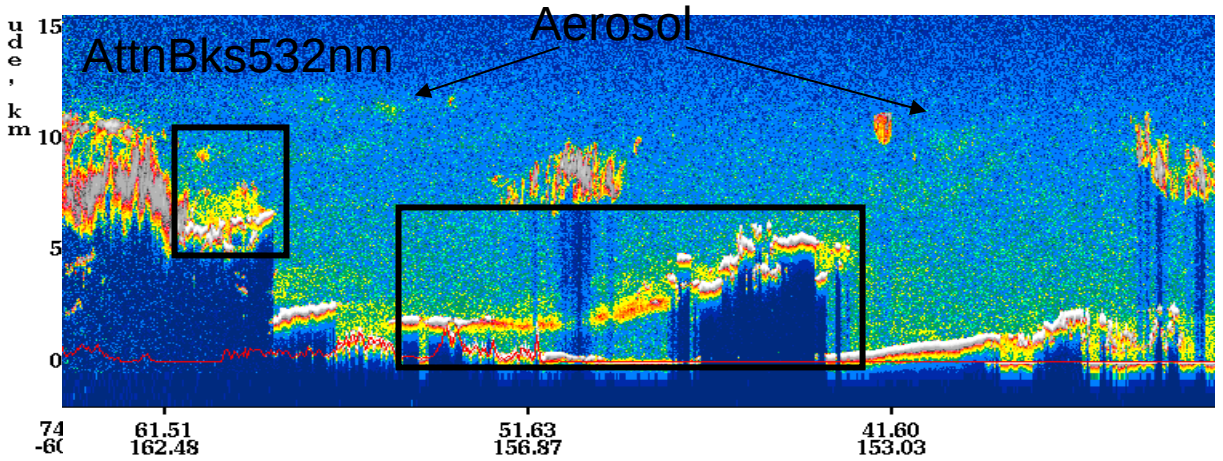
Sahara dust

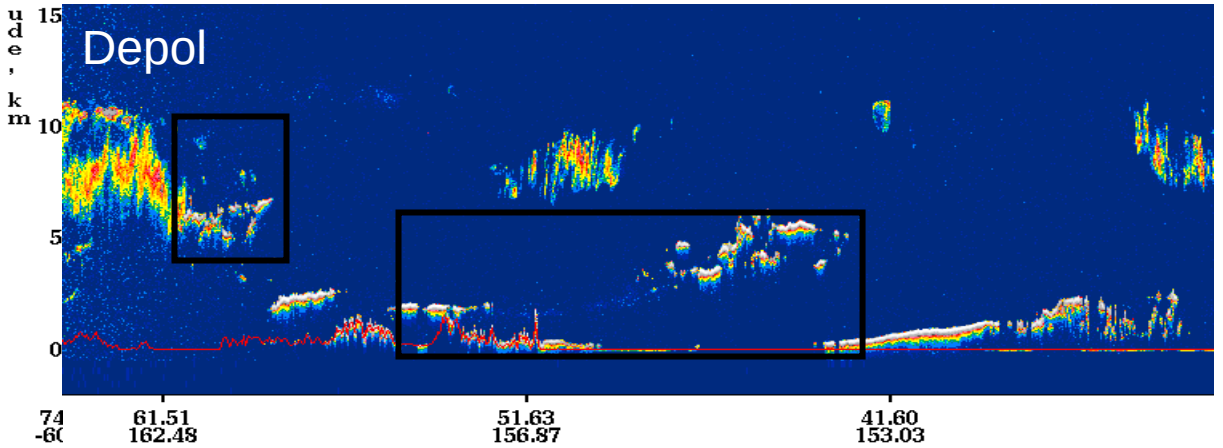



AttnBks532nm
Aerosol
Depol
77.22
-122.86
68.40
-141.64
58.73
-149.95
15
10
5
0
90
60
30

nditions
08




Aerosol
AttnBks532nm
15
10
5
0
74
-6(
61.51
162.48
51.63
156.87
41.60
153.03


Depol
15
10
5
0
74
-6(
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162.48
51.63
156.87
41.60
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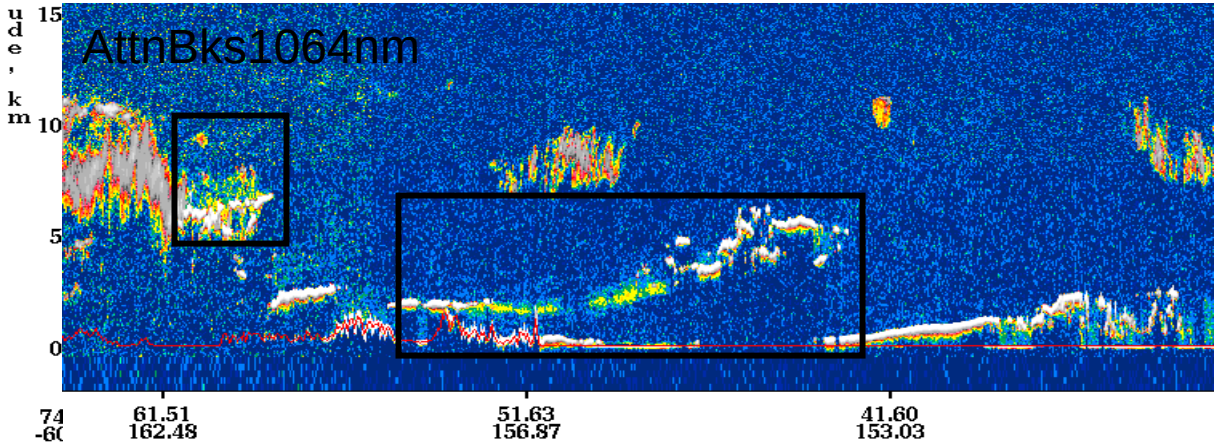
AttnBks1064nm
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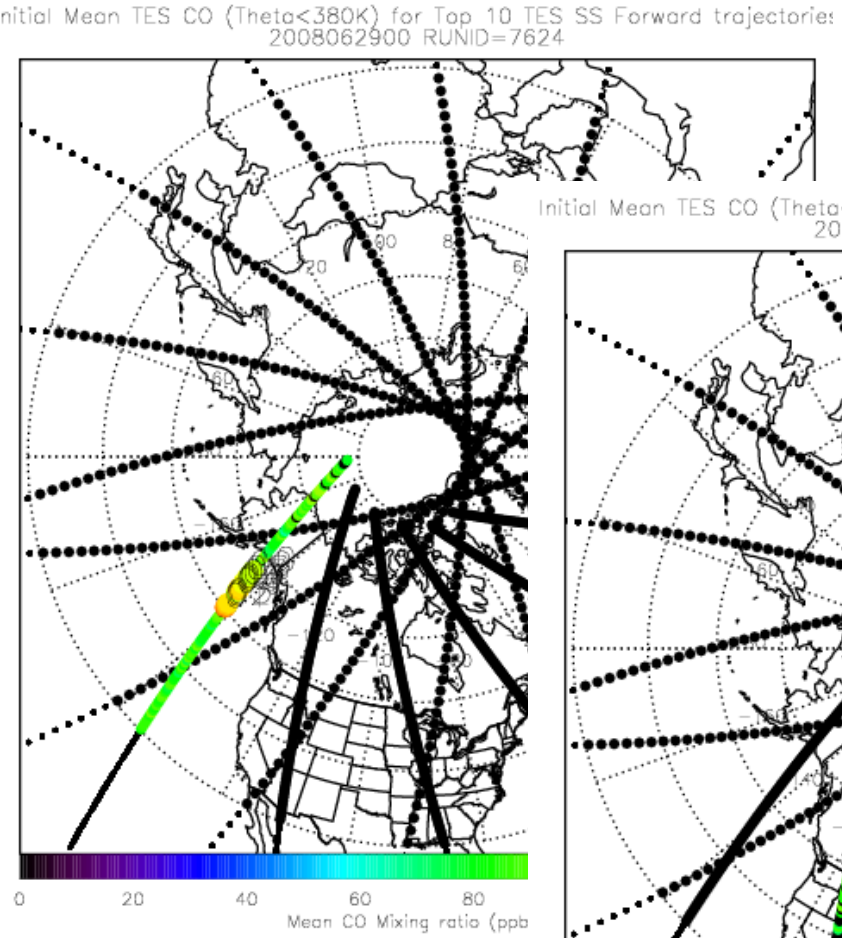
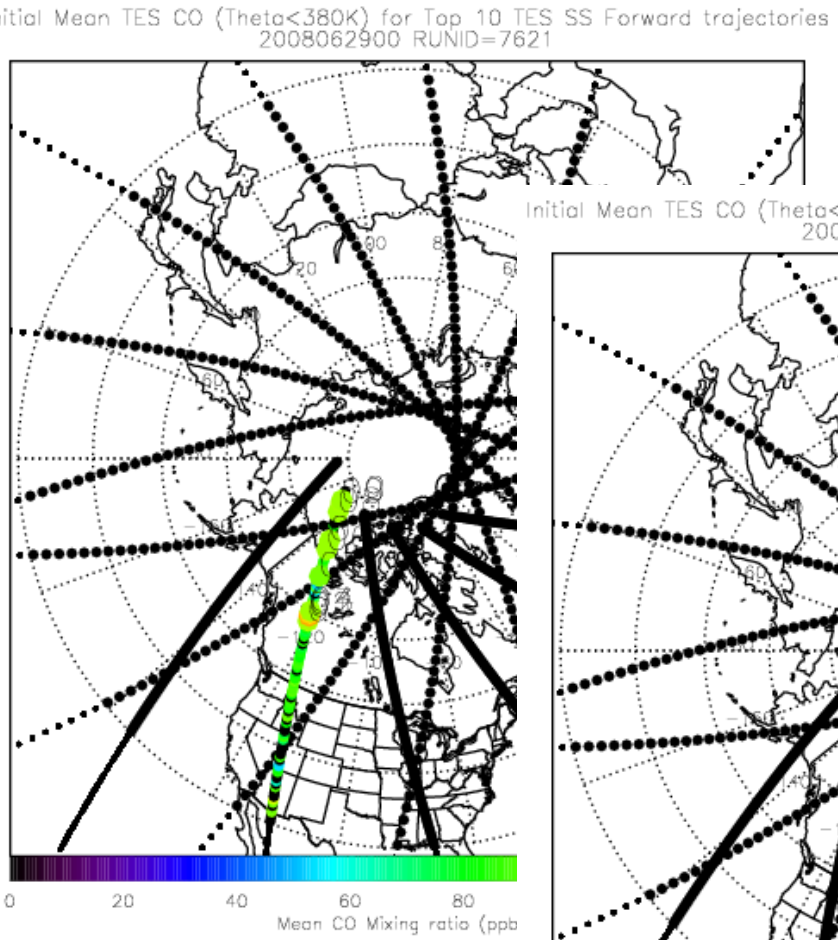
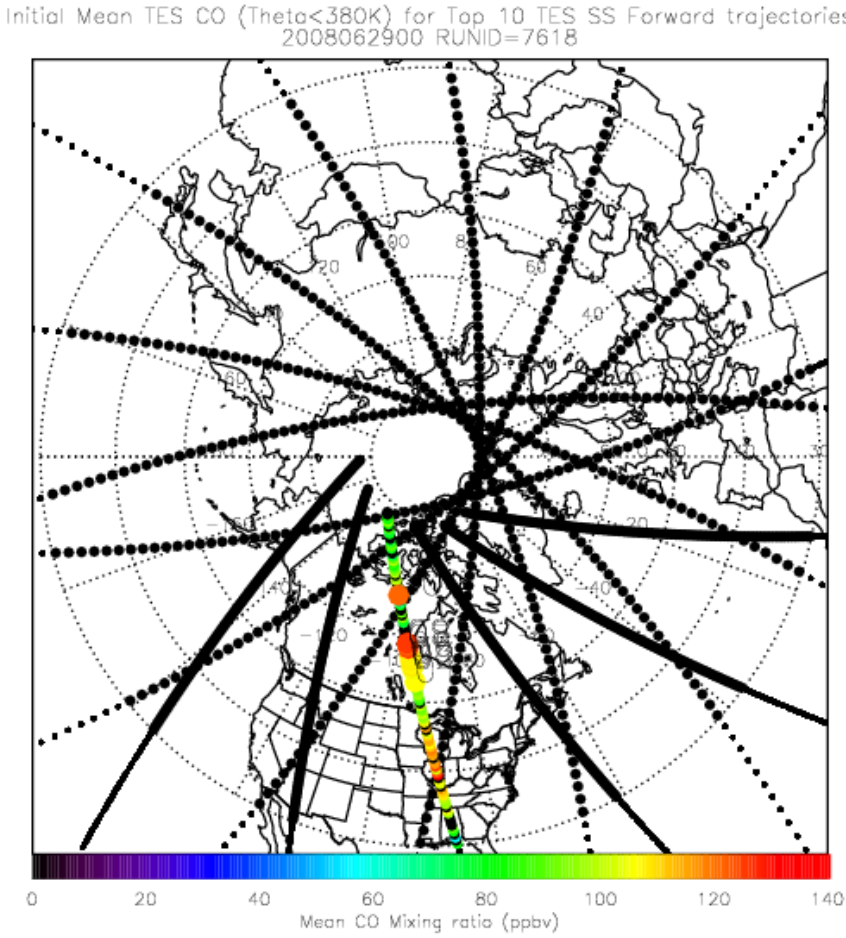
10
5
0
74
-6(
61.51
162.48
51.63
156.87
41.60
153.03

TES Step&Stare Obs 06/29 (Run ID 7618, 7621, 7624): Mean CO below 380K

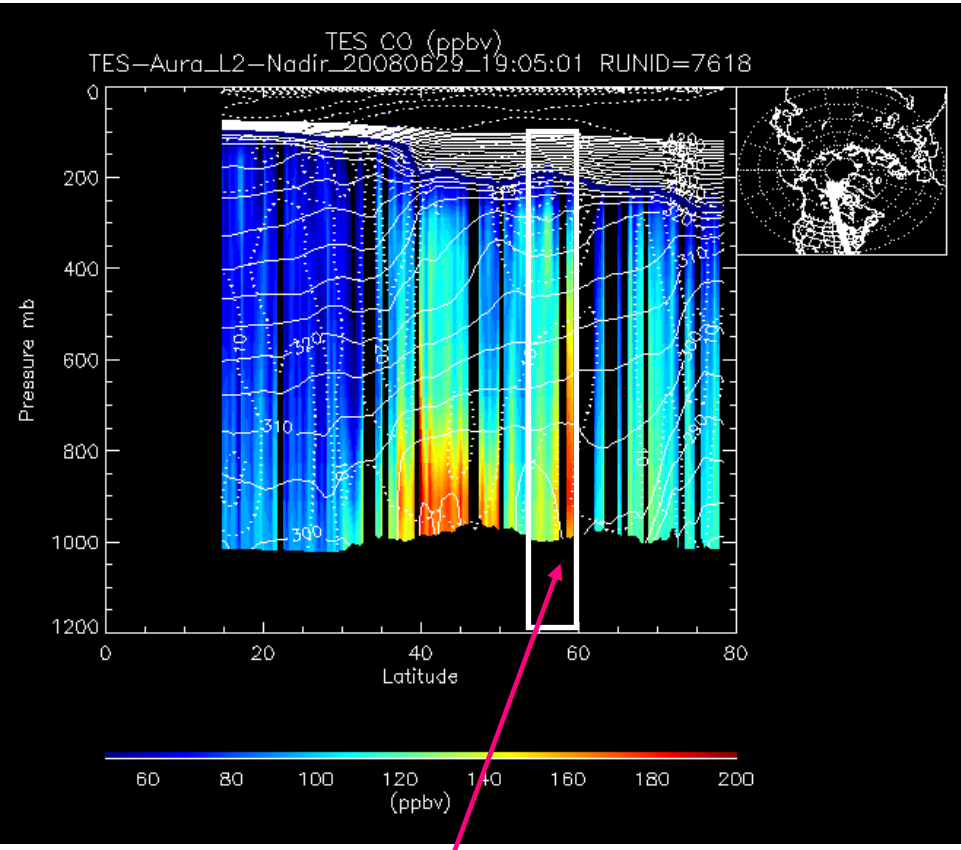


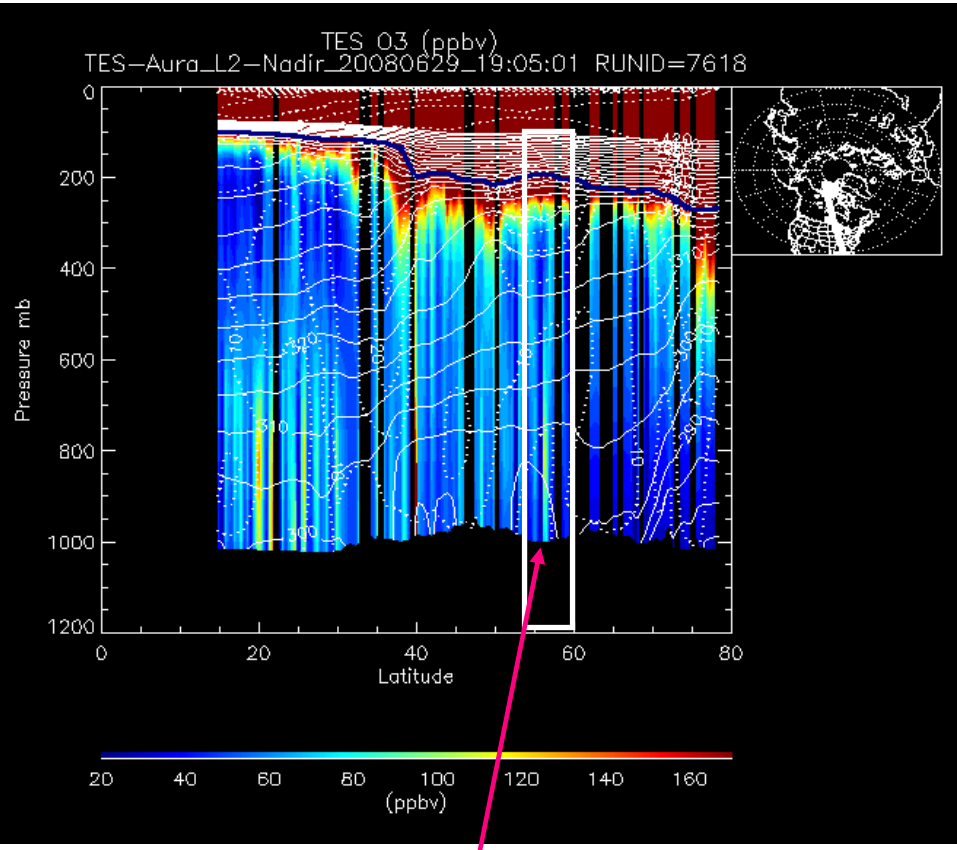




TES CO (left) and O3 (right) curtains from SS orbit 7618 (06/29)

White box shows region of selected profile

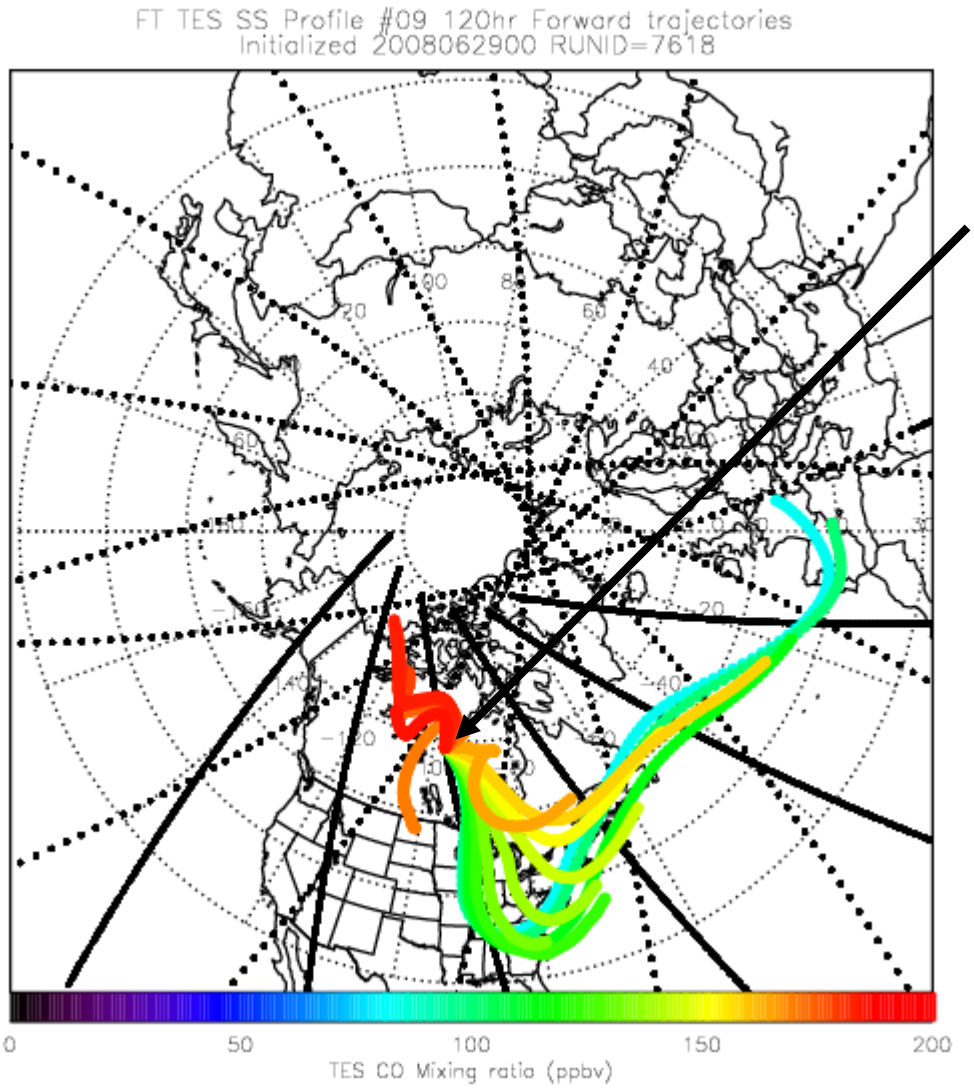




High CO in lower trop

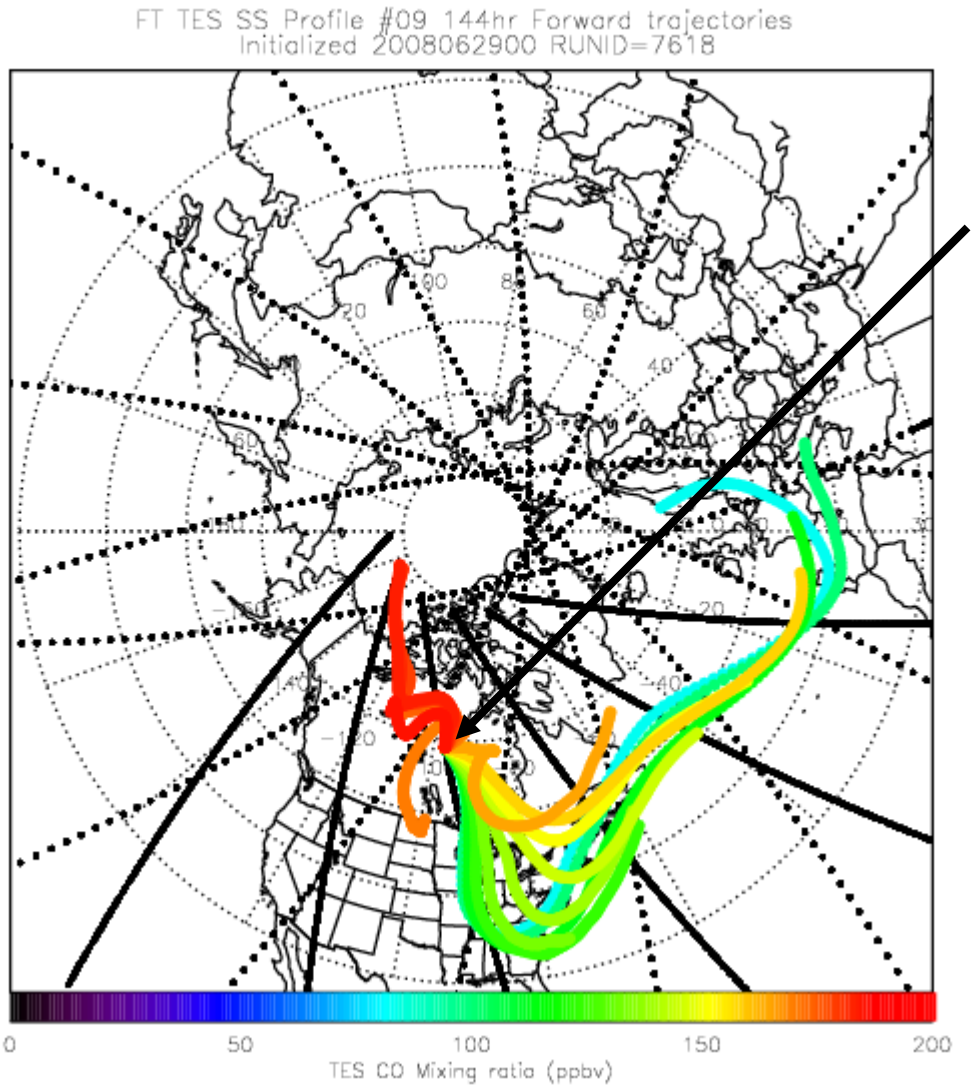
O3 enhancement to the south of high CO

TES SS Forward Trajectories “Profile 9” Valid 00Z 07/04
(Thursday afternoon 07/03 local time)



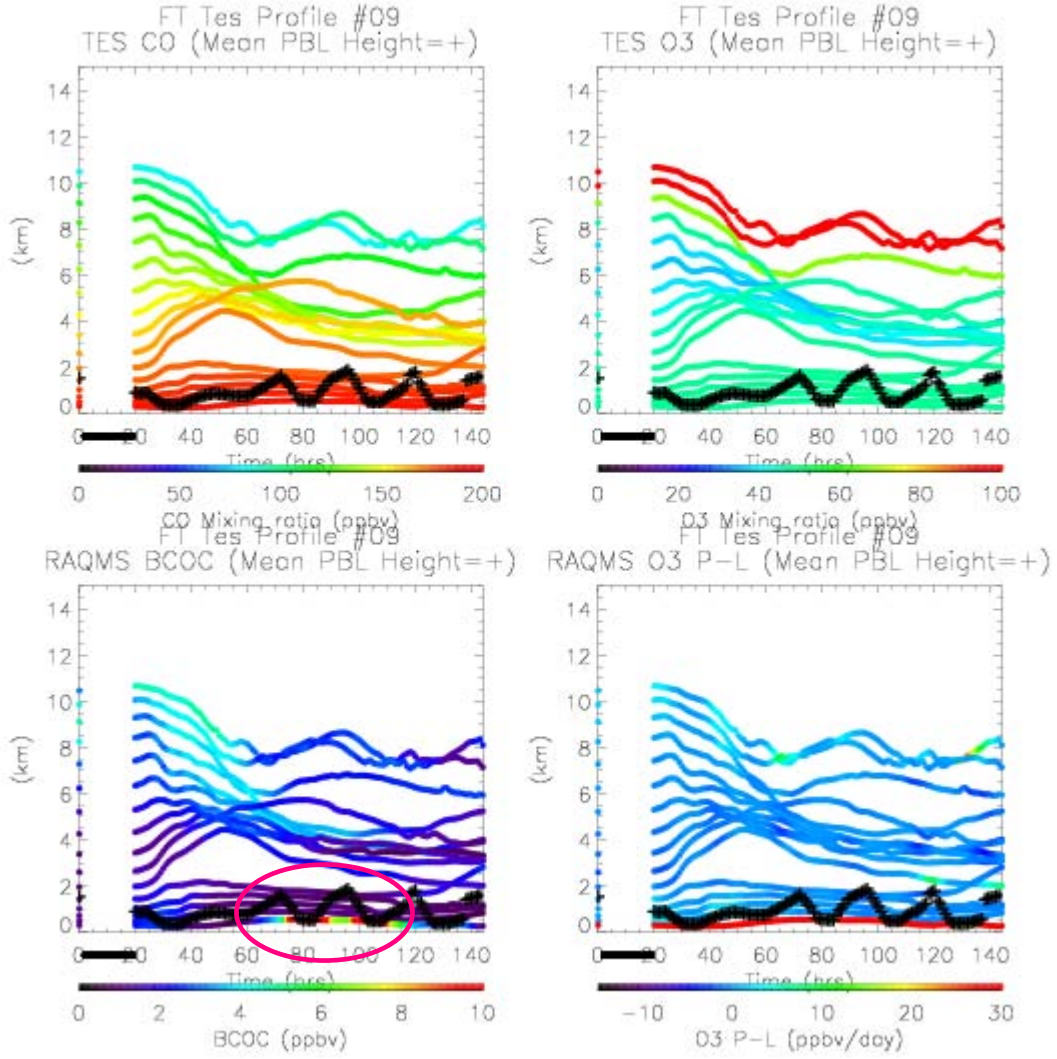
Recirculation and northward advection of lower trop air with high CO

TES SS Forward Trajectories “Profile 9” Valid 00Z 07/05
(Friday afternoon 07/04 local time)



Recirculation and northward advection of lower trop air with high CO

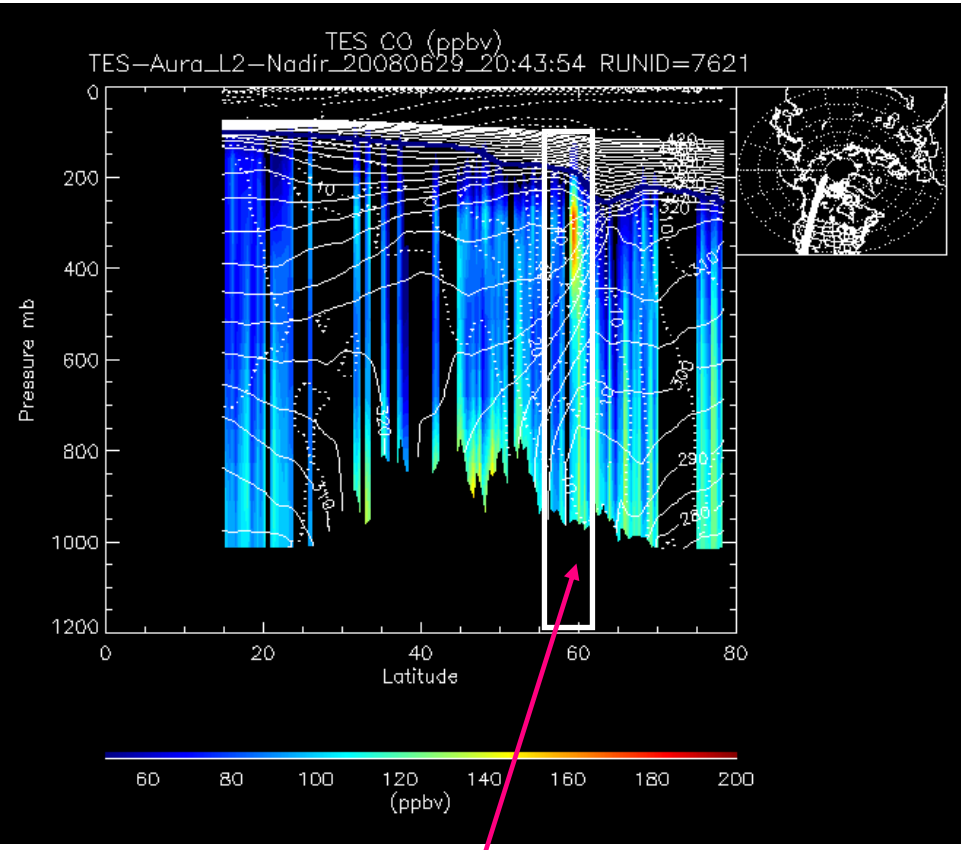
Chemical evolution along “SS Profile 09” forward trajectories

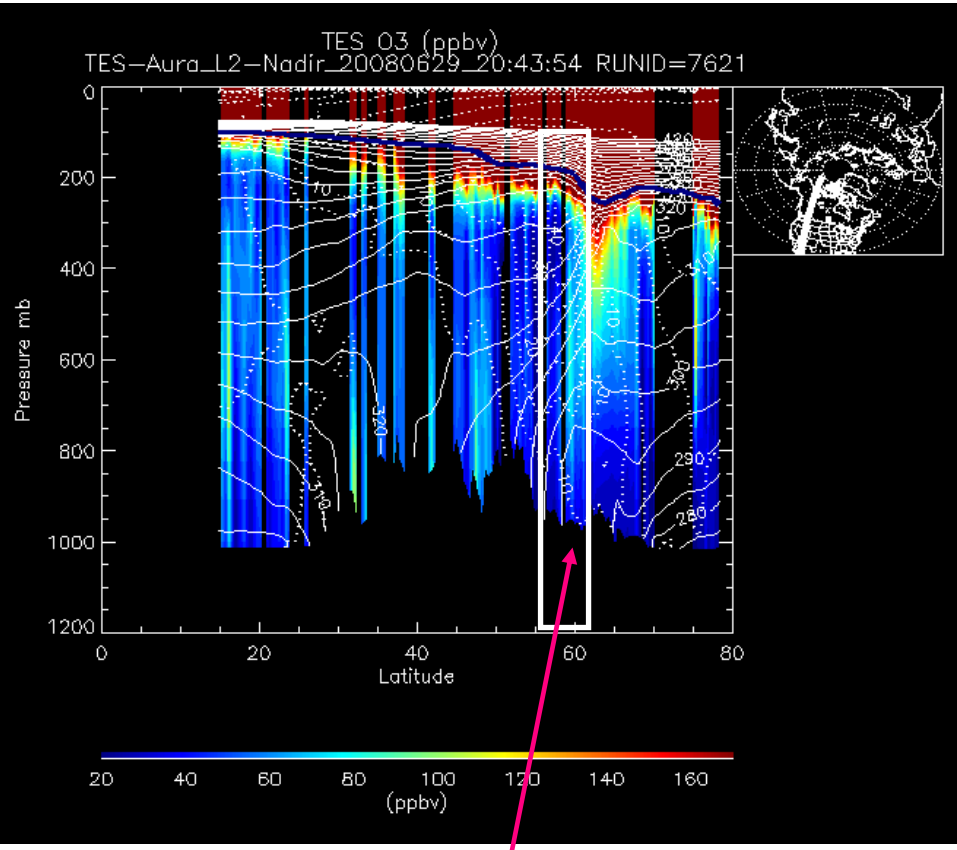


Boundary layer CO enhancement from Canadian BB burning sampled by TES on 06/29 largely remains in BL over NW Canada.
Airmass also exposed to fresh local emissions over YK.

TES CO (left) and O3 (right) curtains from SS orbit 7621 (06/29)

Pyro-cb signature? RAQMS also shows transported Asian plume…

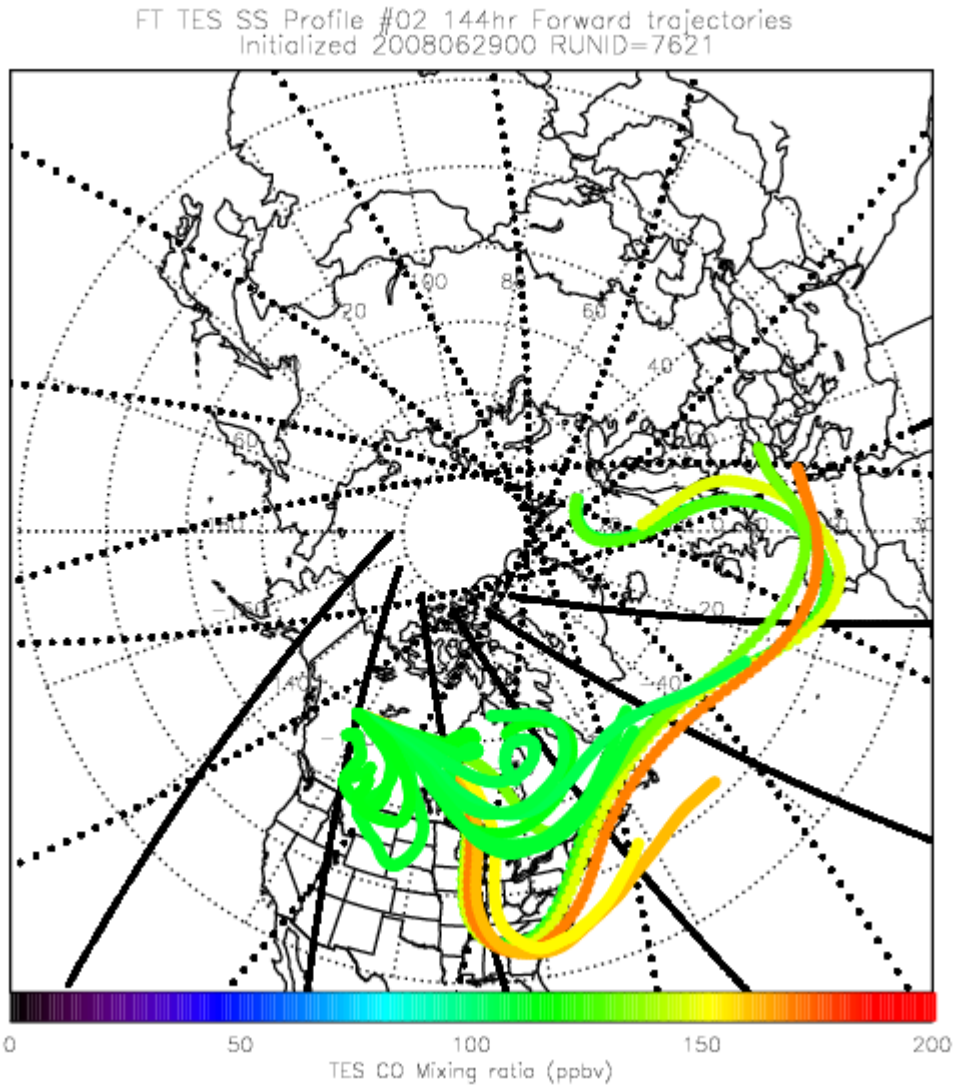




High CO in upper trop

O3 minima colocated with high CO

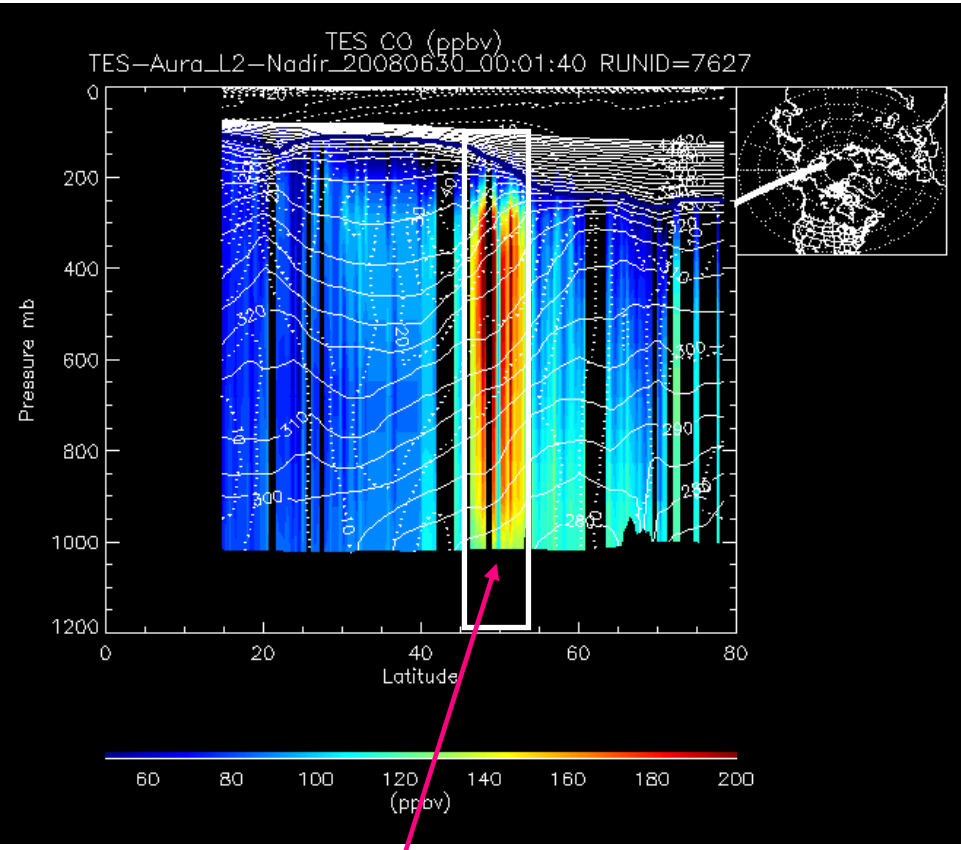
TES SS Forward Trajectories “Profile 2” Valid 00Z 07/05
(Friday afternoon 07/04 local time)

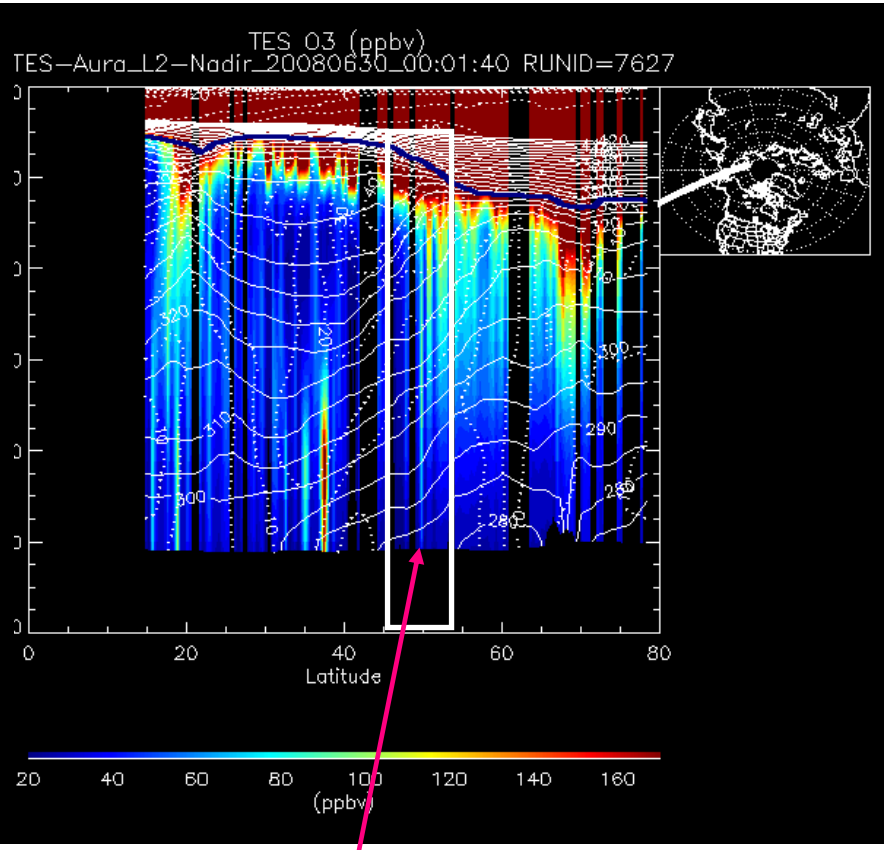


By Friday the upper trop CO enhancement will have been advected over the Atlantic…

TES CO (left) and O3 (right) curtains from SS orbit 7627 (06/30)

The “fresh” Asian plume…



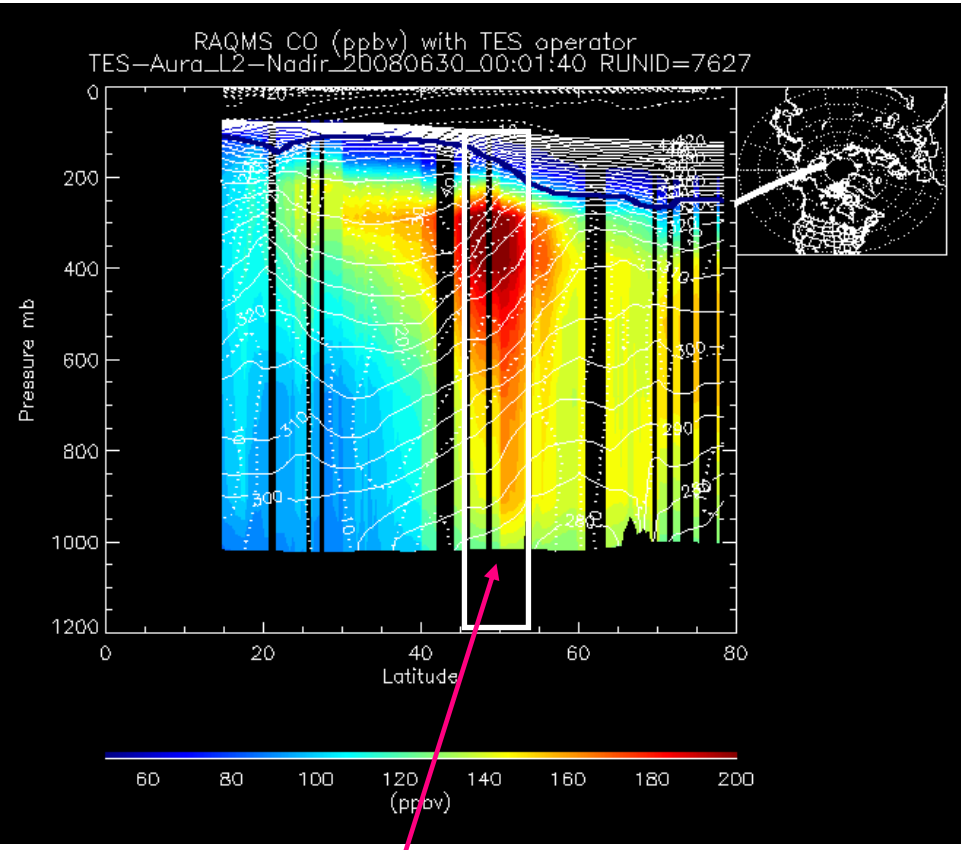


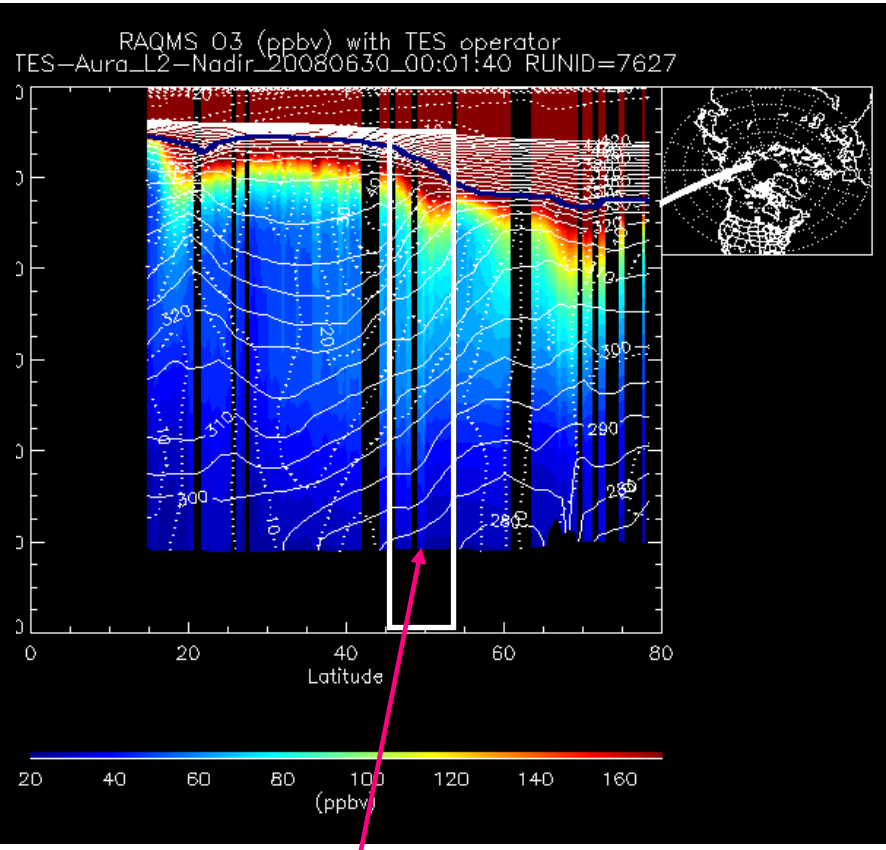
Large CO enhancement
between 45-55 North

High O3 between 50-55 North

RAQMS* CO (left) and O3 (right) curtains from SS orbit 7627

Good consistency between observations and model prediction



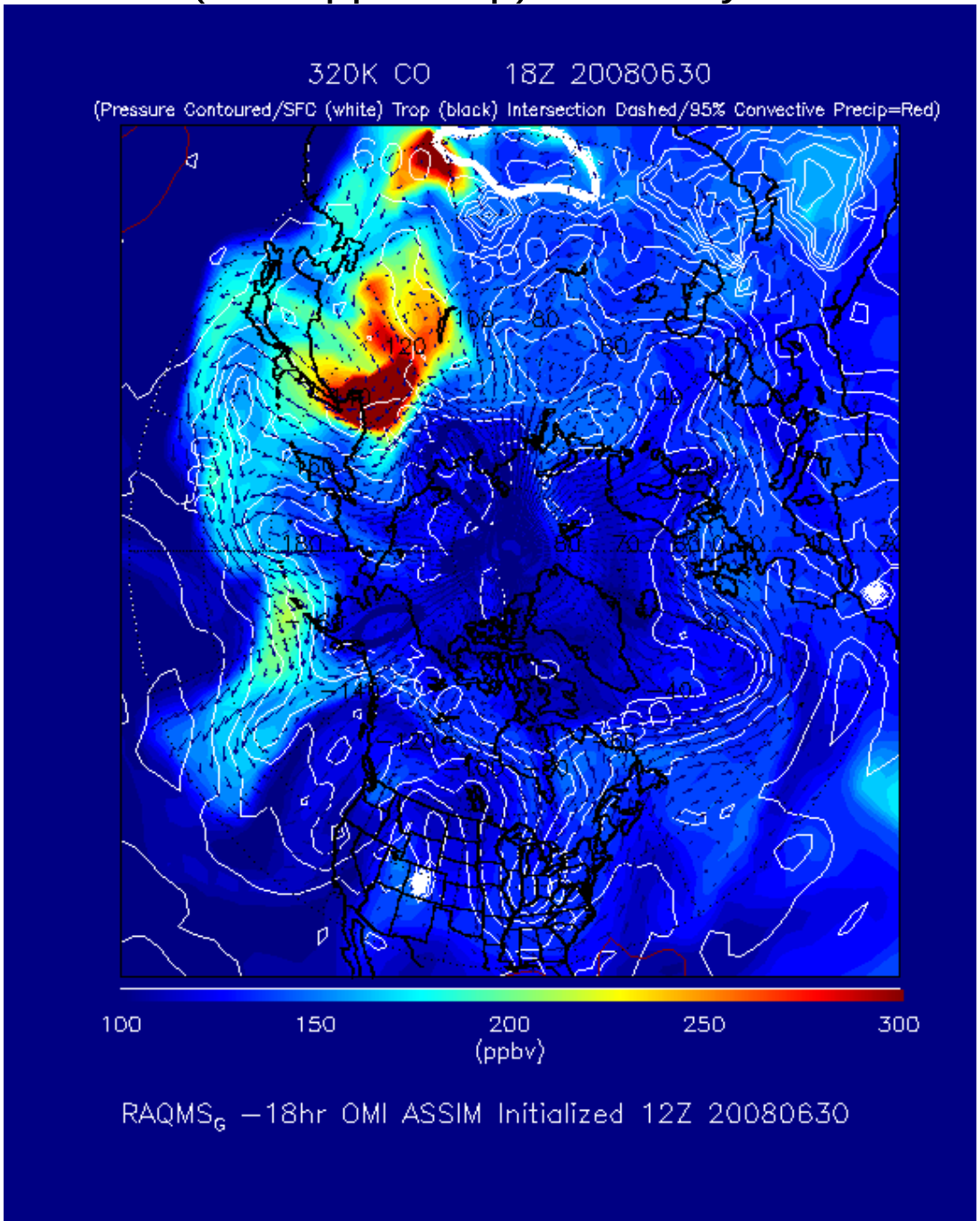


Large CO enhancement
between 45-55 North

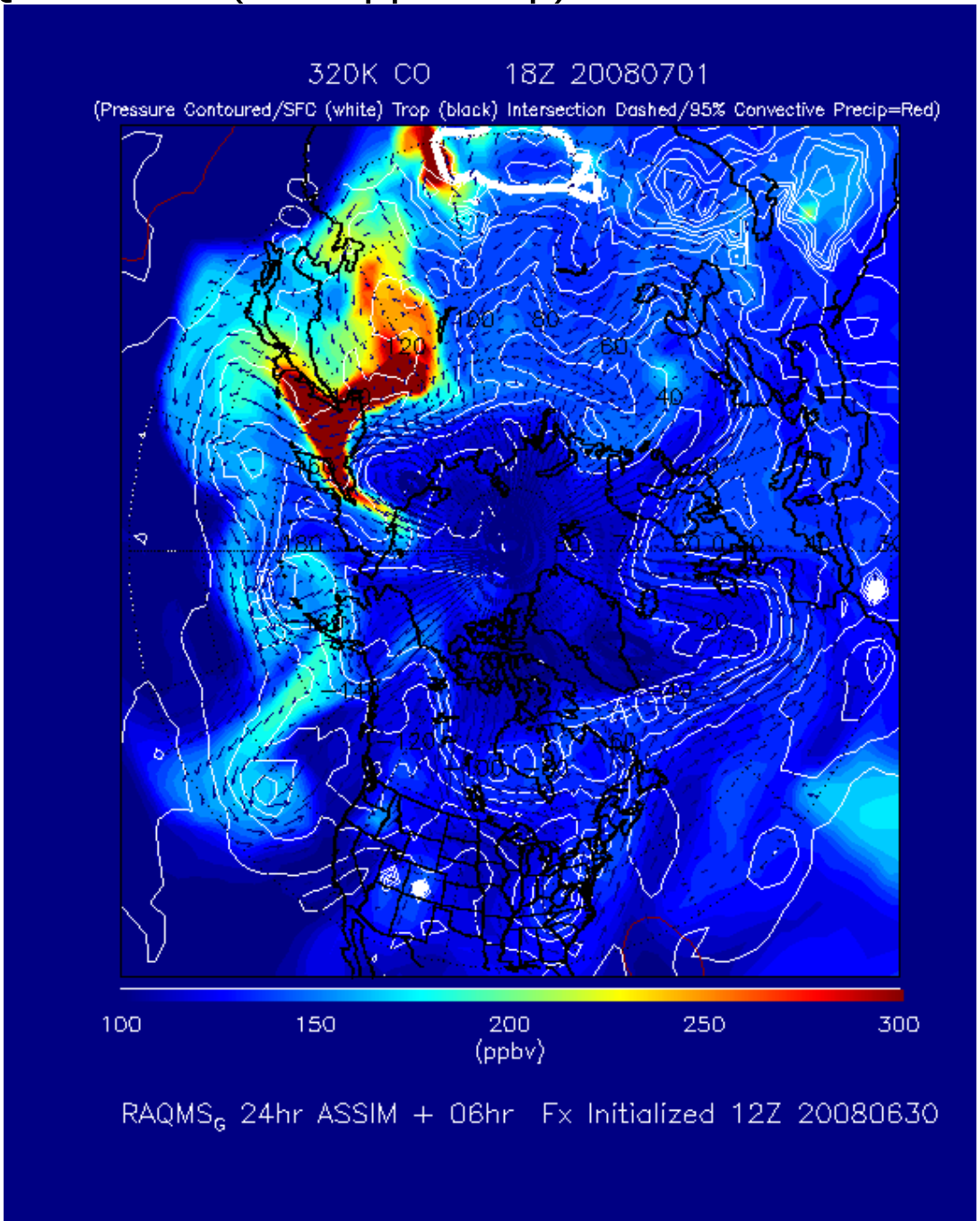
High O3 between 50-55 North

*With TES sensitivity operator applied

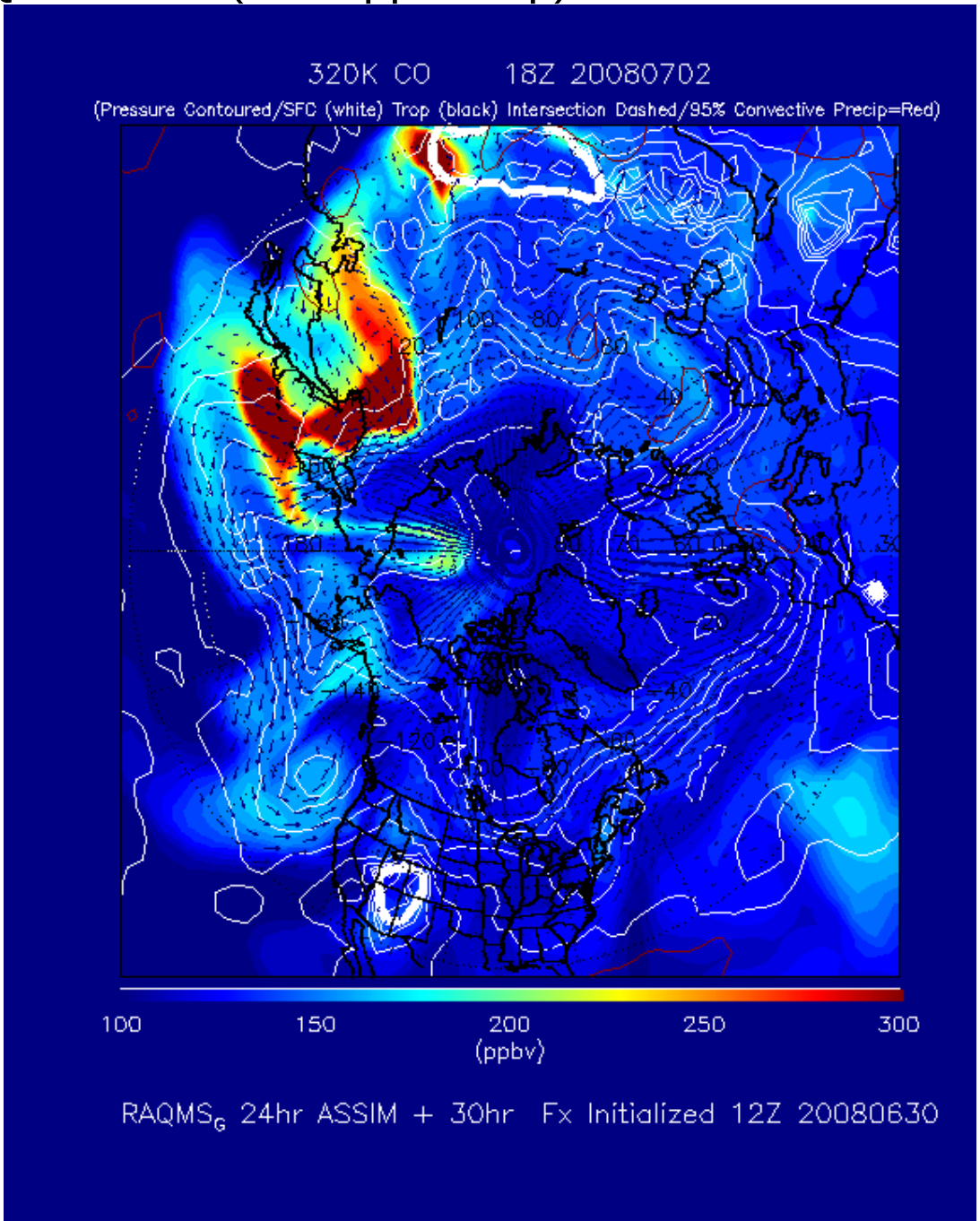
RAQMS 320K (mid-upper trop) CO analysis valid 18Z 06/30



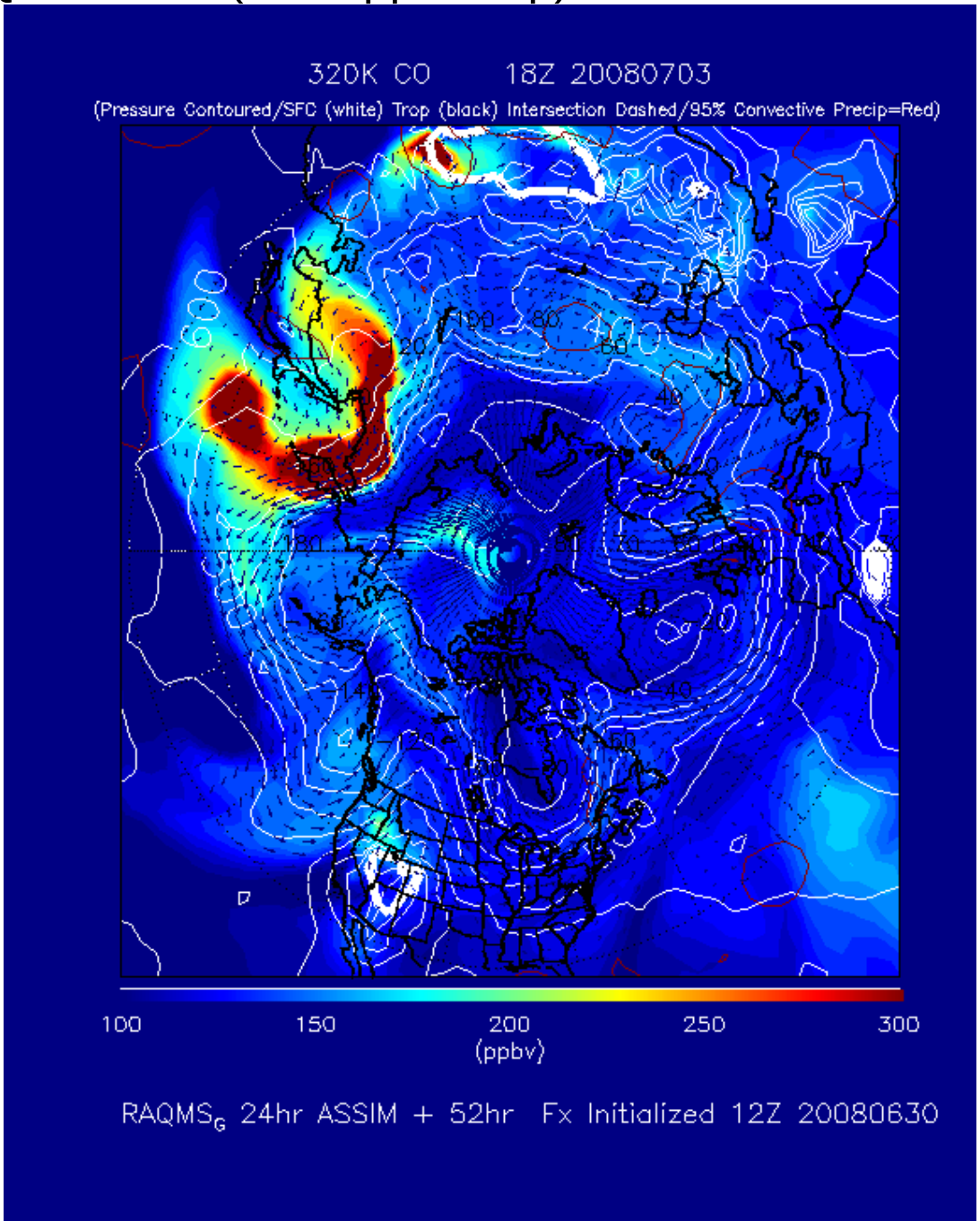
RAQMS 320K (mid-upper trop) CO fx valid 18Z 07/01



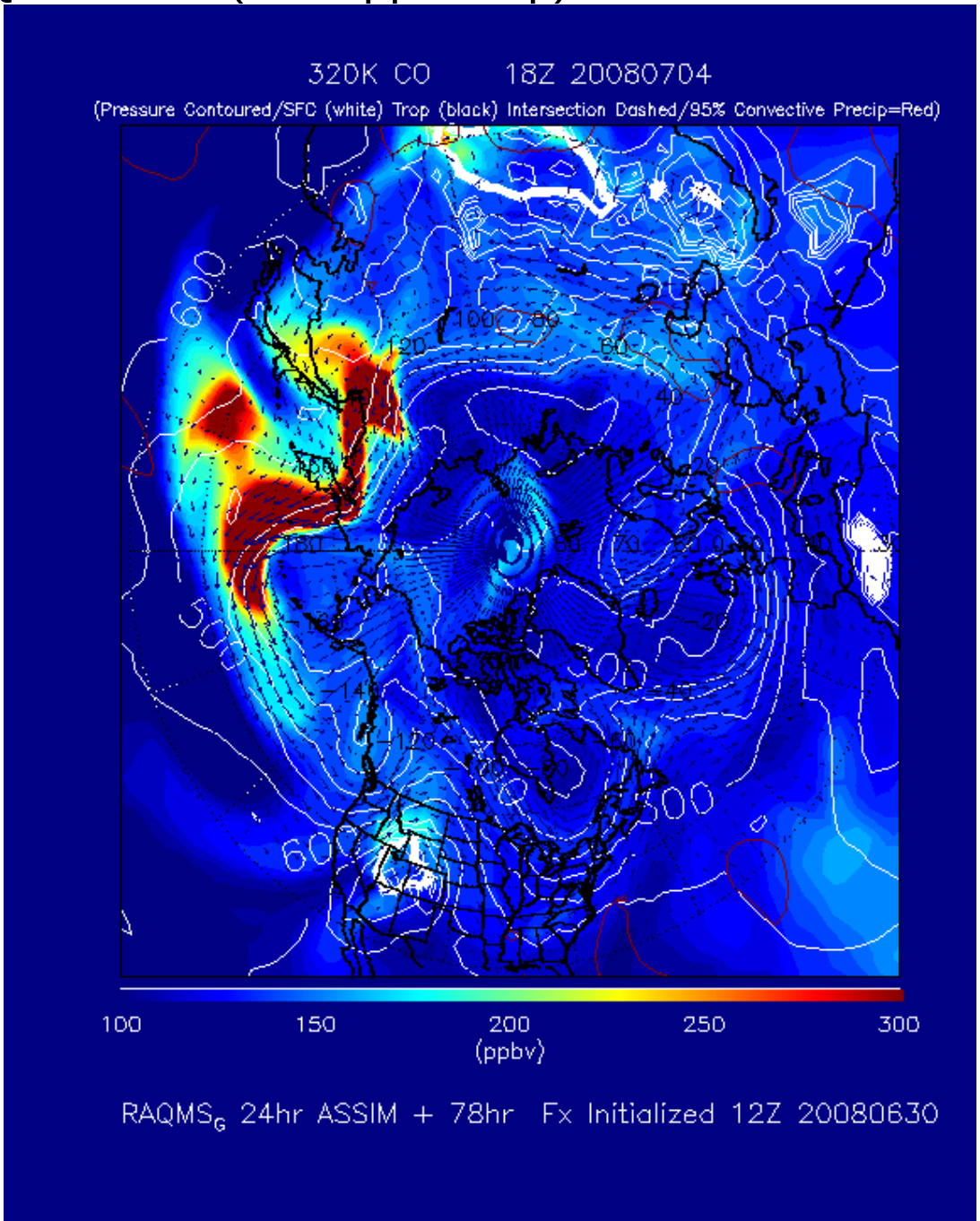
RAQMS 320K (mid-upper trop) CO fx valid 18Z 07/02



RAQMS 320K (mid-upper trop) CO fx valid 18Z 07/03

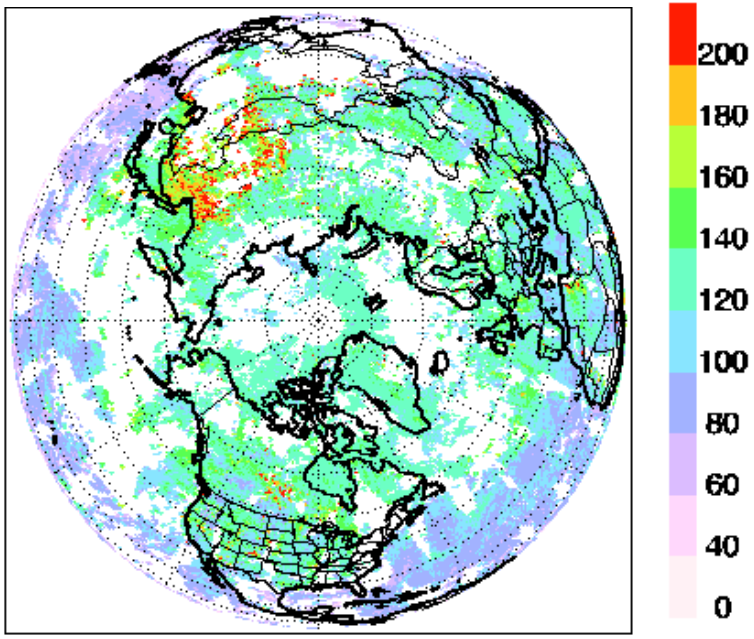


RAQMS 320K (mid-upper trop) CO fx valid 18Z 07/04

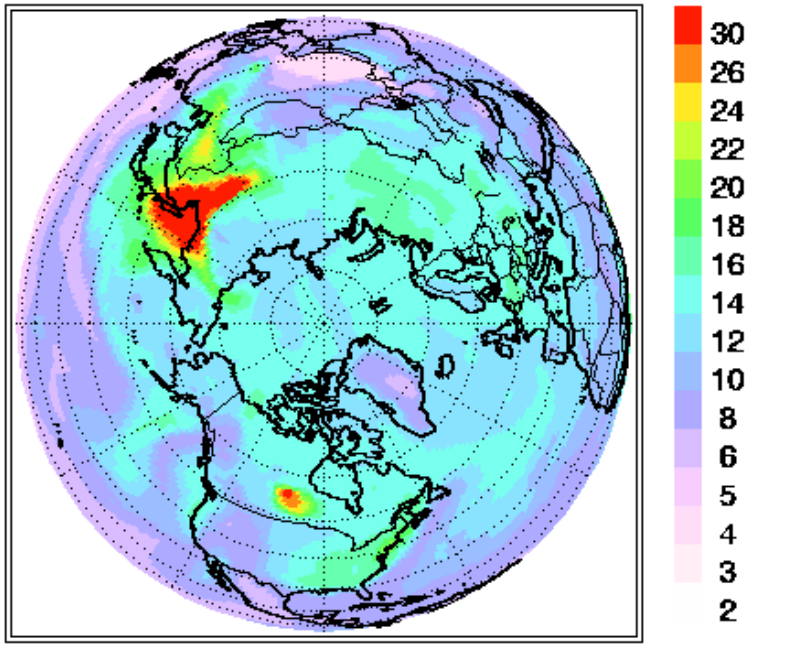


Quick look at the main players….

MOPITT CO 700 hPa Jun29-Jul1

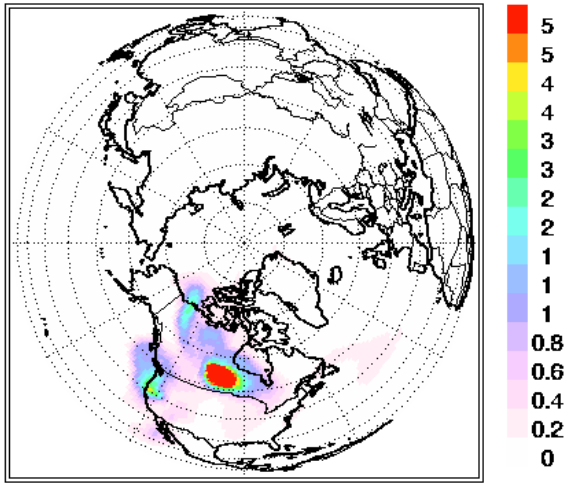


CAM CO Column for Jul 1 12Z



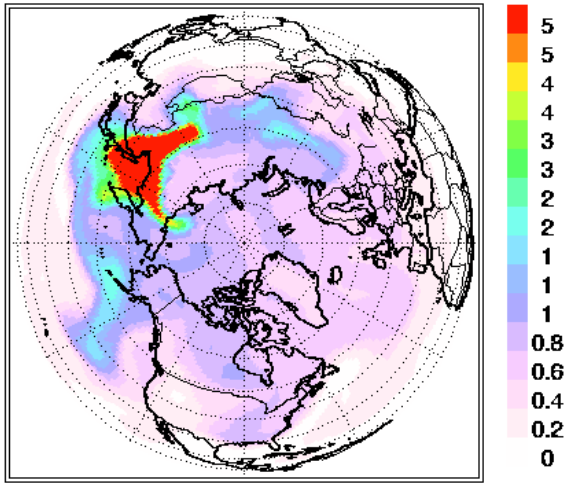
CAM Forecast from 20080701

N-American Fires



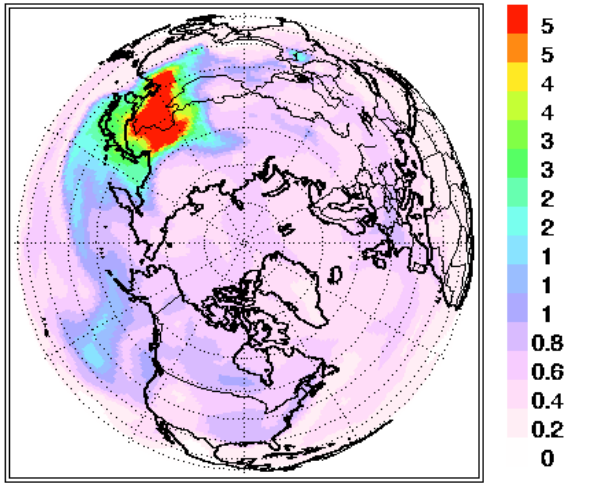
CAM Forecast from 20080701

N-Asia Fires



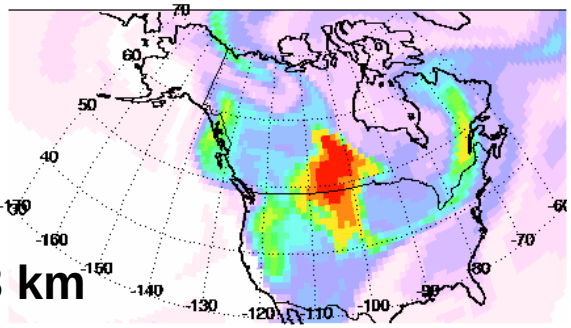
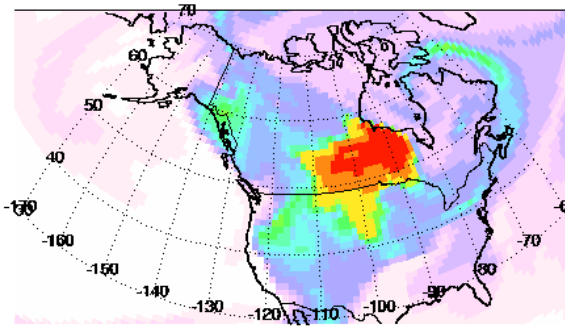
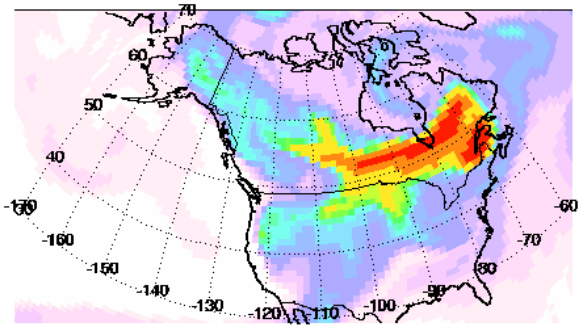
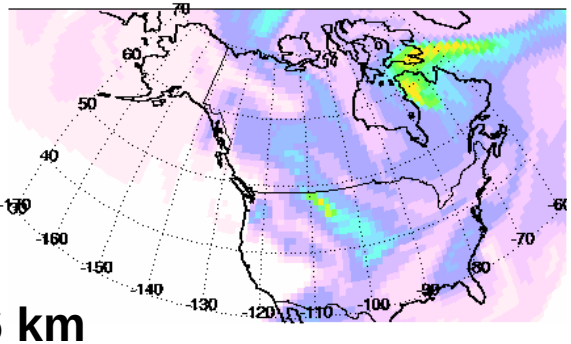
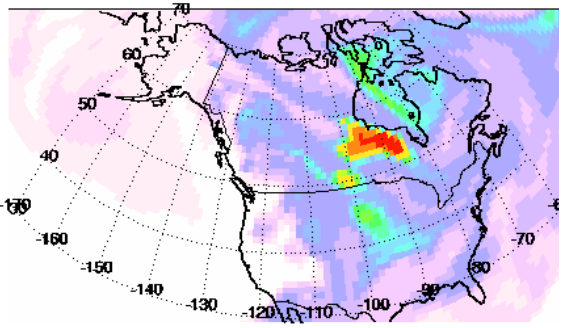
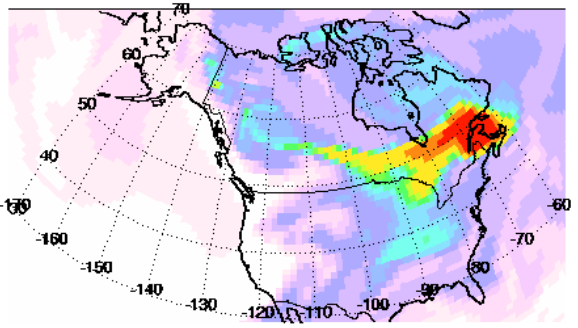
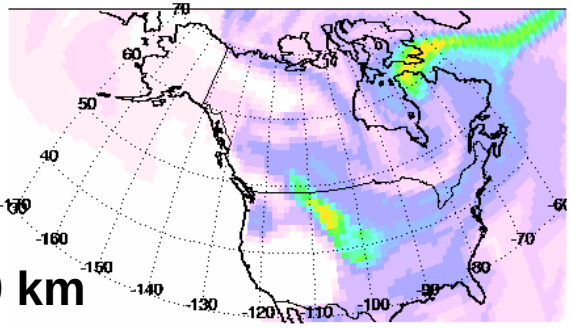
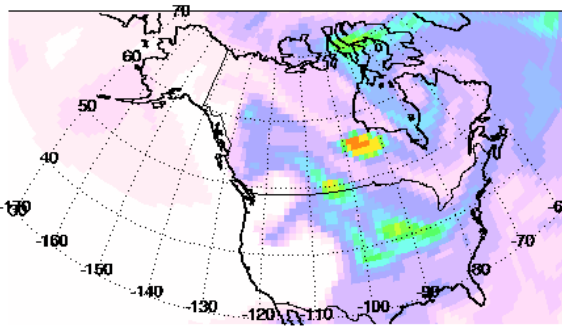
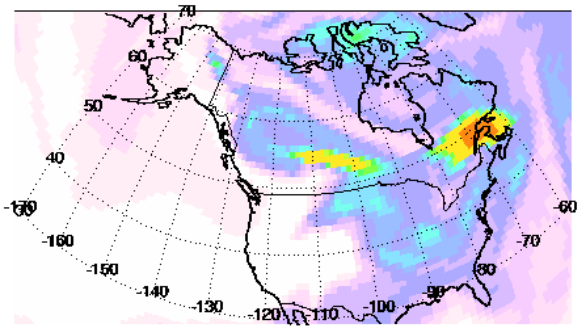
CAM Forecast from 20080701

N-Asia Anthro



CAM Forecast from 20080701

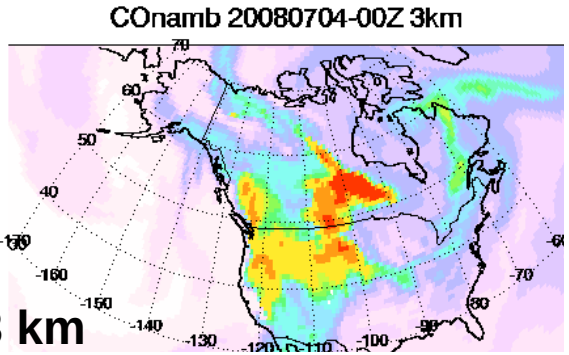
CAM Fx for *North American Fires*

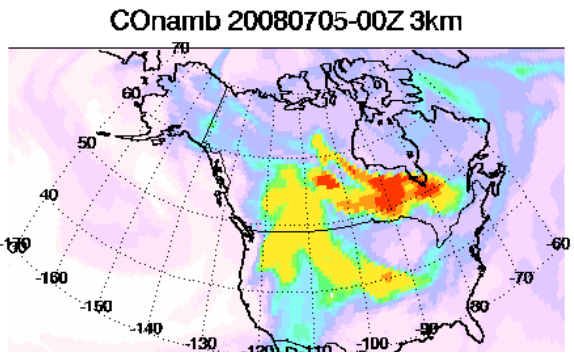
Thursday **Fx for 07/03**	Friday **Fx for 07/04**	Saturday **Fx for 07/05**
COnamb 20080704-00Z 3km	COnamb 20080705-00Z 3km	COnamb 20080706-00Z 3km
		
3 km		
CAM Forecast from 20080701	CAM Forecast from 20080701	CAM Forecast from 20080701
COnamb 20080704-00Z 6km	COnamb 20080705-00Z 6km	COnamb 20080706-00Z 6km
		
6 km		
COnamb 20080704-00Z 9km	COnamb 20080705-00Z 9km	COnamb 20080706-00Z 9km
		
9 km		
CAM Forecast from 20080701	CAM Forecast from 20080701	CAM Forecast from 20080701

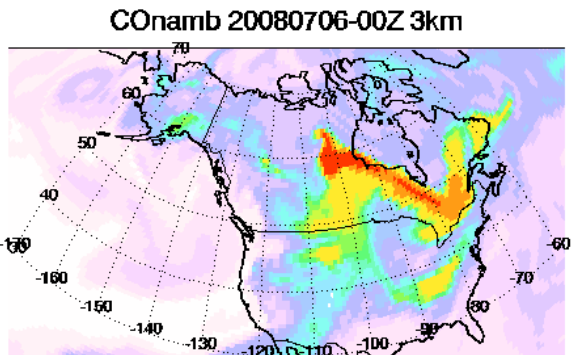
MOART Fx for *North American Fires*

Thursday	Friday	Saturday
Fx for 07/03	**Fx for 07/04**	**Fx for 07/05**

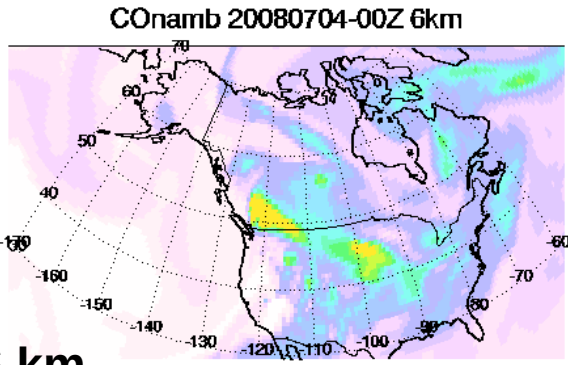
3 km

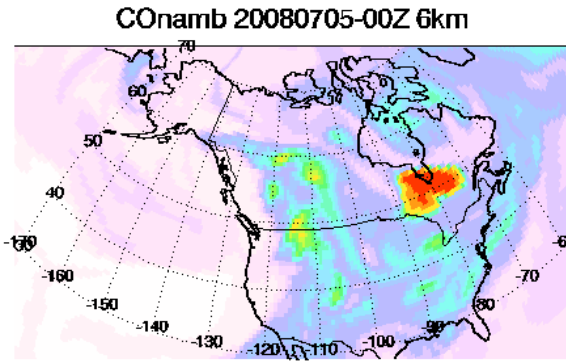


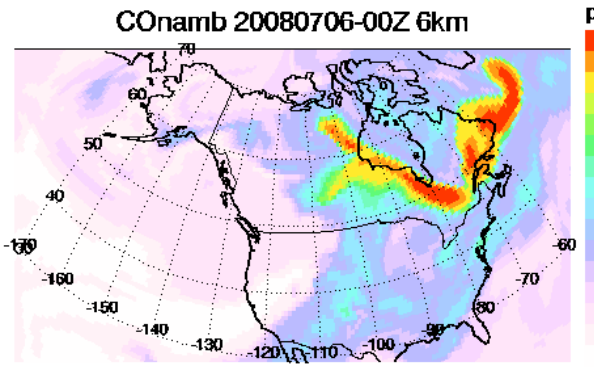




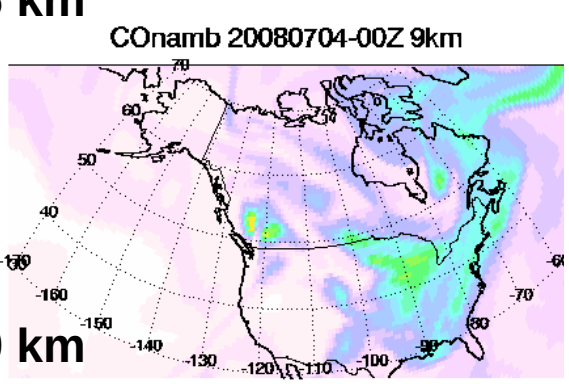
6 km

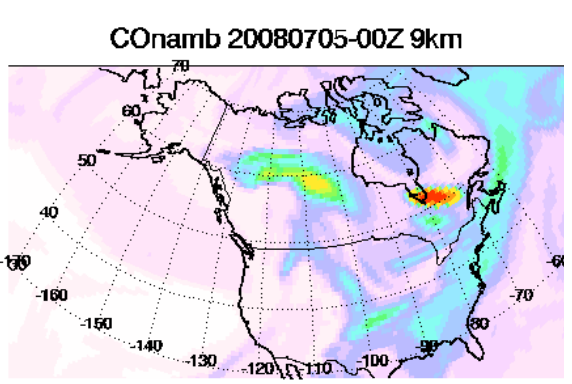


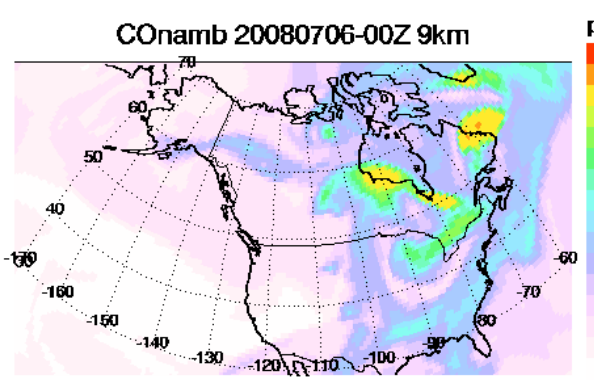




9 km







MOZART Forecast from 20080702

MOZART Forecast from 20080702

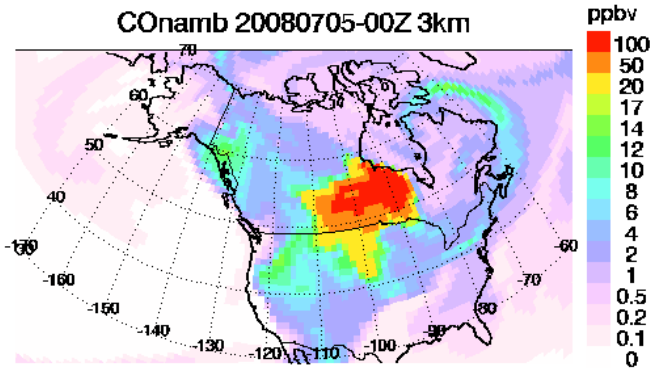
MOZART Forecast from 20080702

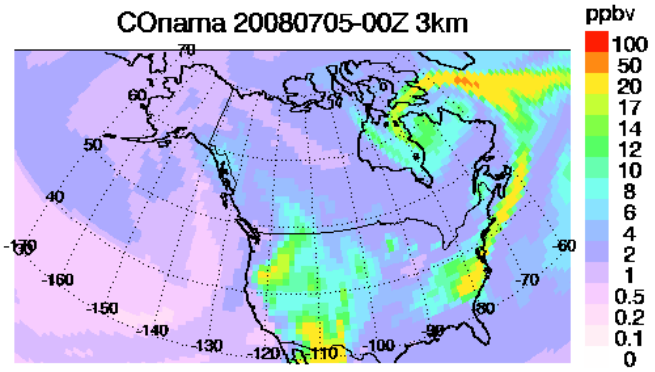
CAM Fx for 07/04

N-American Fires

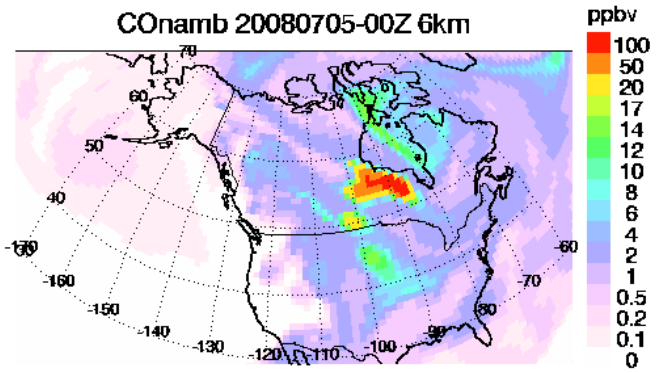
N-American Anthropogenic

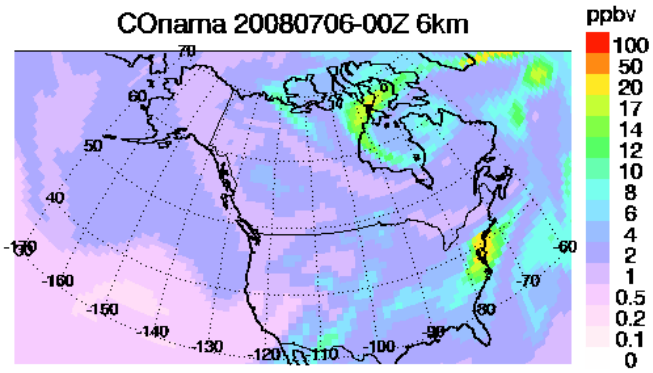
3 km



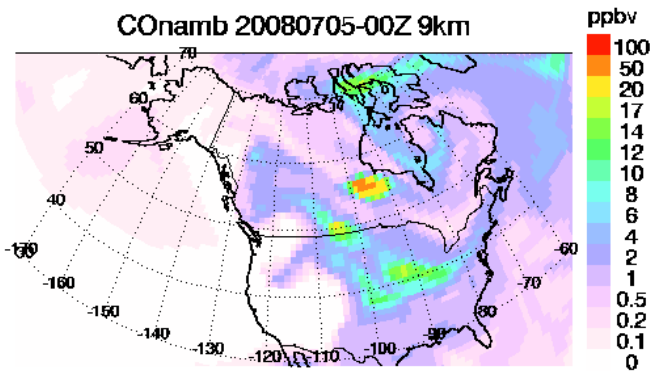


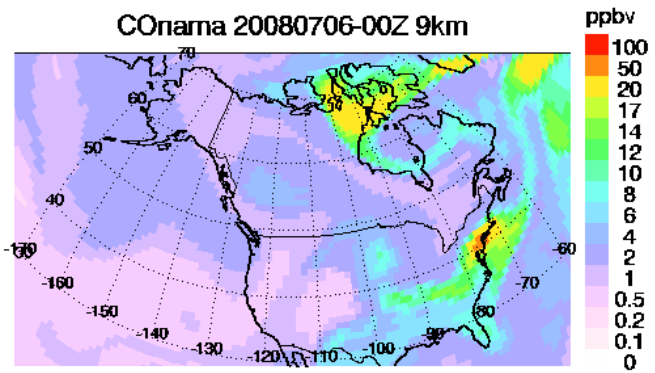
6 km





9 km



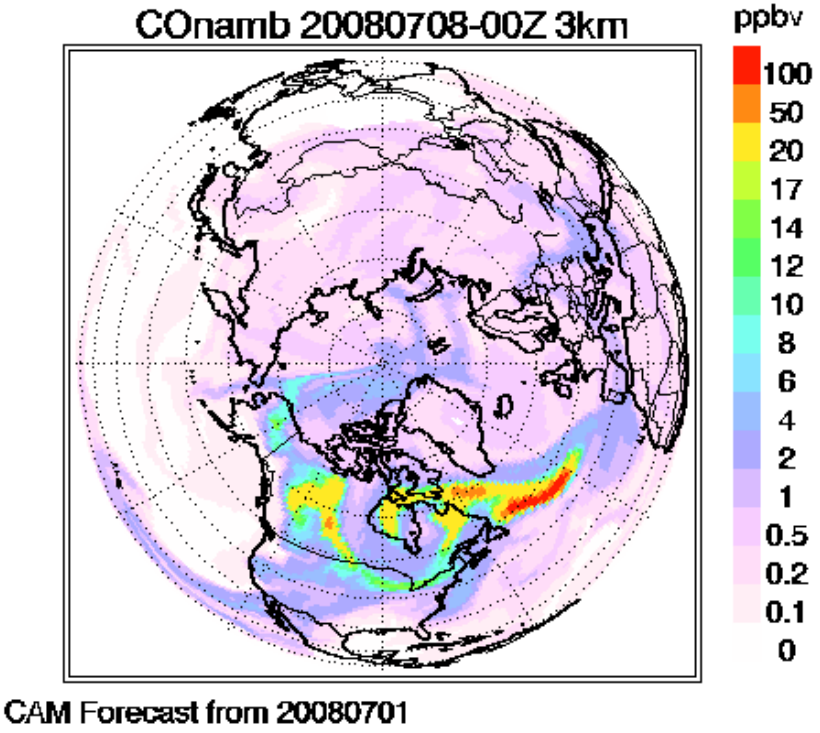


CAM Forecast from 20080701

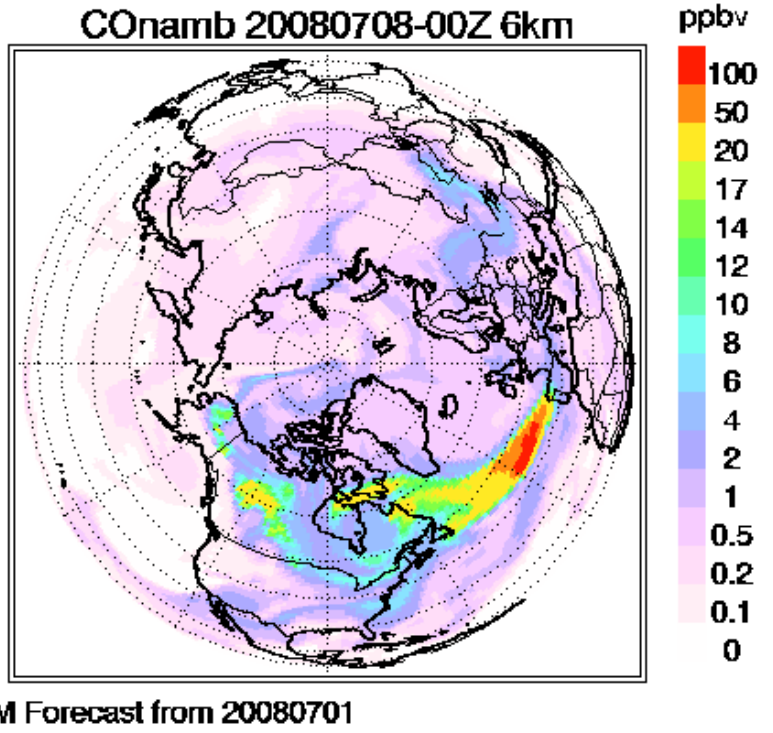
CAM Forecast from 20080701

CAM Fx for North American Fires

3 km

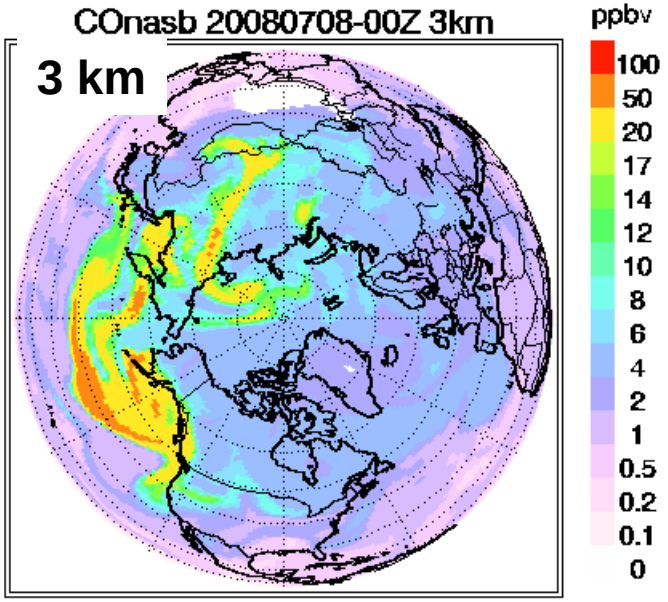


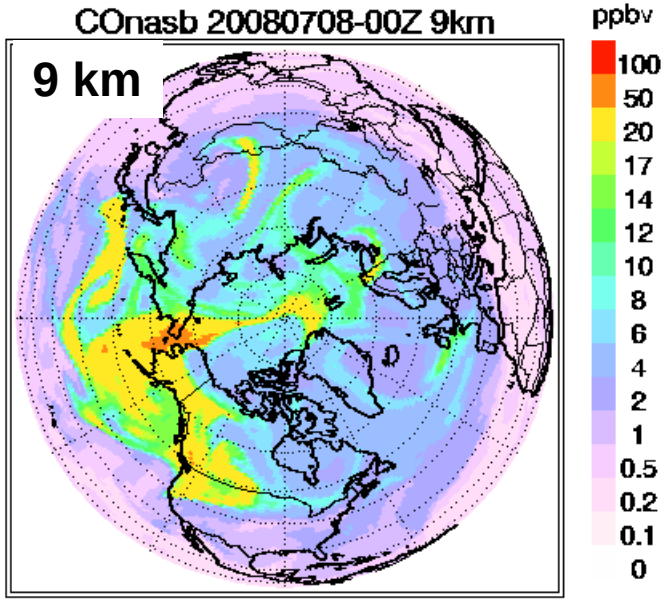
6 km



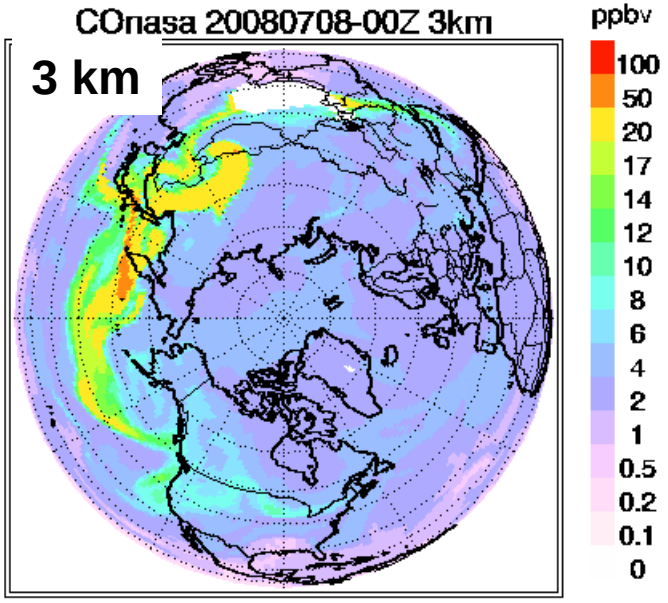
CAM Fx for Jul 3-7 Siberian Plumes

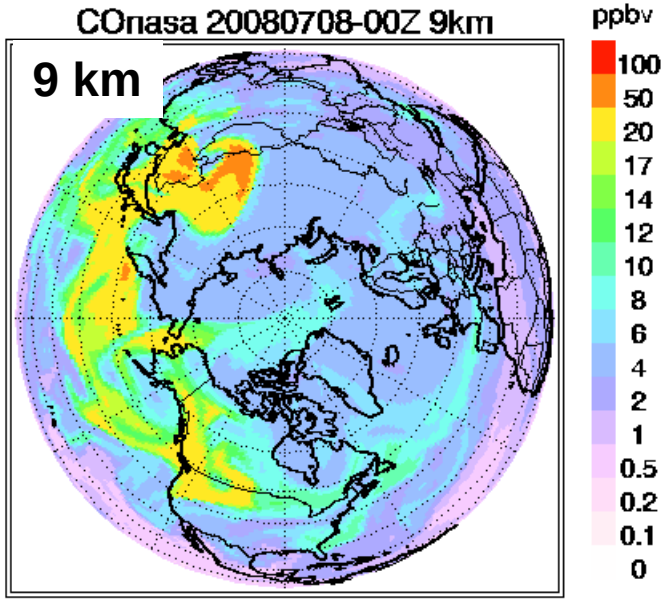
Fires





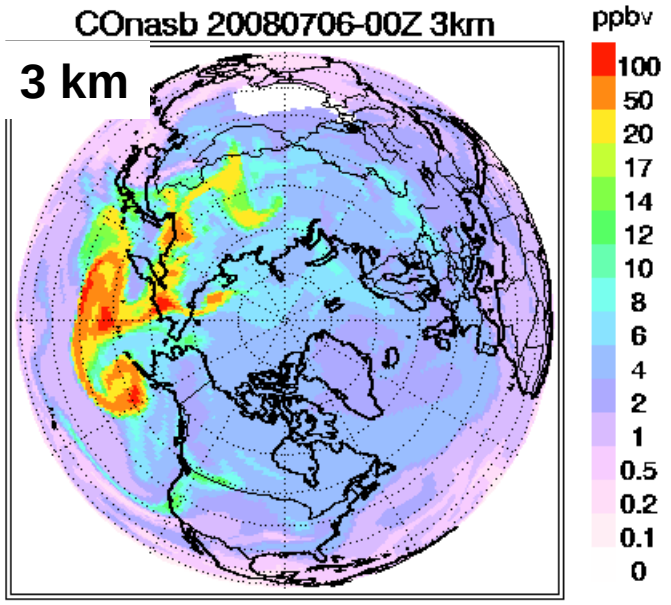
Anthropogenic



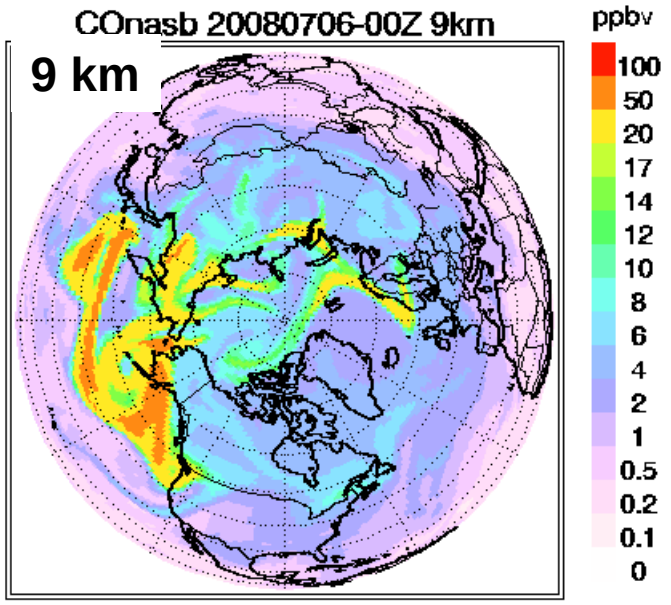


CAM Fx and MOZART for Saturday Jul 5 Siberian Fire Plumes

CAM

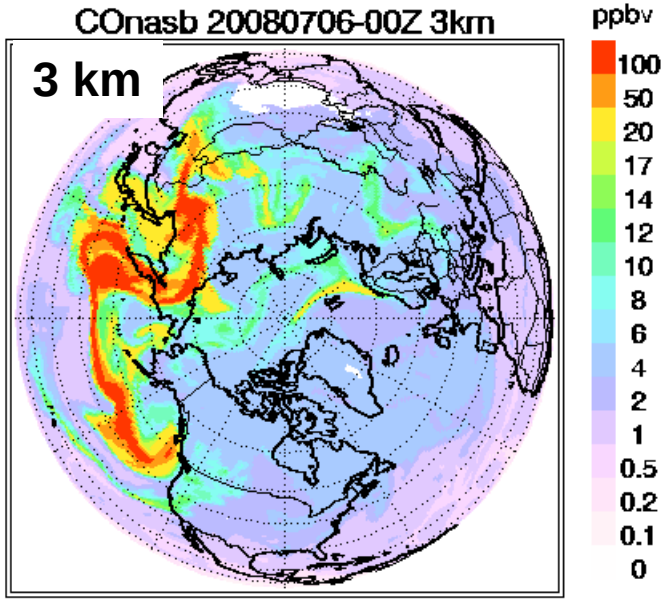


CAM Forecast from 20080701

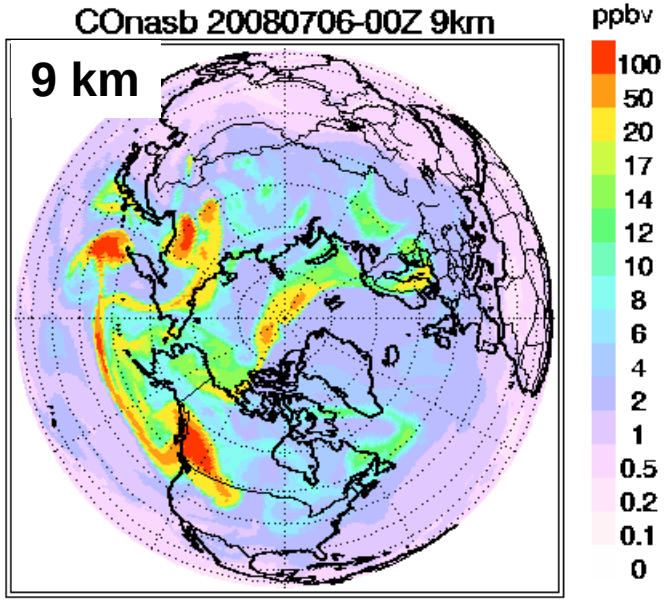


CAM Forecast from 20080701

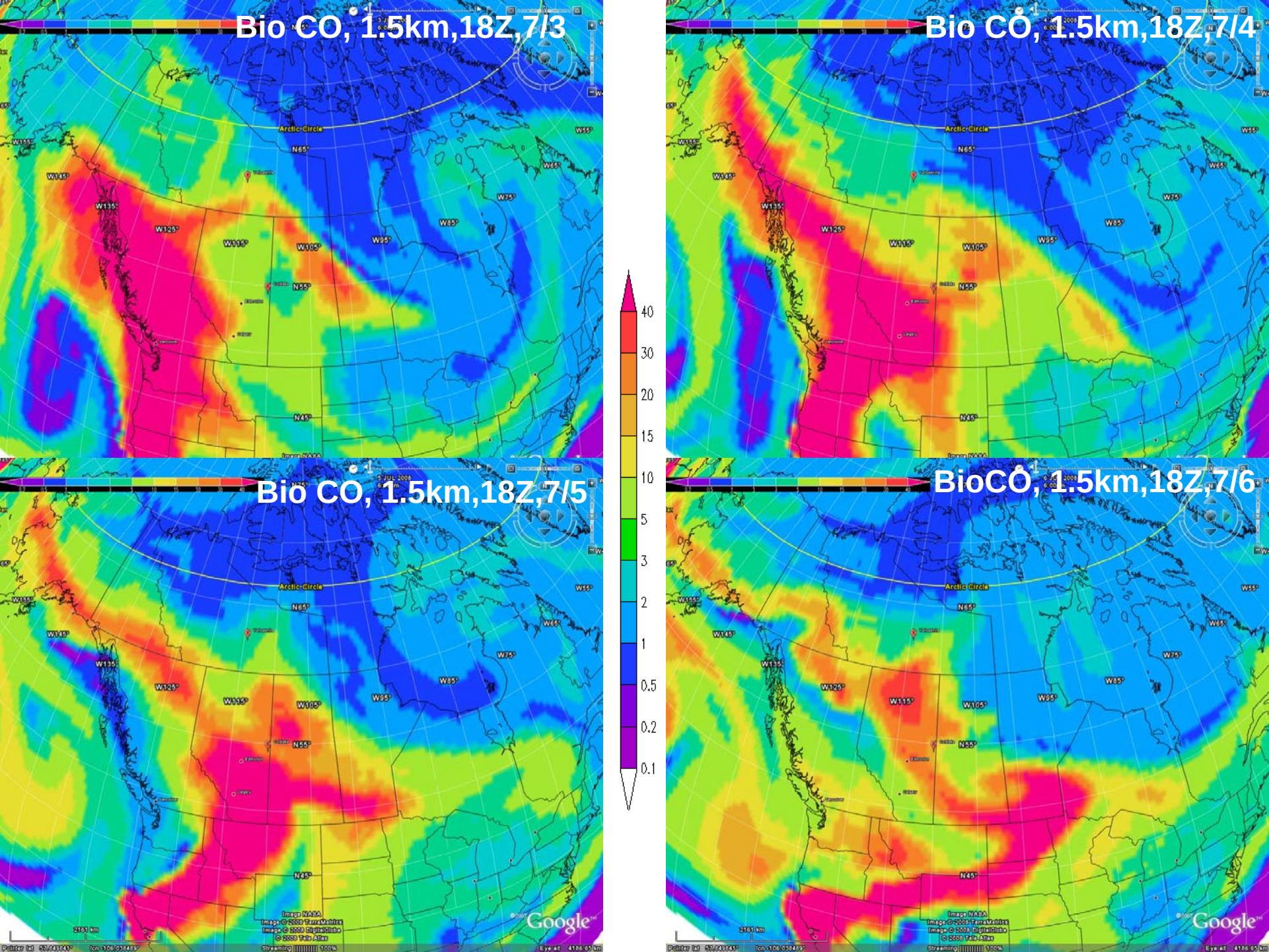
MOZART

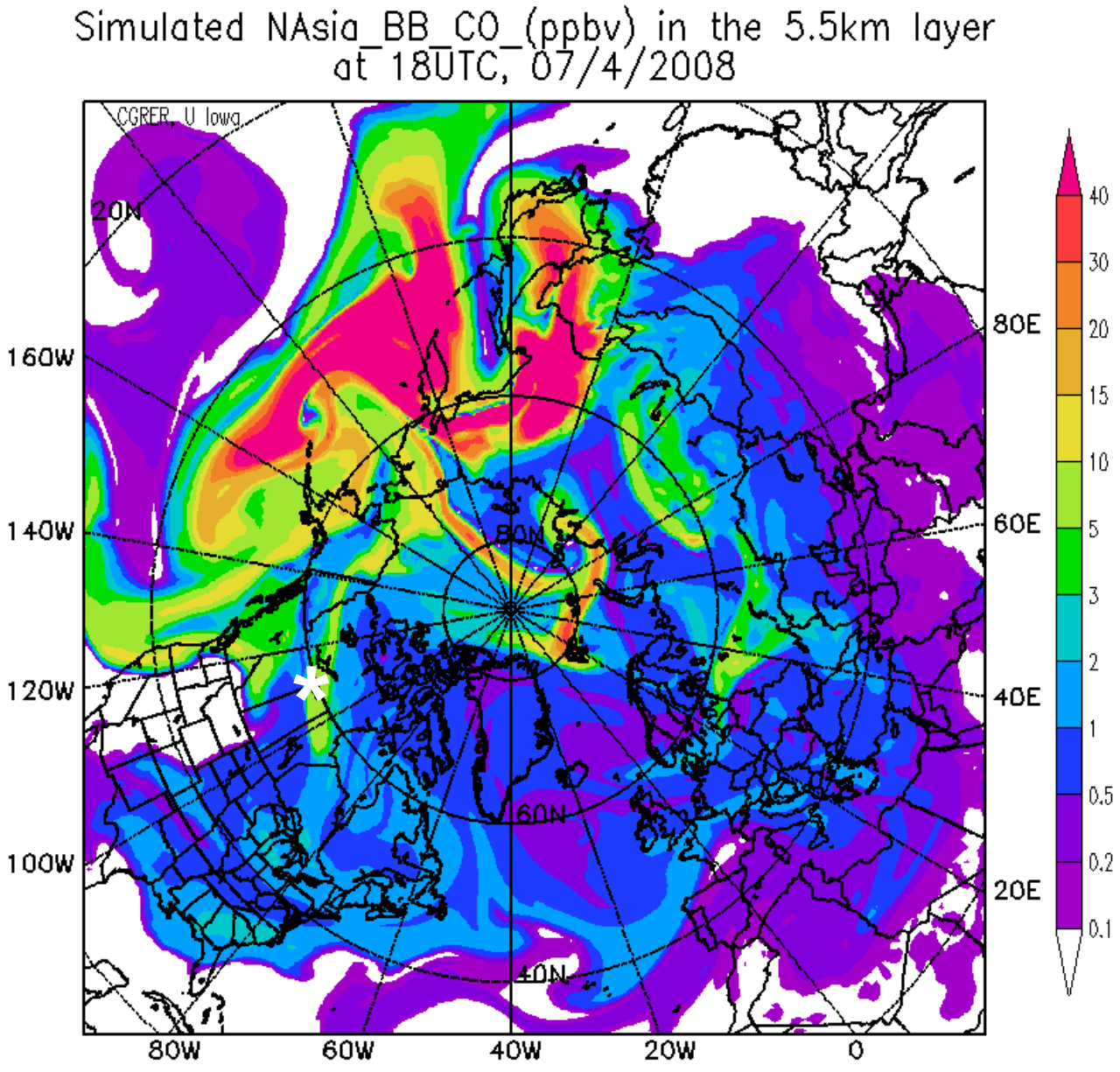


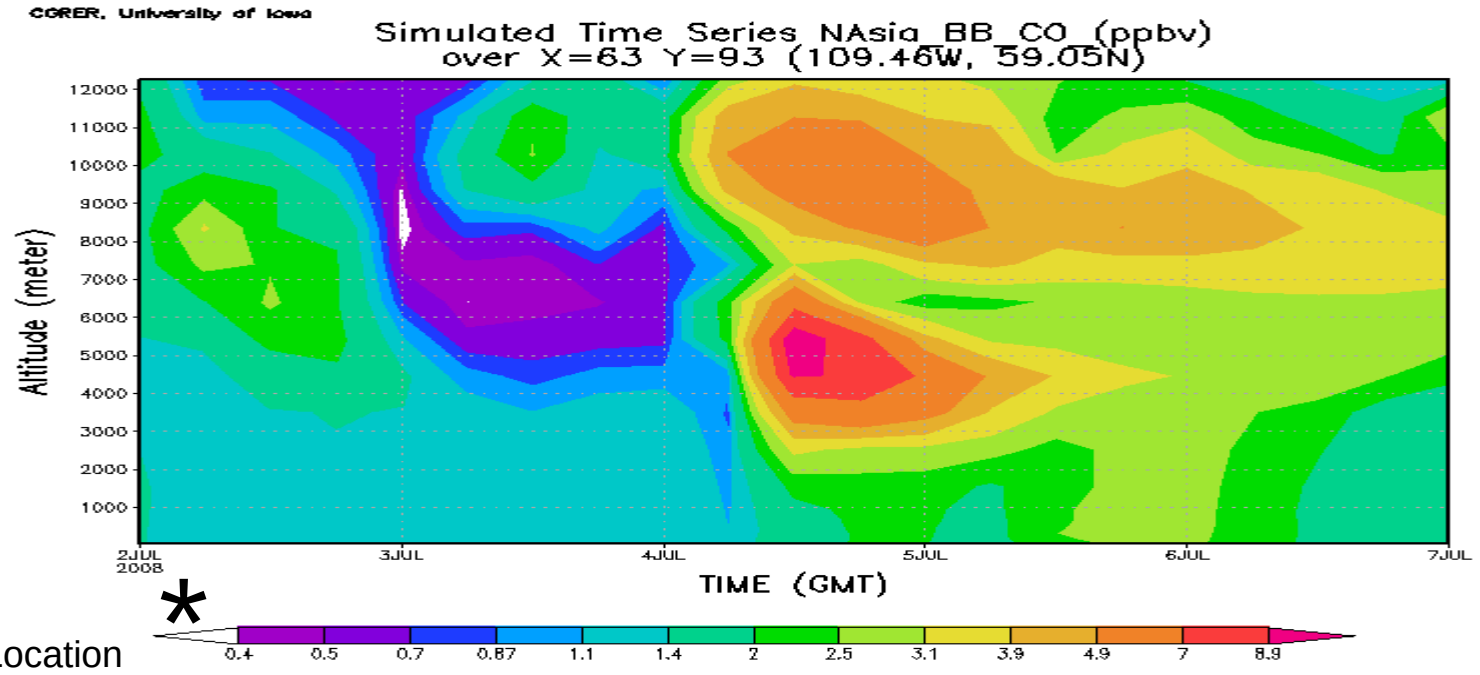
MOZART Forecast from 20080702



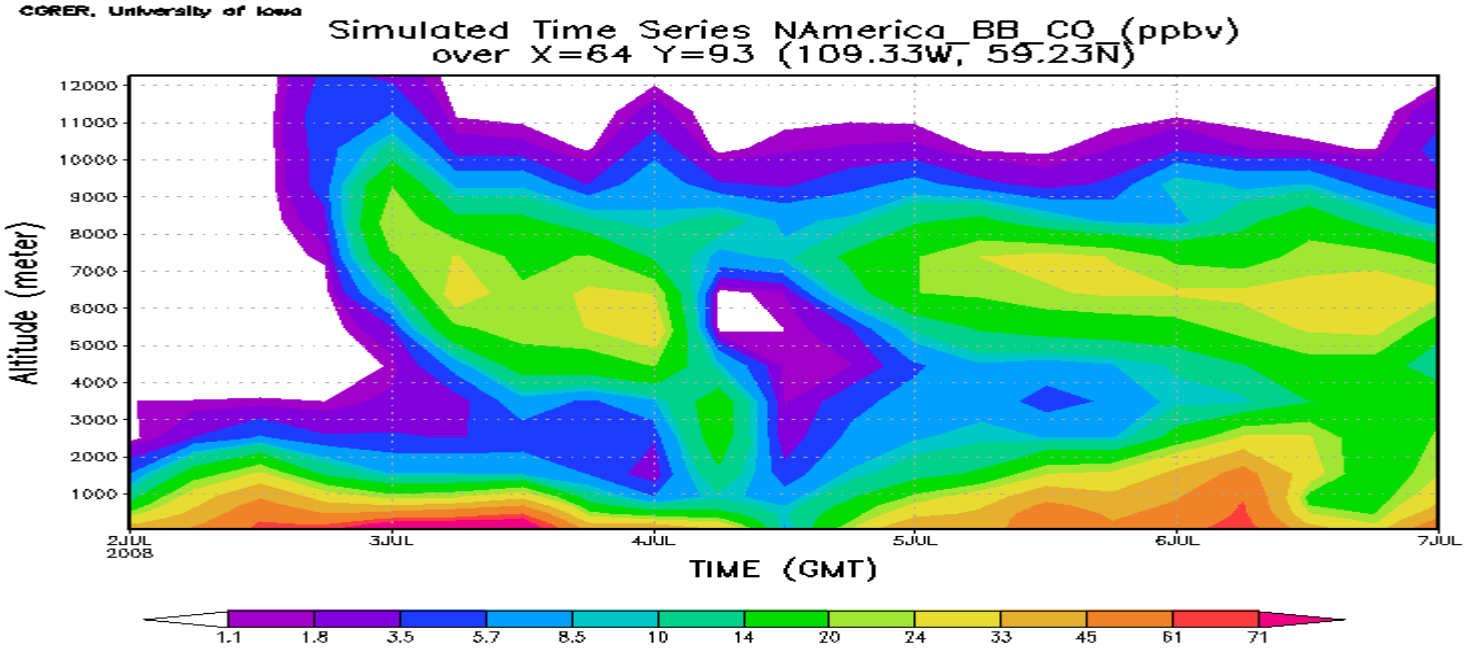
MOZART Forecast from 20080702

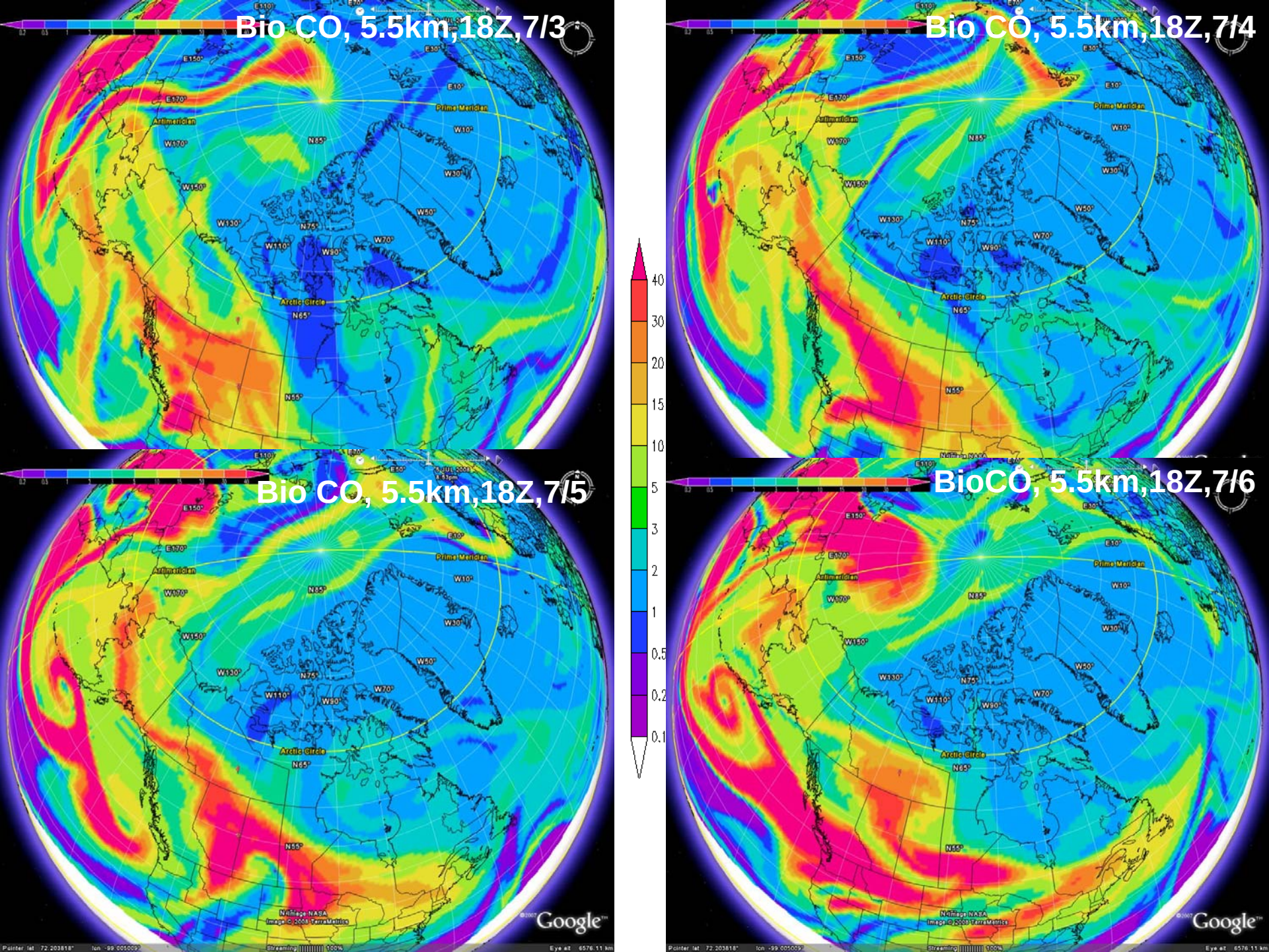

Bio CO, 1.5km,18Z,7/3
Bio CO, 1.5km,18Z,7/4
Bio CO, 1.5km,18Z,7/5
BioCO, 1.5km,18Z,7/6
40
30
20
15
10
5
3
2
1
0.5
0.2
0.1
Arctic Circle
N65°
N55°
N45°
W145°
W135°
W125°
W115°
W105°
W95°
W85°
W75°
W65°
Google

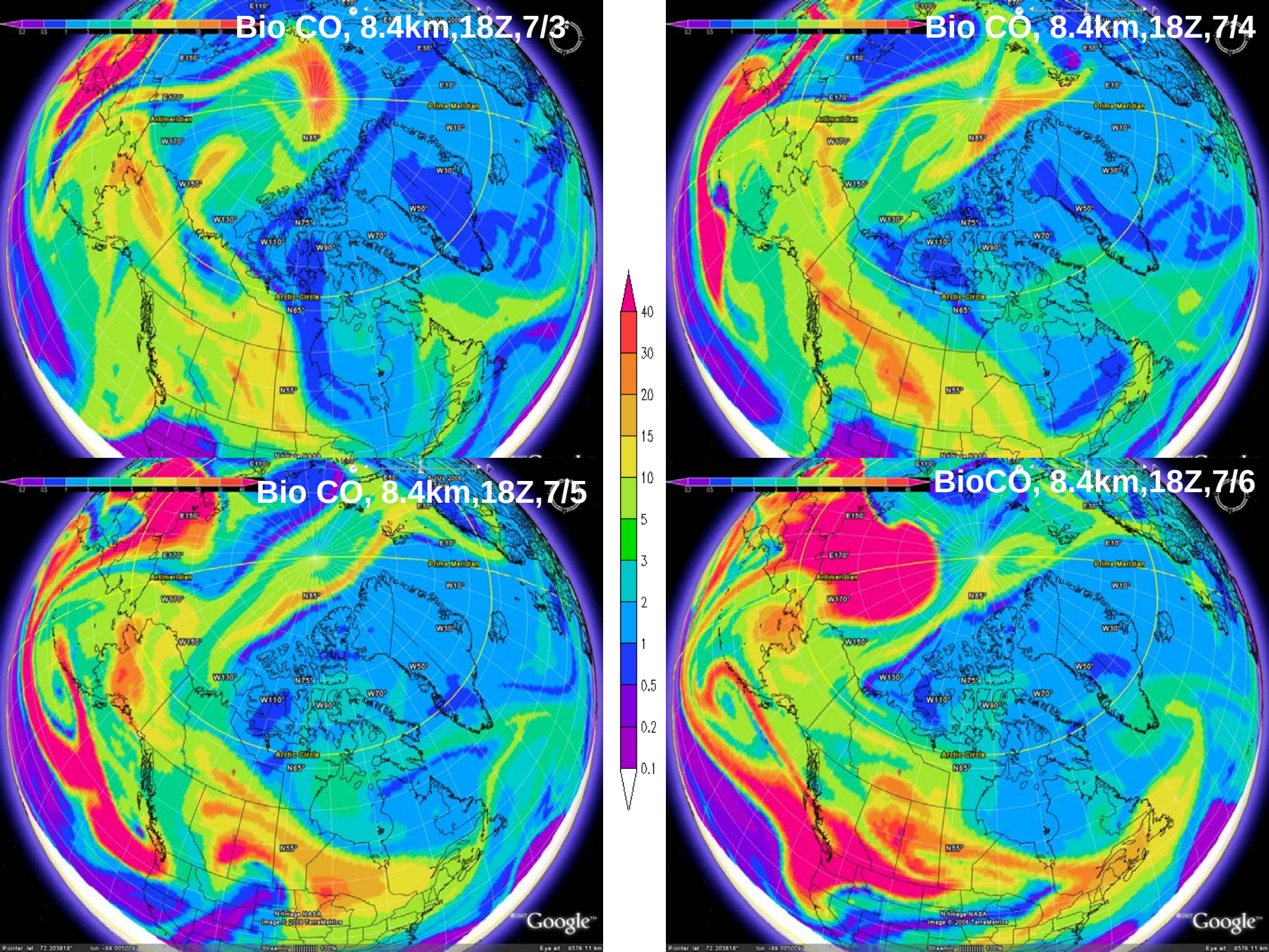

Simulated NAsia_BB_CO_(ppbv) in the 5.5km layer
at 18UTC, 07/4/2008
CGRER, U Iowa
20N
160W
140W
120W
100W
80N
60N
40N
80E
60E
40E
20E
80W
60W
40W
20W
0
40
30
20
15
10
5
3
2
1
0.5
0.2
0.1

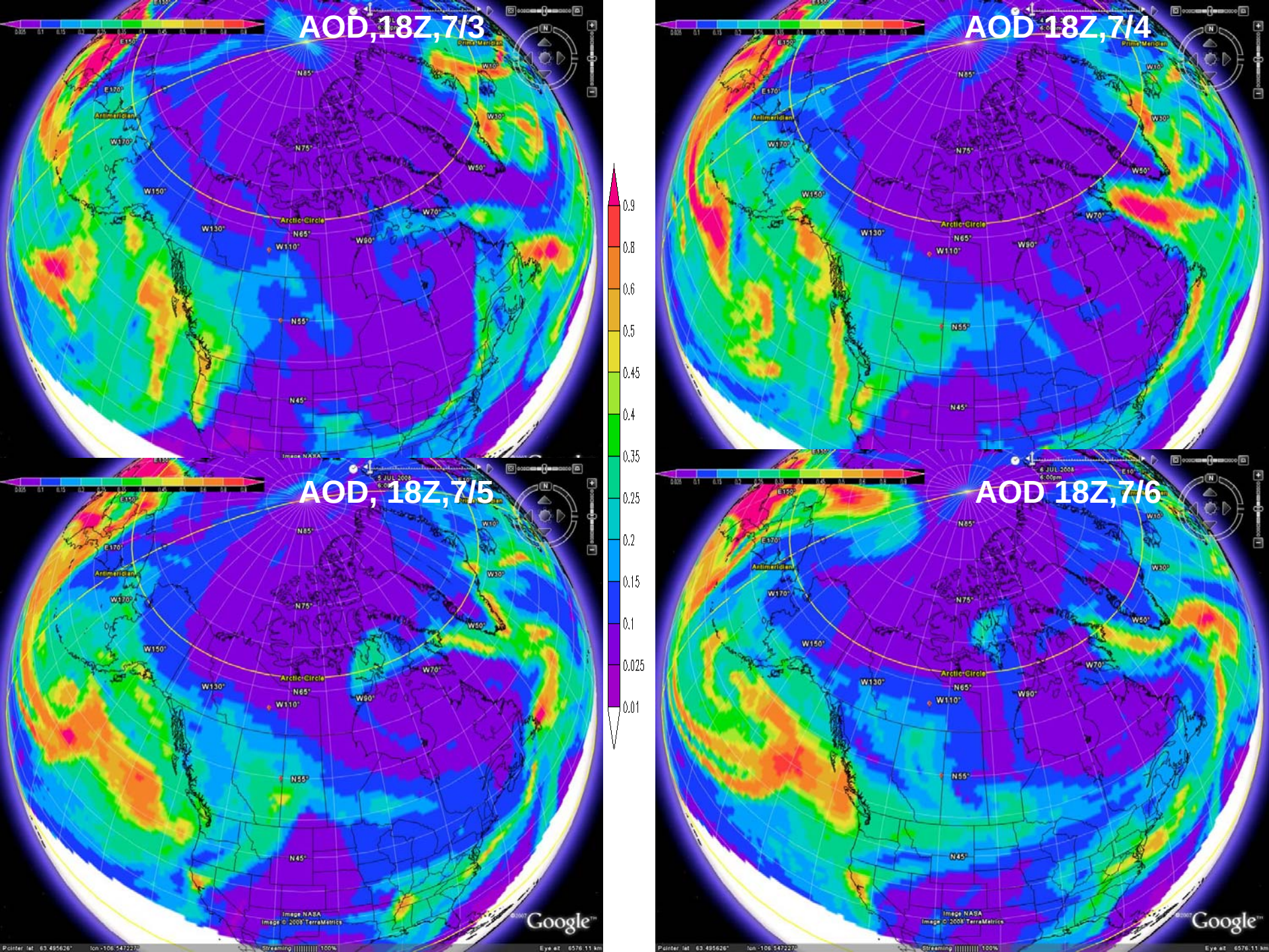


Sounding Location

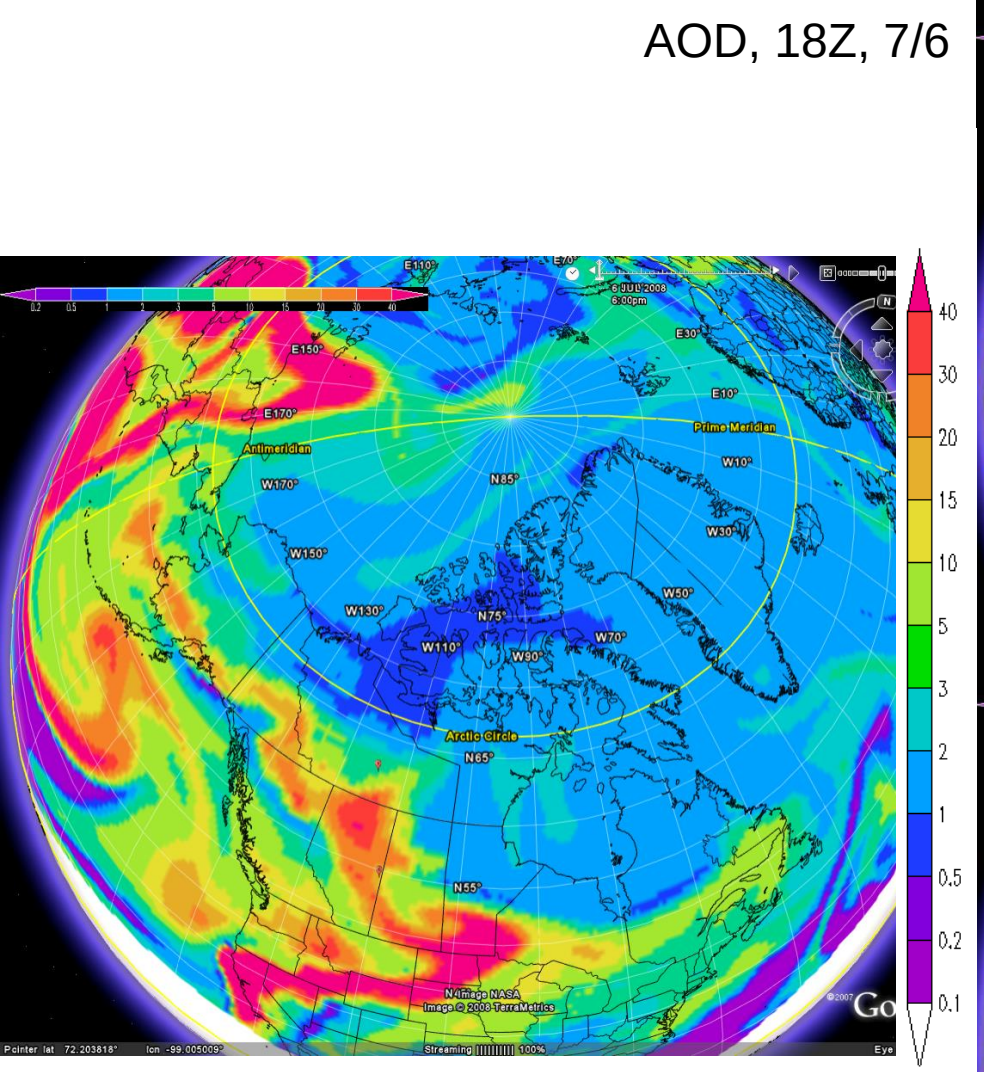


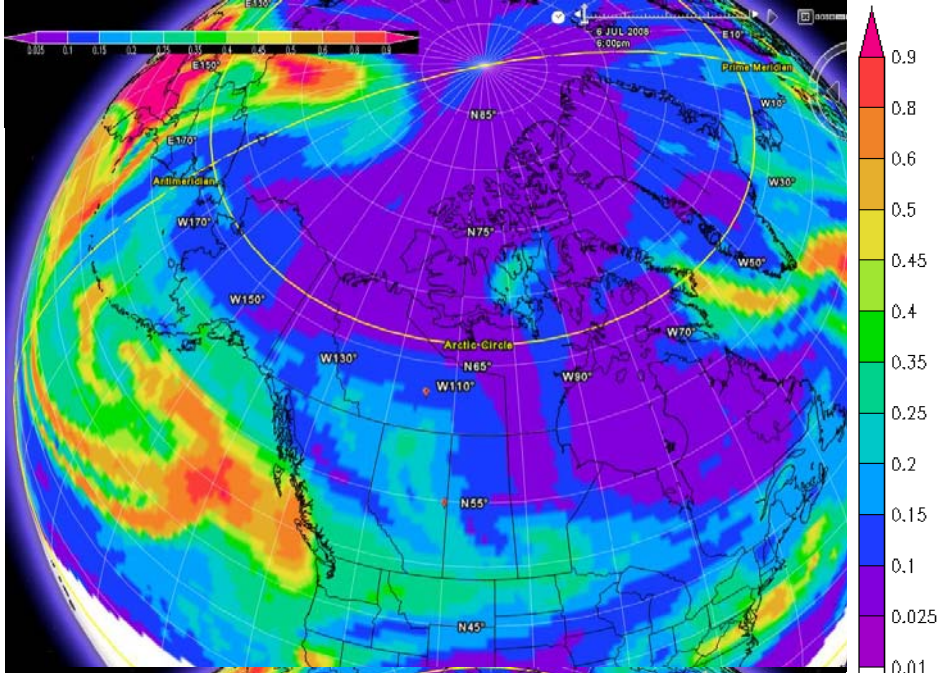

Bio CO, 5.5km,18Z,7/3
Bio CO, 5.5km,18Z,7/4
Bio CO, 5.5km,18Z,7/5
BioCO, 5.5km,18Z,7/6
40
30
20
15
10
5
3
2
1
0.5
0.2
0.1
Google


Bio CO, 8.4km,18Z,7/3
Bio CO, 8.4km,18Z,7/4
Bio CO, 8.4km,18Z,7/5
BioCO, 8.4km,18Z,7/6
40
30
20
15
10
5
3
2
1
0.5
0.2
0.1
Google

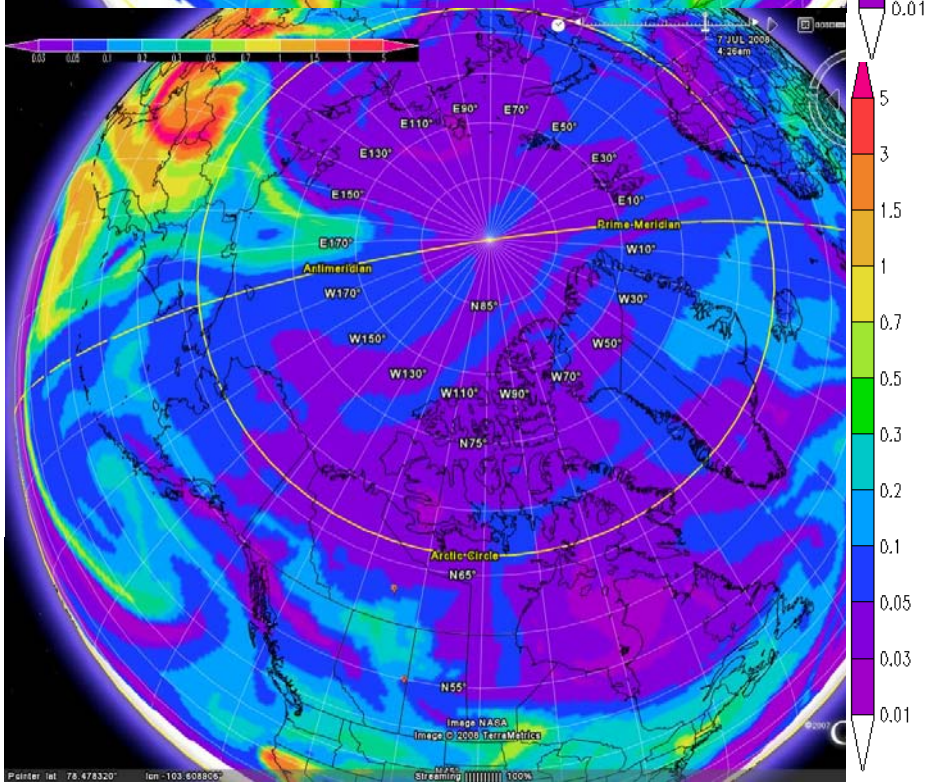

AOD, 18Z, 7/3
AOD 18Z, 7/4
AOD, 18Z, 7/5
AOD 18Z, 7/6
0.9
0.8
0.6
0.5
0.45
0.4
0.35
0.25
0.2
0.15
0.1
0.025
0.01
Google

AOD, 18Z, 7/6





Biomass CO, 18Z, 7/6, 1.5 km



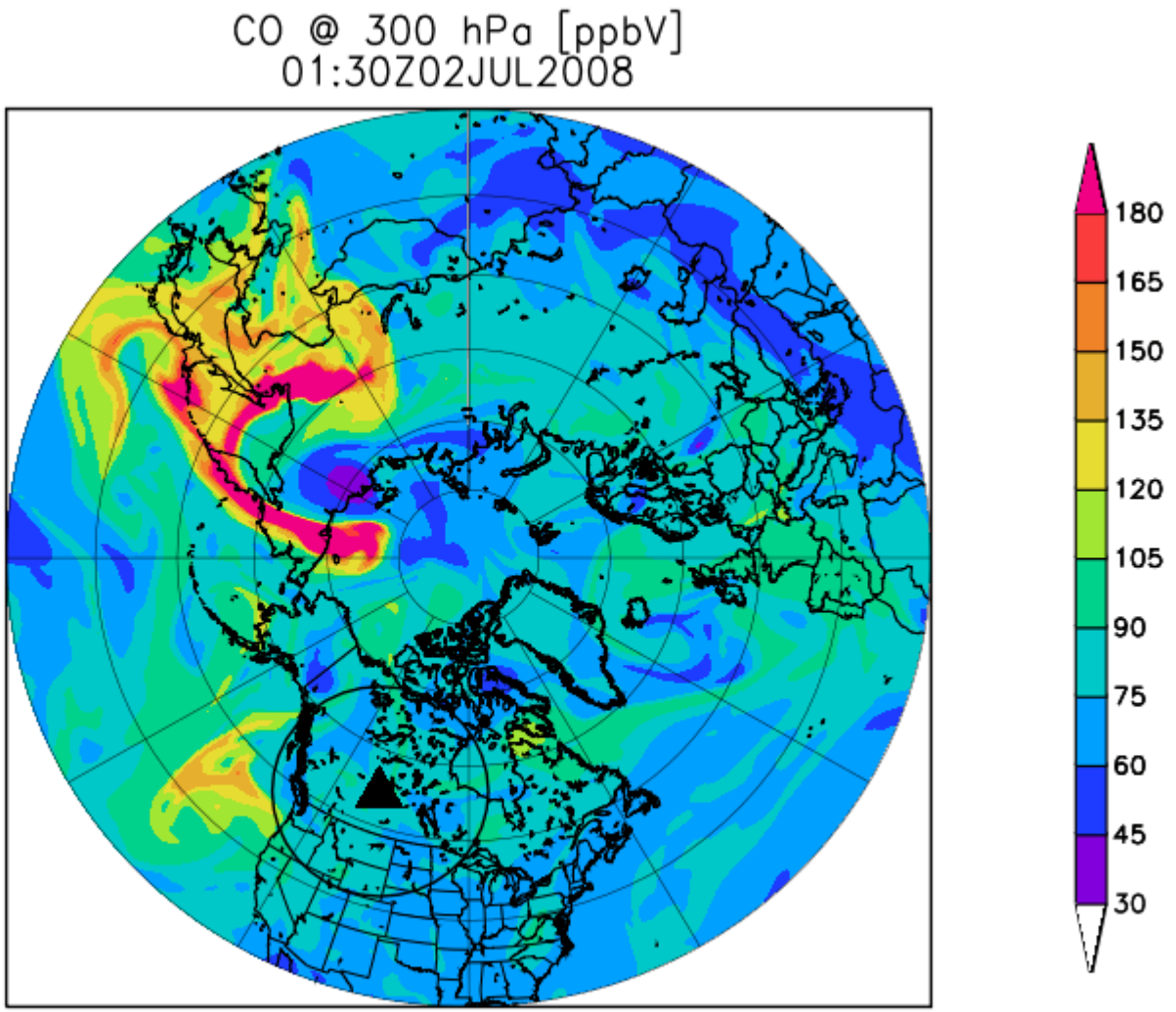
BC, 1.5km, 7/6

300 mb

5-Day Total CO Animation

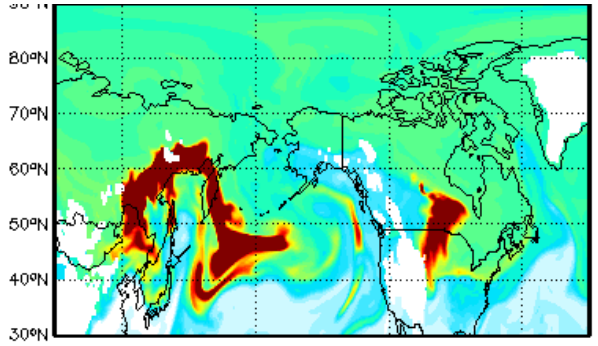
Siberian plume due north to N. Pole & approaches Thule on 3rd-6th!

Another plume crosses Pacific Oc. & should be over Cold Lake by July 6th – at 500 mb too.

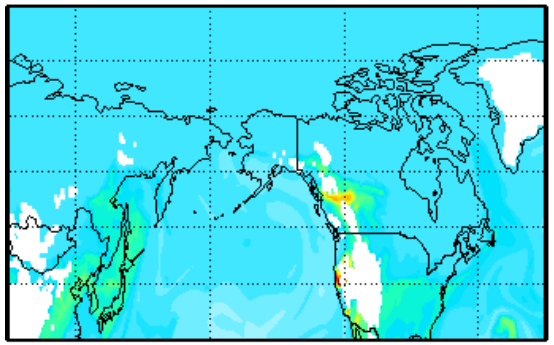


July 4th (19:30Z) : 3-levels

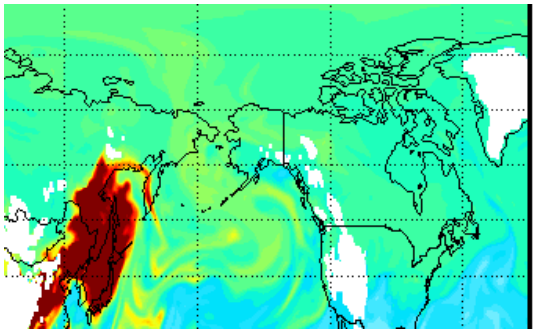
BOREAL : 850 mb



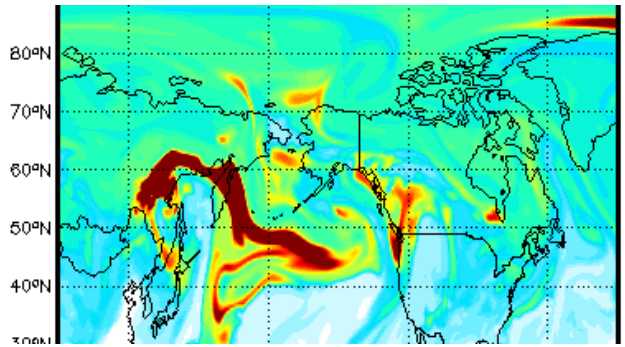
NON-BOREAL : 850 mb



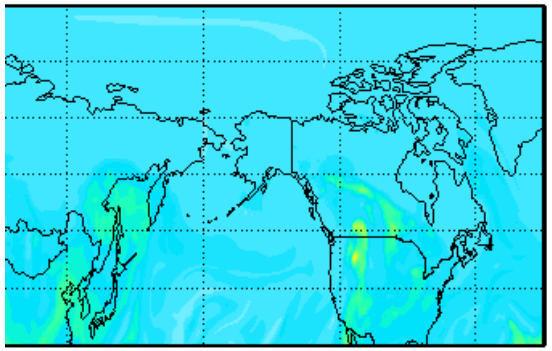
Asian FF/BF : 850 mb



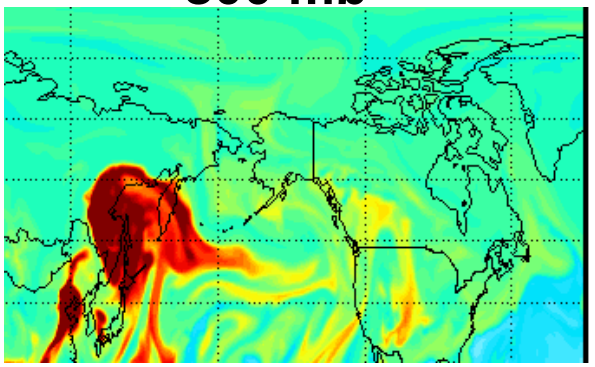
500 mb



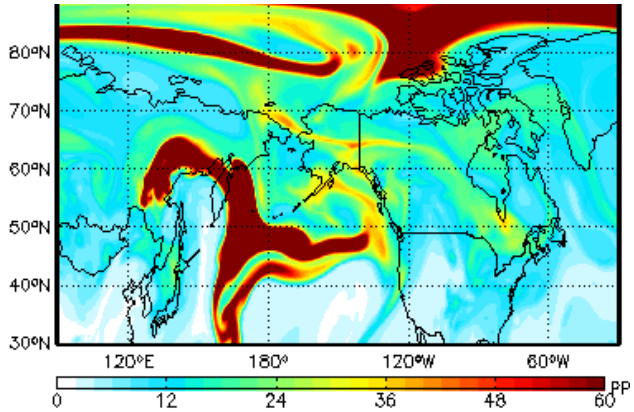
500 mb



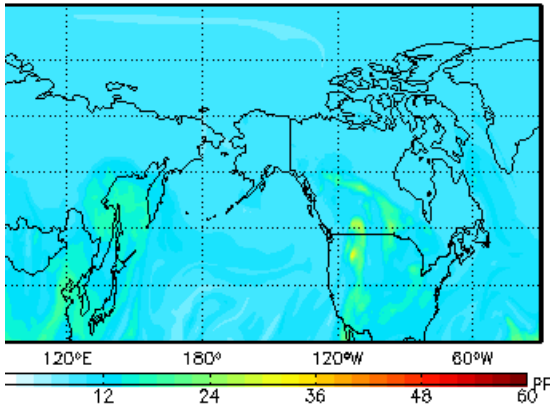
500 mb



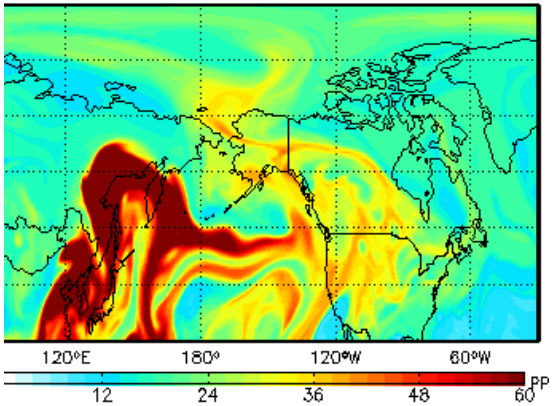
300 mb



300 mb

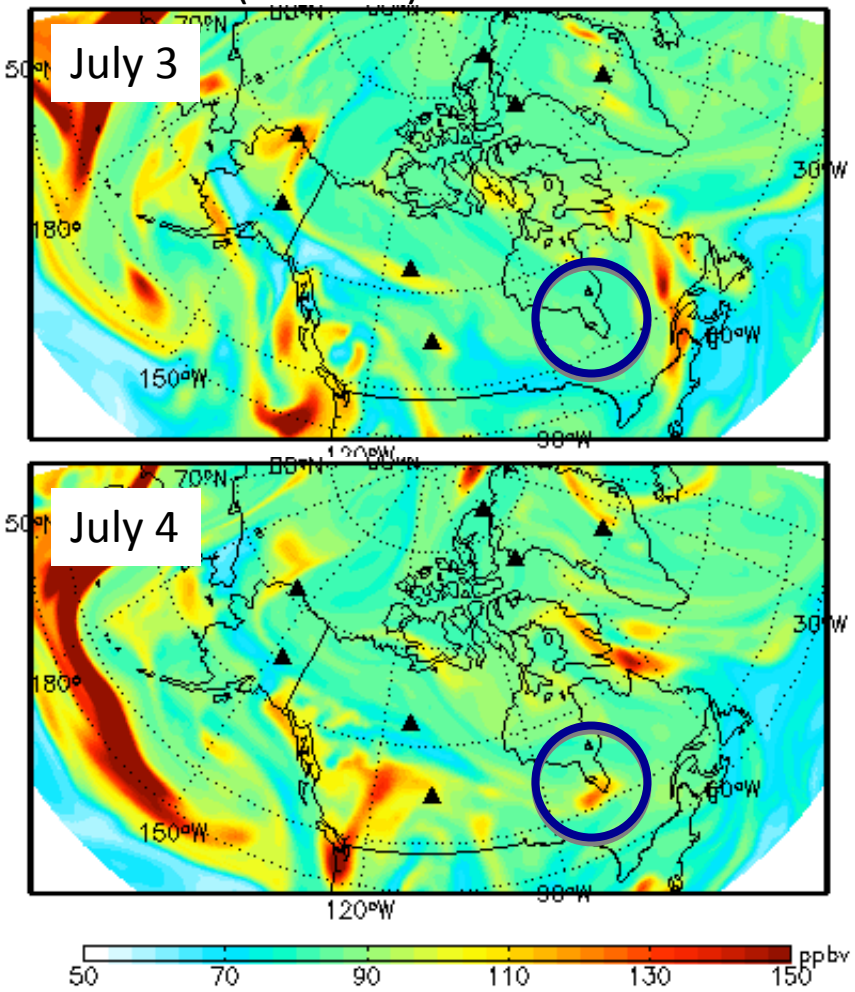


300 mb

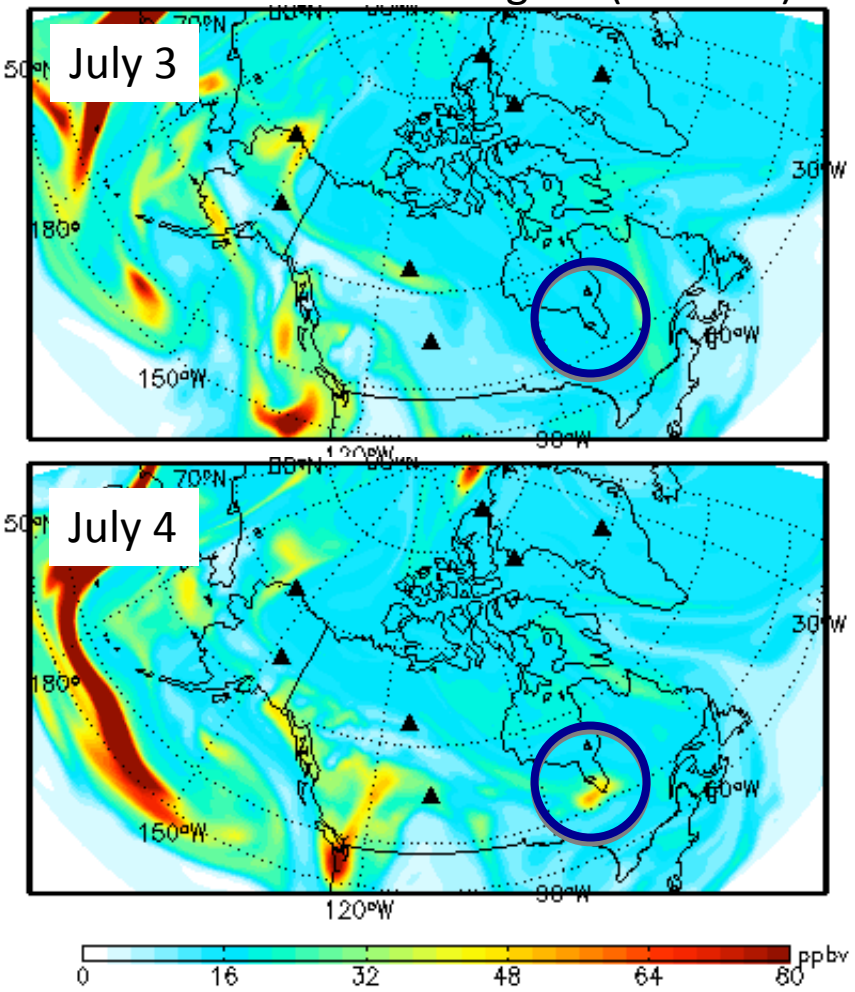


Potential **July 4th** flight: sample **aged Canadian fire plumes** that have finally been **lofted to the free troposphere** near Hudson's Bay

Total CO (500 hPa)

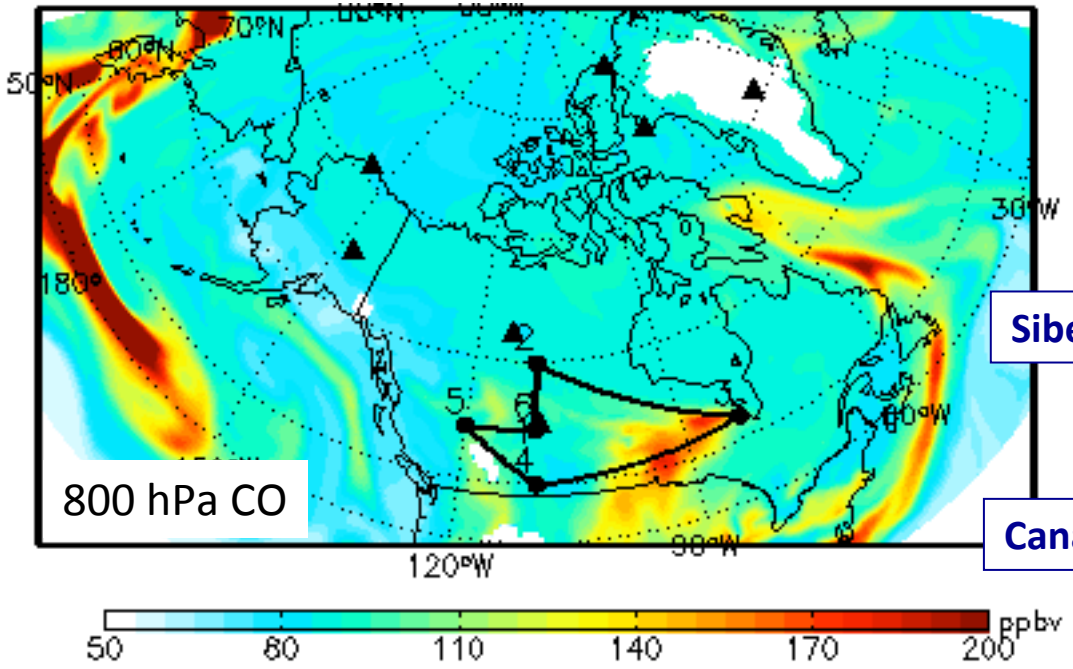


Boreal biomass burning CO (500 hPa)

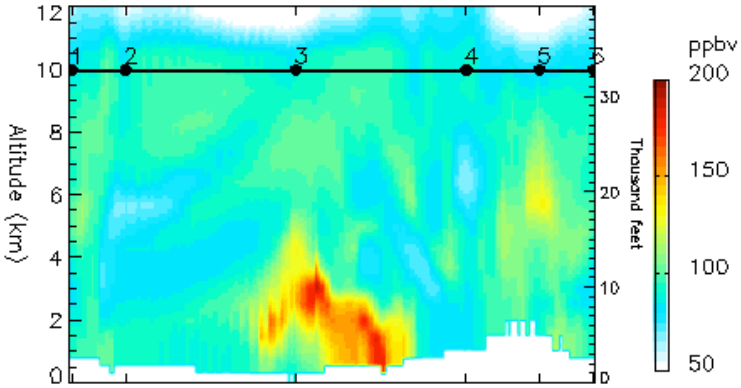


Potential July 4th flight:

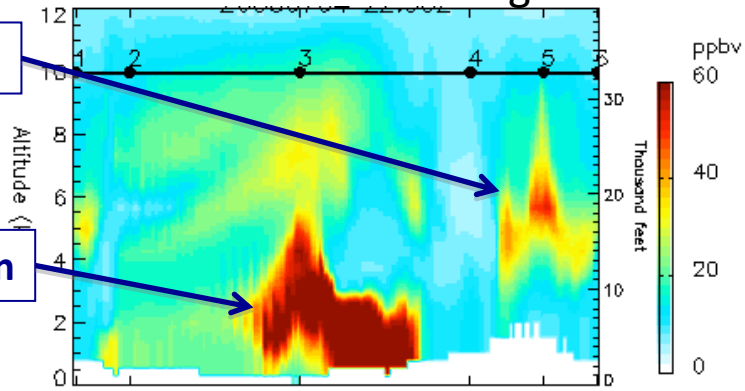
- Transported Asian pollution aloft everywhere
- Siberian plume is west of Cold Lake
- Little influence from aged CA fires



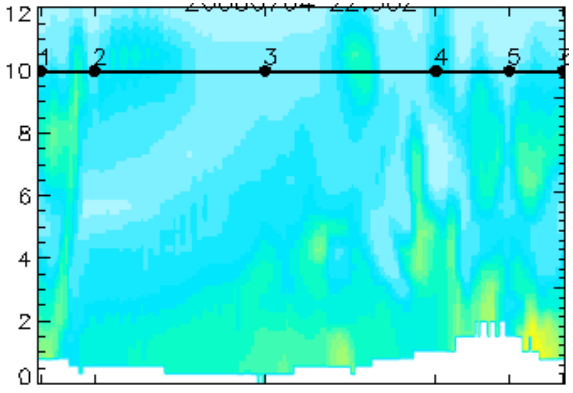
Total CO



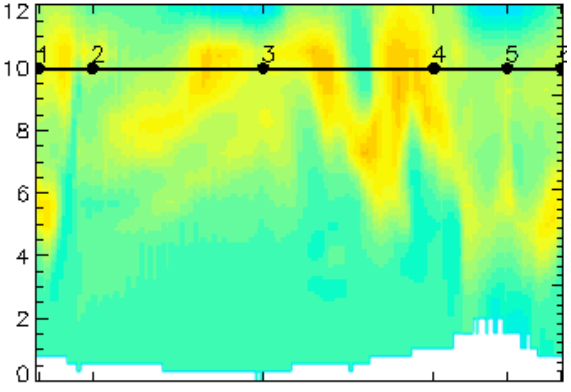
Boreal biomass burning CO



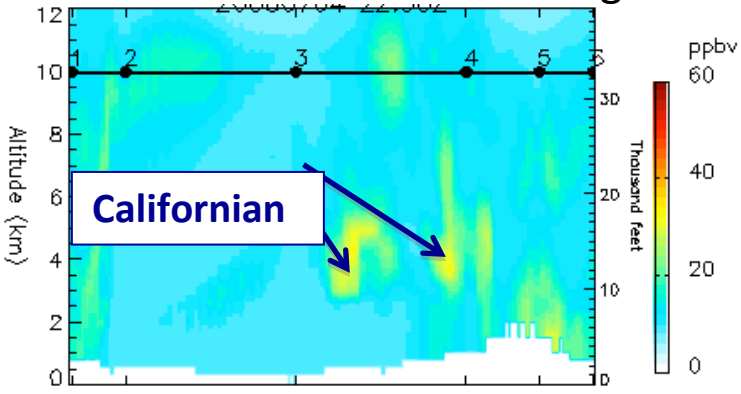
N. American fossil fuel CO



Asian fossil fuel CO

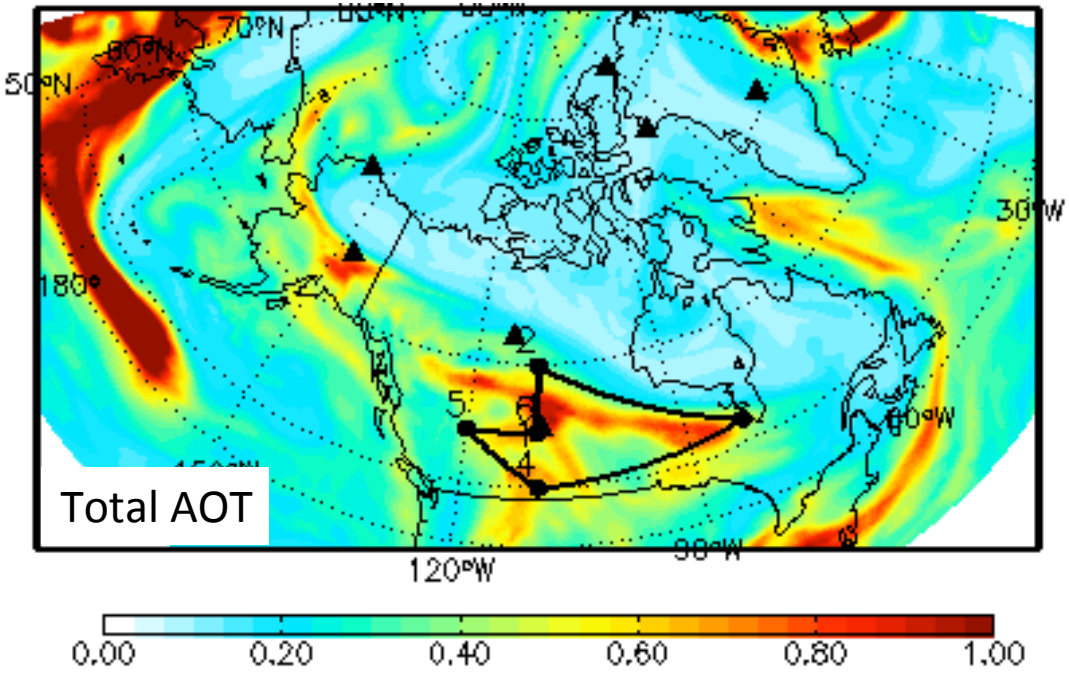


Non-boreal biomass burning CO

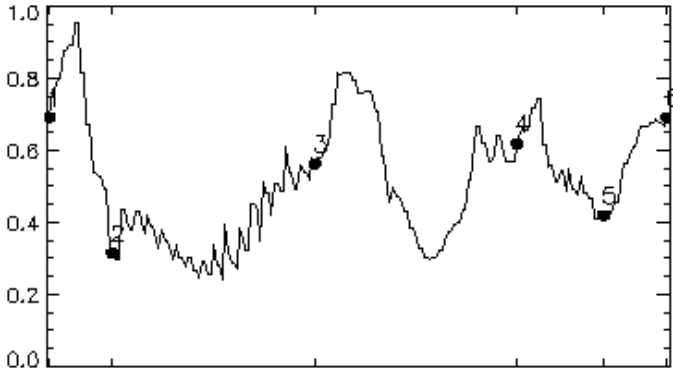


Potential July 4th flight:

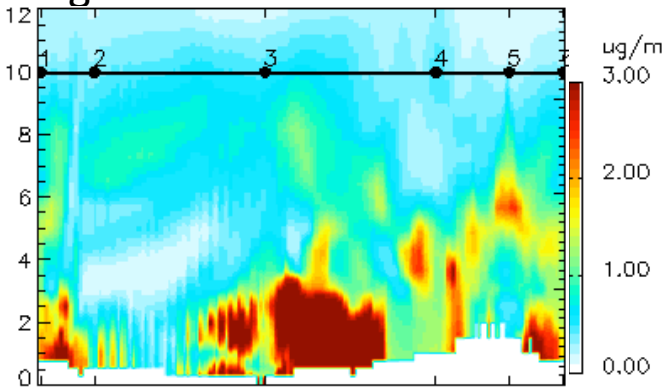
- Lots of transported dust and sulfate west of Cold Lake
- “Purest” fire emissions east/southeast of Cold Lake



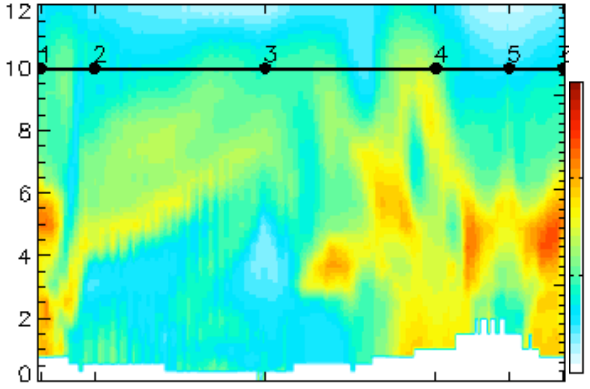
Total AOT



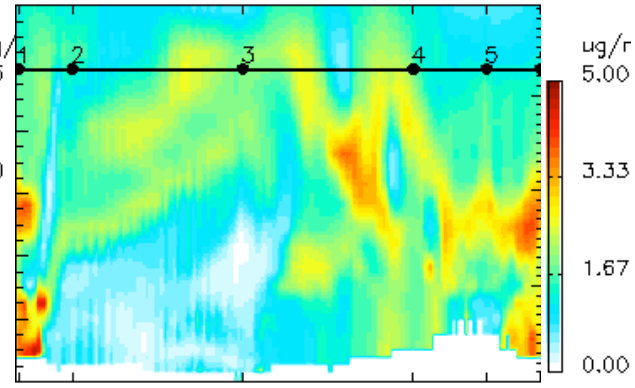
Organic carbon aerosol



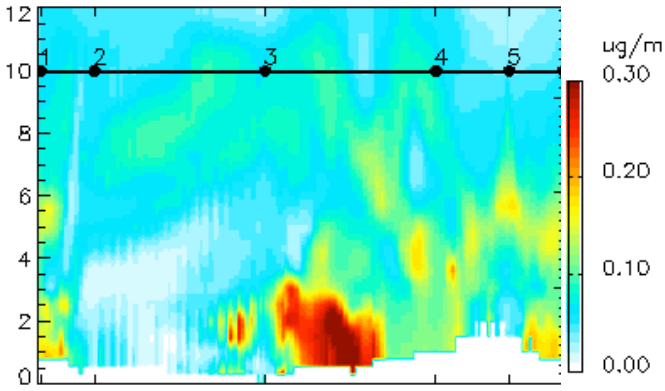
Dust



Sulfate aerosol

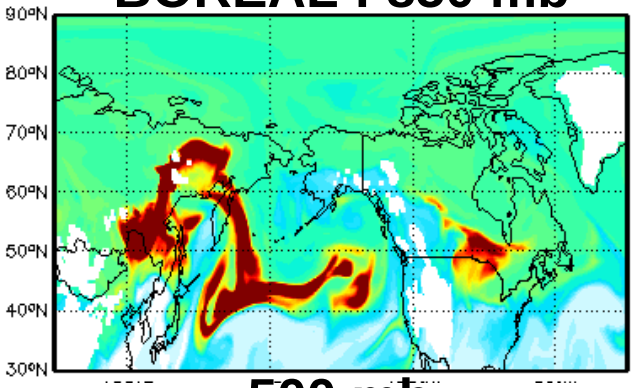


Black carbon aerosol

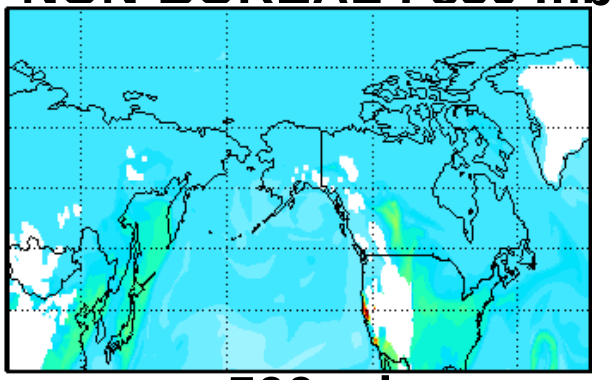


July 5th (19:30Z) : 3-levels

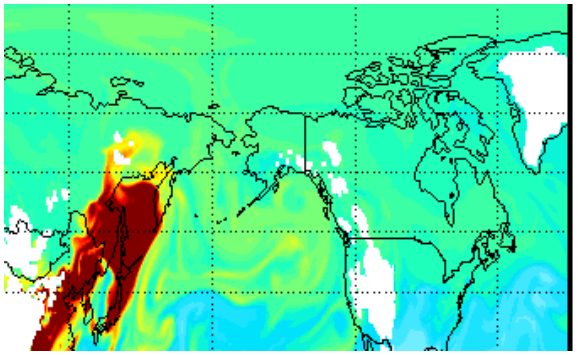
BOREAL : 850 mb



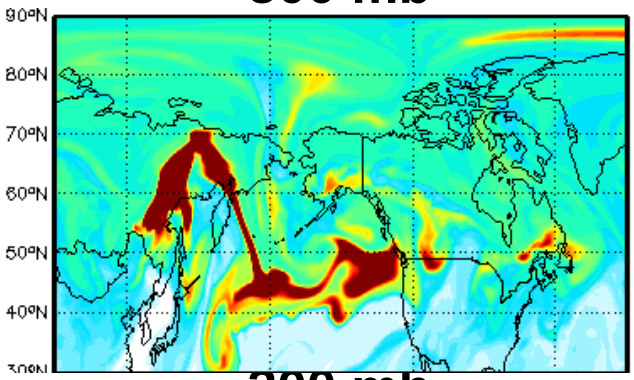
NON-BOREAL : 850 mb



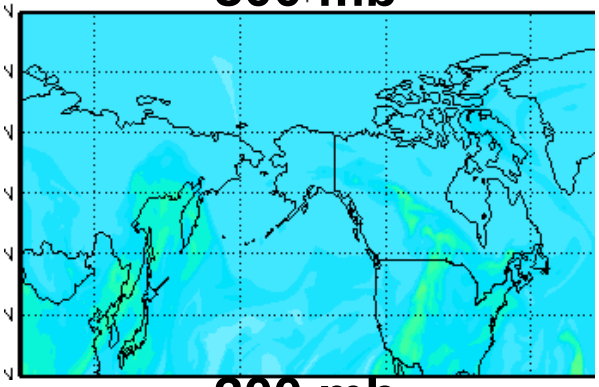
Asian FF/BF : 850 mb



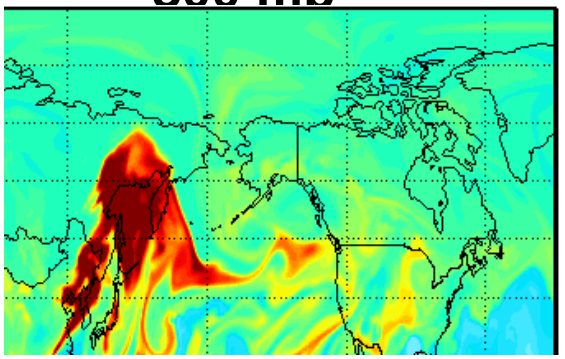
500 mb



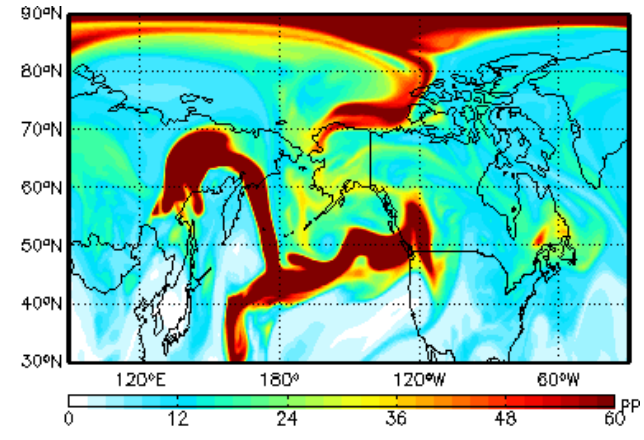
500 mb



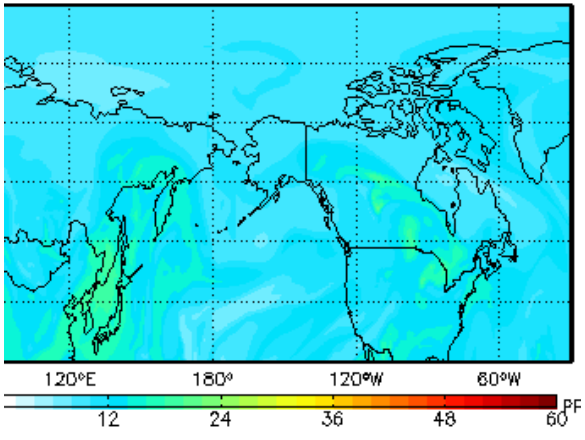
500 mb



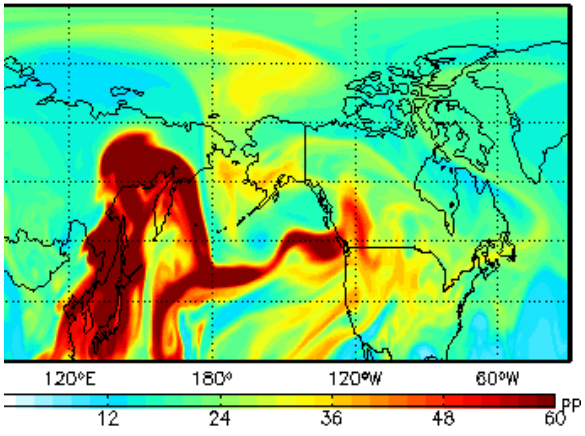
300 mb



300 mb

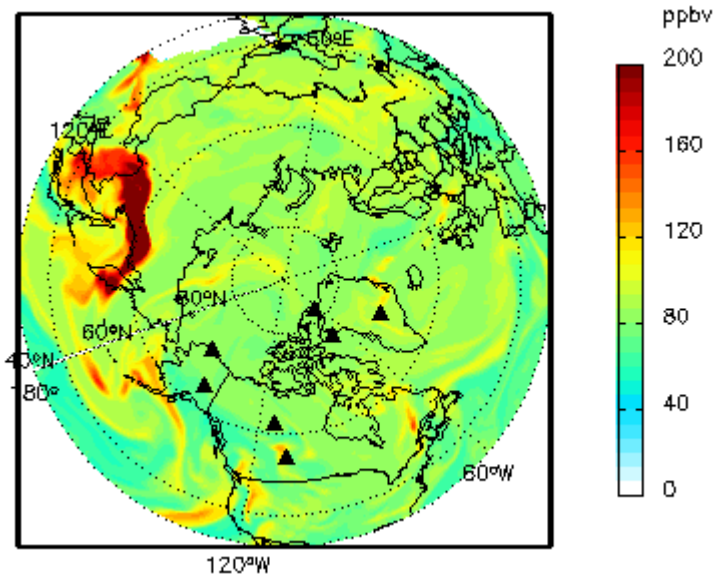


300 mb

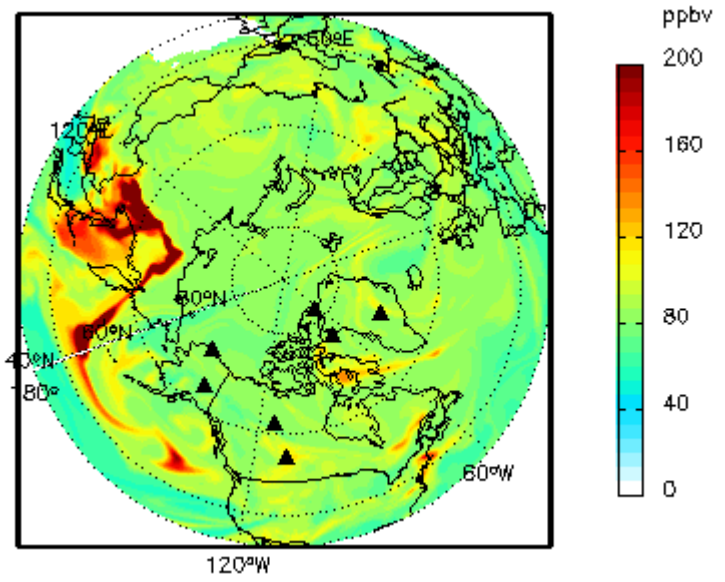


GEOS-5 outlook for total CO at 600 mb, 19:30z

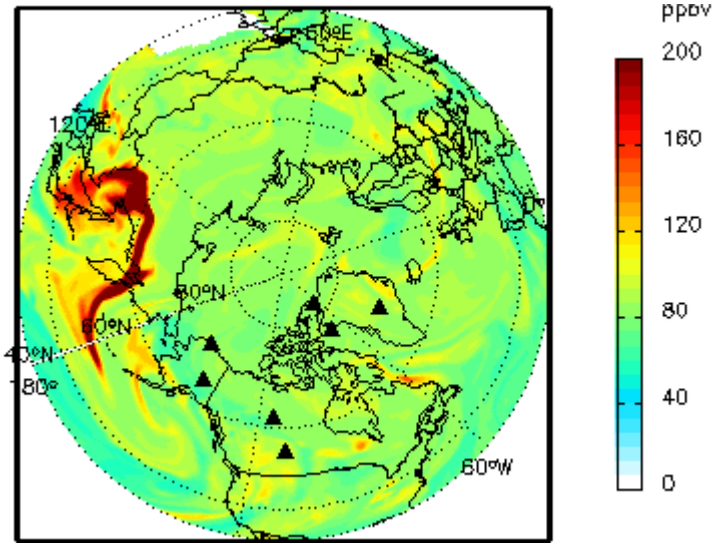
July 3



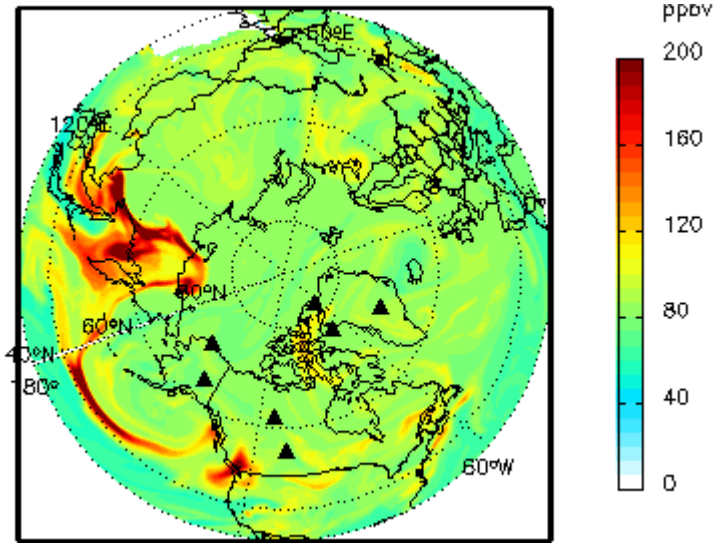
July 5



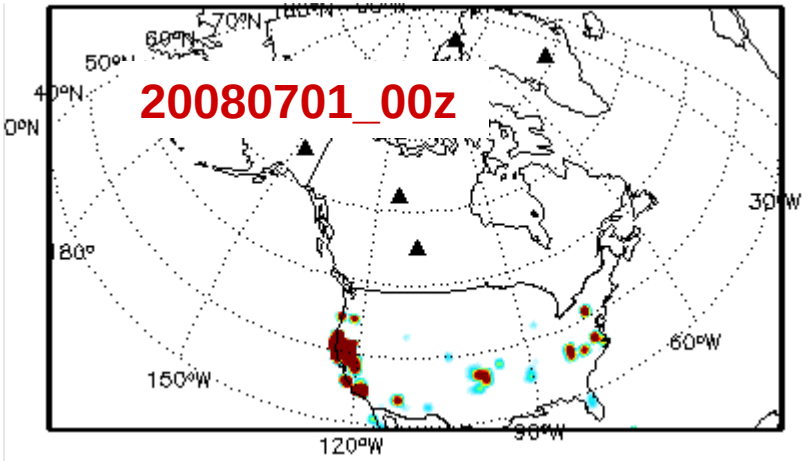
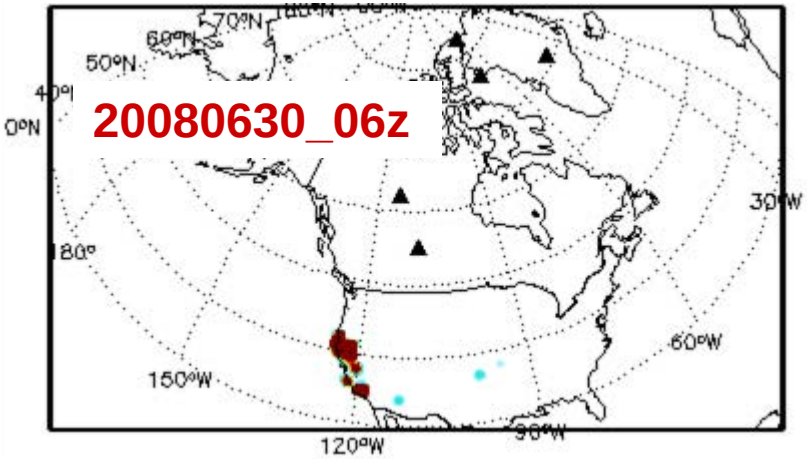
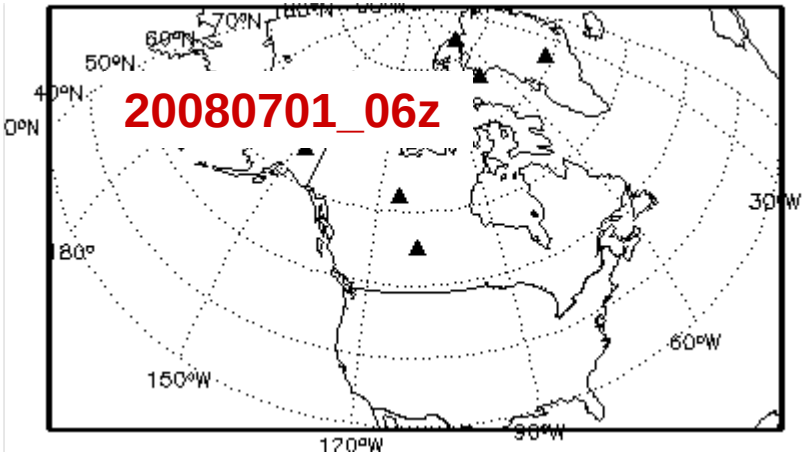
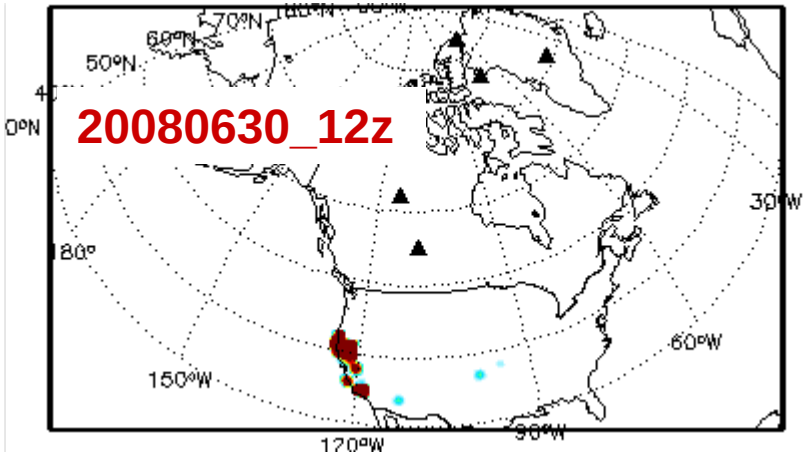
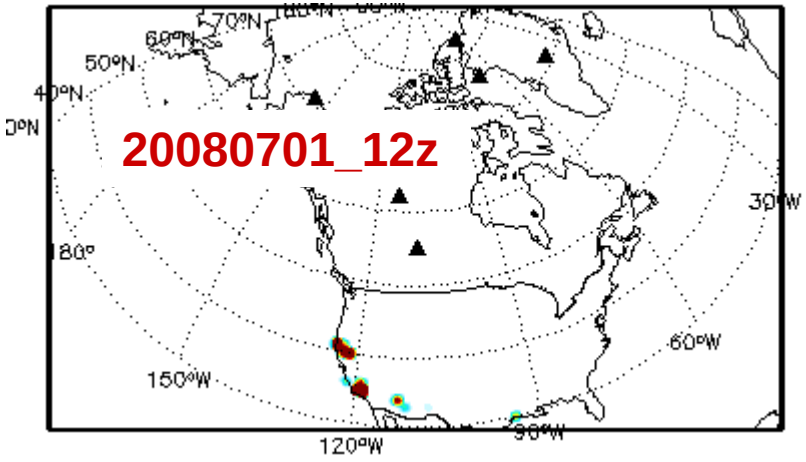
July 4



July 6



20080702_06z

There are California fires at every initialized time except 20080701_06Z.

This might be one of reasons that GEOS5 forecast initialized at 20080701_06z underestimated California CO compared with the simulations of the other models.