

Overflight of Global Hawk and the GV during HIPPO and GloPac along with satellite intercomparisons

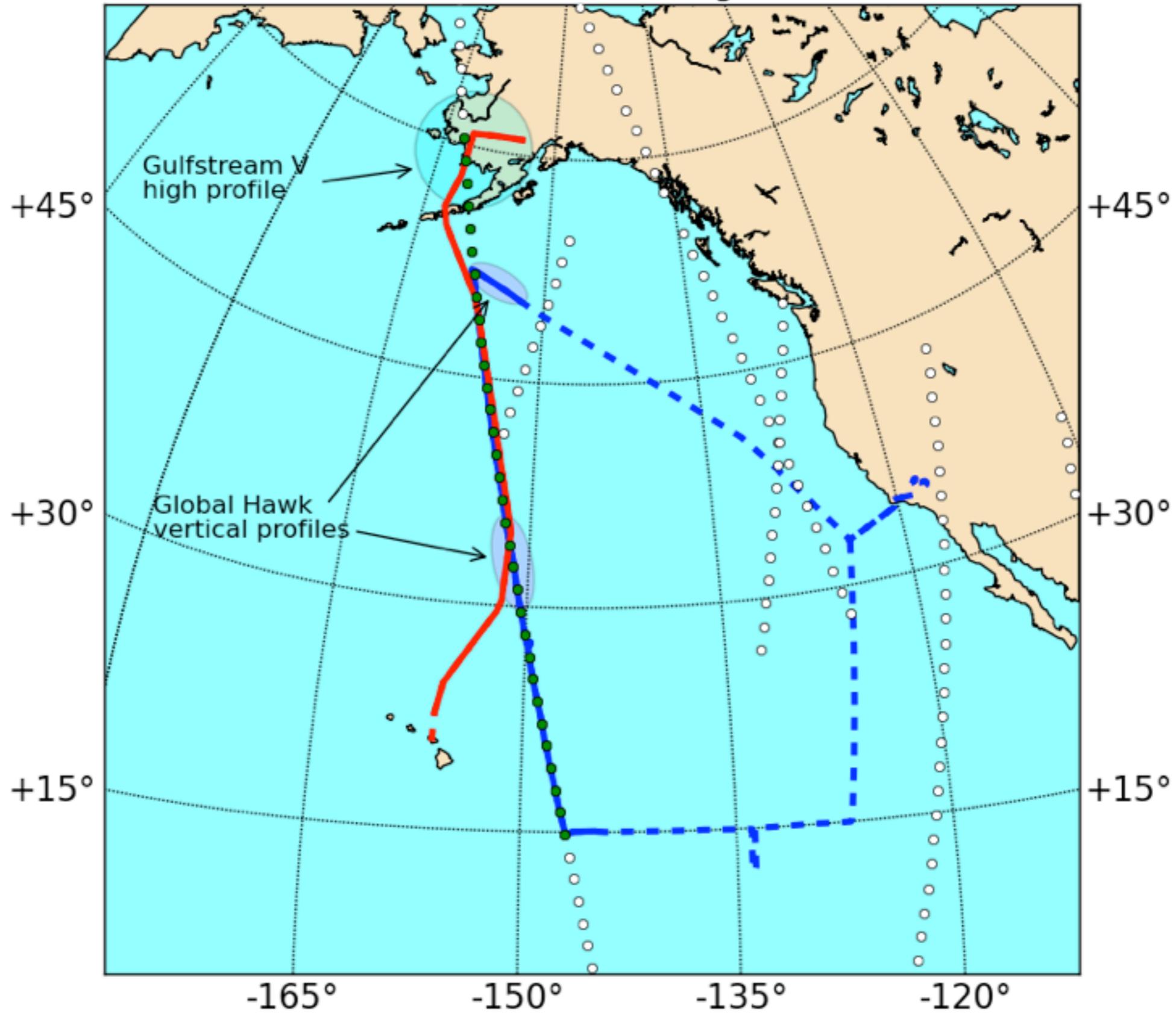
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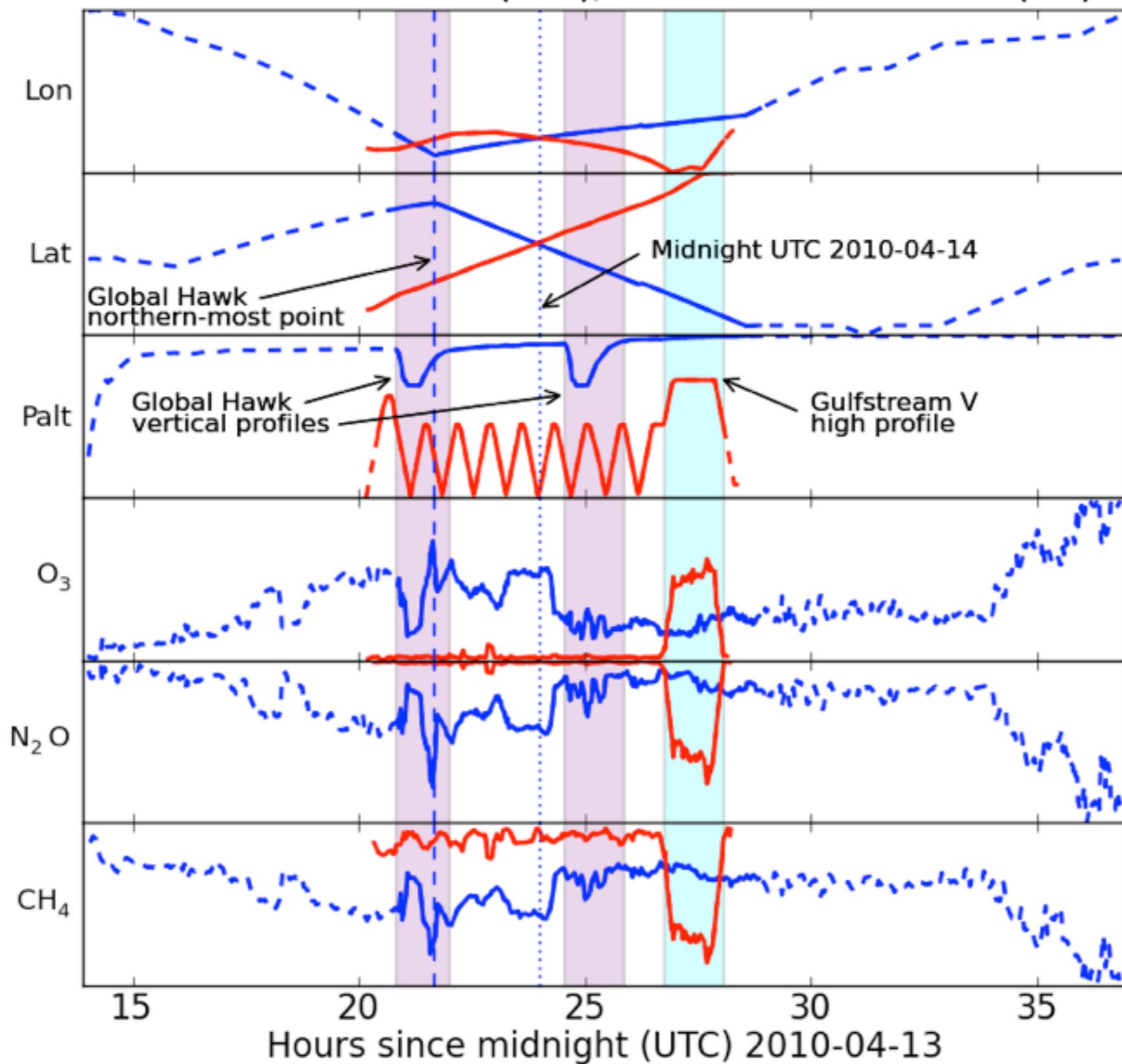
Aura-MLS Profile Locations from 2010-04-13,14 (circles) with NASA Global Hawk track during GloPac RF02 (blue), NSF/NCAR Gulfstream V track during HIPPO-3 RF09 (red)



Aura pre-selection criteria: within 600 nmi, 6 hours of aircraft
Comparison transect highlighted green (MLS), solid (aircraft)

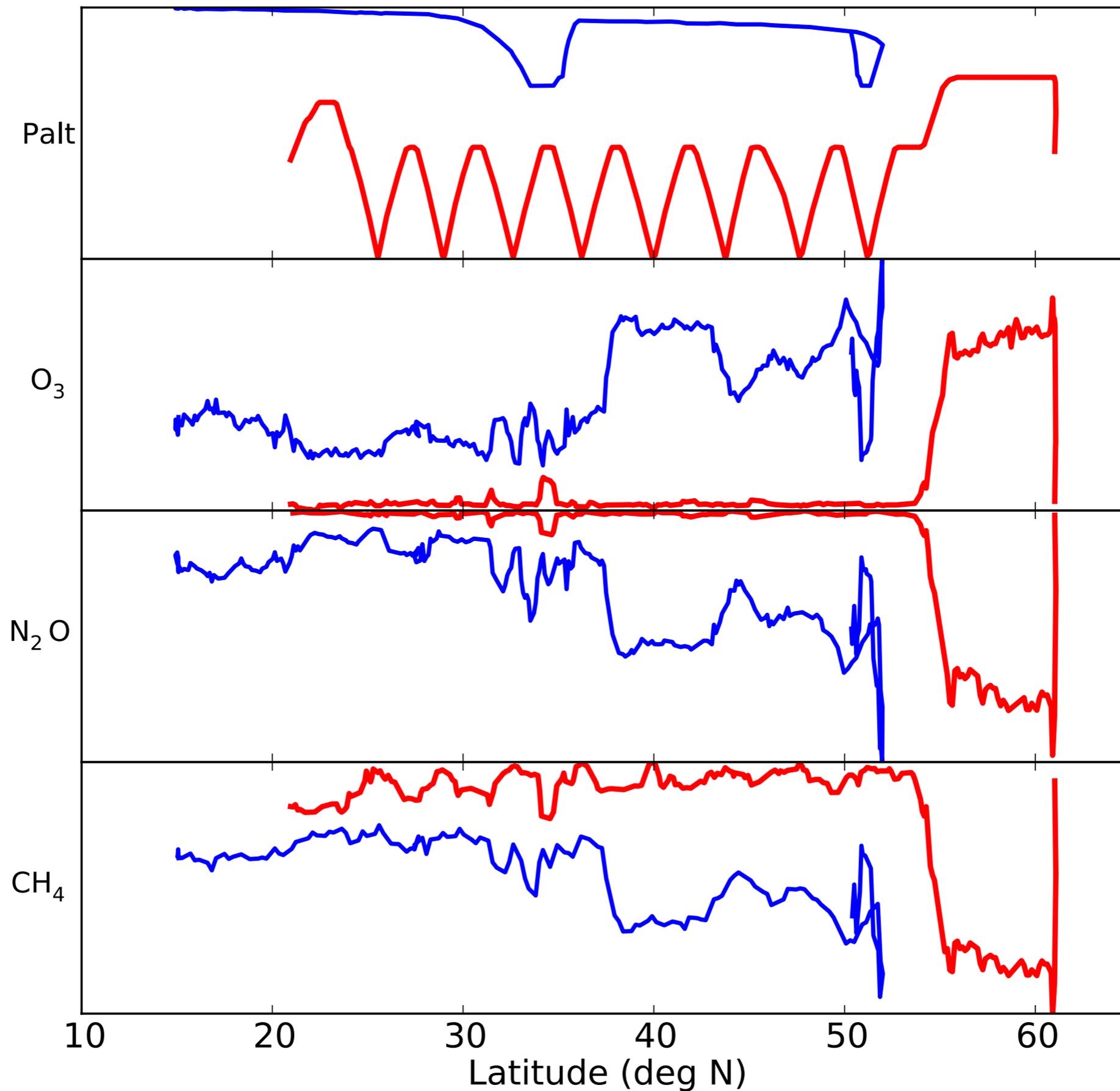
Aircraft Time Series Data

GloPac RF02-20100413 (blue), HIPPO-3 RF09-20100413 (red)



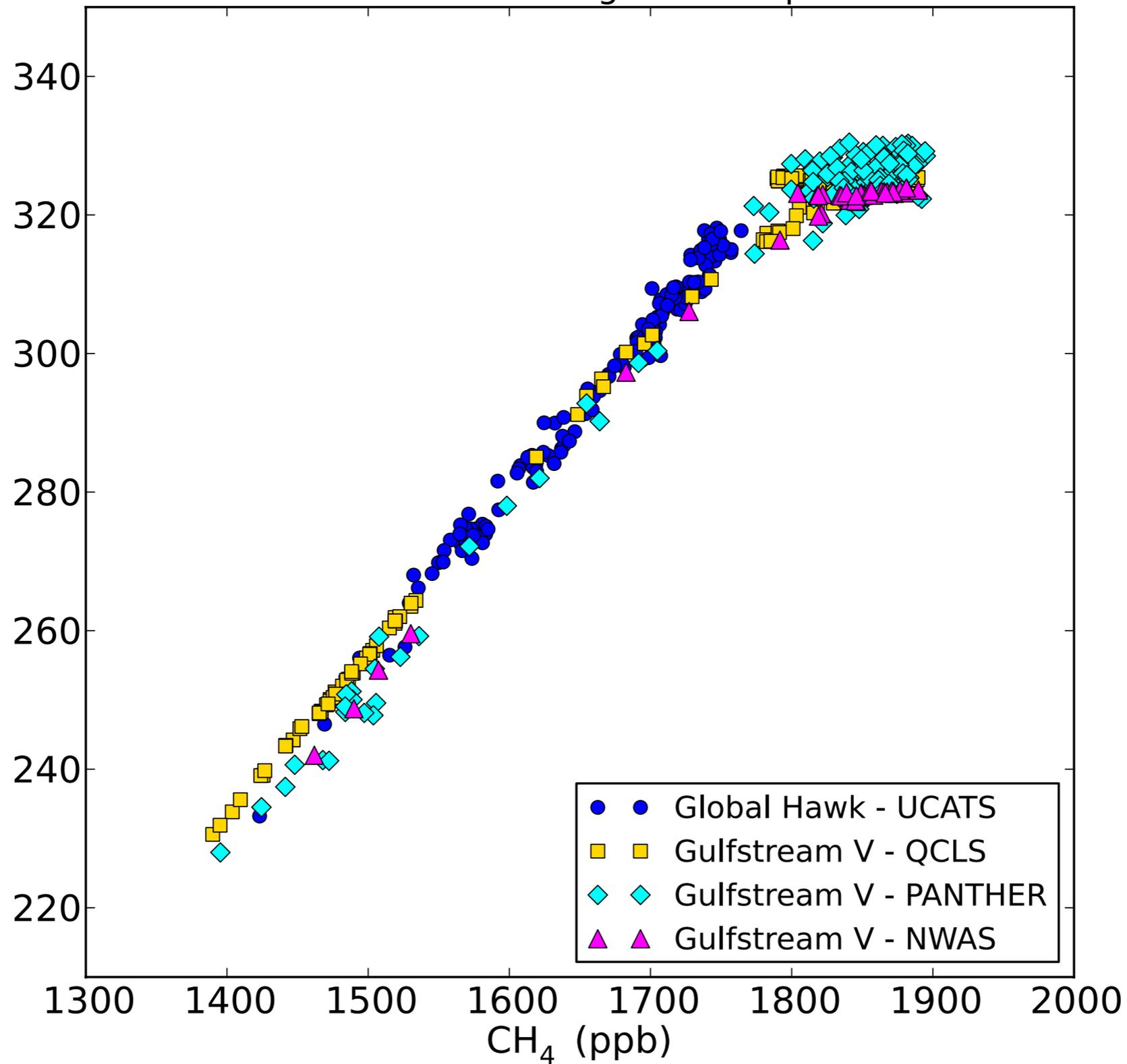
Comparison transect highlighted solid.

Aircraft data along MLS Comparison Transect
GloPac RF02-20100413 (blue), HIPPO-3 RF09-20100413 (red)



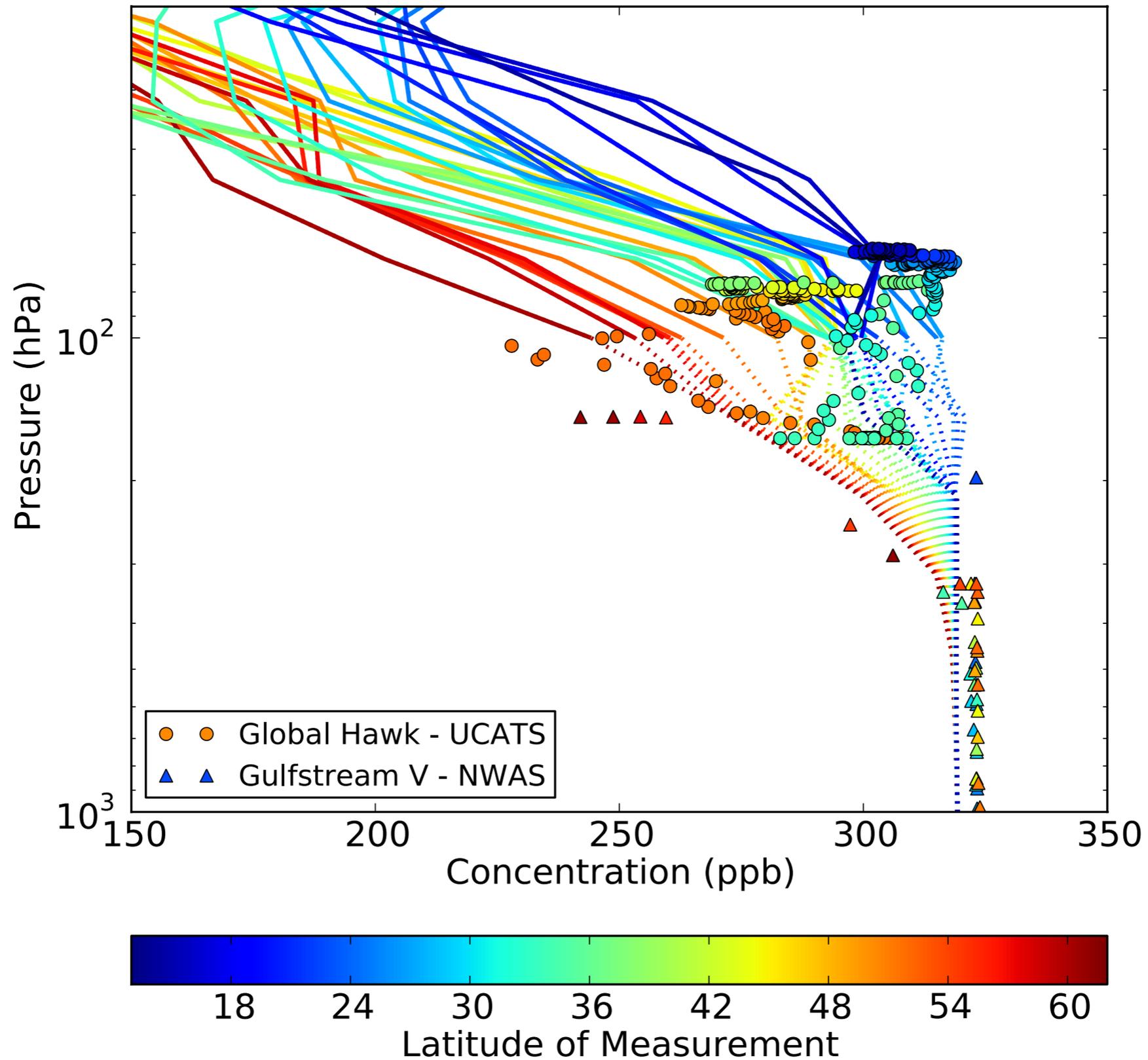
N₂O vs CH₄

Aircraft data from GloPac RF02-20100413 and
HIPPO-3 RF09-20100413 along MLS comparison transect.

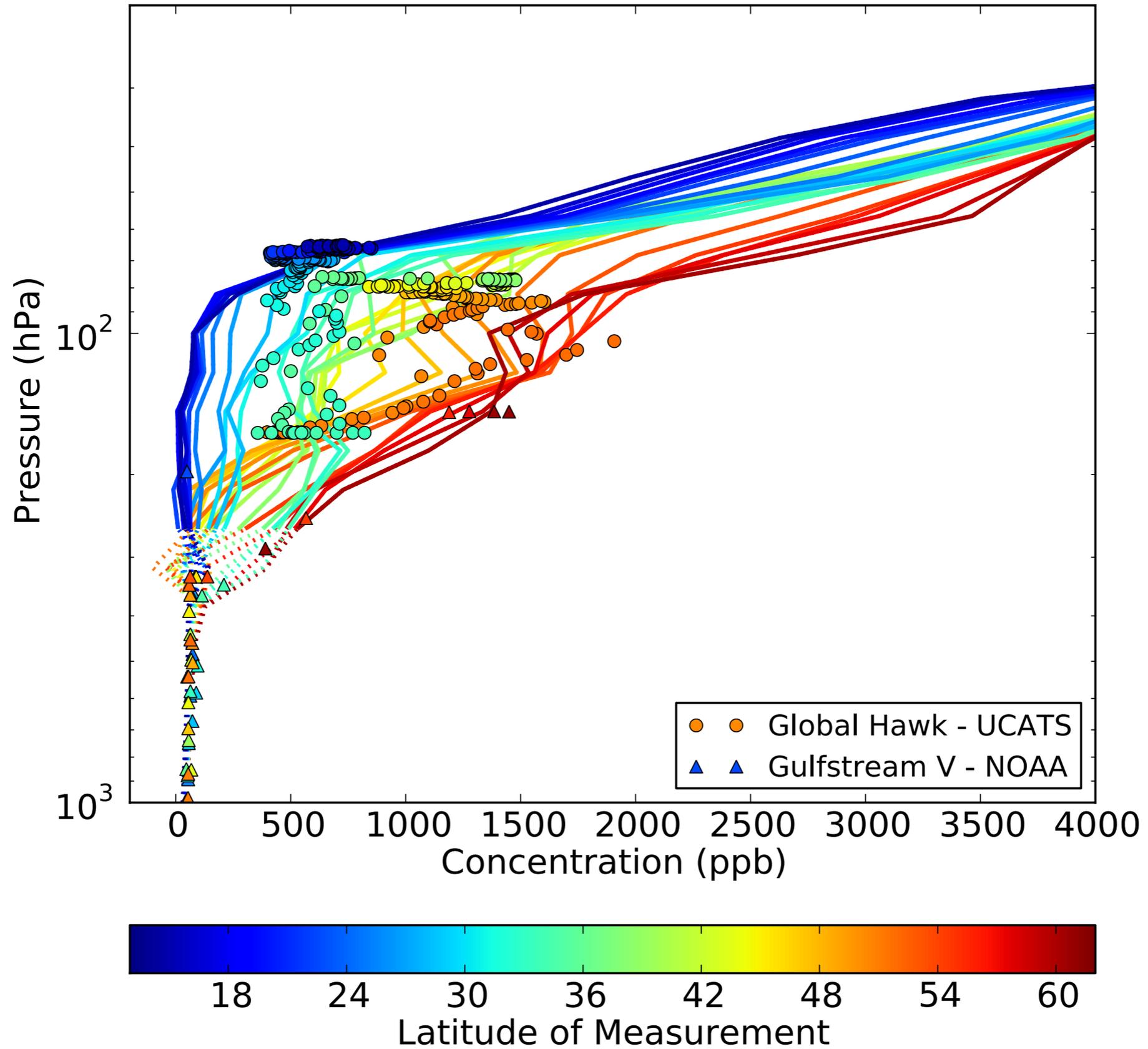


(1 Hz QCLS data presented as 1-minute averages)

Selected Aura-MLS N₂O Profiles from 2010-04-14 (Hour 0)
with N₂O measured from nearby NASA Global Hawk during
GloPac RF02 and NSF/NCAR Gulfstream V during HIPPO-3 RF09

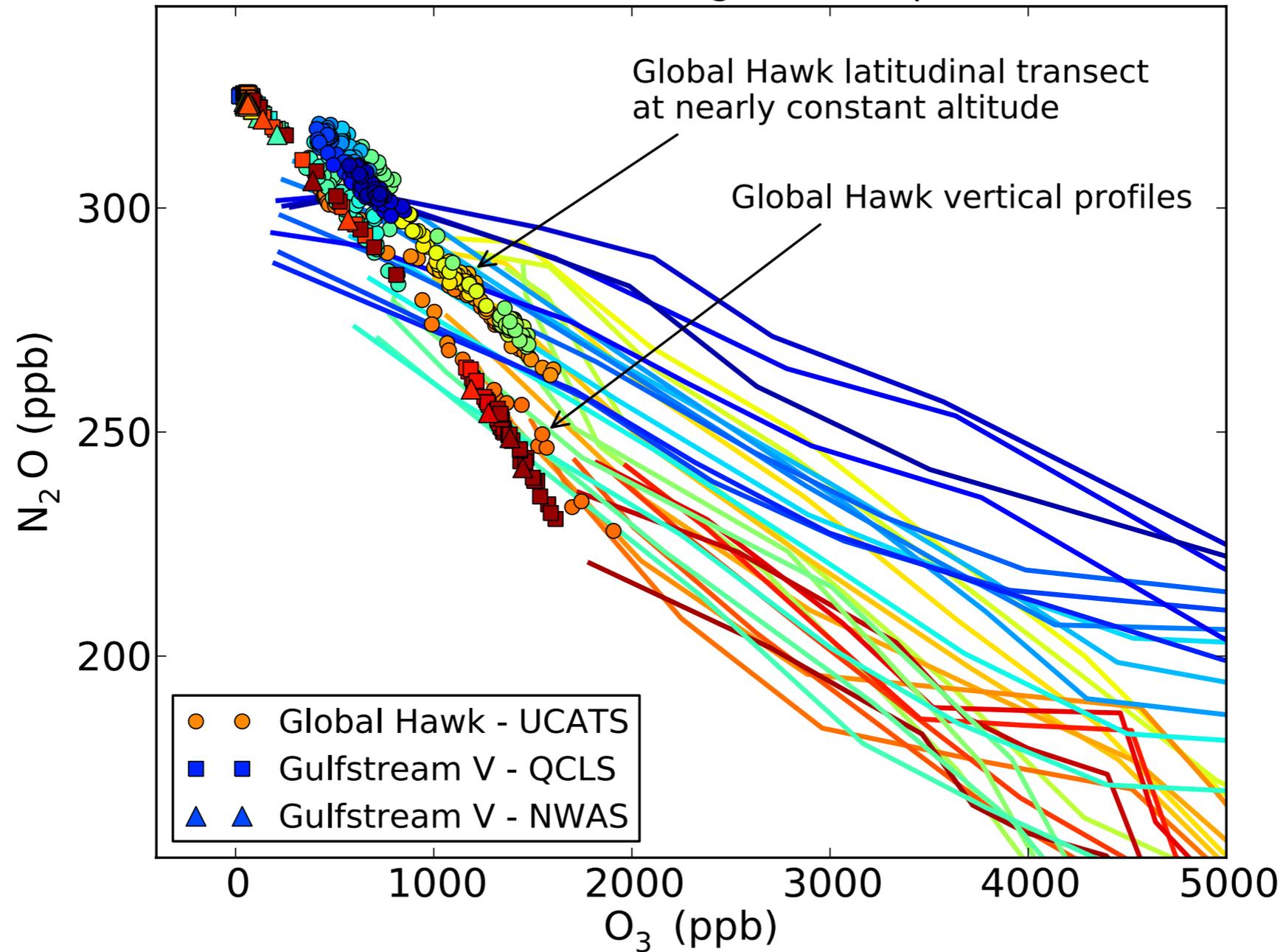


Selected Aura-MLS O₃ Profiles from 2010-04-14 (Hour 0)
with O₃ measured from nearby NASA Global Hawk during
GloPac RF02 and NSF/NCAR Gulfstream V during HIPPO-3 RF09



N₂O vs O₃

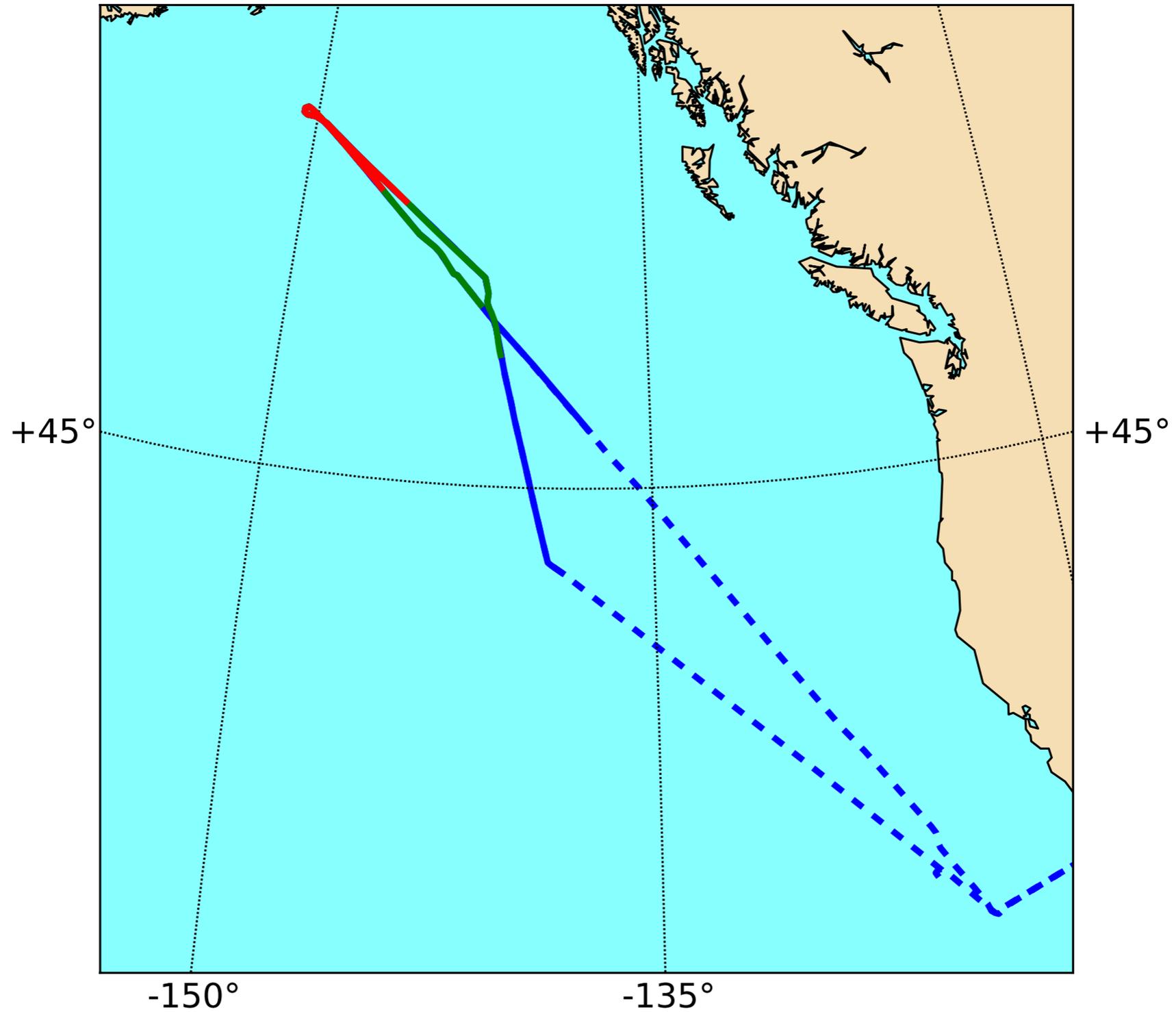
From selected MLS profiles (2010-04-14, hour 0)
and Aircraft data from GloPac RF02-20100413 and
HIPPO-3 RF09-20100413 along MLS comparison transect.



(1 Hz QCLS data presented as 1-minute averages)

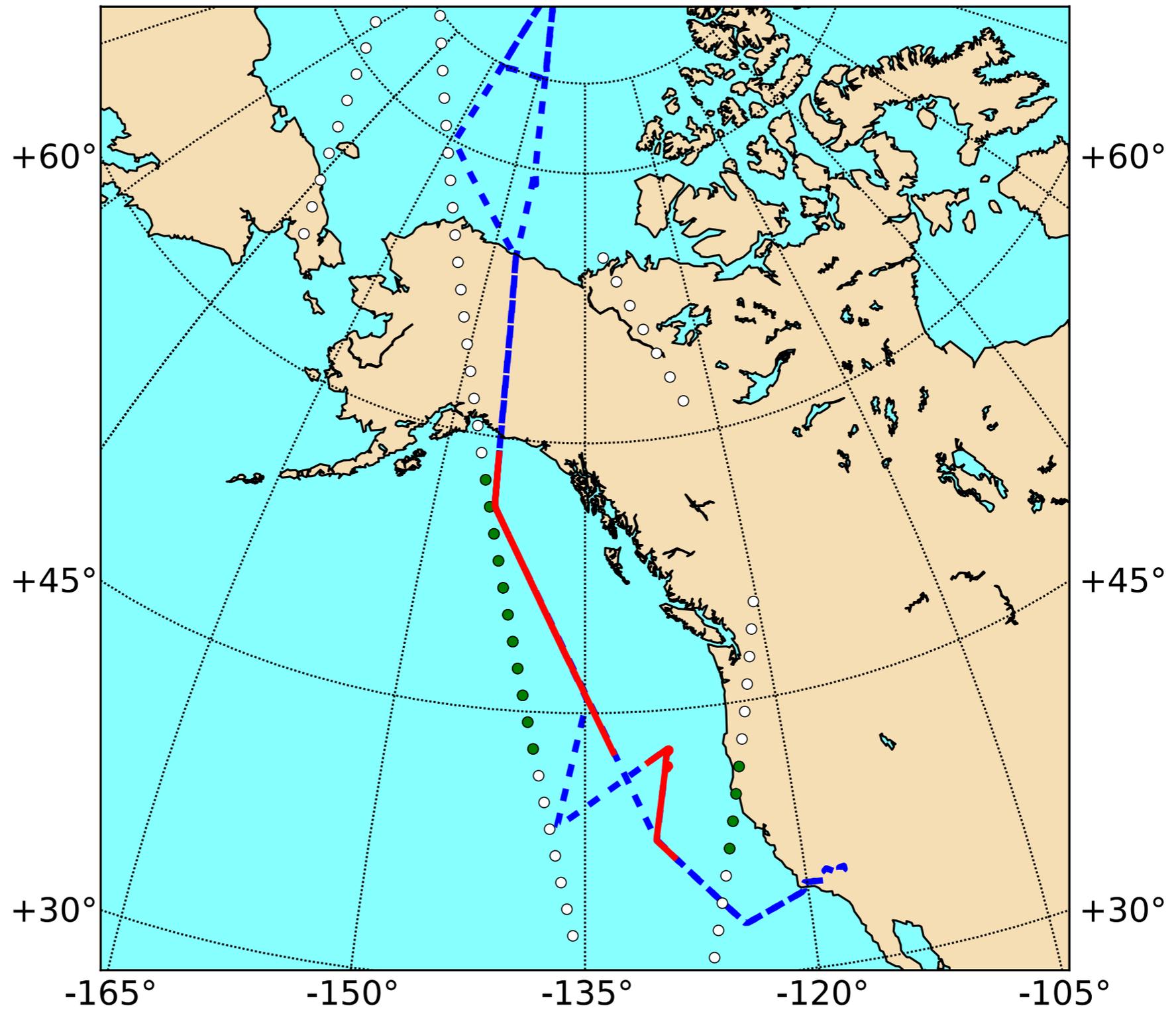


NASA Global Hawk track during GloPac RF01-20100407



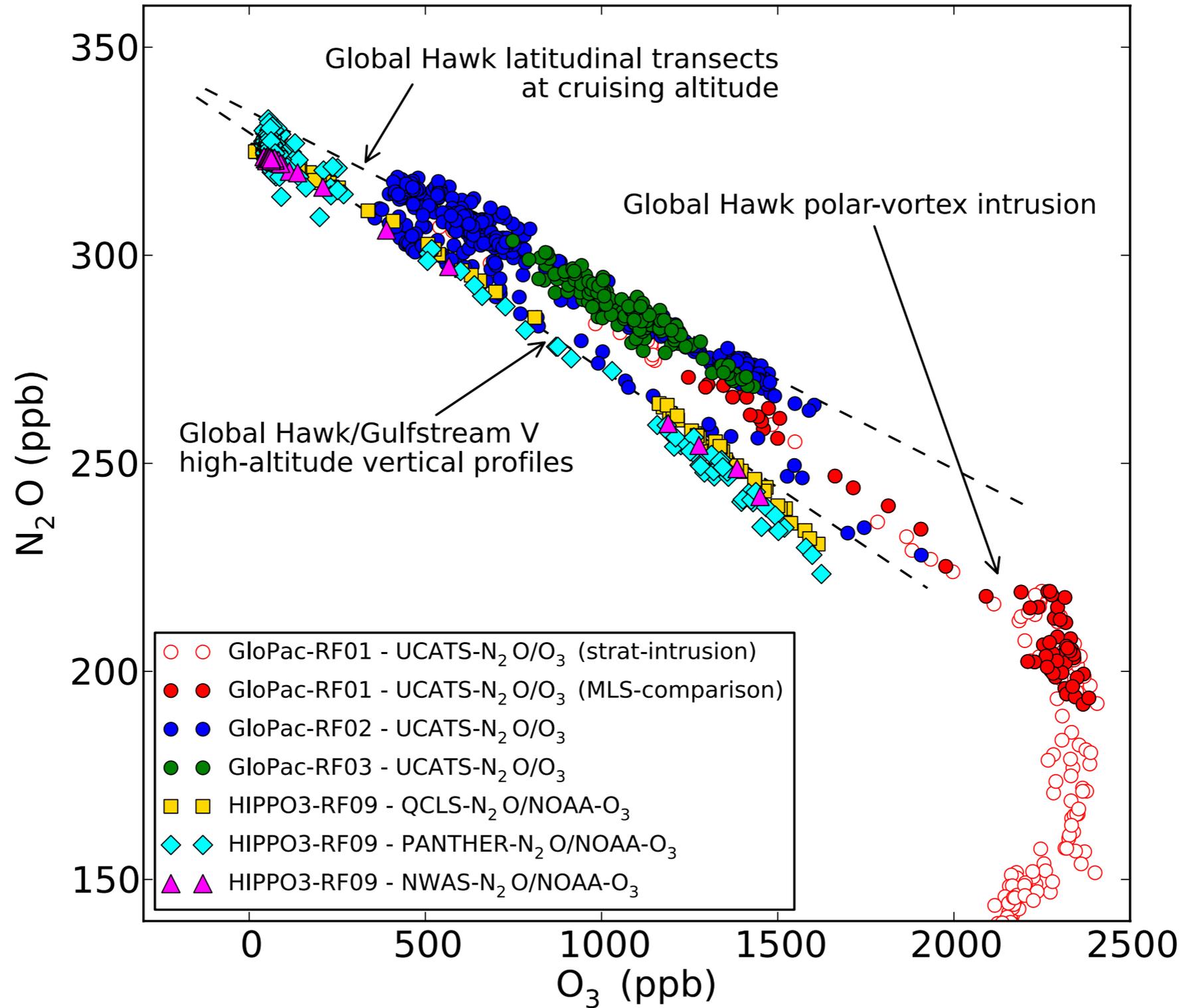
Region of stratospheric penetration highlighted solid.
Ozone-depleted stratospheric region highlighted green, red.

Aura-MLS Profile Locations from 2010-04-23,24 (circles)
with NASA Global Hawk track during GloPac RF03 (blue)



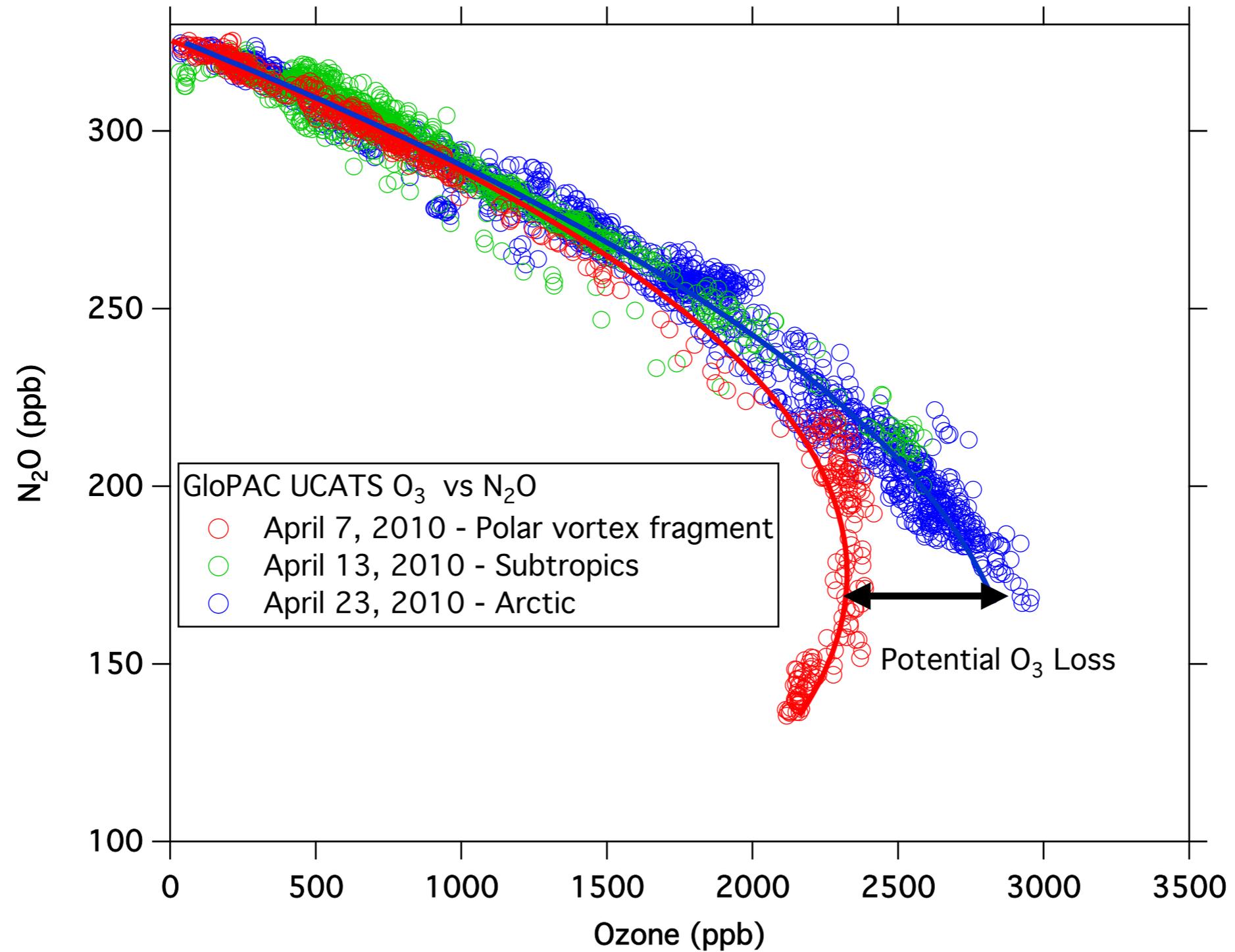
Aura pre-selection criteria: within 600 nmi, 6 hours of Aircraft
Comparison transect highlighted green (MLS), solid red (aircraft)

Aircraft data from GloPac RF01-20100407,
 GloPac RF02 and HIPPO-3 RF09 (both on 20100413), and
 GloPac RF03-20100423 along multiple MLS comparison transects.



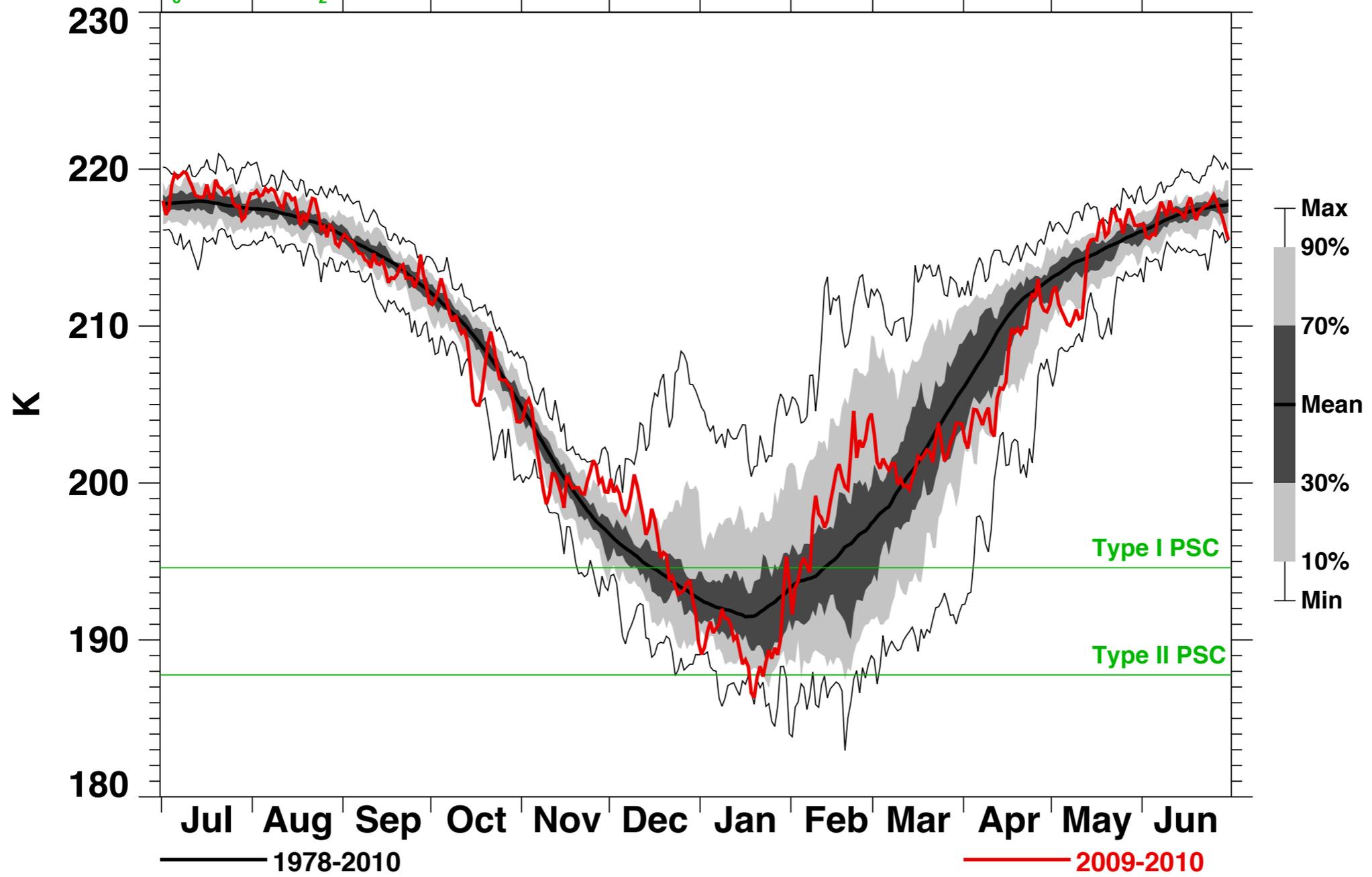
1 Hz QCLS- N_2O , 2 Hz NOAA- O_3 reduced to 1-minute averages

Ozone loss of between 0.5 and 0.7 ppm

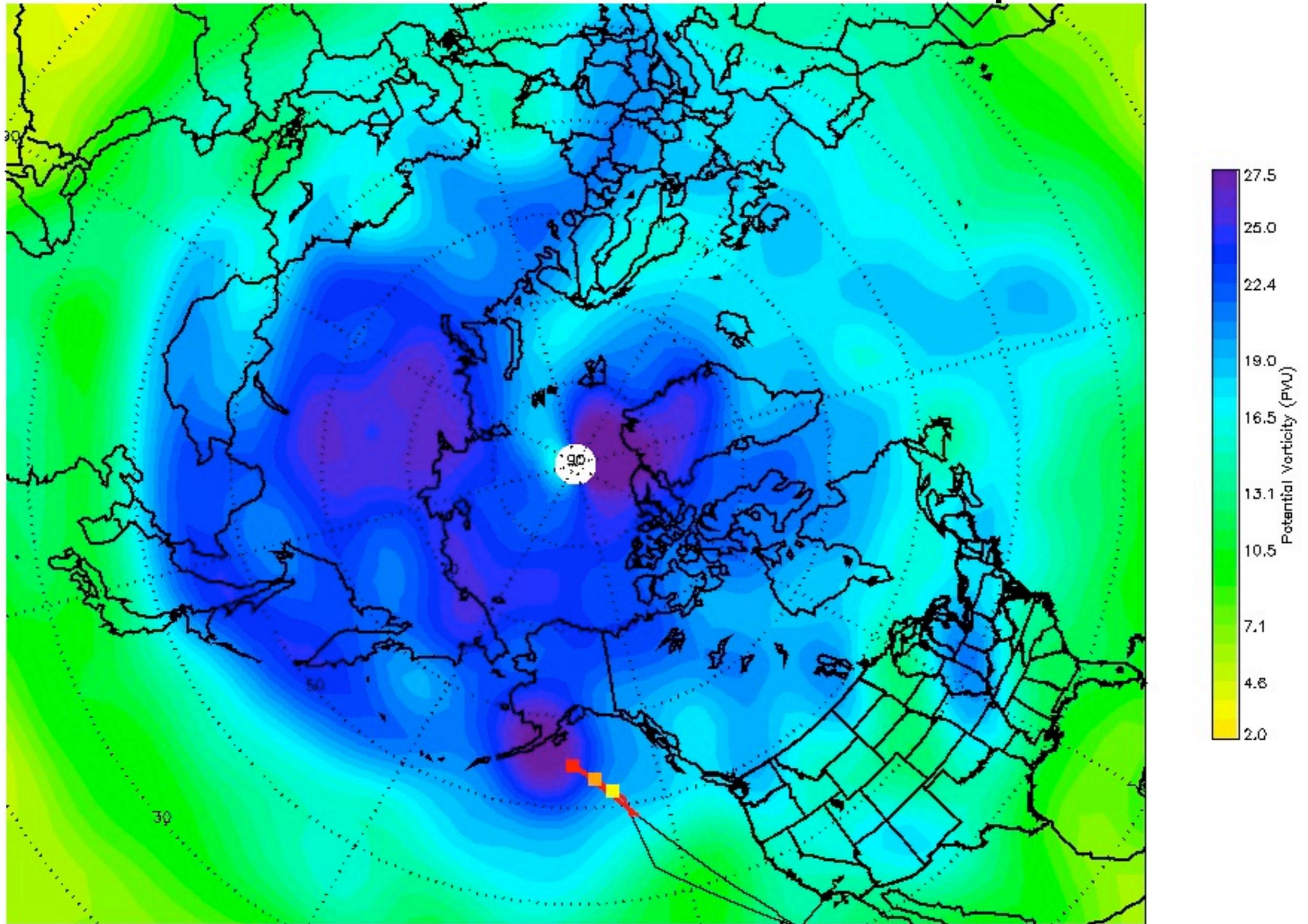


50-90°N Minimum Temperature 50 hPa MERRA

$\text{HNO}_3 = 6 \text{ ppbv}$, $\text{H}_2\text{O} = 4.5 \text{ ppmv}$

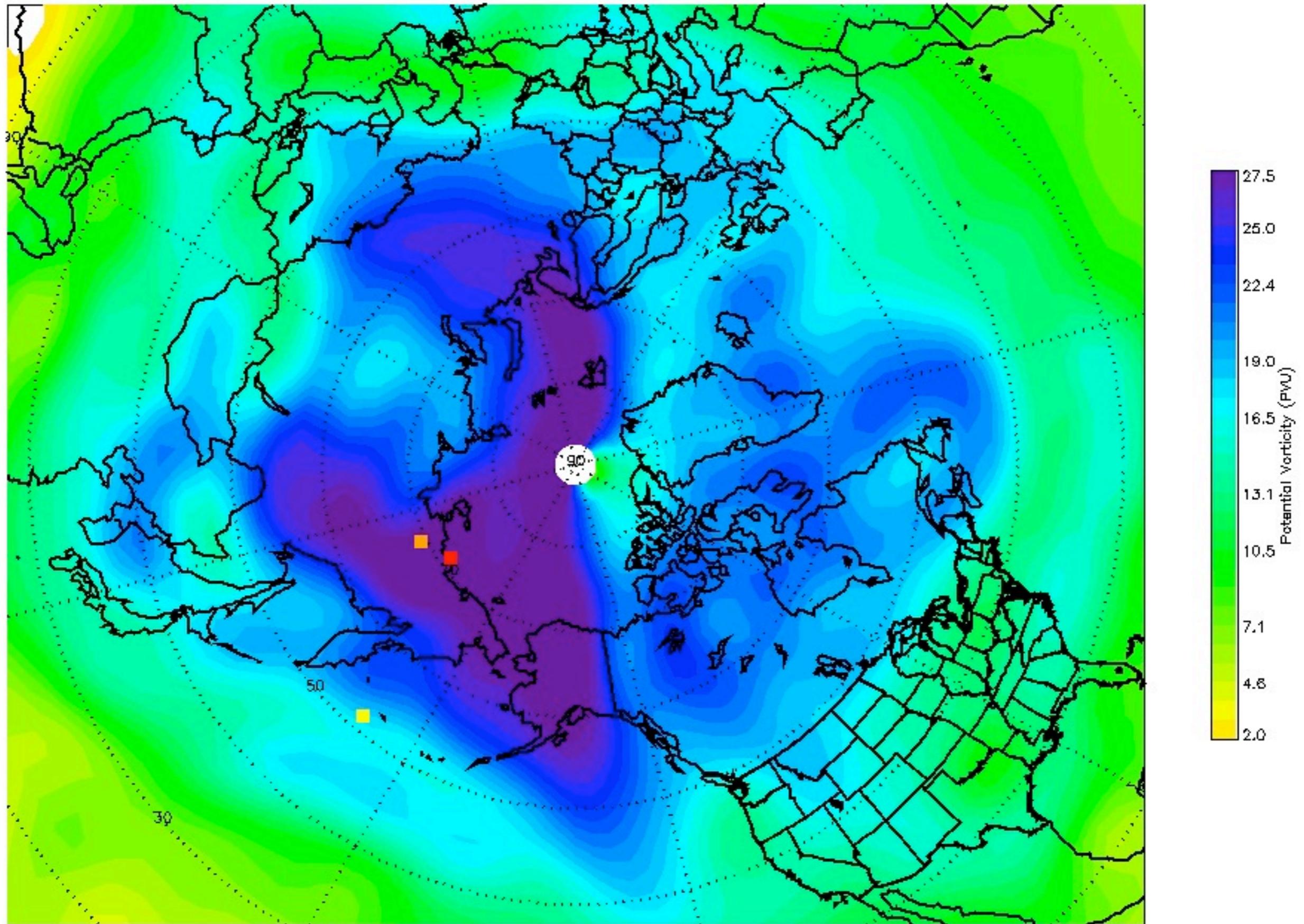


P. Newman (NASA), E. Nash (SSAI), S. Pawson (NASA)

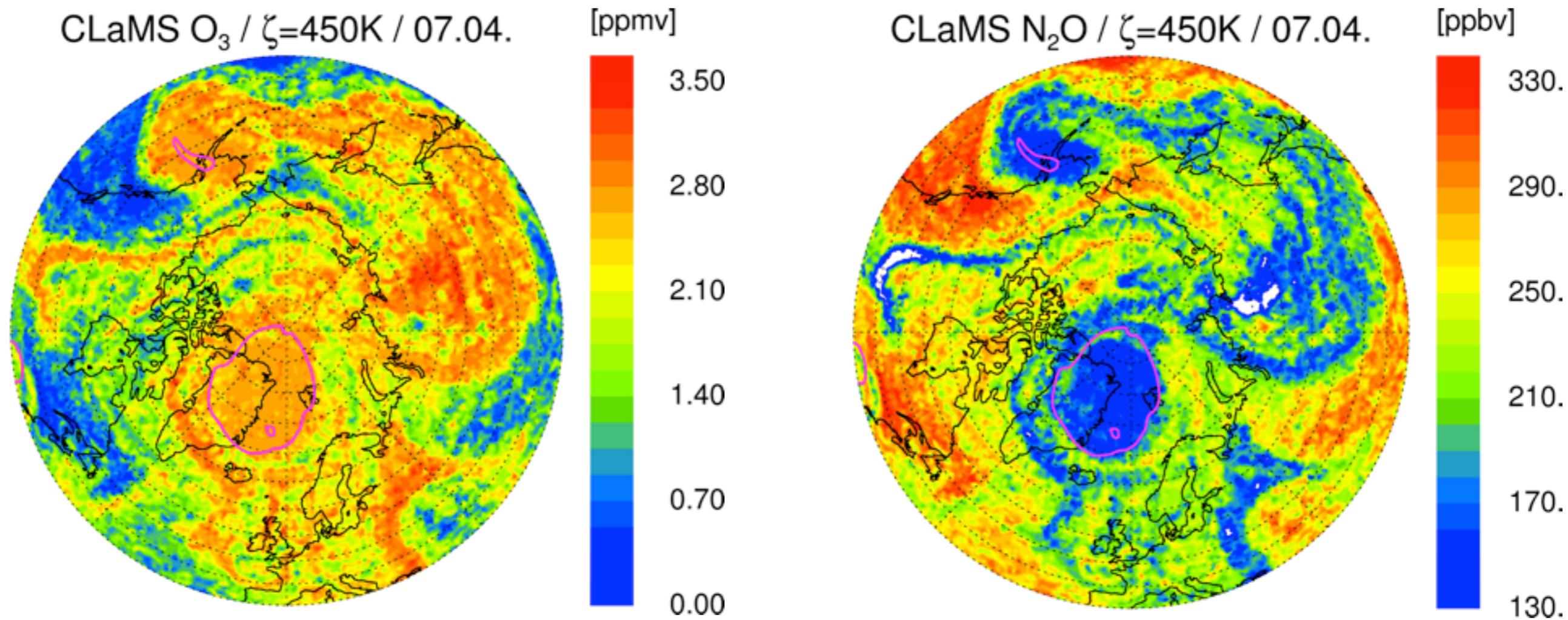


12 March 2010

NCEP reanalysis Daily Mean Potential Vorticity
Press = 70. hPa 20100312



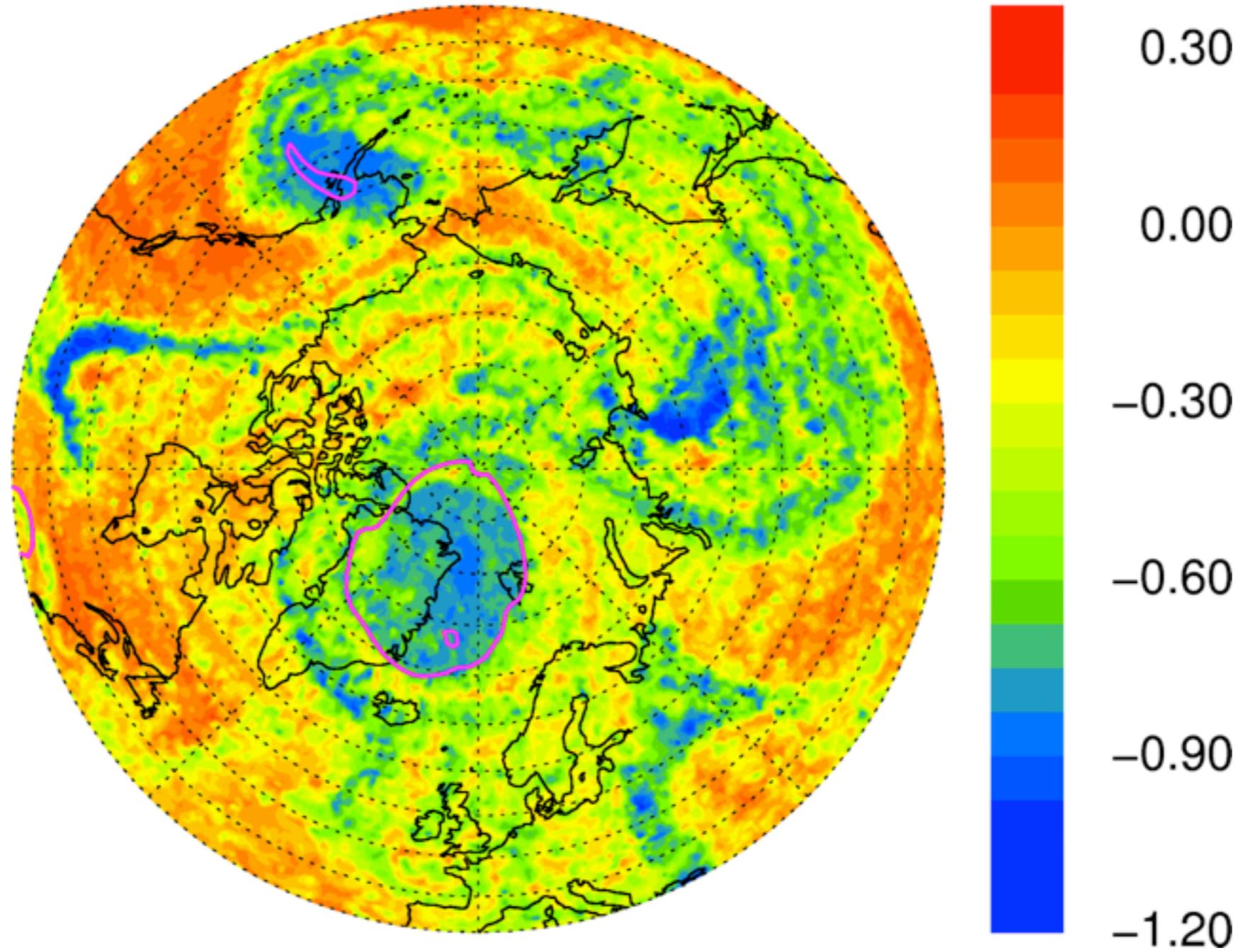
CLaMS Model Simulation for 7 April 2010 (450K ~ 17 km)



CLaMS Accumulated Ozone Loss since 1 Dec 2009

ΔO_3 (accum.) / $\zeta=450K$ / 07.04.

[ppmv]



Conclusions

- Overflight of the Global Hawk over the GV during HIPPO/3 produced similar tracer-tracer relationships with structure.
- There was a good agreement of common tracers from different instruments on two aircraft and one satellite instrument.
- Breakup of the polar vortex with low ozone during HIPPO/3 and GloPac was observed in filaments.
- Agreement of ozone loss between ozone loss and model simulation.