

Characterization of transport and dynamical
boundaries during CONTRAST
using chemical tracers

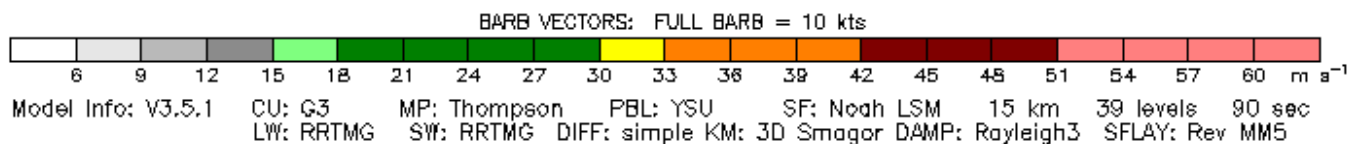
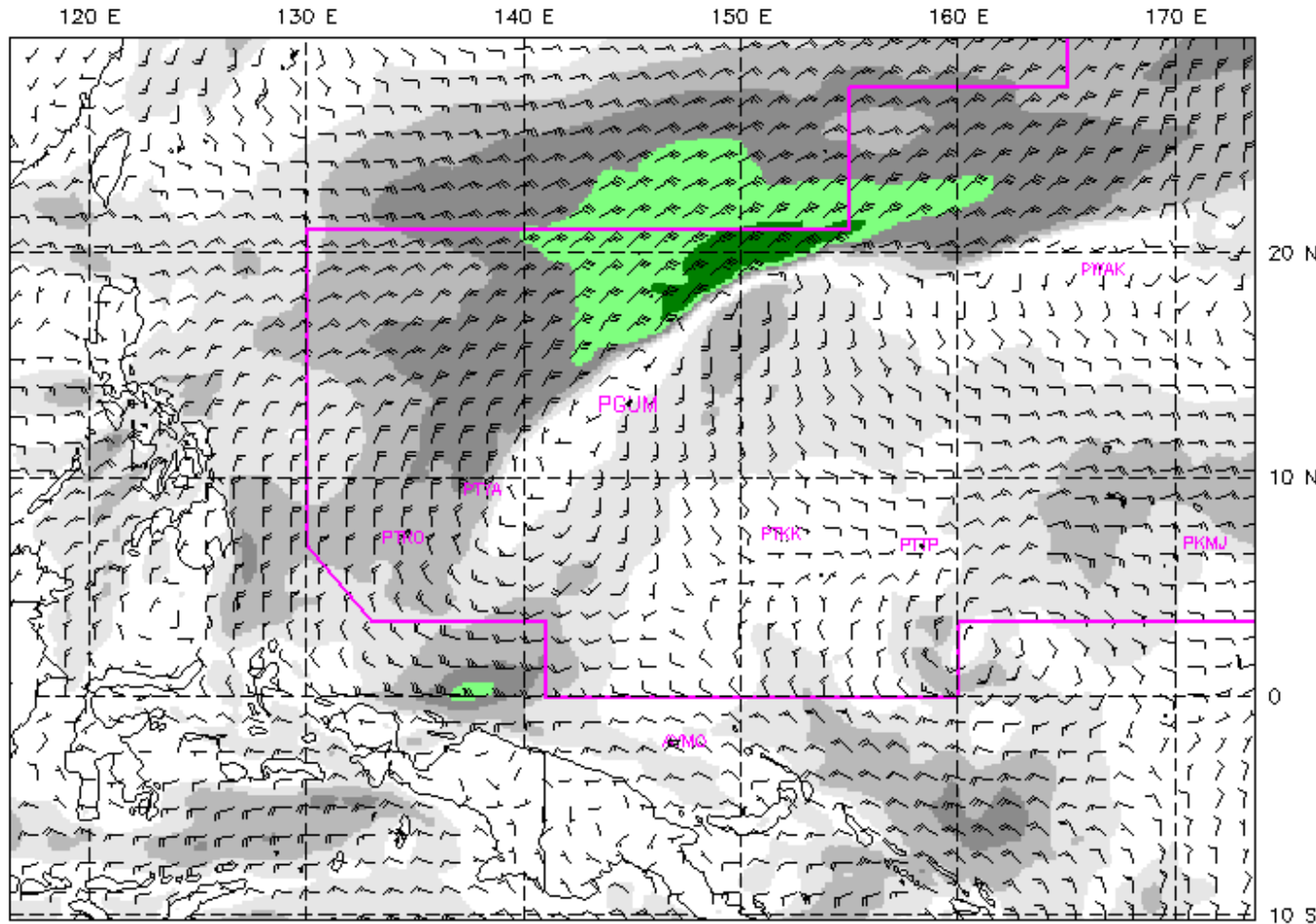
Sue Schauffler, Elliot Atlas

Eric Apel, Rebecca Hornbrook

RF06, Jan 25: Shear line just west of Guam

RF10, Feb. 8: Plume of CO northeast of Guam

The WRF low-level wind analysis from 00z on 25 January shows the air mass boundary as a wind shift line extending from Yap (PTYA) to northwest of Guam (PGUM) to 20N, 154E. The thermal contrast on either side of the front is small south of 18N, so the boundary is called a shear line rather than a cold front.

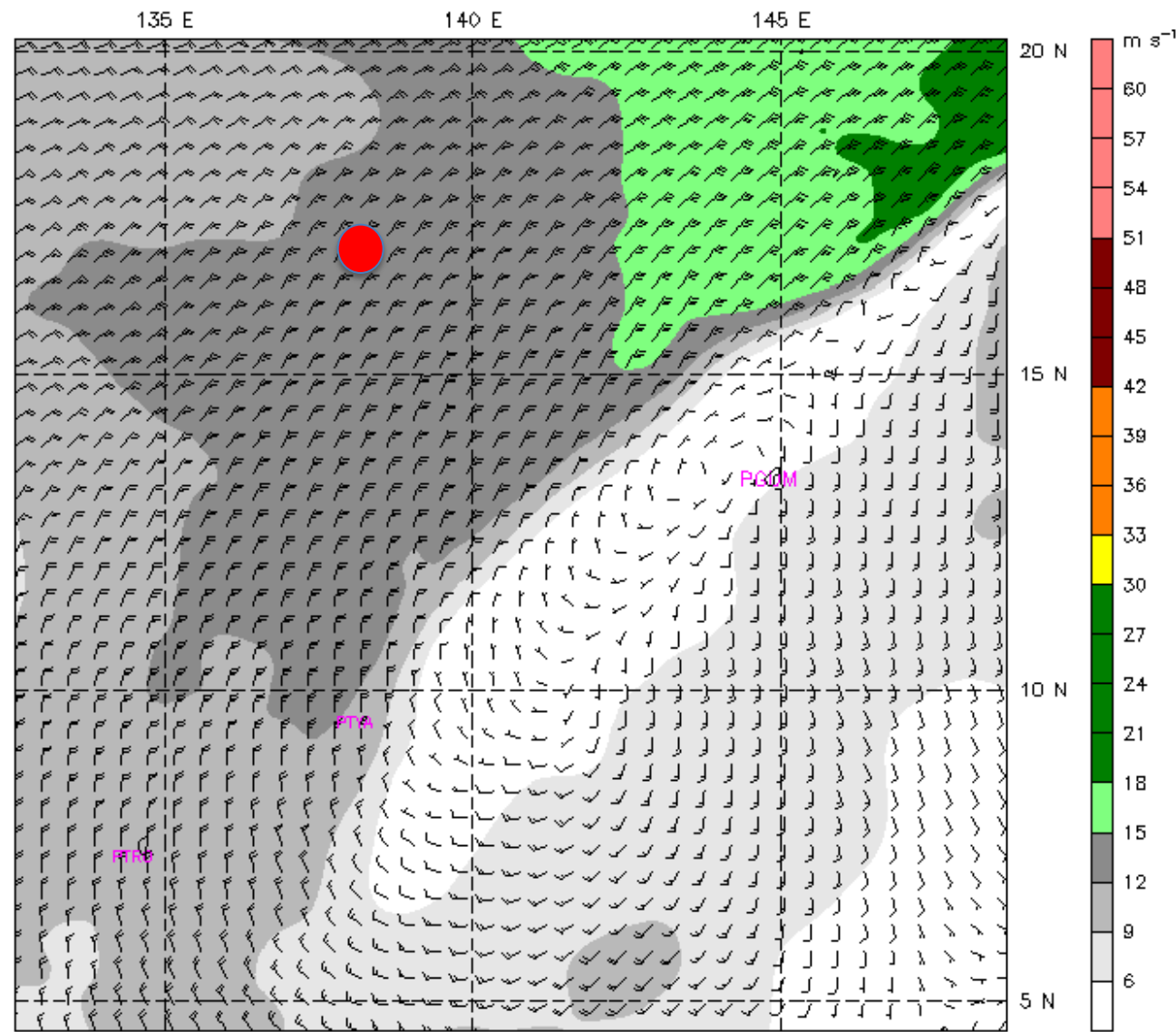


CONTRAST 3km ARW
Fest: 0 h
Horizontal wind speed
Horizontal wind vectors

NCAR/MMM

Init: 00 UTC Sat 25 Jan 14
Valid: 00 UTC Sat 25 Jan 14 (10 ChT Sat 25 Jan 14)
at k-index = 39 sm= 1
at k-index = 39 sm= 1

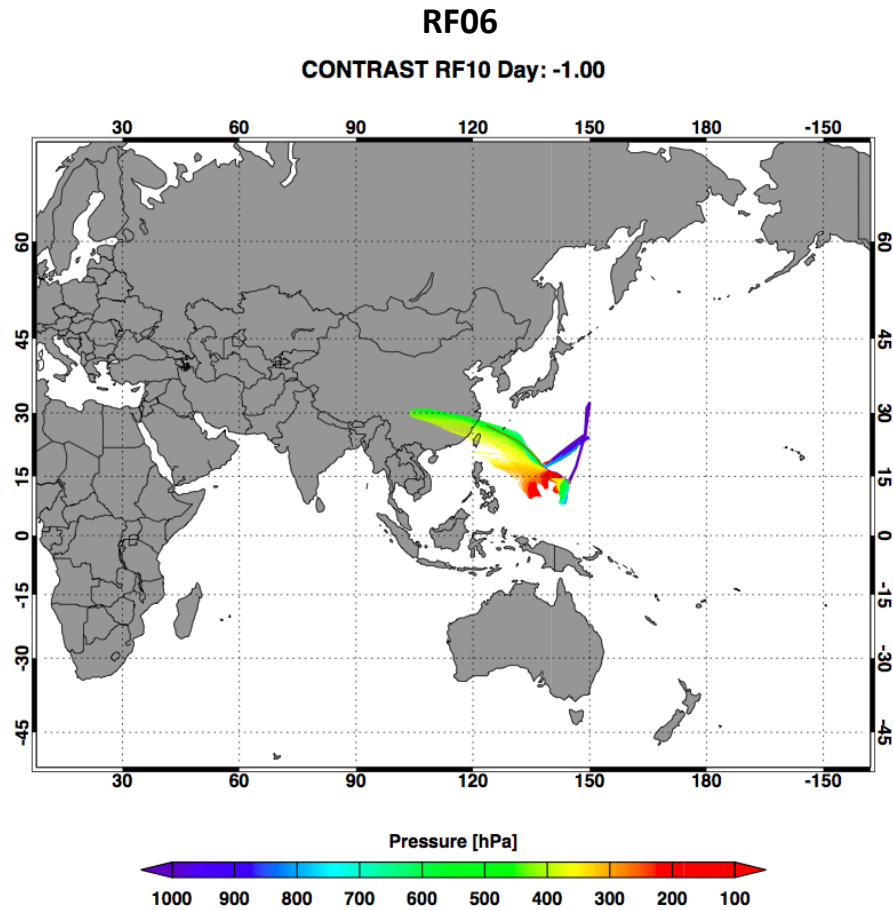
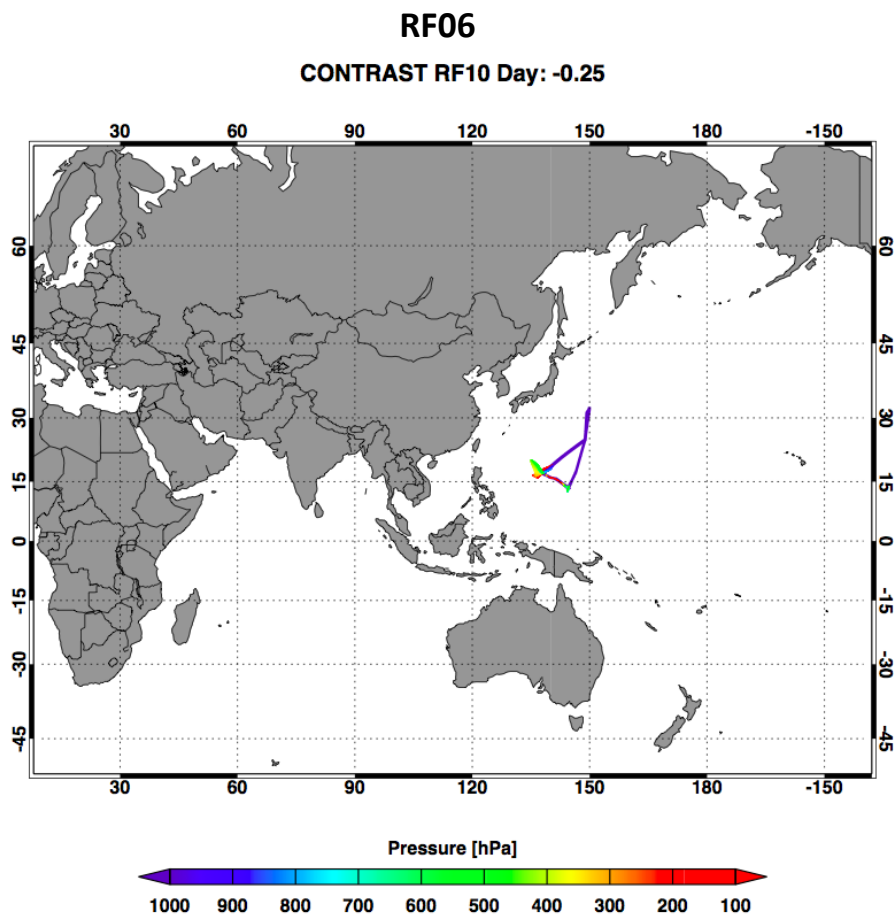
The 3km WRF analysis shows that the location of the GV's spiral descent (17N,138E) was well into the post-frontal air mass.



Model Info: V3.5.1 CU: No Cu LW: RRTMG MP: Thompson SW: RRTMG PBL: YSU DIFF: simple SF: Noah LSM KM: 3D Smagor DAMP: Rayleigh3 SFLAY: Rev MMS BARB VECTORS: FULL BARB = 10 kts

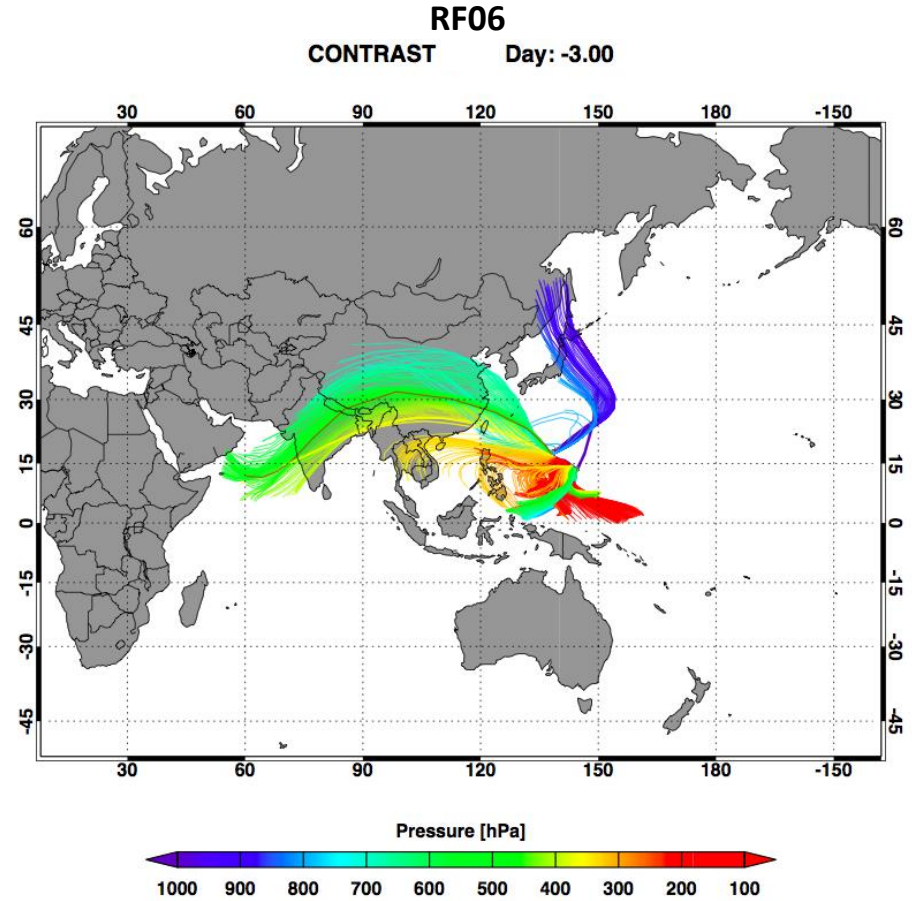
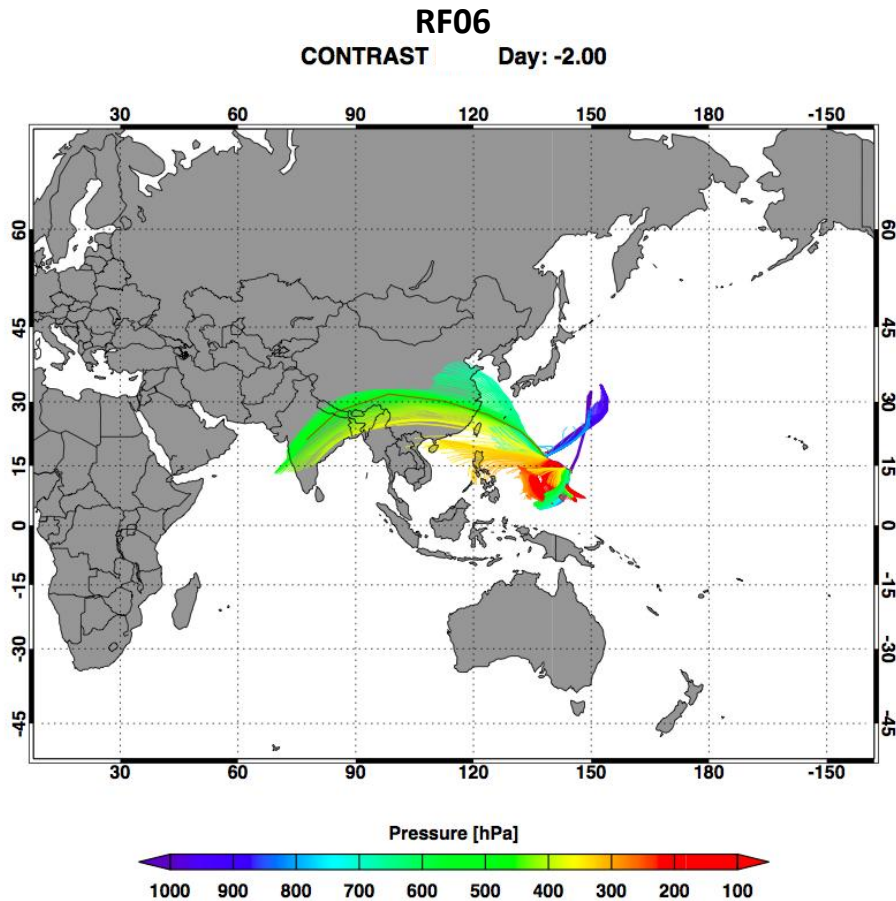
RF06 Trajectory analysis for the last part of the flight on both sides of the shear line.

Trajectories are color coded by pressure along the flight track.
Initial (left) & - Day 1 (right)



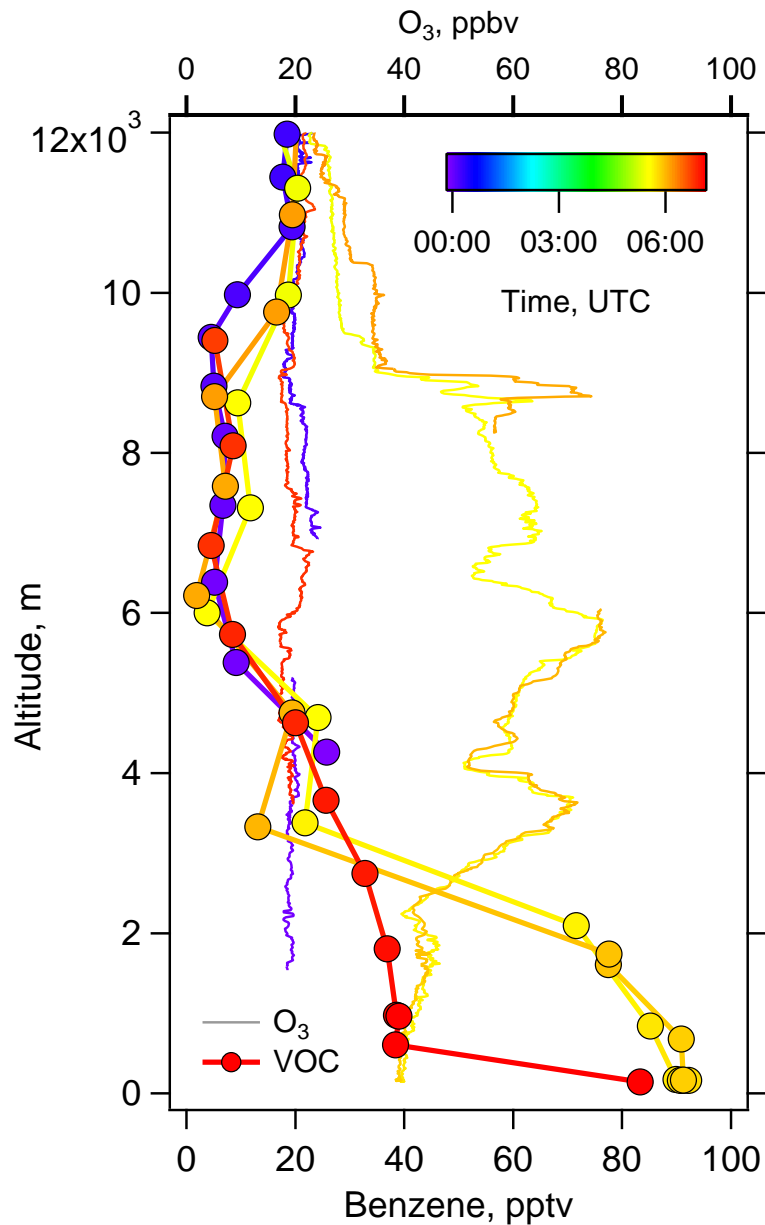
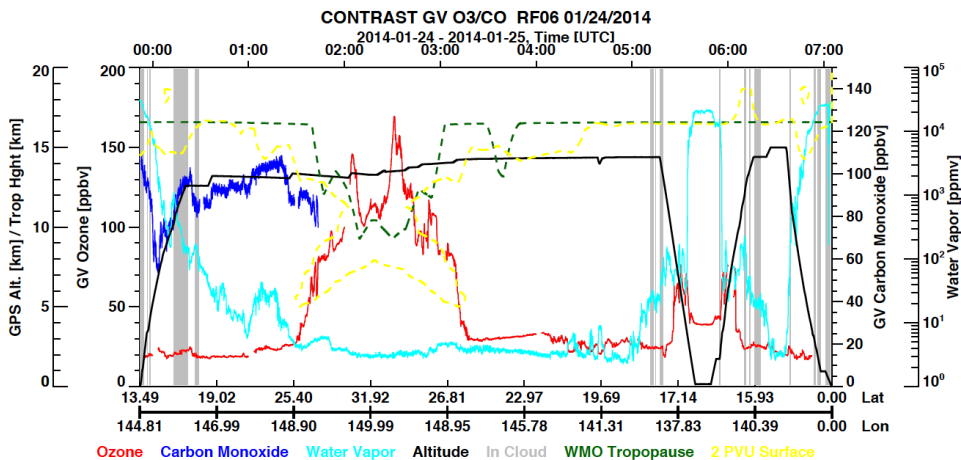
RF06 Trajectory analysis for the last part of the flight on both sides of the shear line

Days -2 & -3



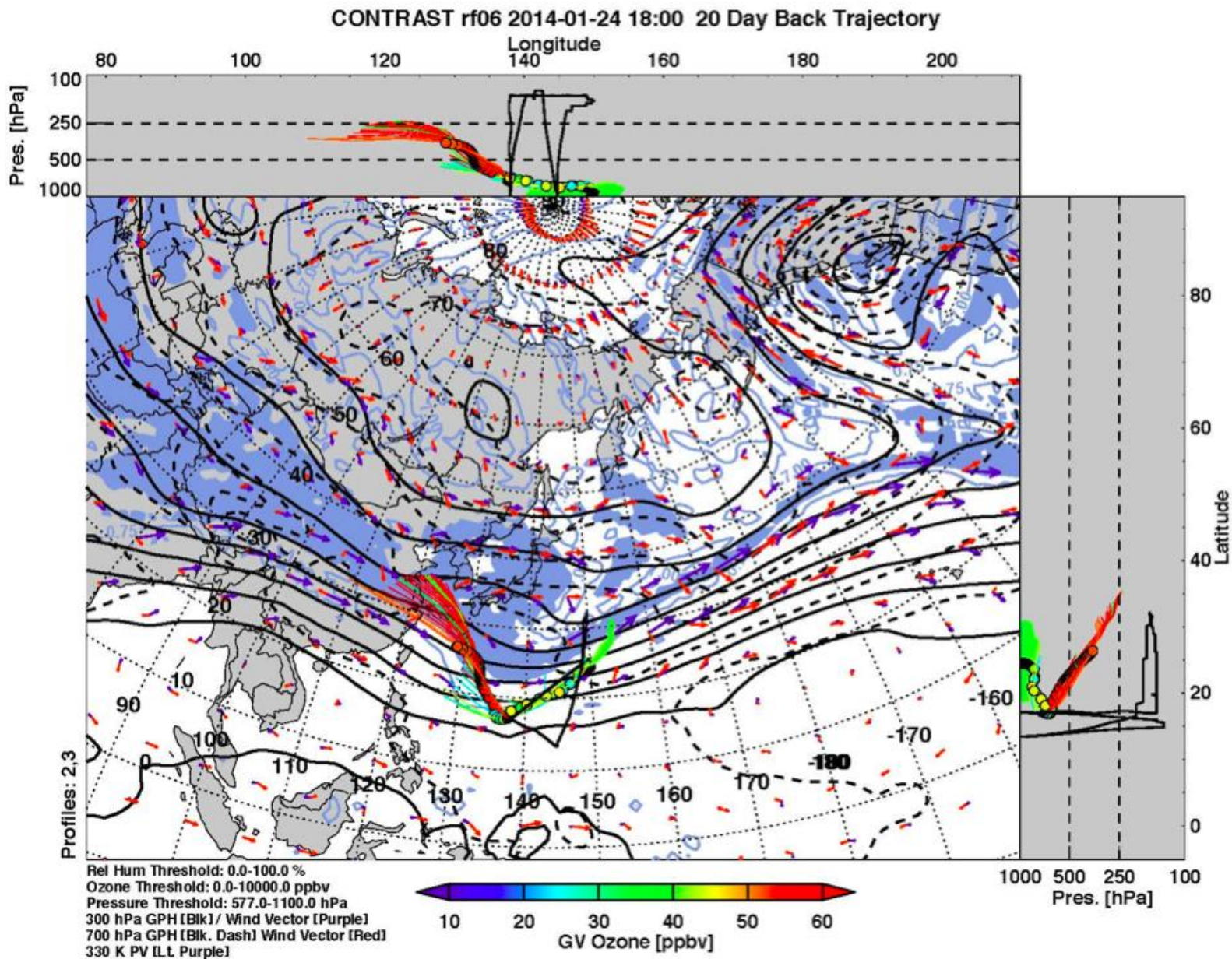
RF06 vertical profile of ozone and benzene west of the shear line

RF06 O3/CO/H2O time series

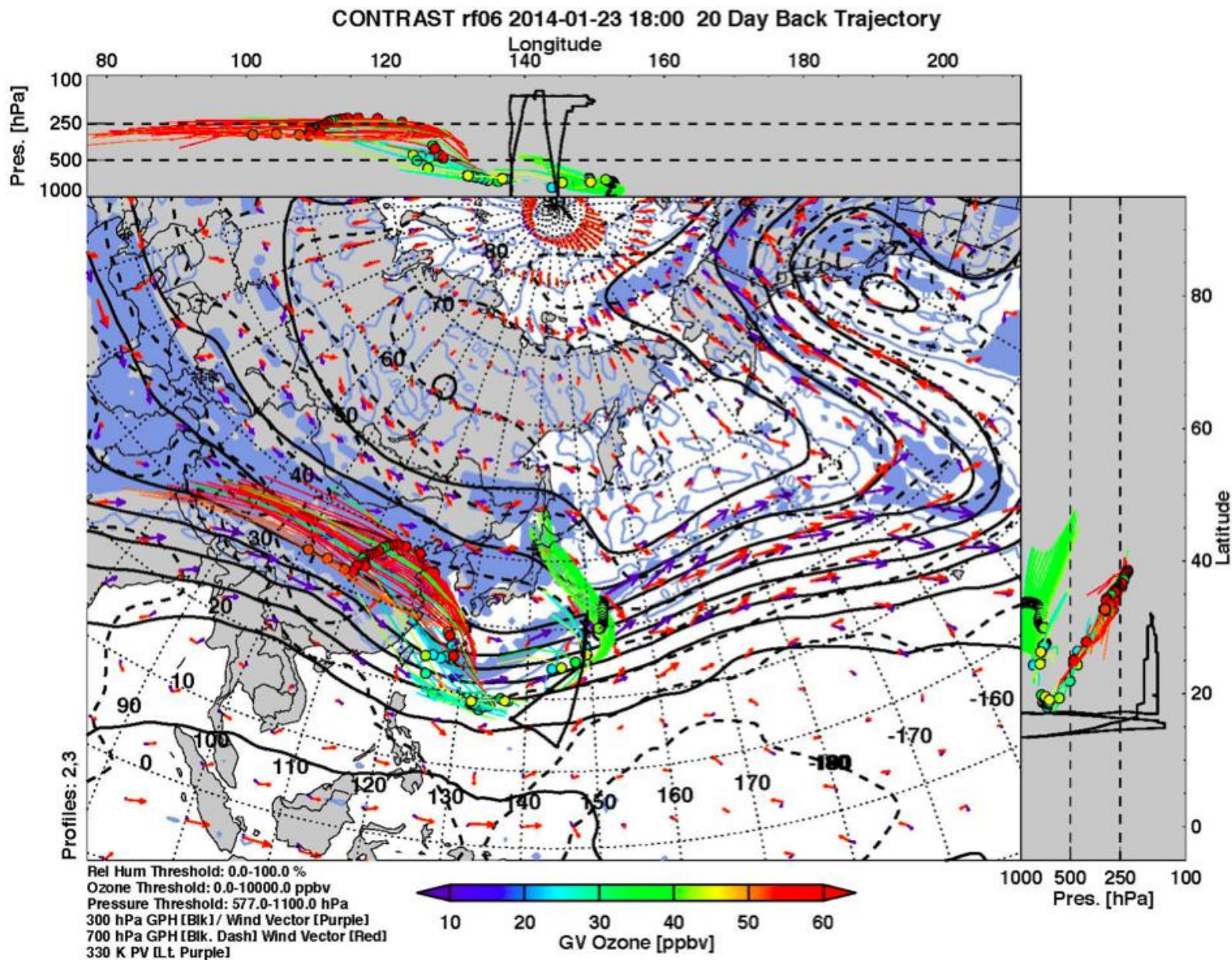


RF06; -day 1 back trajectories from < 4.5km in the dip west of the shear line.

Trajectories are color coded by ozone mr.

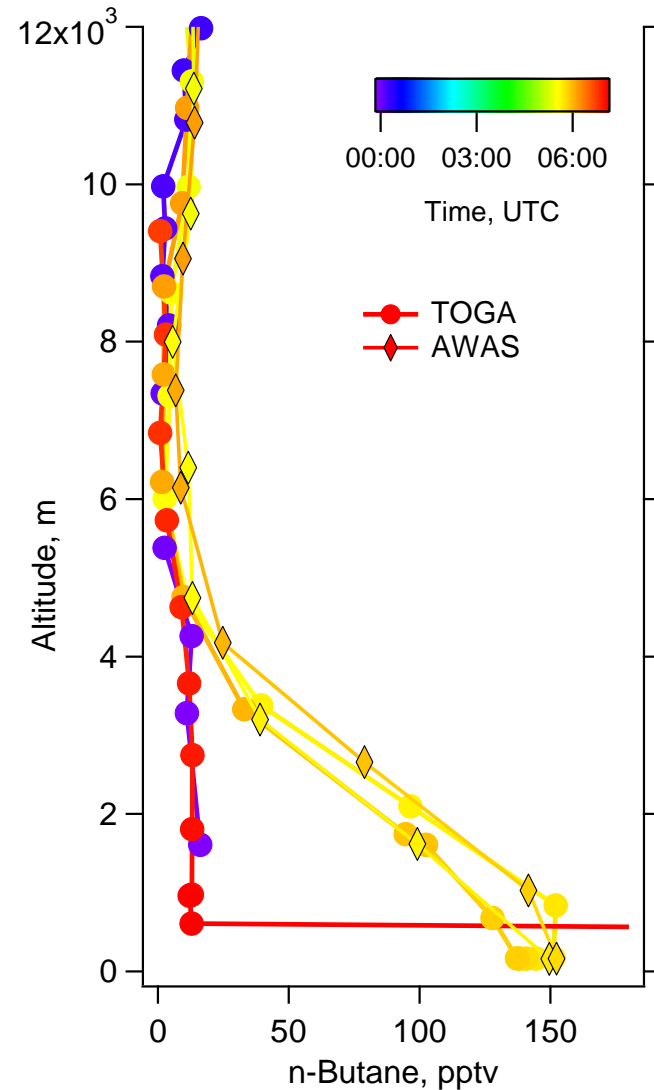
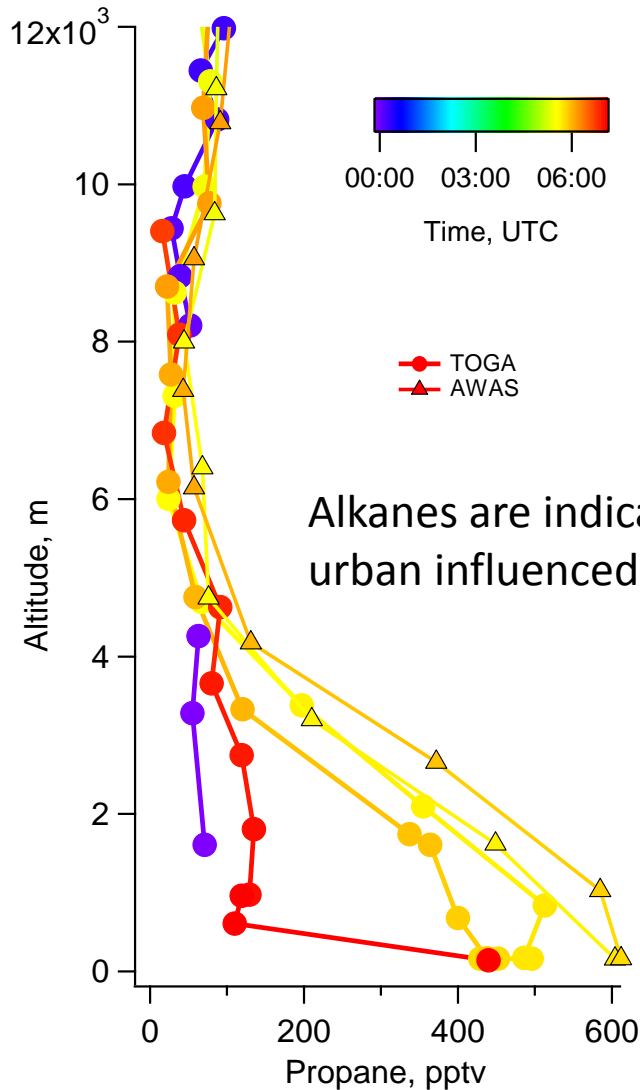


RF06: - day 2 back trajectories from < 4.5km in the dip west of the shear line.
Trajectories are color coded by ozone mr.



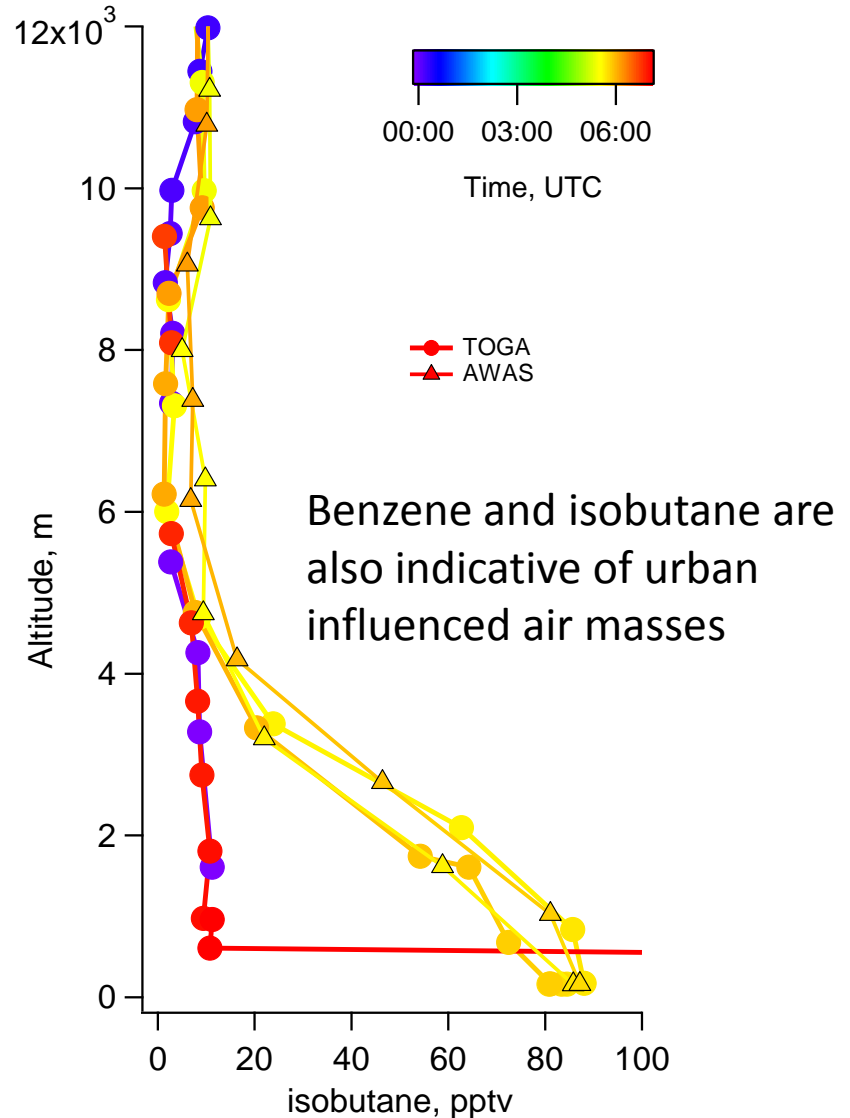
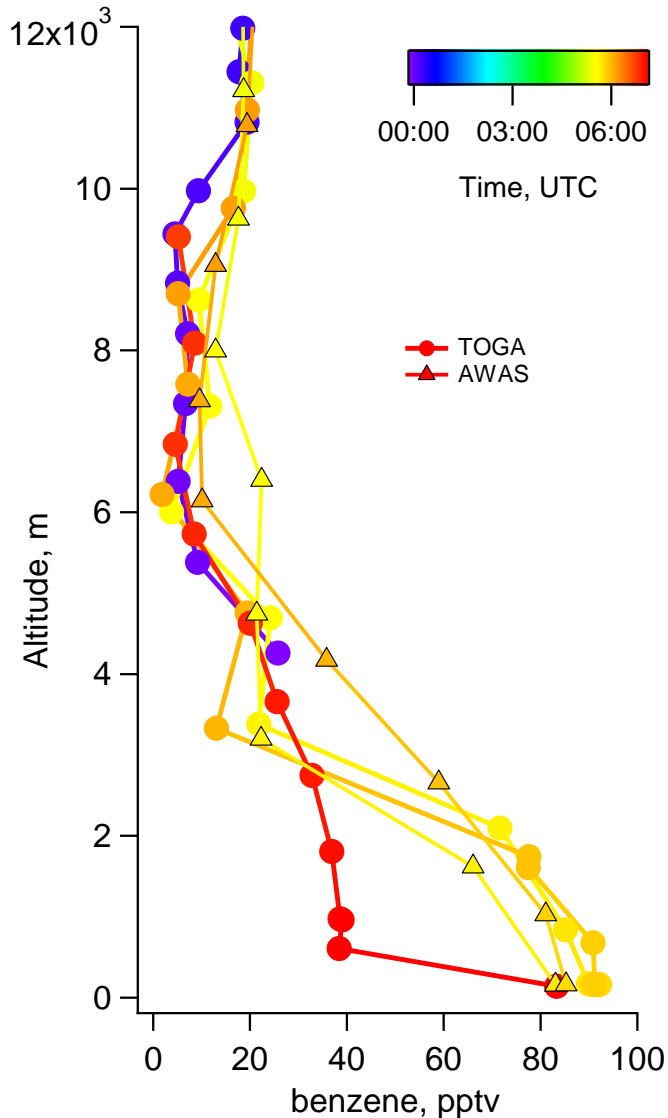
RF06: Four vertical profiles

Guam ascent (purple), Guam descent (red),
West of shear line descent (yellow), west of shear line ascent (orange)



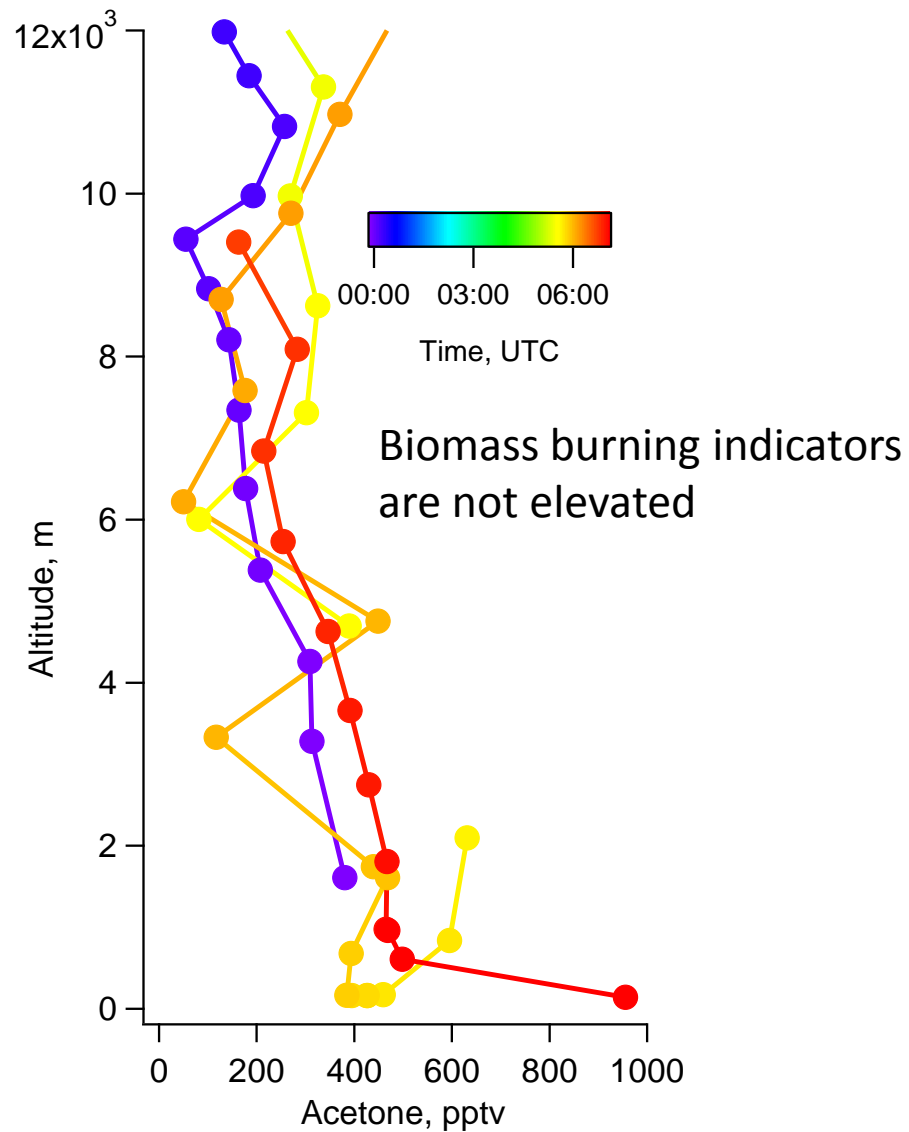
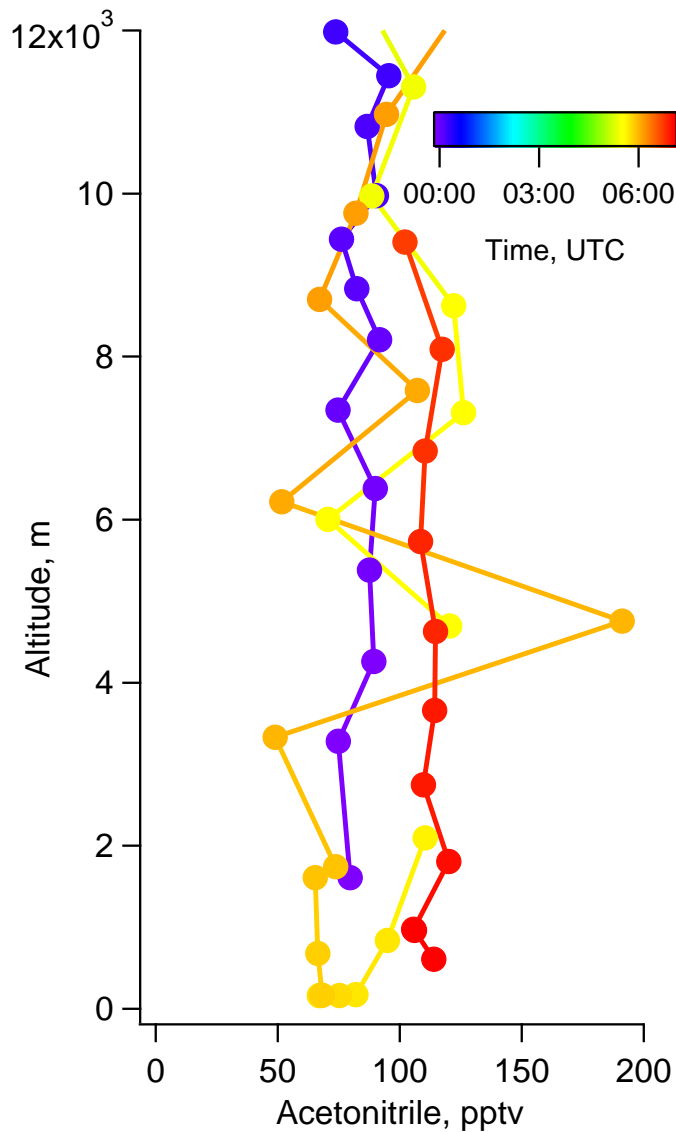
RF06: Four vertical profiles

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West of shear line descent (yellow), west of shear line ascent (orange)



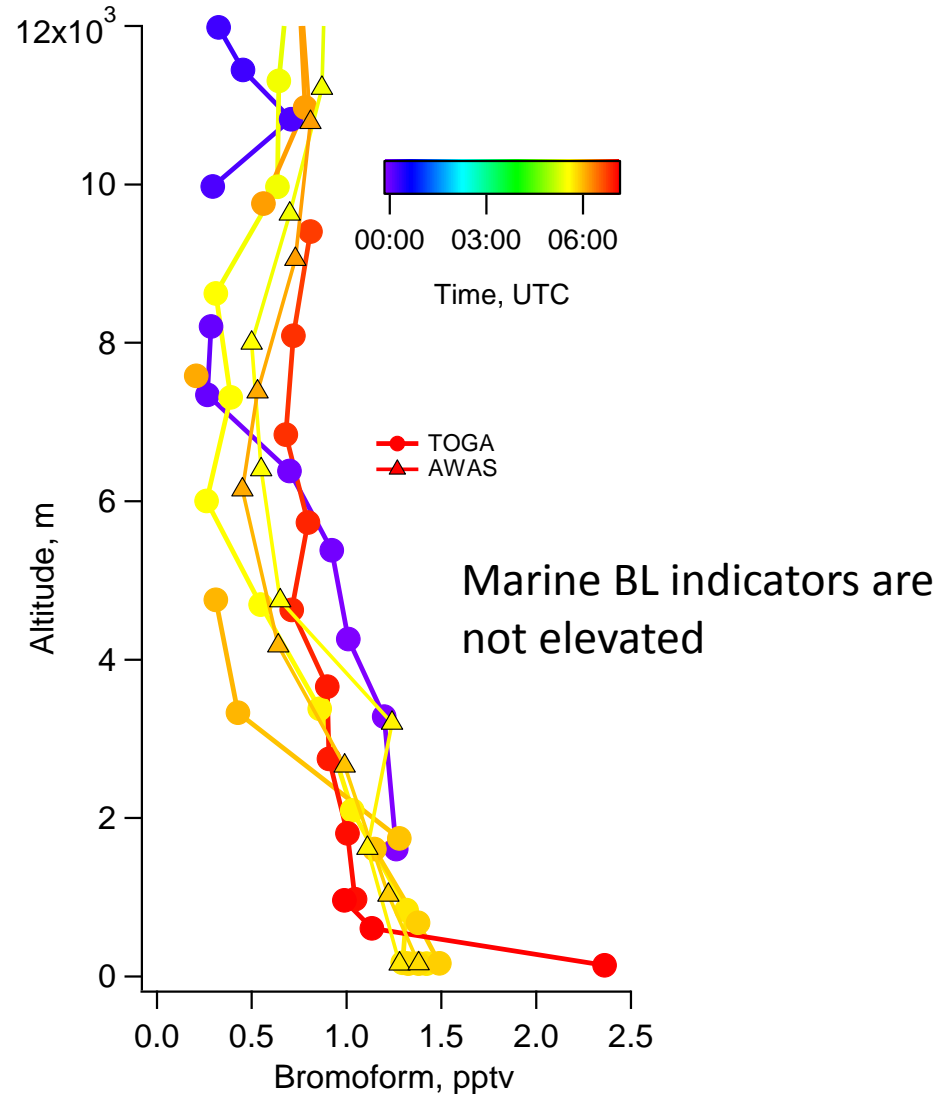
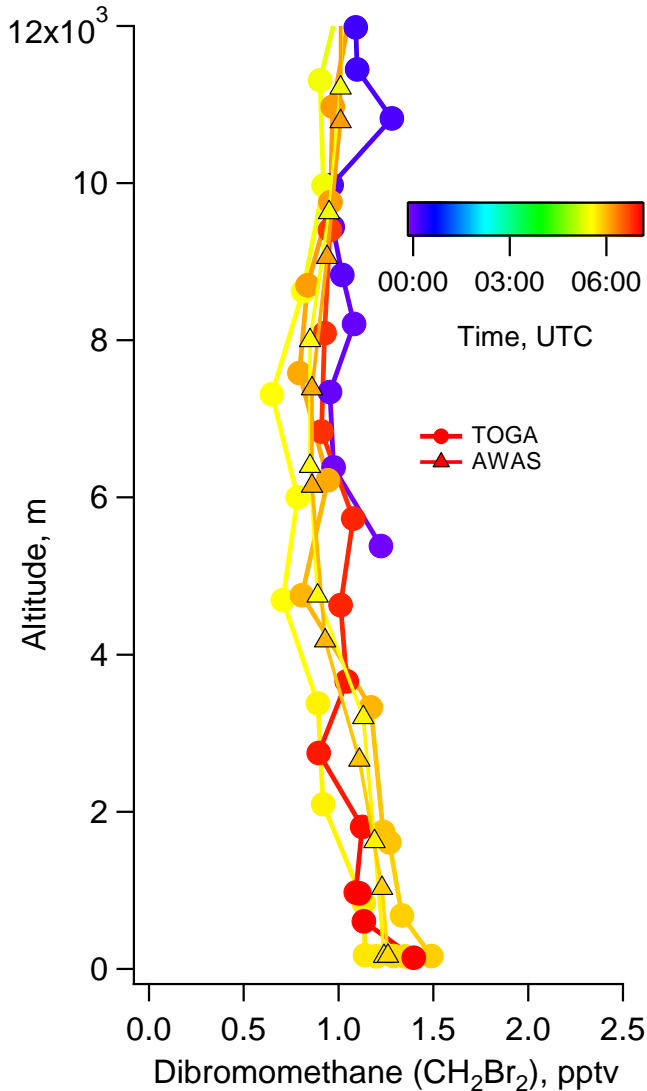
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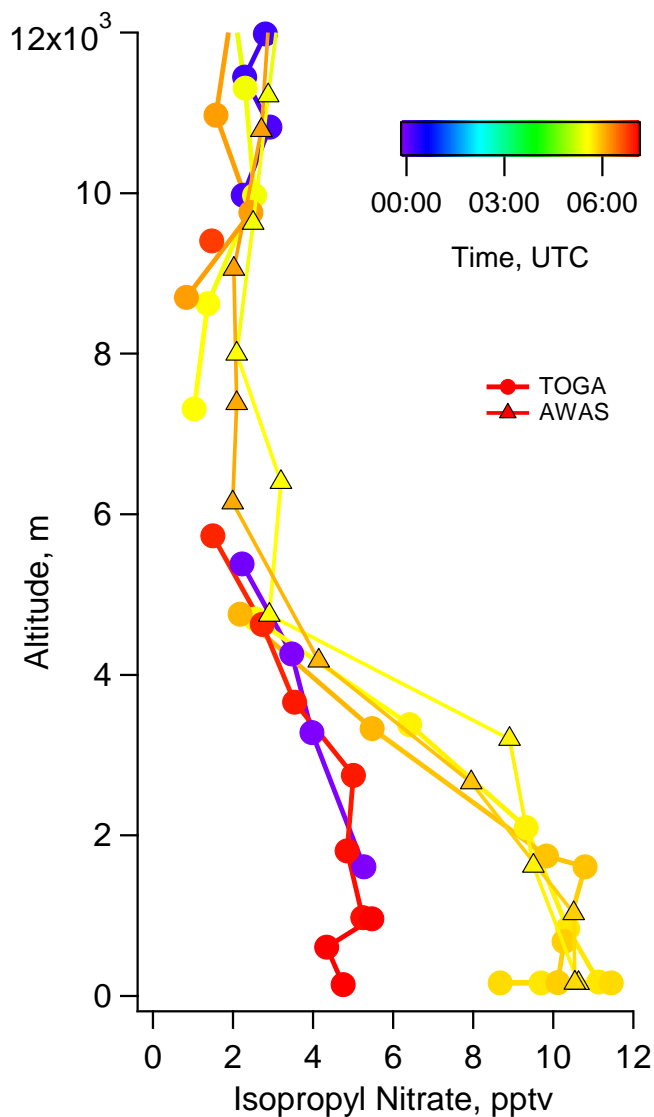
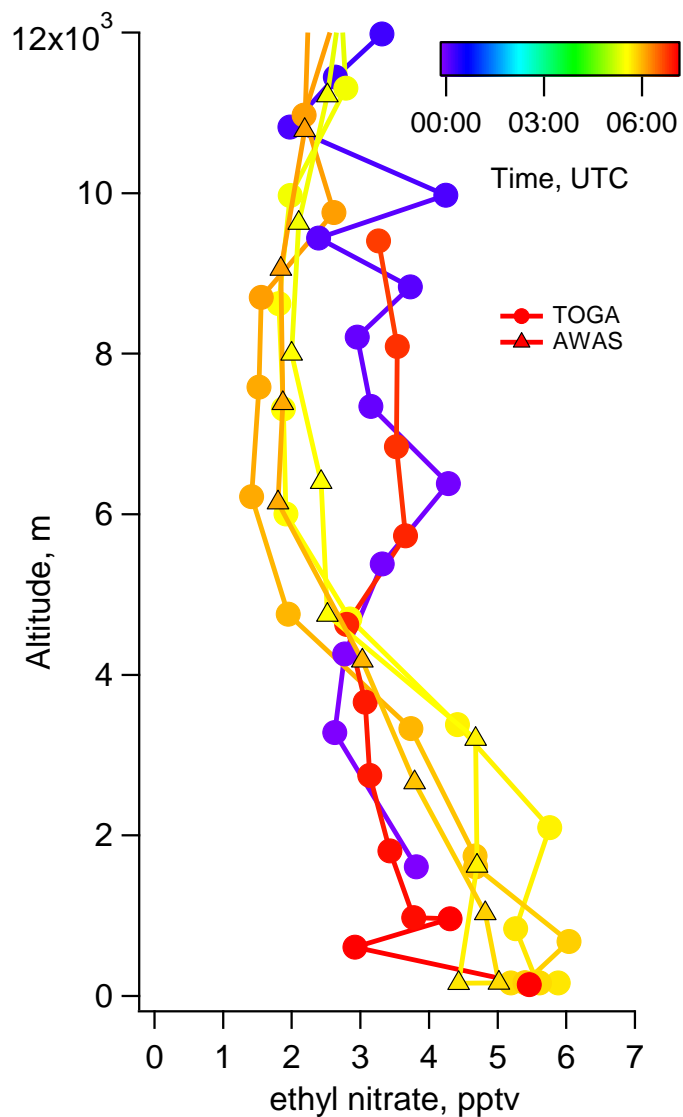
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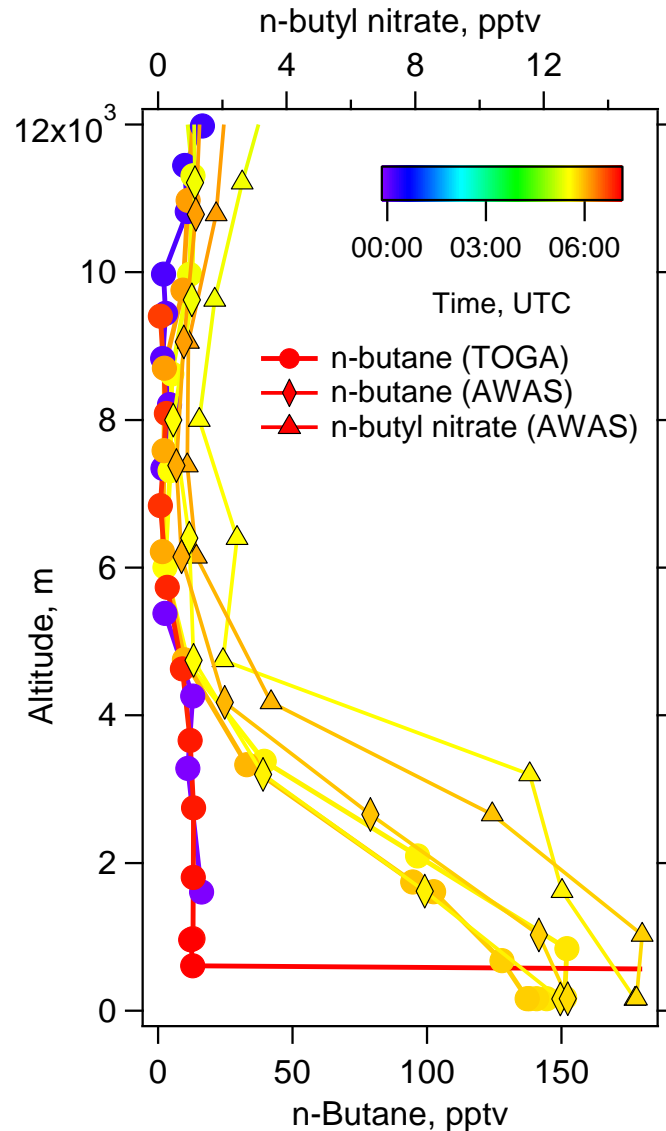
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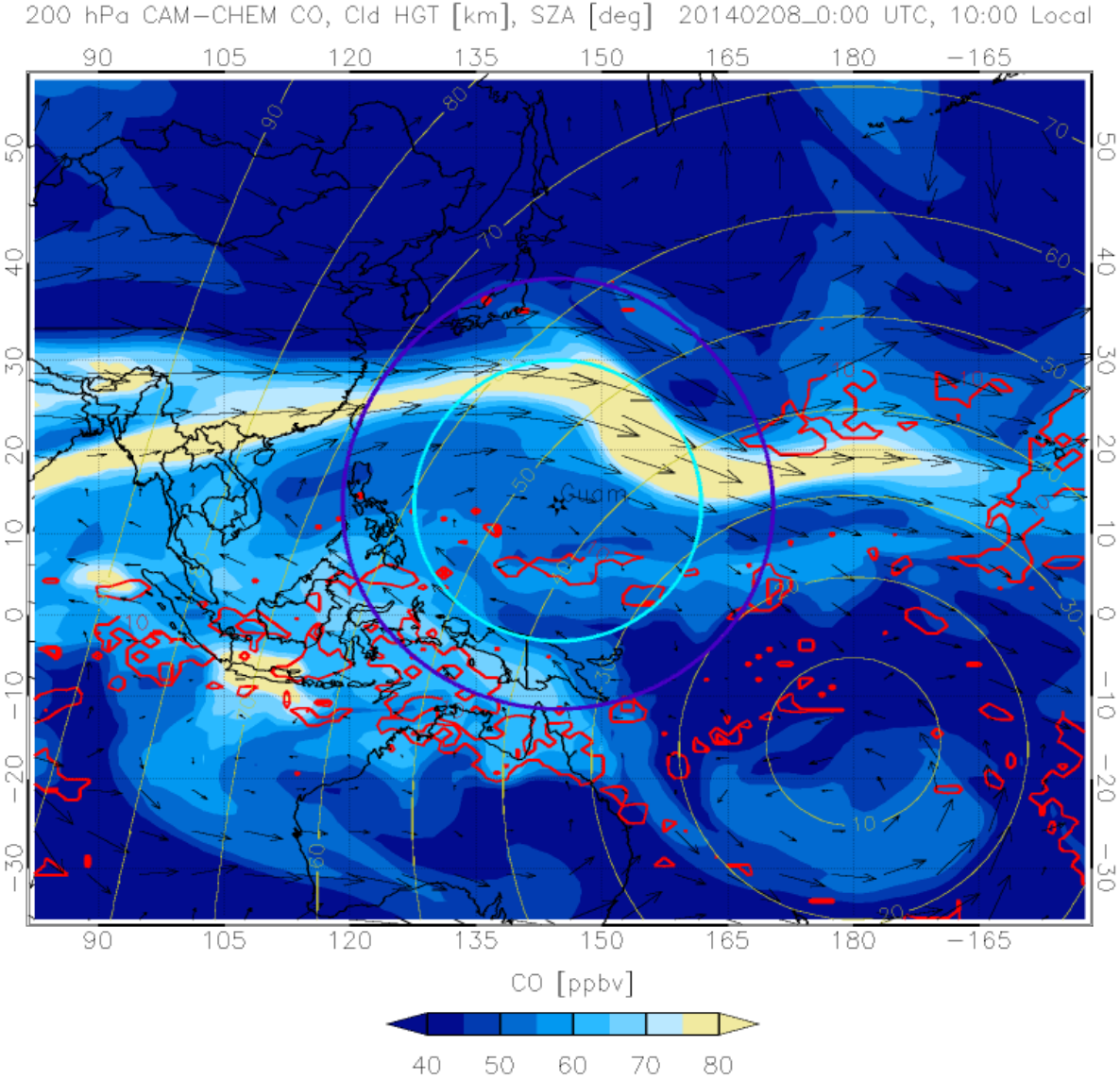
RF06: Four vertical profiles

Guam ascent (purple), Guam descent (red),
West of shear line descent (yellow), west of shear line ascent (orange)



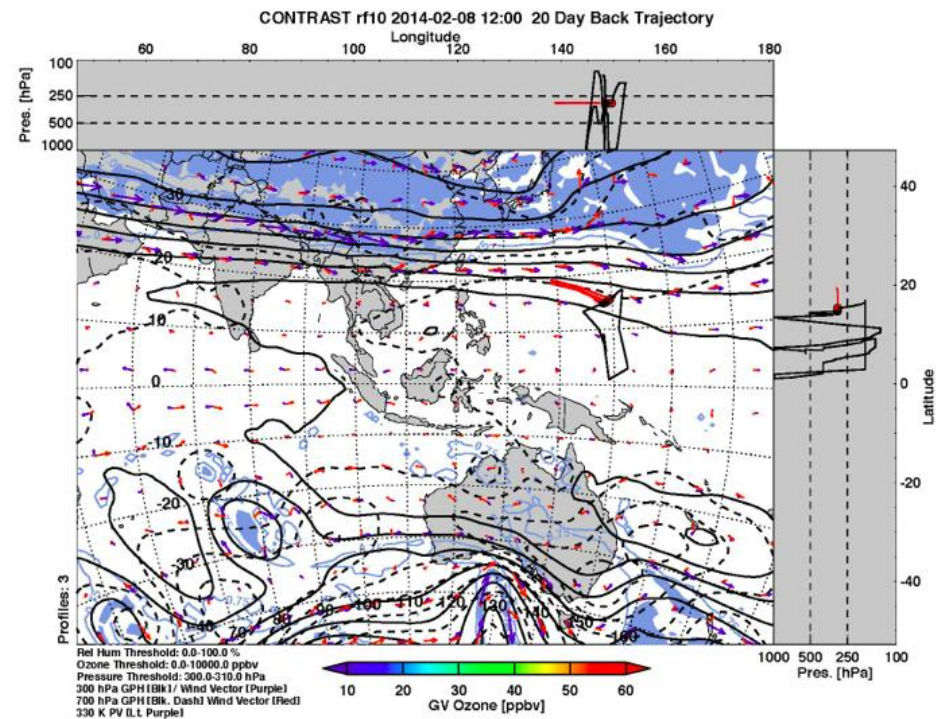
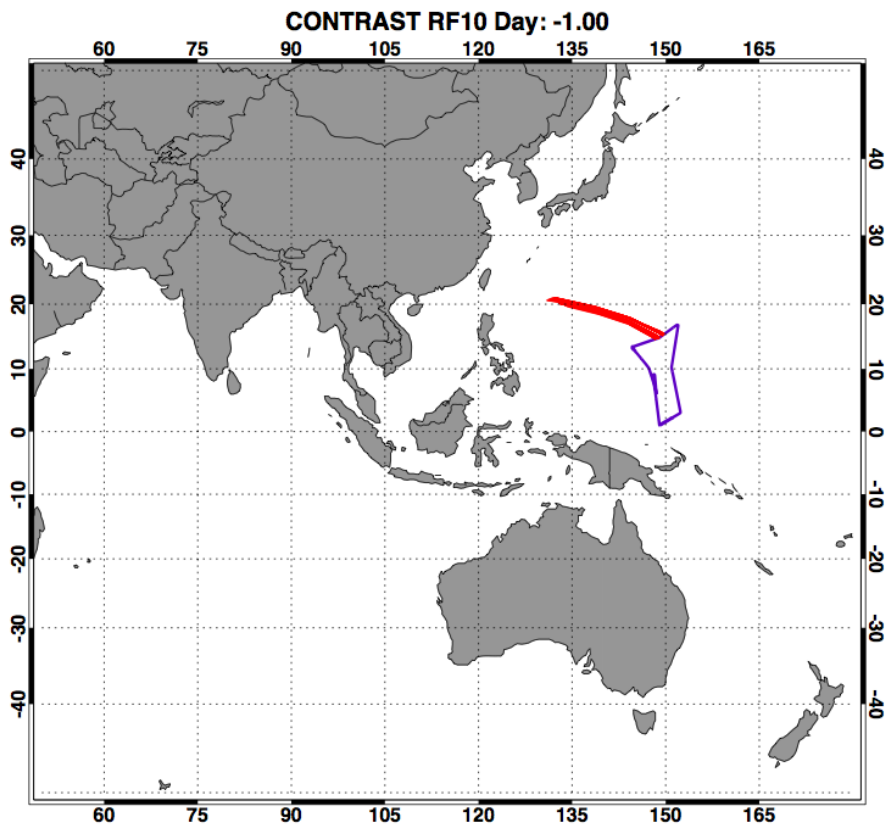
Initial calculations show a photochemical lifetime of the lowest altitude samples of ~3 days based on the benzene/toluene ratio.

RF10 (Feb. 8) CAM-Chem forecast of CO River at 200mb

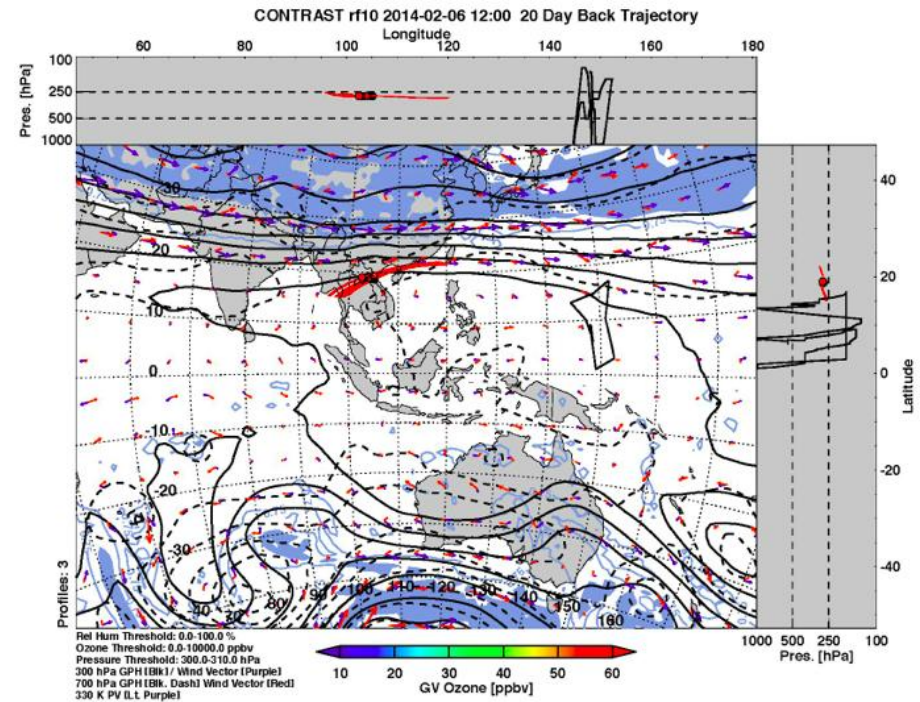
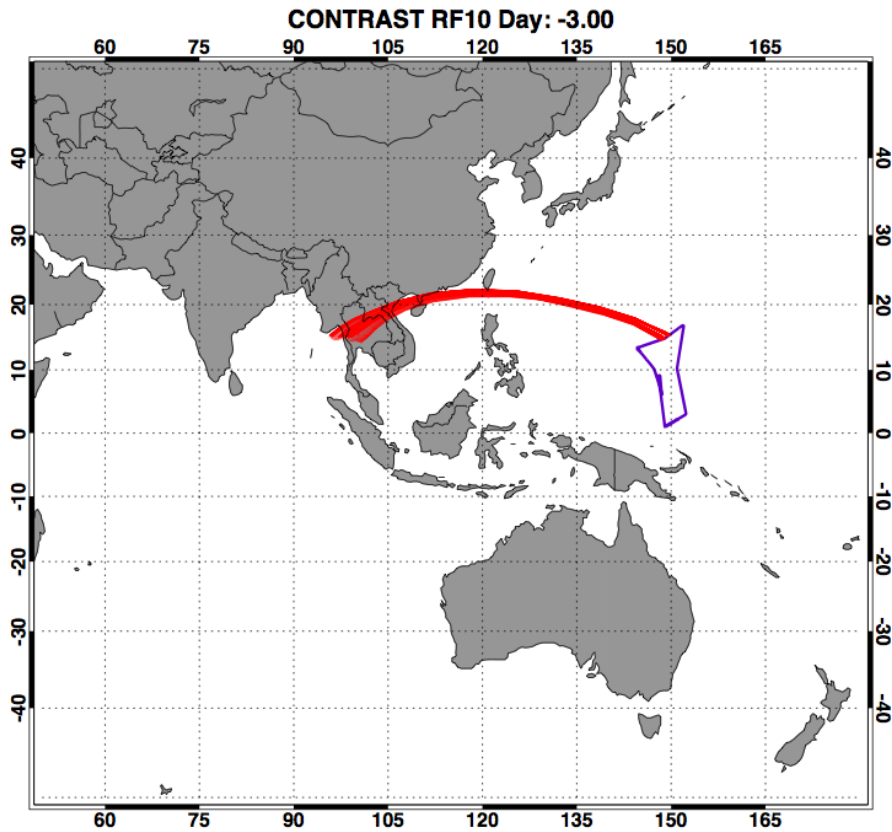


RF10 Trajectory analysis CO Plume

Plume location on the flight track Day -1

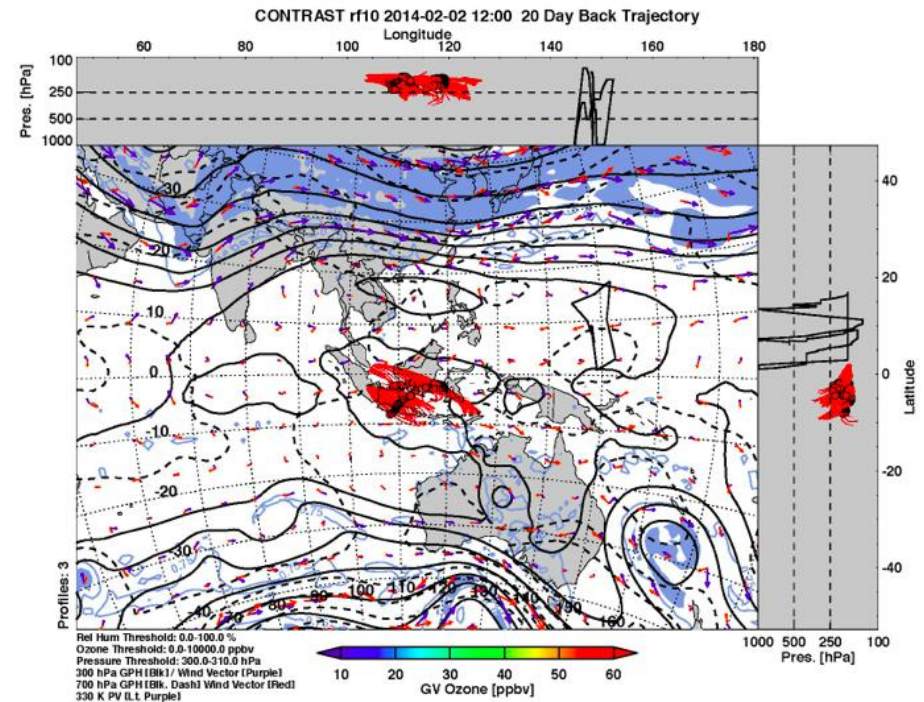
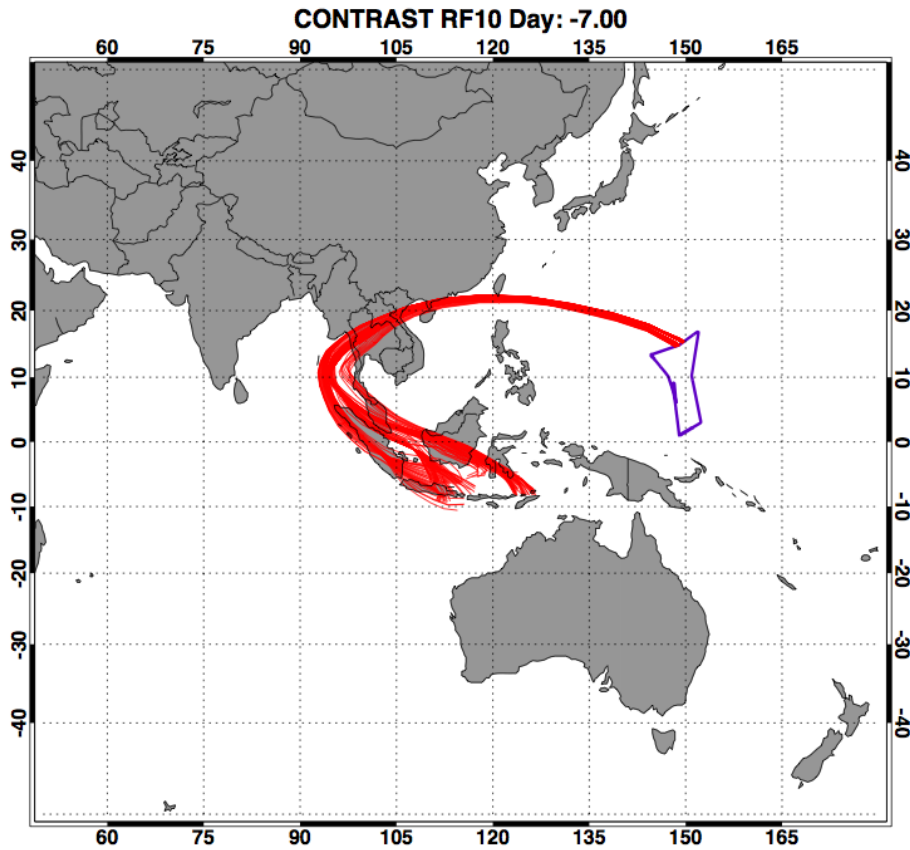


RF10 Trajectory analysis CO Plume Day -3

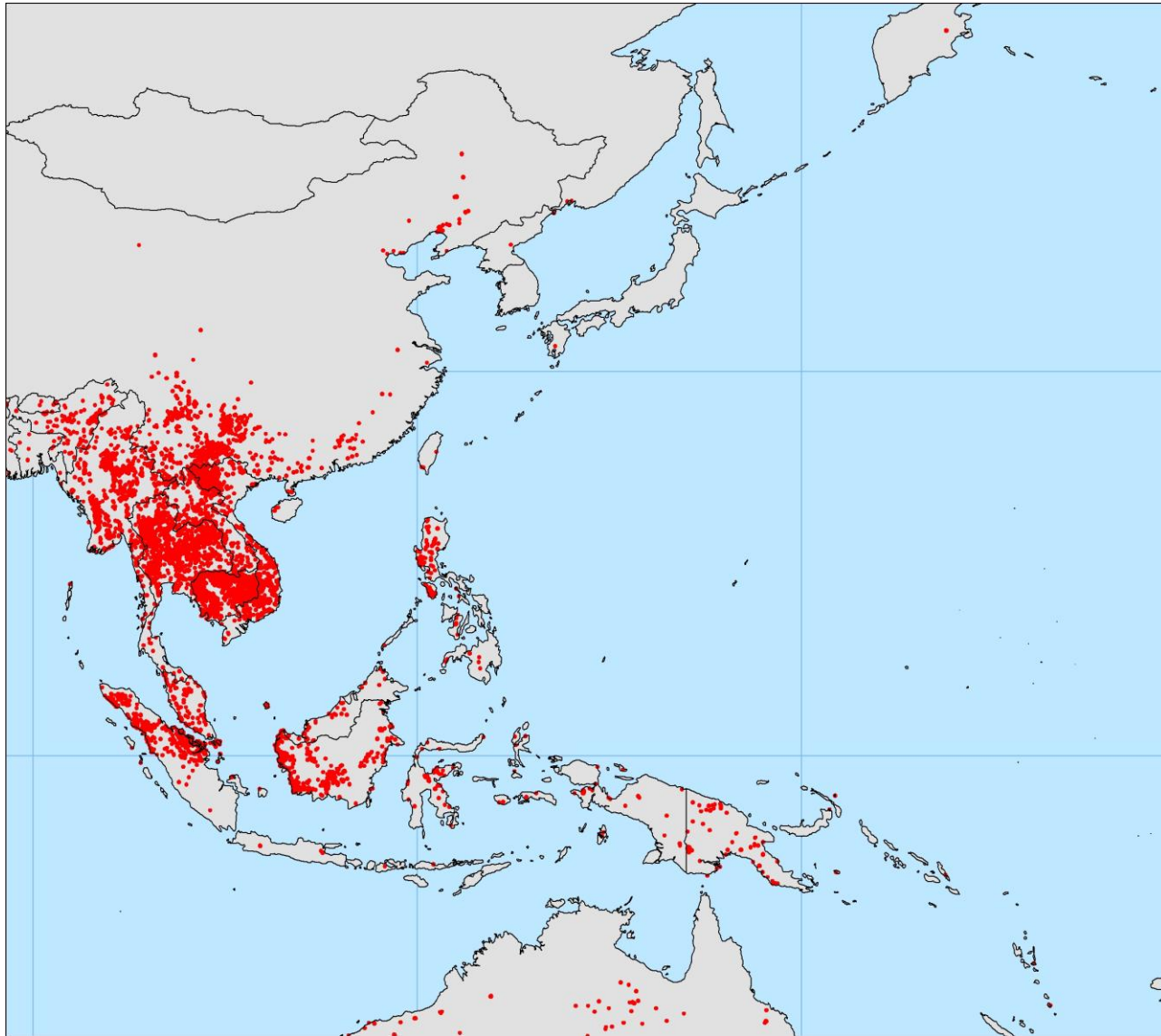


RF10 Trajectory analysis CO Plume

Day -7

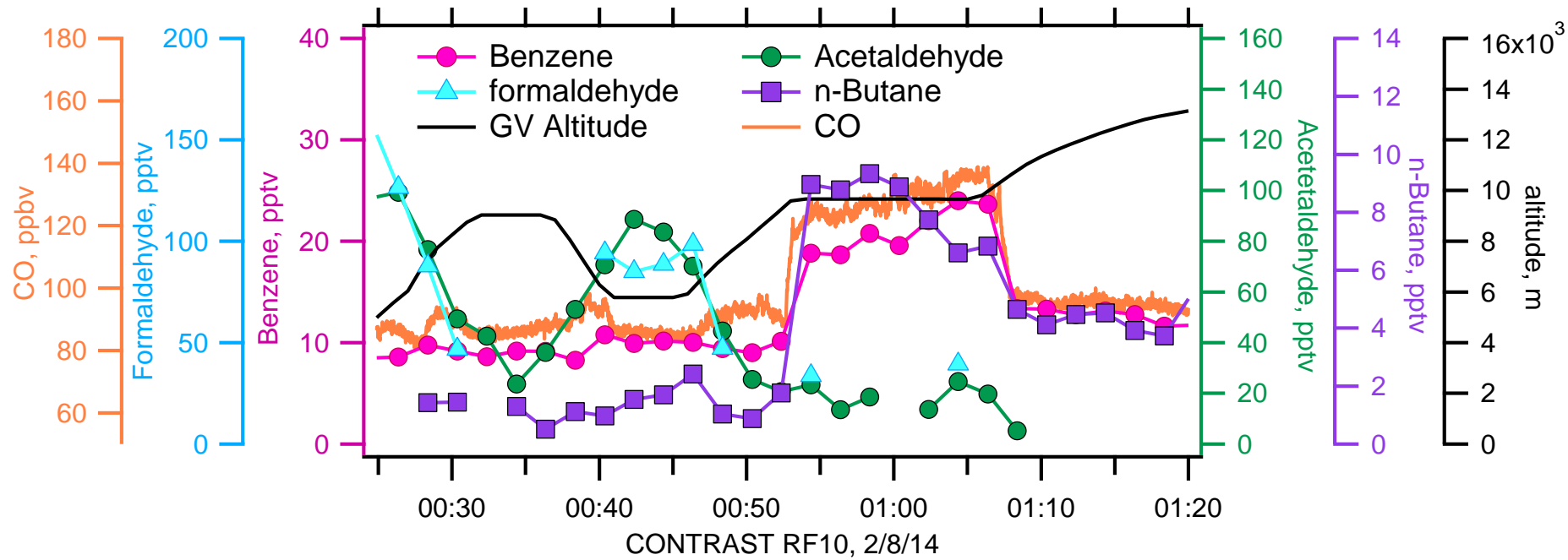
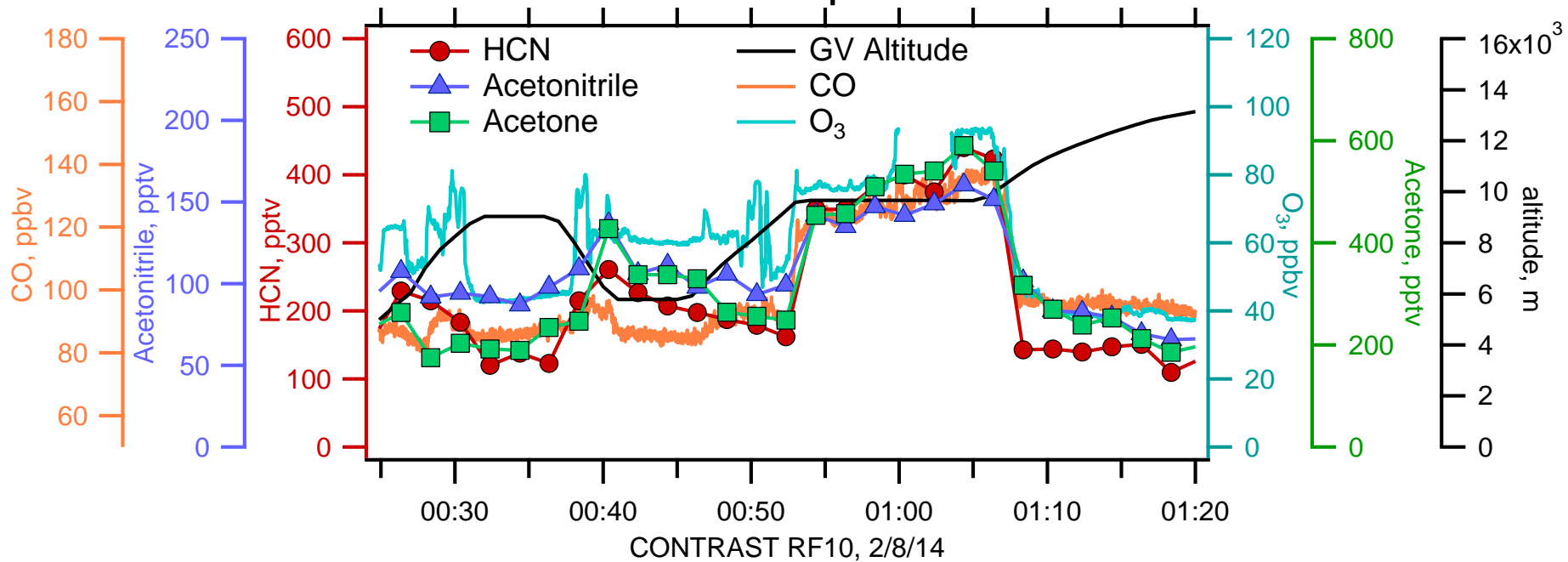


MODIS Fire counts Feb 4 – Feb 12, 2014

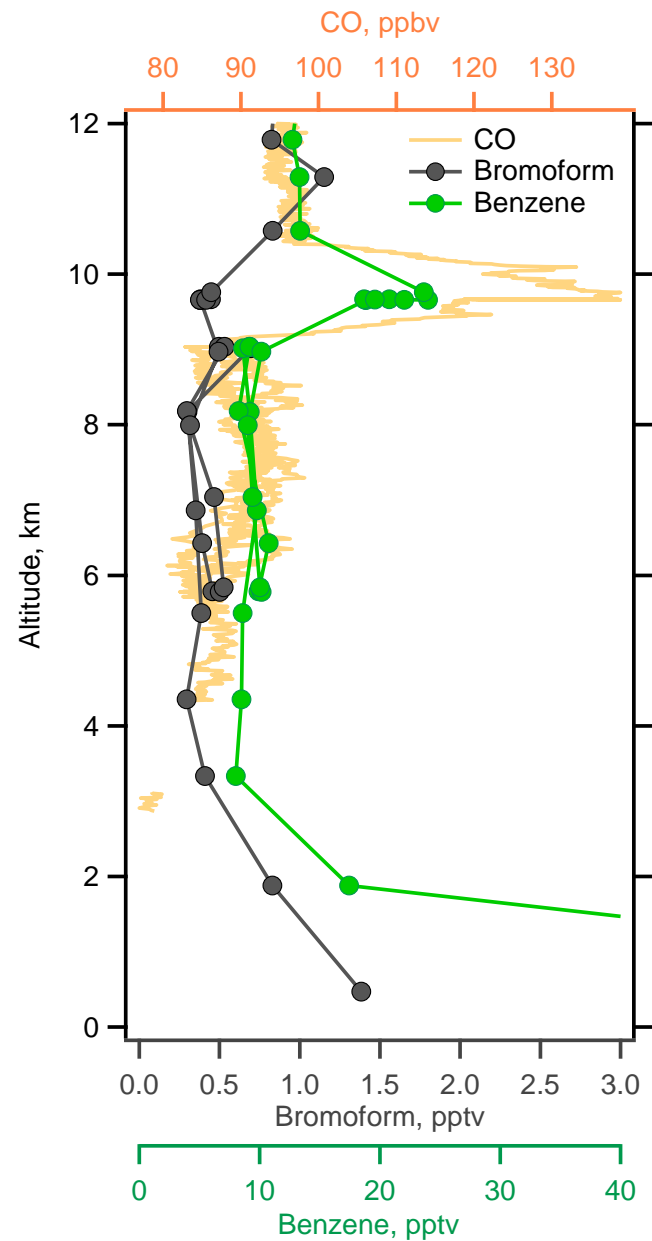
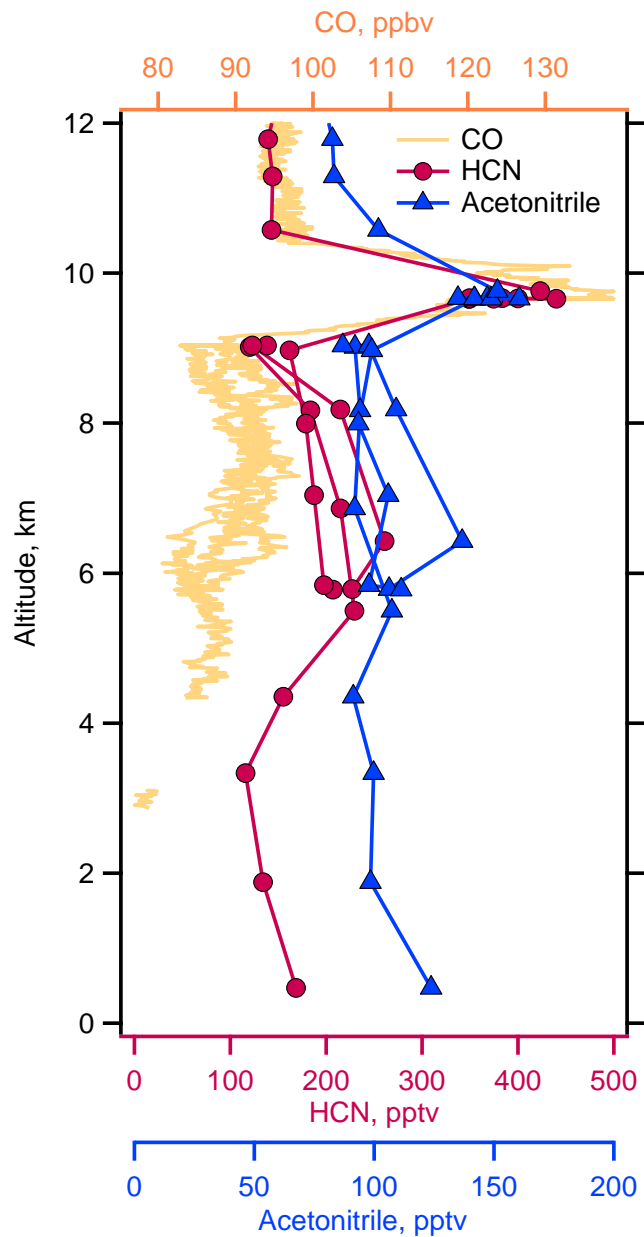


Modis Fire Count Map: Christine Weidinmyer

RF10: CO plume



RF10: Vertical profiles



Questions?

Thanks again to Becky, Eric, Elliot, Shawn, Jim, and
Laura for their assistance with this presentation.