

Convective signatures in CONTRAST O3 and Water Vapor measurements for RF01-RF05

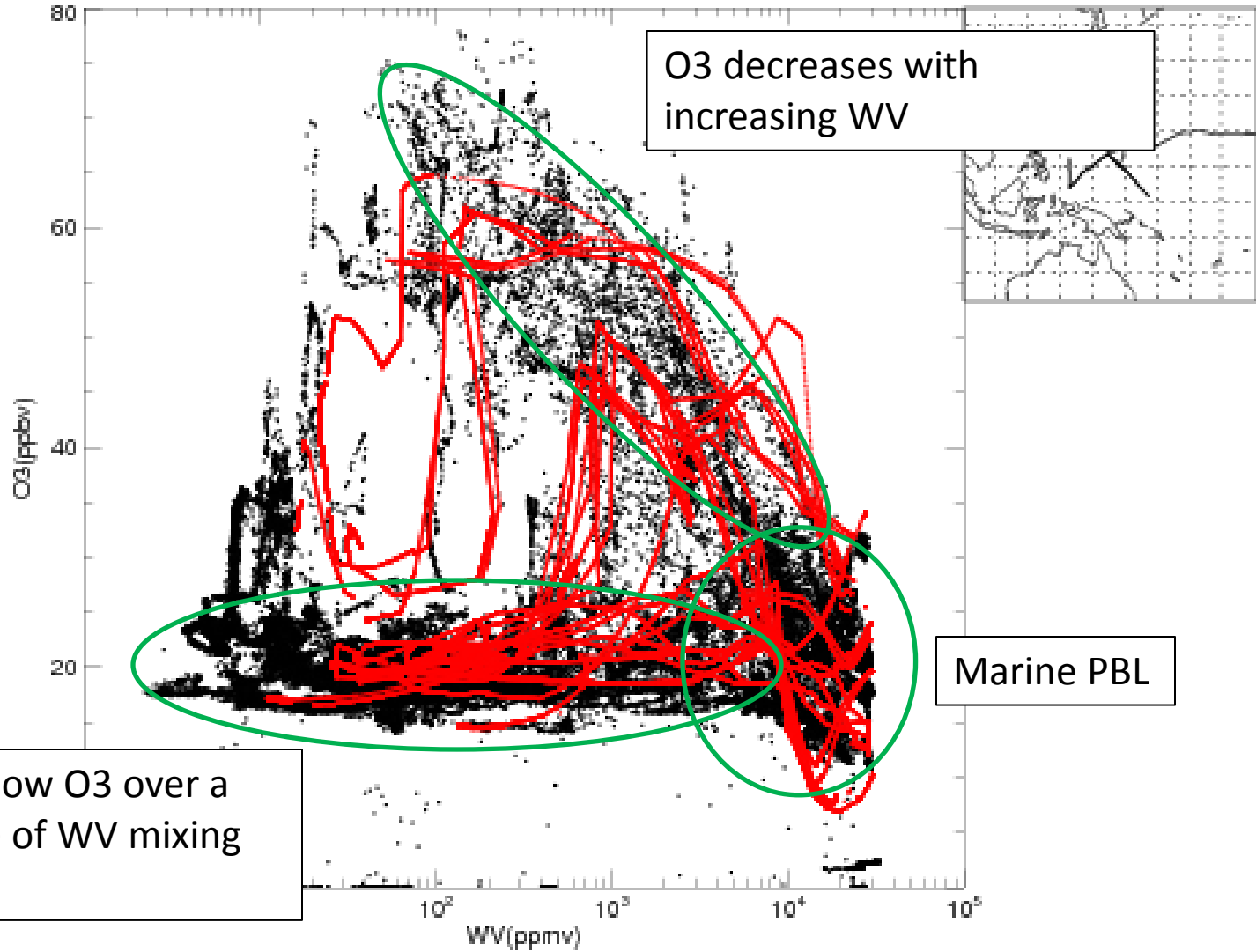
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- Comparison of CONTRAST measurements with Real-time Air Quality Modeling System (RAQMS) analyses
- Interpretation based on air mass history using Reverse Domain Filling (RDF) techniques

CONTRAST GV vs RAQMS O3 vs Water Vapor (20S-20N)

CONTRAST RF01-05 (20S<lat<20N) O3/WV
from GV (black) [NCAR] and RAQMS (red)

GV Track



O3 decreases with increasing WV

Marine PBL

Uniformly low O3 over a wide range of WV mixing ratios

Reverse Domain Filling (RDF) Analysis

The RAQMS RDF¹ calculations are based on analysis of back trajectories initialized along the aircraft flight track.

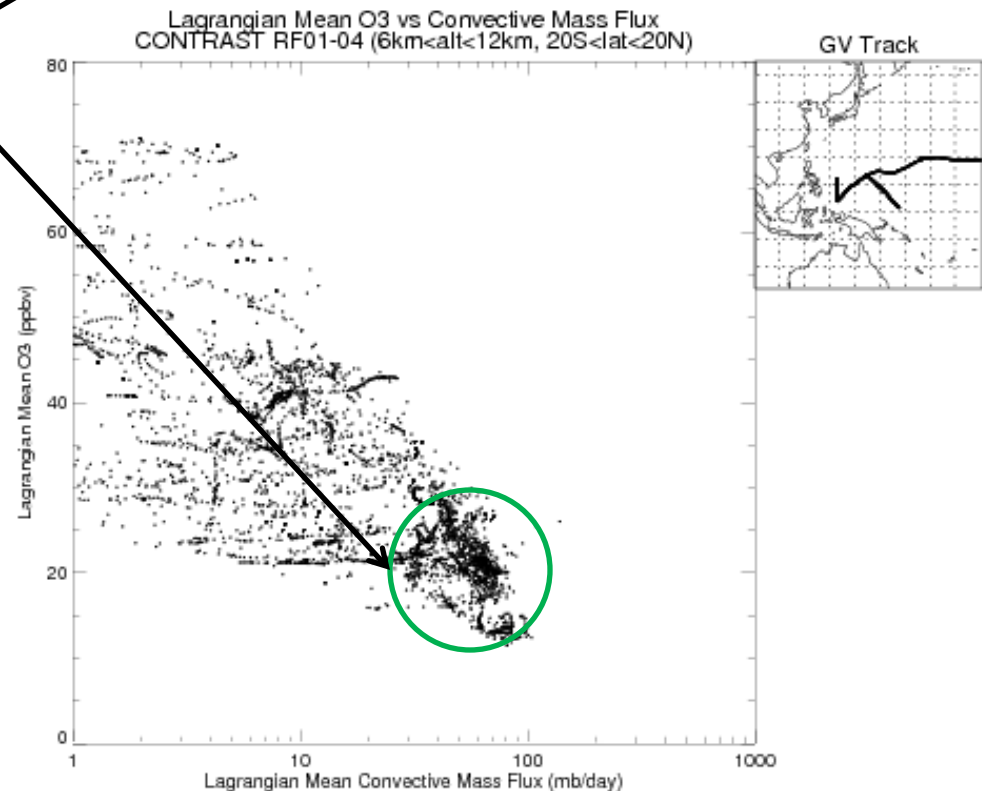
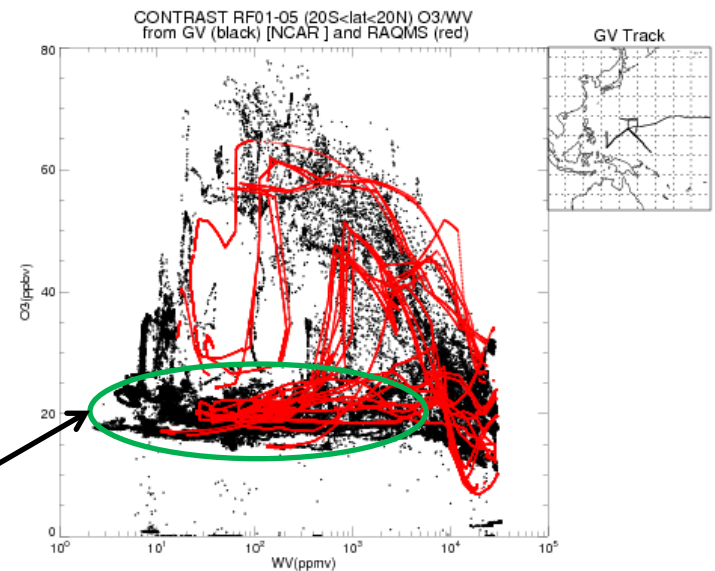
The back-trajectories sample and archive RAQMS chemical and dynamical quantities so that Lagrangian averages could be determined.

The Lagrangian averages (time-averages following a given trajectory) are then mapped back onto the initial flight curtain to produce the RDF products.

¹Fairlie, et al., J. Geophys. Res., 112, D16S90, doi:10.1029/2006JD007923, 2007

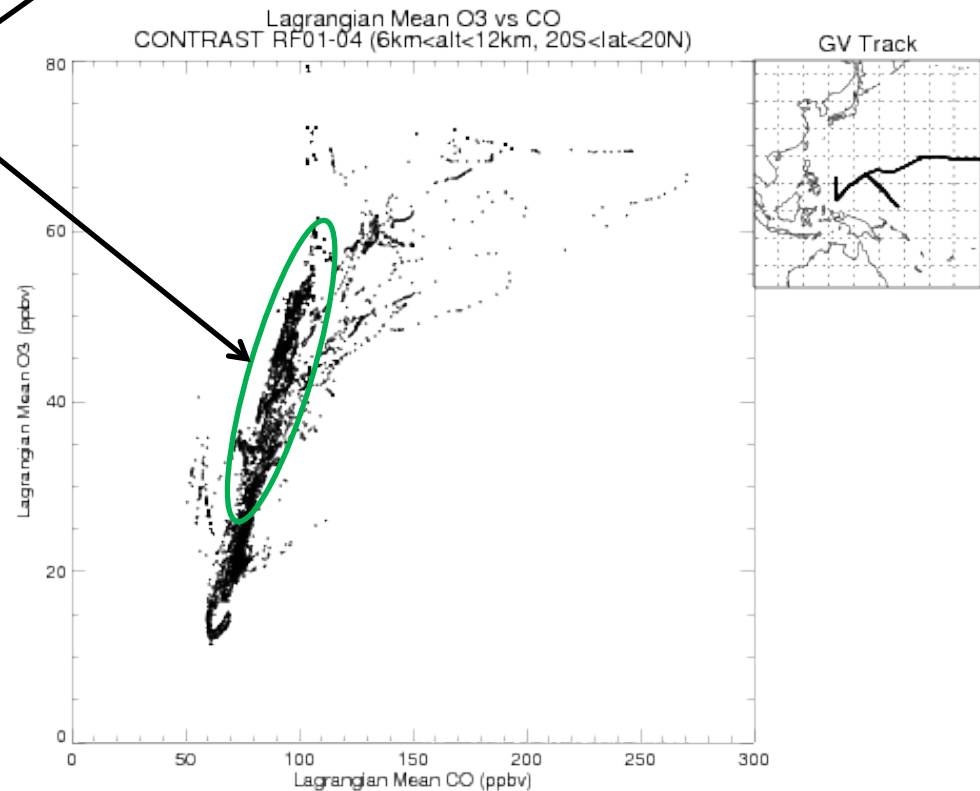
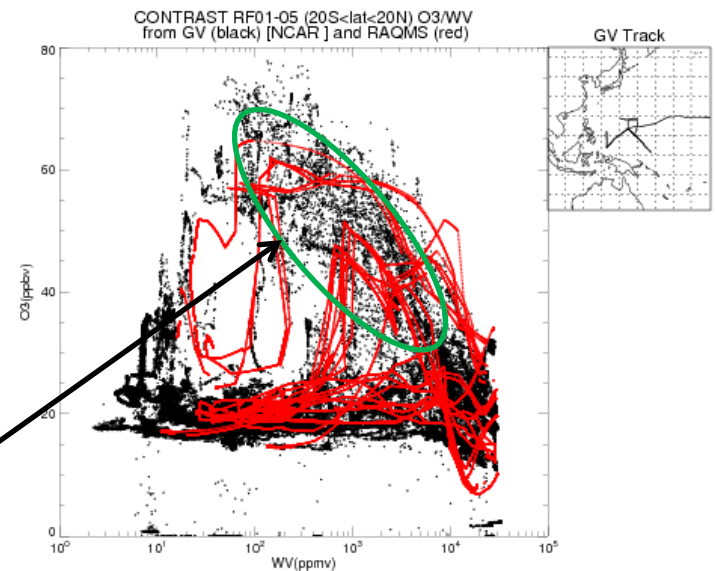
RAQMS RDF O3 vs RDF Convective Mass Flux RF01-RF04

Uniformly low O3 ratios are associated highest Lagrangian mean convective mass flux between 6-12km and 20S-20N



RAQMS RDF O3 vs CO RF01-RF04

Air masses between 6-12km and 20S-20N show positive correlations between RDF O3 and CO suggesting continental influence.



Summary:

- Uniformly low O₃ ratios over a wide range of WV mixing ratios sampled on RF01-RF04 between 6-12km and 20S-20N are associated highest Lagrangian mean convective mass flux (maritime deep convection)
- Air masses sampled on RF01-RF04 between 6-12km and 20S-20N show positive correlations between Lagrangian mean O₃ and CO (continental influence)