

“How the HIPPO suite of measurements could complement those on the Global Hawk during ATTREX”

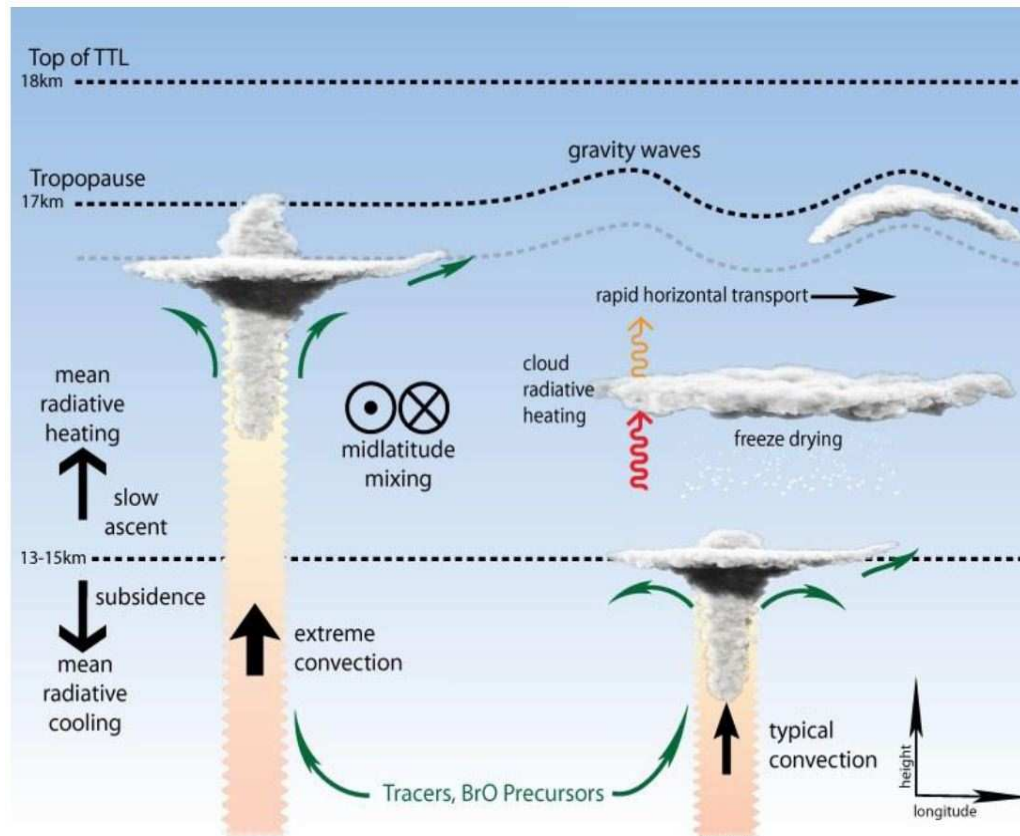


James W. Elkins
NOAA/ESRL/GMD

What's next for HIPPO?

- Of course, we still have HIPPO/4 and HIPPO/5.
- NASA Climate Satellite Launch Problems (Taurus XL vehicle).
No global coverage of radiation and CO₂.
- Atmospheric Transport of Fallout from Fukushima Reactors.
Models need tracer and wind data to validate atmospheric transport.
- Reactive Gas HIPPO?
- Aerosol HIPPO?
- Support Upcoming missions
 - WB-57F Missions
 - DC-8
 - Global Hawk

Airborne Tropical Tropopause Experiment (ATTREX)

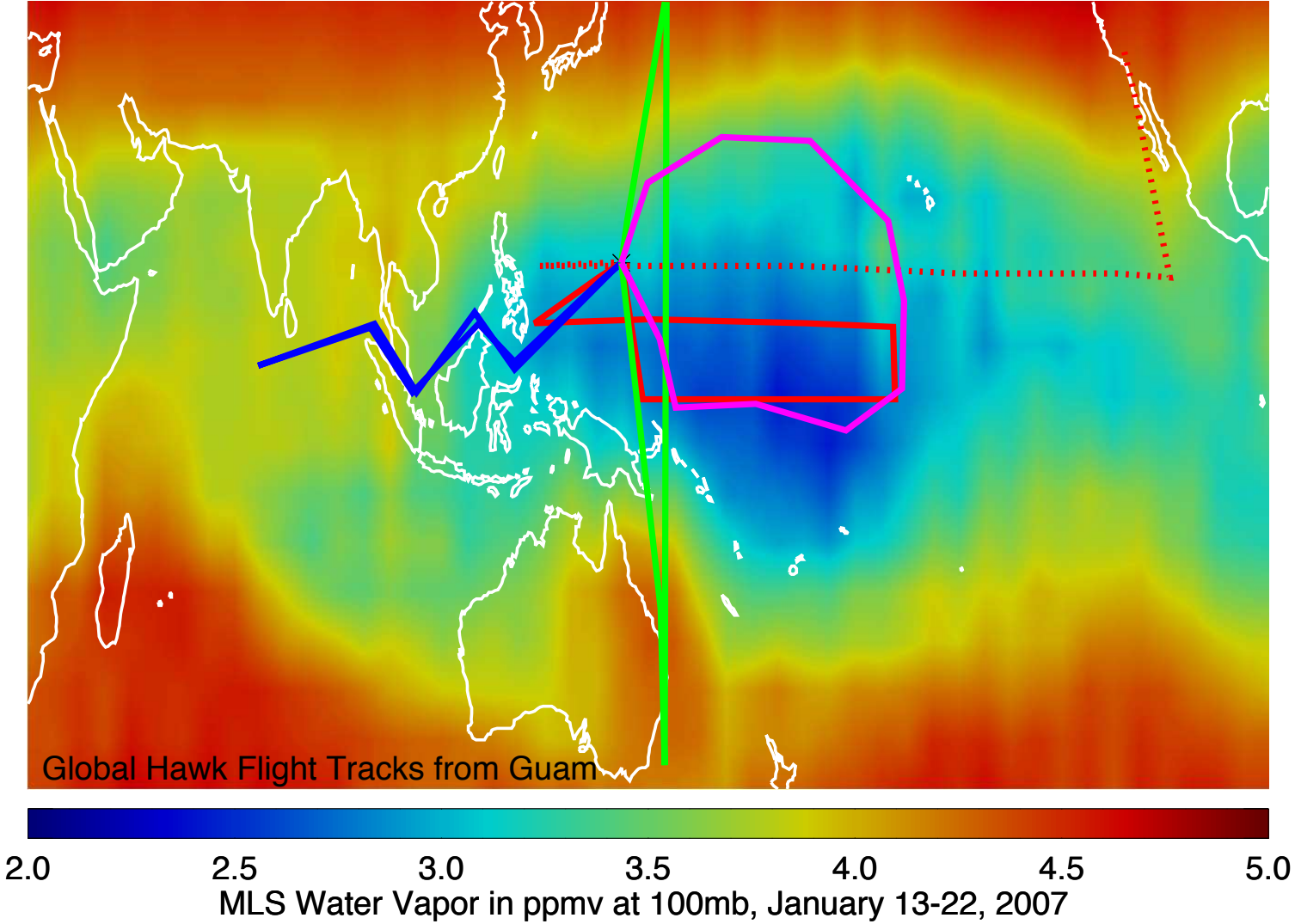


Science issues:

- thin cirrus, dehydration
- transport pathways: convection
radiative heating
- thermal structure: waves,
circulation
- chemistry: bromine budget

Project Scientist: Eric Jensen
NASA Ames, based here at NCAR.

Attrex: Study Dehydration from Satellite Observations.

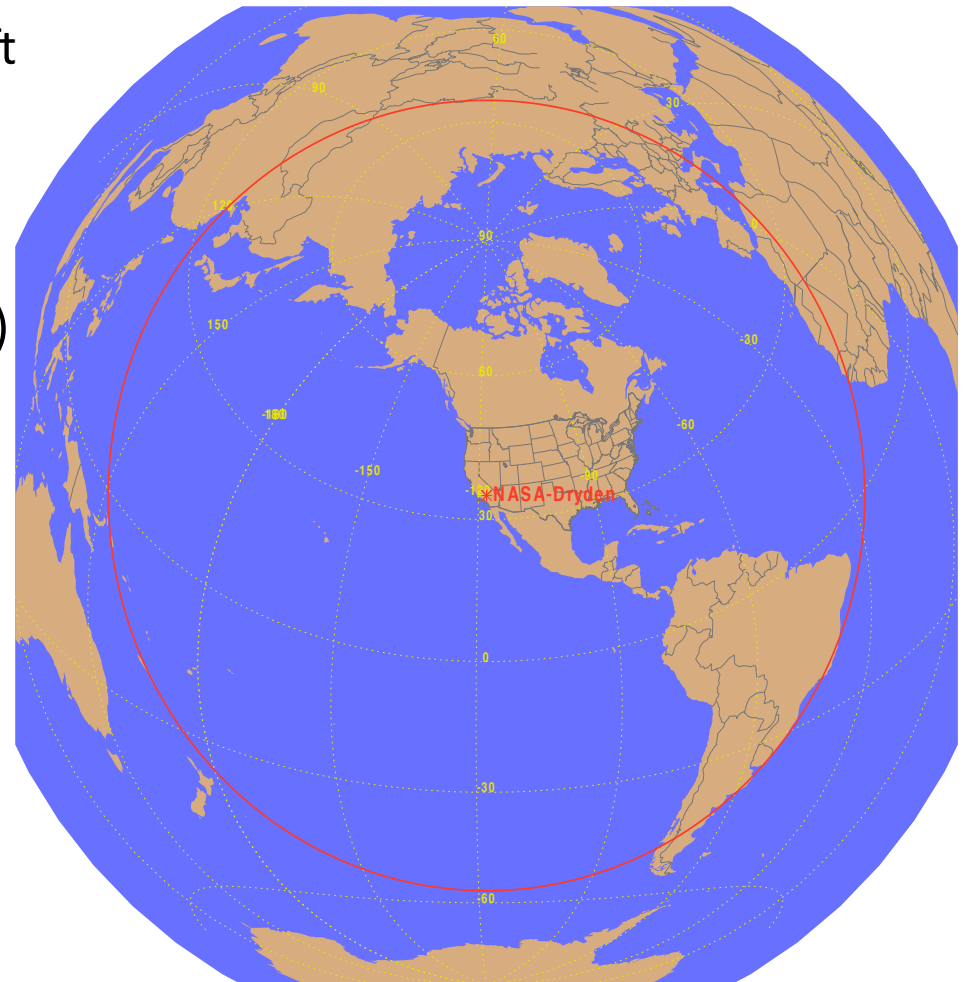


The NASA Global Hawk UAS Platform

- Autonomous drone, single jet engine, 44.4 ft (13.5 m) long, 15.2 ft (4.63 m) high, wingspan 116.2 ft (35.4 m)
- Max. Altitude 65,000 ft (17.1 km)
- Max. Range 11,000 nm (20,400 km)
- Duration 30+ hours
- Payload 1,500 lbs. (680 kg)



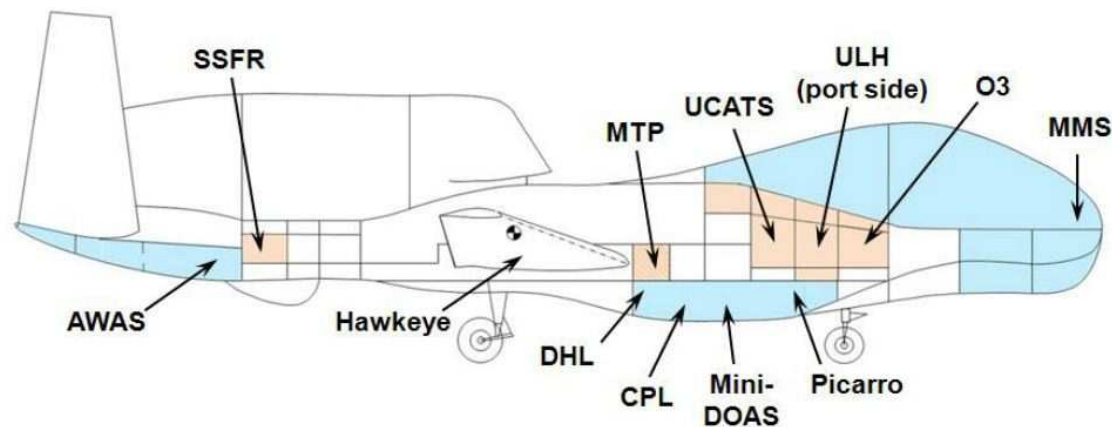
Global Hawk: Maximum Range (nmi) from NASA-Dryden
Outer Limit Assumption: 5500 nmi



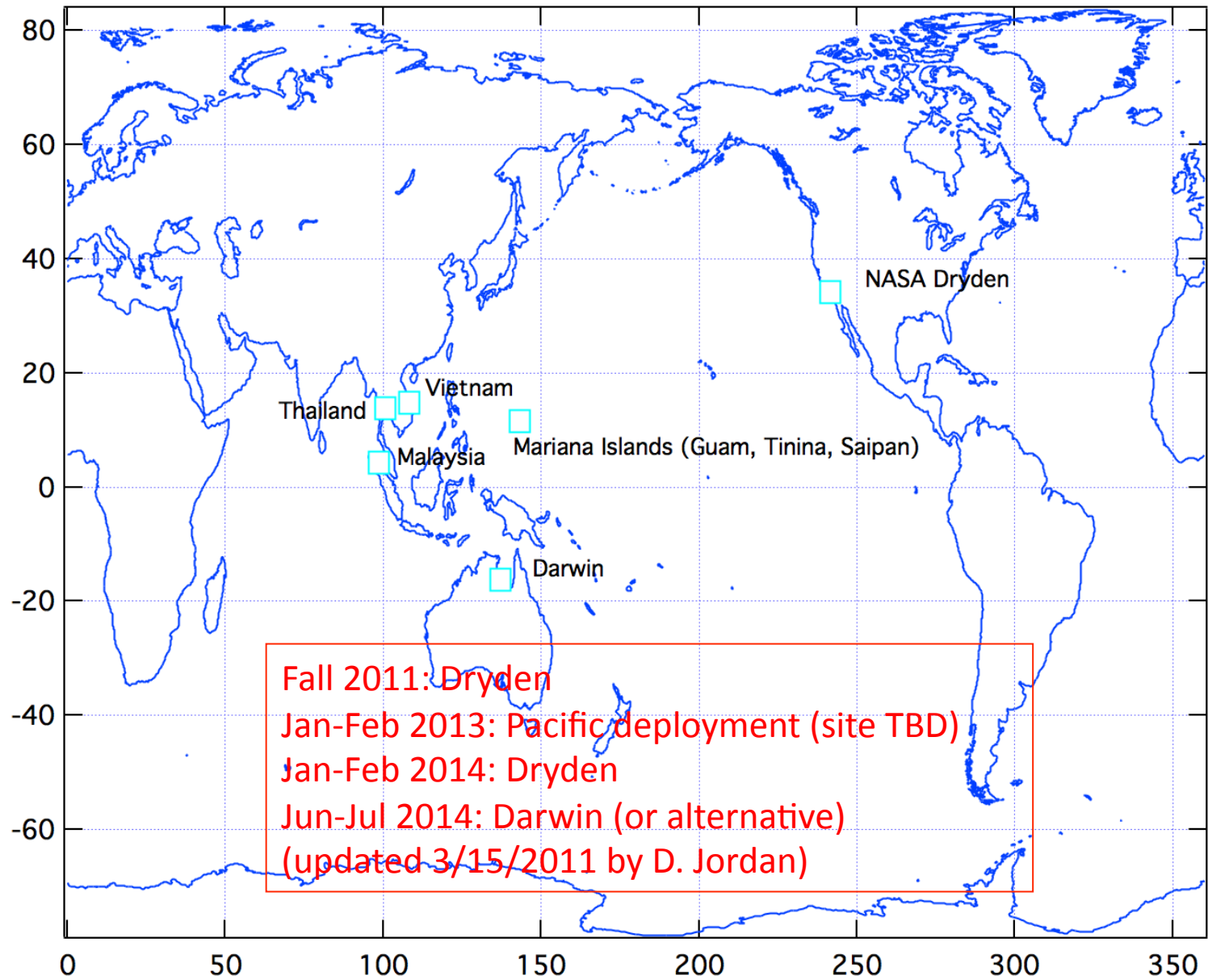
Plot courtesy of D. Nance

ATTREX Global Hawk Payload

| Instrument | Investigator | Measurements |
|---|--------------------|---|
| Cloud Physics Lidar (CPL) | M. McGill | aerosol/cloud backscatter |
| Advanced Whole Air Sampler (AWAS) | E. Atlas ✓ | many tracers w/varying lifetimes |
| UAS Chromatograph for Tracers (UCATS) | J. Elkins ✓ | O ₃ , CH ₄ , N ₂ O, SF ₆ , H ₂ O, CO |
| NOAA Ozone | R. Gao ✓ | O ₃ |
| Picarro Cavity Rindown Spectrometer | S. Wofsy ✓ | CO ₂ , CO, CH ₄ |
| UAS Laser Hygrometer (ULH) | R. Herman | H ₂ O |
| Diode Laser Hygrometer (DLH) | G. Diskin | H ₂ O |
| Hawkeye | P. Lawson | Ice crystal size dist., habits |
| Solar, Infrared Radiometers | P. Pilewskie | Radiative fluxes |
| Meteorological Measurement System (MMS) | P. Bui | Temperature, pressure, winds |
| Microwave Temperature Profiler (MTP) | M. Mahoney ✓ | temperature profile |
| Absorption Spectrometer (DOAS) | Stutz/Pfeilsticker | BrO, NO ₂ , OClO, IO |



Potential ATTREX Deployment Locations



GloPac flights have provided key observations for satellite validation

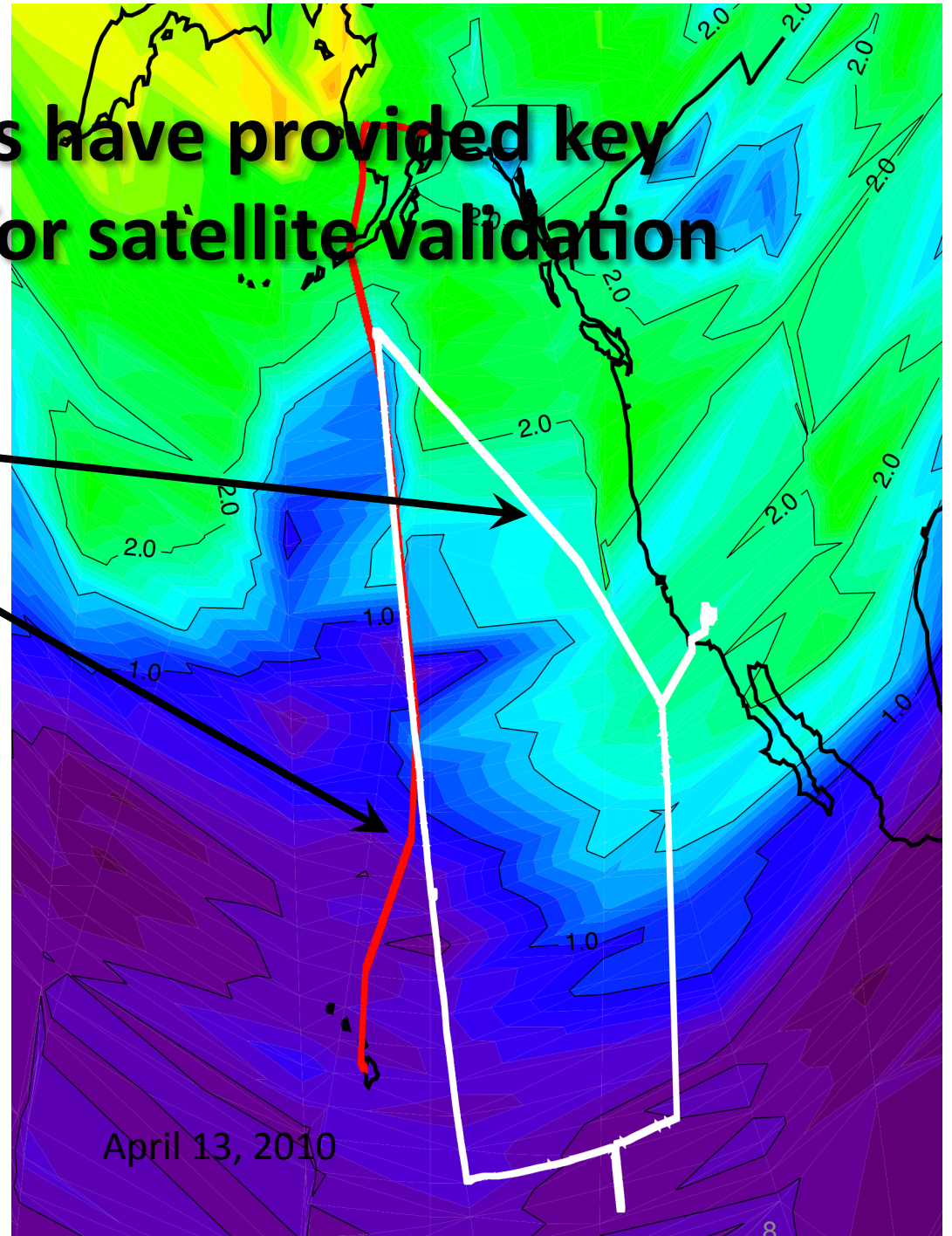
GloPac GH track in white

HIPPO NCAR GV in red

Aura satellite track follows the western side of the GloPac flight.

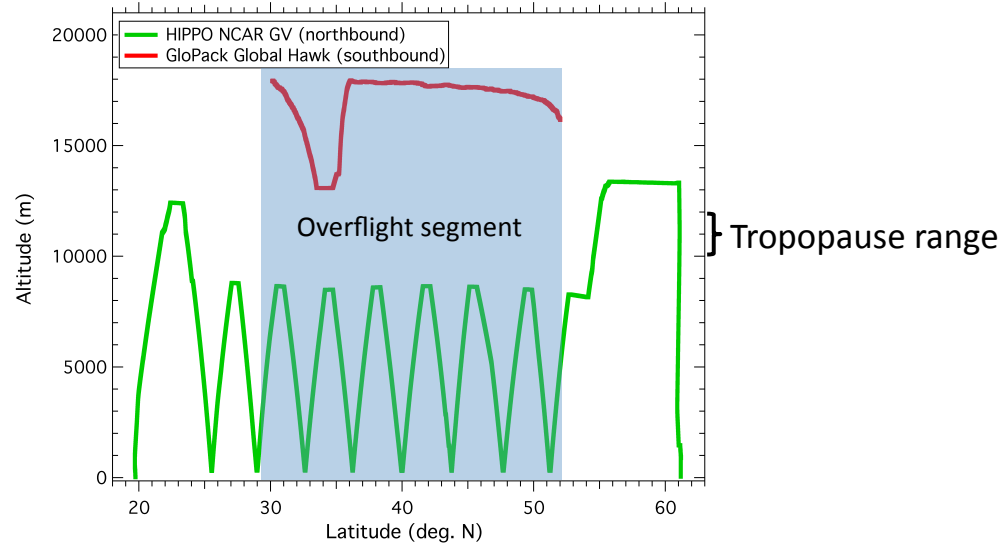
Ozone data from Microwave Limb Sounder (MLS), figure courtesy of Dr. Karen Rosenlof

April 13, 2010



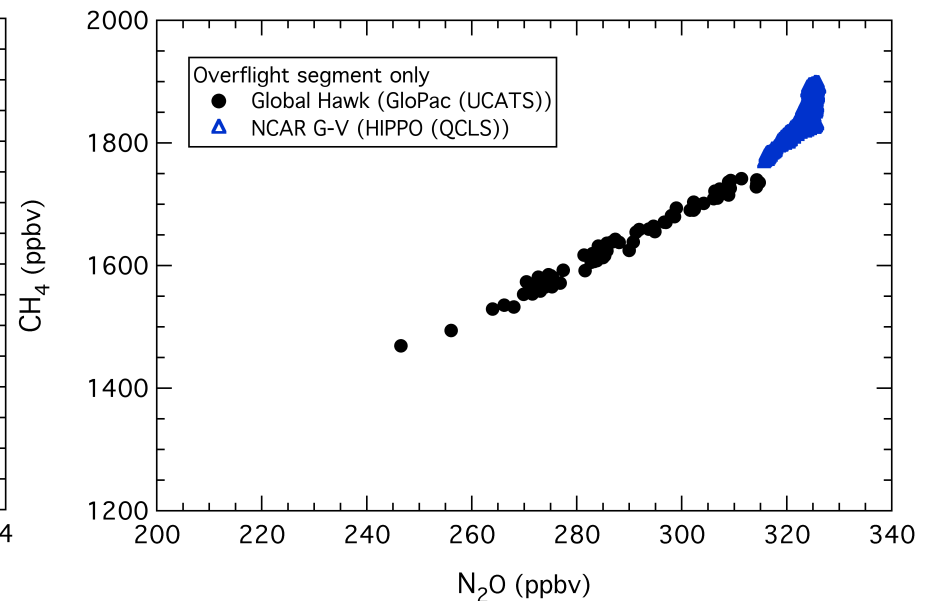
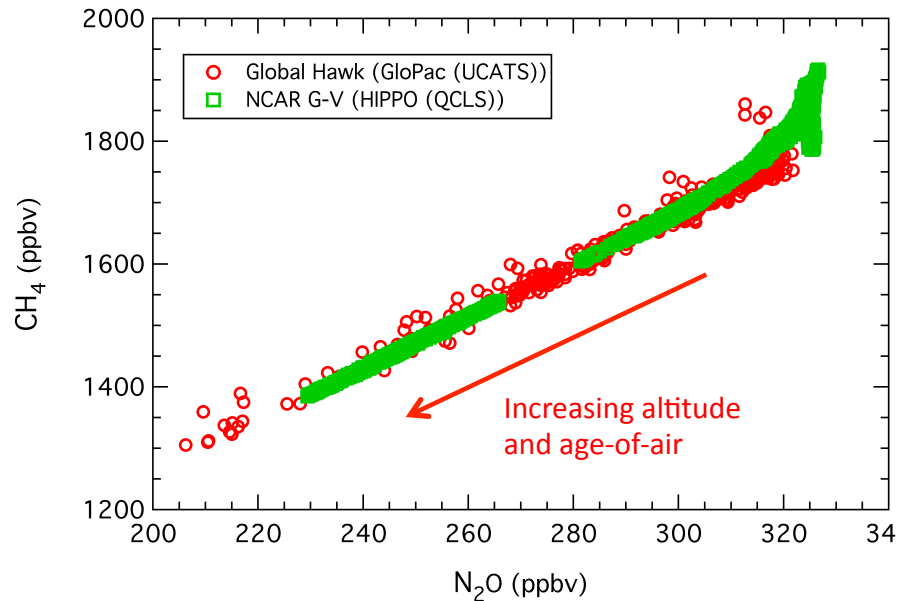
Comparison of Global Hawk and NSF/NCAR GV correlations of CH₄ with N₂O

Coordinated flights allow unique sampling of tracer space in UT/LS



All data

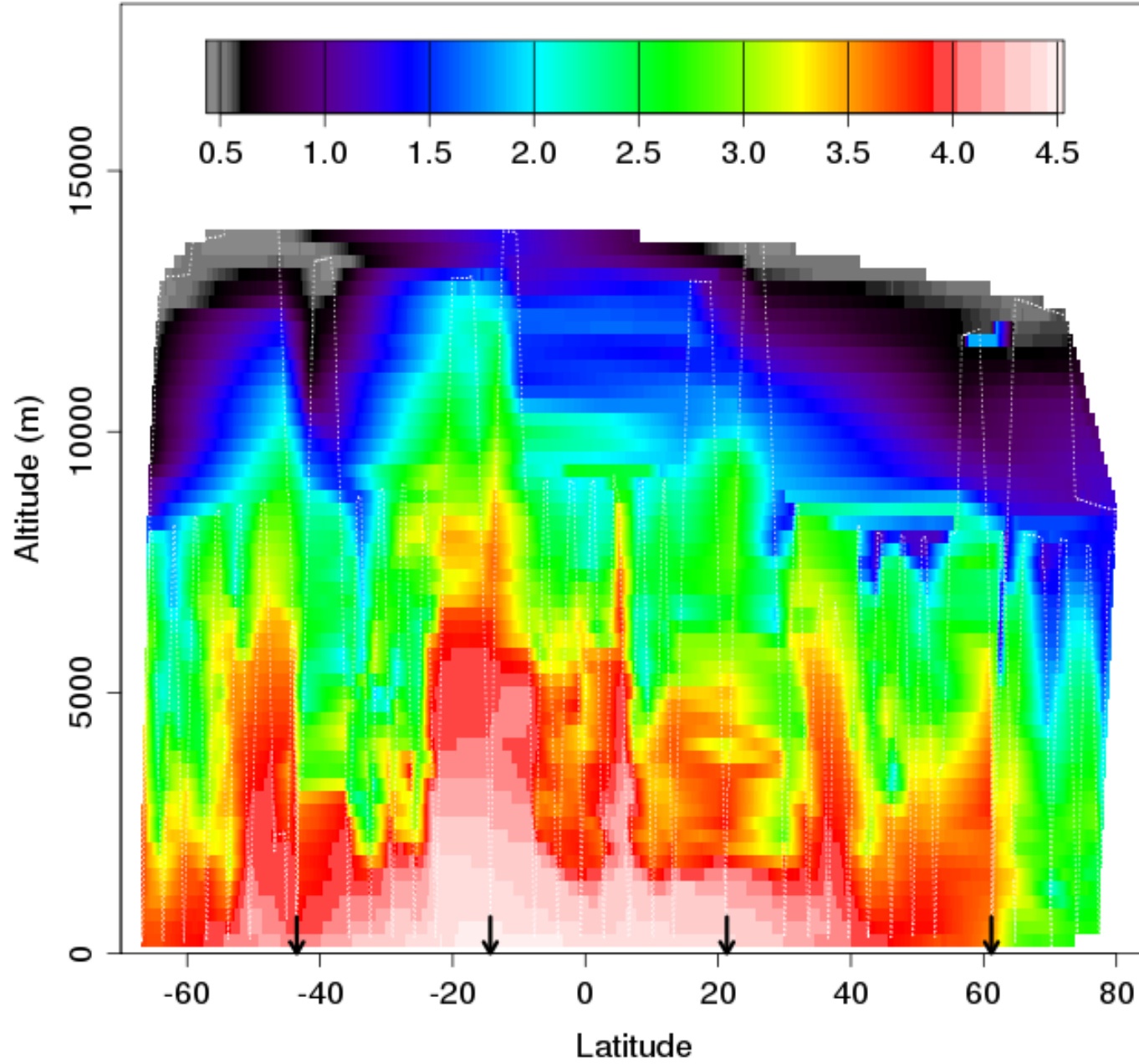
Overflight segment data only



HIPPO1 Southbound H2Oppmv_vxl (Log)

20090112, 20090114, 20090116, 20090118, 20090120

RF03, RF04, RF05, RF06, RF07



Missions to support ATTREX

- The British are coming, NERC, funding instruments on the NERC/Met Office FAAM BAe 146 Atmospheric Research Aircraft.
- Write a proposal for the NCAR GV 2014?
- Write a proposal for NASA aircraft use?



Discussion: Ideas?