

CAST- Co-ordinated Airborne Studies in the Tropics



N.R.P. Harris and the CAST team

Scientific Issues

- Tropical upper troposphere is gateway to the stratosphere
 - Important for stratospheric composition and ozone depletion
- Tropical troposphere is large part of Earth's atmosphere (40%)
 - Important for tropospheric composition and climate – locally & globally
- West Pacific in January and February: strong convection near and south of equator
 - THE place where we need measurements
 - Hard to make them
 - Will in time lead to improved modelling of regional convection and weather

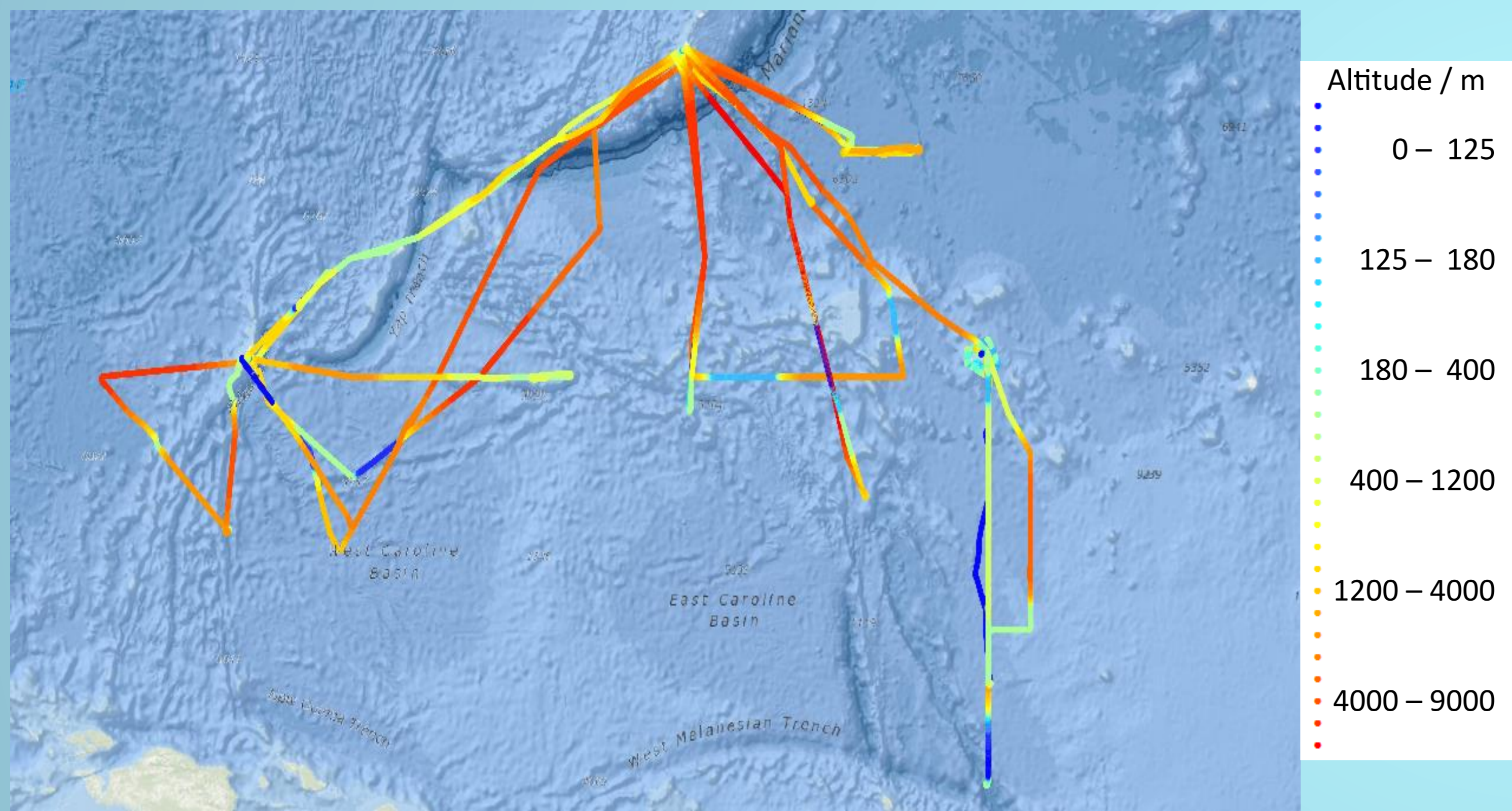
Specifically

- Chlorine and bromine chemistry resulting from emissions from ocean
- Movement of air upwards, especially in convection
- Cirrus, humidity and temperature in tropical troposphere layer

success in addressing any of these issues requires collaboration

Aircraft flights

- 25 flights
- 90 flight hours
- January 20 – February 16, 2014

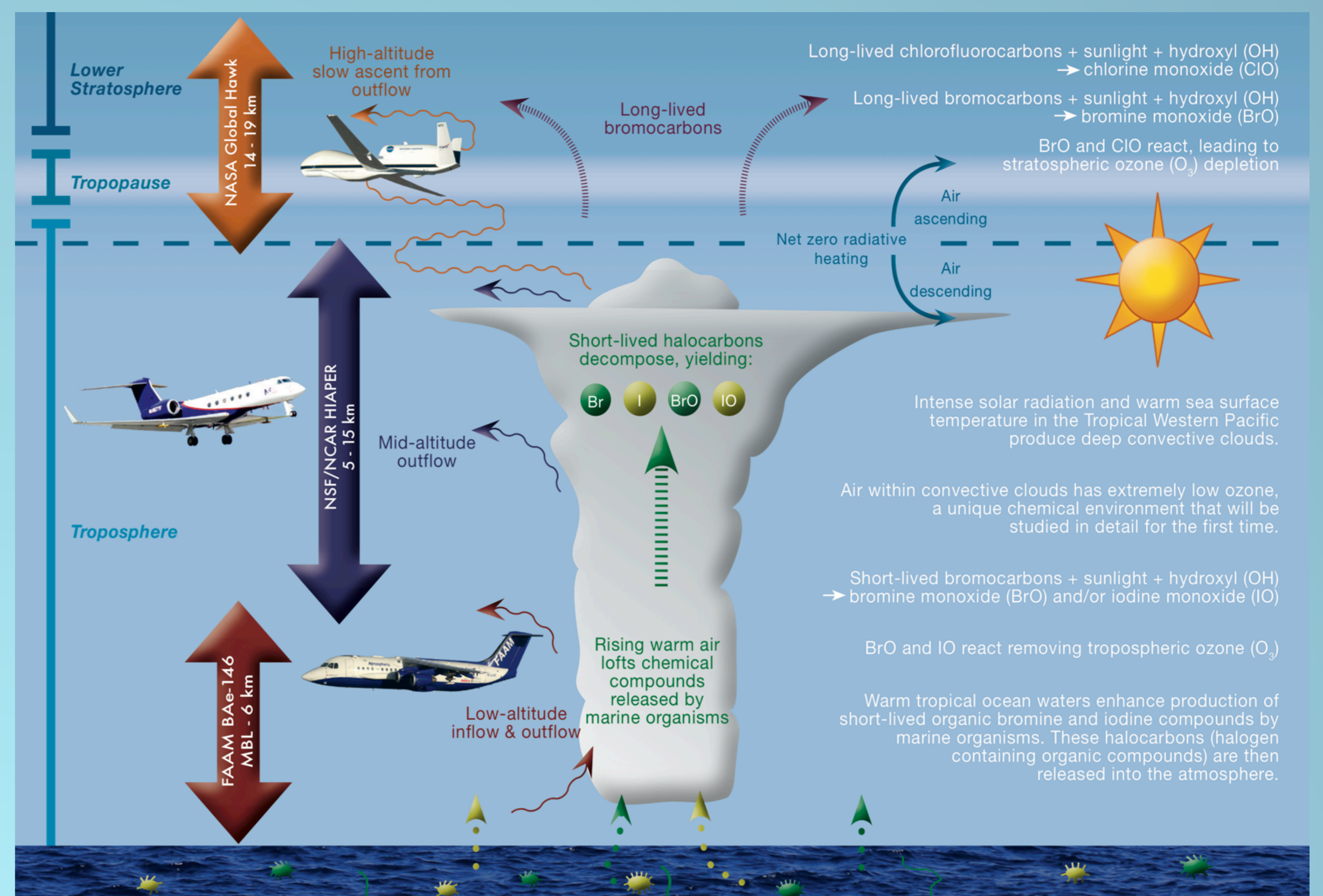


Aircraft payload

Observation	Instrument	Investigator	Synergy
O ₃	TE49C	FAAM	GH, GV
H ₂ O Vapor	General Eastern 1011 / Buck CR2	FAAM	GH, GV
CO	Aerolaser 5002	FAAM	GH, GV
CO ₂ , CH ₄	Los Gatos	FAAM / Bauguitte + Manchester/Gallagher	GH, GV
N ₂ O, H ₂ O	Aerodyne QCLAS	Manchester/Gallagher	GH
VSL halocarbons	Agilent GC-MS / Markes Dual TD (in situ and WAS)	York/Carpenter	GH, GV
NMHC, small OVOC, DMS	GC-FID (WAS)	York/Carpenter	GH, GV
NO, NO ₂	Air Quality Design	FAAM/Bauguitte + York/Lee	GV
BrO, BrCl, Br ₂ and HOBr (in situ)	CIMS	Manchester/Percival	GV
IO, I ₂ , OIO (in situ)	BBCEAS	Cambridge/Jones	GV (IO remote)
Black carbon	SP-2	Manchester/Gallagher	None
Aerosol	PCASP (Core FAAM)	Manchester/All	GH, GV
Winds/Turbulence/ Met	AIMMS-20 (Core FAAM)	Manchester/Vaughan	GH, GV

Three research aircraft in Guam:

- NERC/FAAM BAe-146 (CAST)
- NSF/NCAR HIAPER (CONTRAST)
- NASA Global Hawk (ATTREX)



Thanks to Alison Rockwell and Nathan Pitt

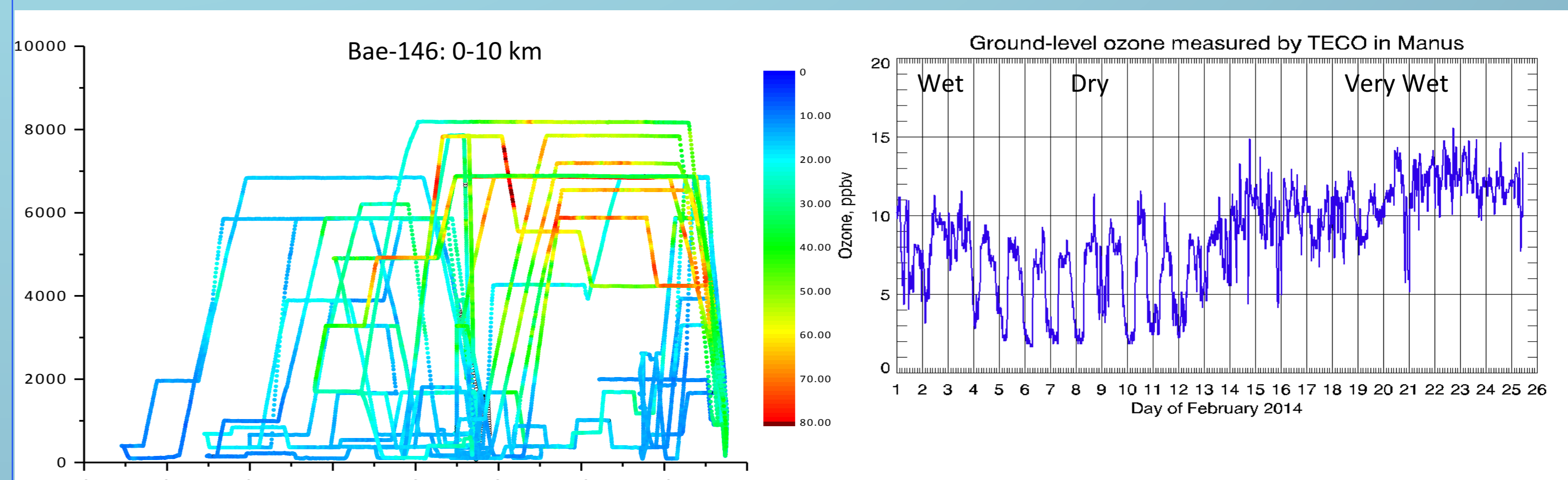
Ground measurements in Manus, PNG

- ARM site
- 2.1°S, 147°E
- February 1 – 24, 2014
- O₃ ground & sondes (35 good profiles)
- CO₂, CH₄, CO Picarro
- VSL μ-Dirac GC-ECD



Lower tropospheric ozone measurements

- FAAM BAe-146 and Manus Teco
- Low level ozone down to 5-10 ppb



Coming soon....

Three science CAST / ATTREX flights from Armstrong Flight Research Centre in March 2015, including AIITS (Aerosol Ice Interface Transition Spectrometer) and GHOST (GreenHouse Observations of the Stratosphere and Troposphere). The aim is to observe the tropical east Pacific in an El Niño winter.

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