

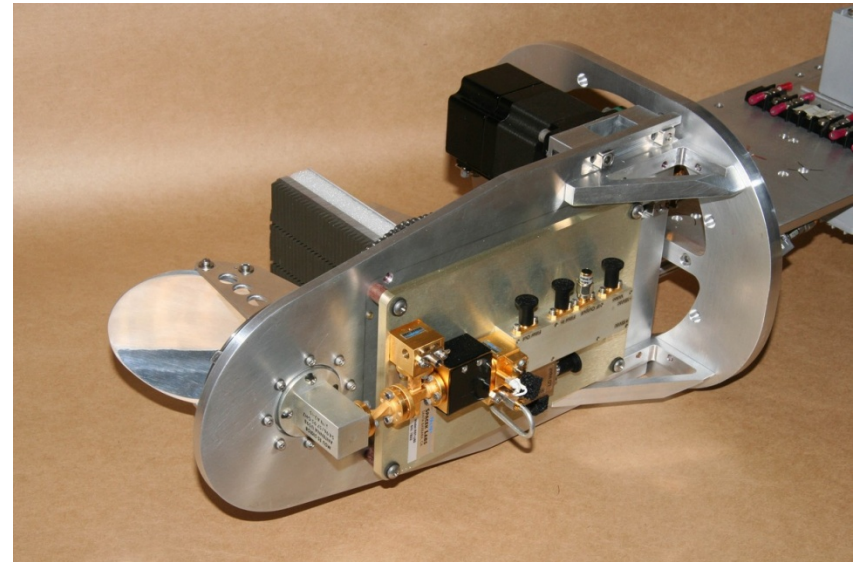
Microwave Temperature Profiler and Other RAF Radiometers for CSET

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CSET Planning meeting
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Microwave Temperature Profiler

Sensor Overview

- Airborne passive microwave sounding device
- Measures emission at 3 frequencies in the oxygen absorption (55 GHz) complex
- Scans from near-nadir to near-zenith, sampling at specified elevation angles
- Internal calibration system uses heated blackbody target and in situ temperature measurement
- Measurement uncertainty $\sim 0.2\text{K}$



- Penetration depths depend on frequency and altitude ($\sim 0.5 - 4$ km at 10 km flight level)
- Surface emission detected at low altitudes

MTP

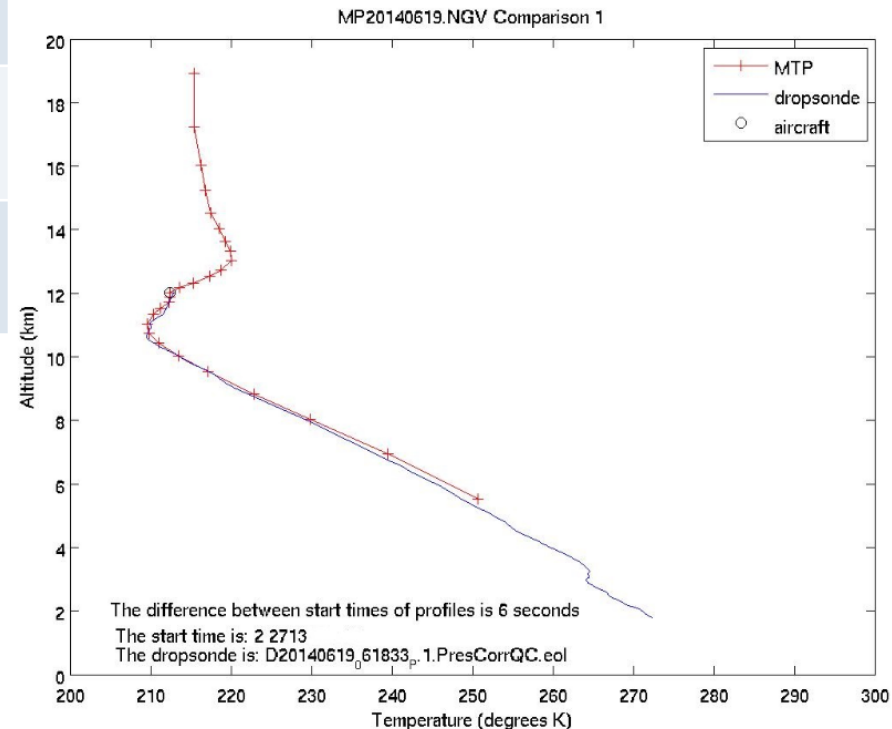
Temperature Profile Retrievals

- Statistical retrieval method constrained with a priori information from proximate radiosondes
- Profiles available at 17 sec intervals (~4 km horizontal spacing)
- Vertical resolution ~150 m within 1 km of aircraft, increases to ~1 km at >6 km away
- Profiles usually extend to $\pm 6-8$ km from flight level



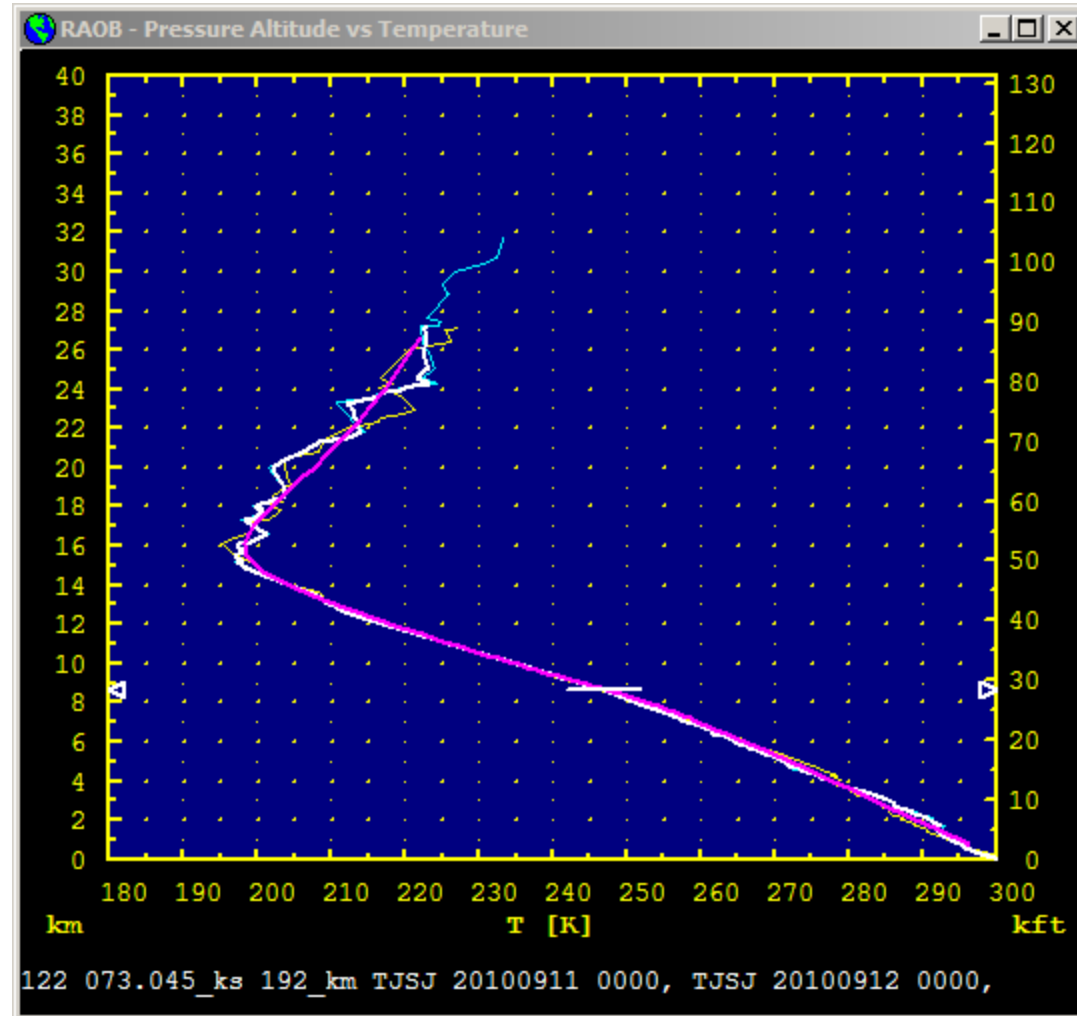
MTP vs. Dropsonde Temperature Profiles

	MTP	Dropsonde
Measurement method	remote	in situ
Accuracy	0.2-1.5 K	0.2K
Horizontal spacing in MPEX	4 km	~100 km
Vertical resolution	150 m – 1 km	6 m
Vertical extent	± 6km from flight level	Flight level to surface

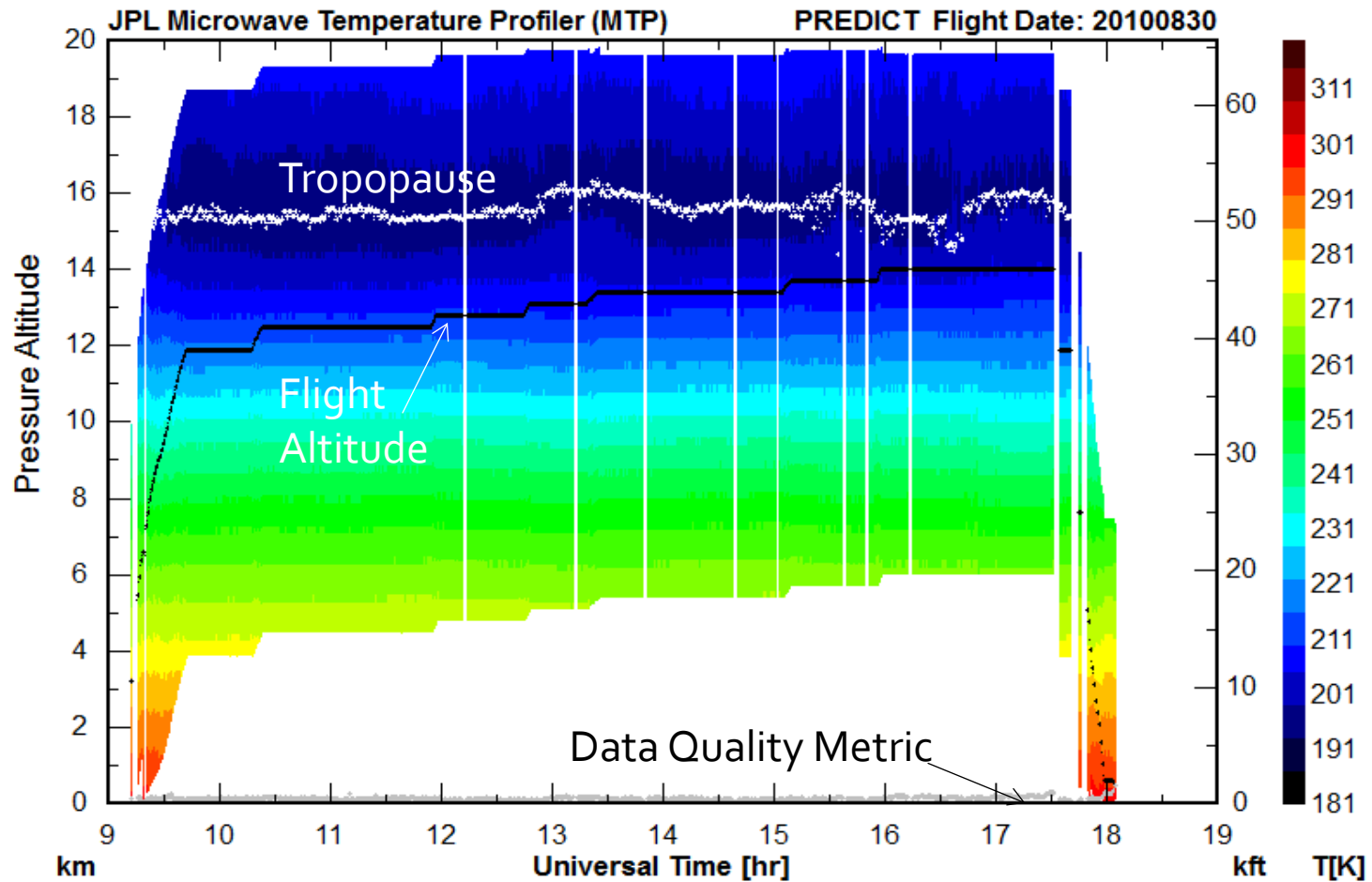


MTP Data Products

- Files containing retrieved temperature profiles (NASA Ames format); can also provide temperature curtain plots and isentrope plots
- Data generally released within 3 months of deployment



MTP Data Products



MTP Temperature Curtain Plot from PREDICT RFo6 (8/30/10) into TS Fiona

Sea Surface Temperature

- Heitronics KT19.85 infrared pyrometer
- Spectral range 9.6 – 11.5 μm
- Field of view 2°
- Sampling rate 5 Hz
- Specified accuracy 0.5 K plus 0.7% of difference between sensor housing temperature and scene temperature
- Emission by water vapor in the column also contributes to uncertainty; contribution can modeled and removed (Haggerty et al., JGR, 2003)



GV Installation

- Mounted on downward facing aperture plate
- Vertical orientation

Infrared Irradiance

- Kipp&Zonen CGR₄ pyrgeometer
 - Spectral range 4.5-42 μm
 - Modified for airborne operation
 - Upward- and downward-looking units
 - Currently undergoing calibration at NRL-Monterey

