

The Microwave Temperature Profiler Data Set from PREDICT

Julie Haggerty

NCAR/RAF

M.J. Mahoney

JPL

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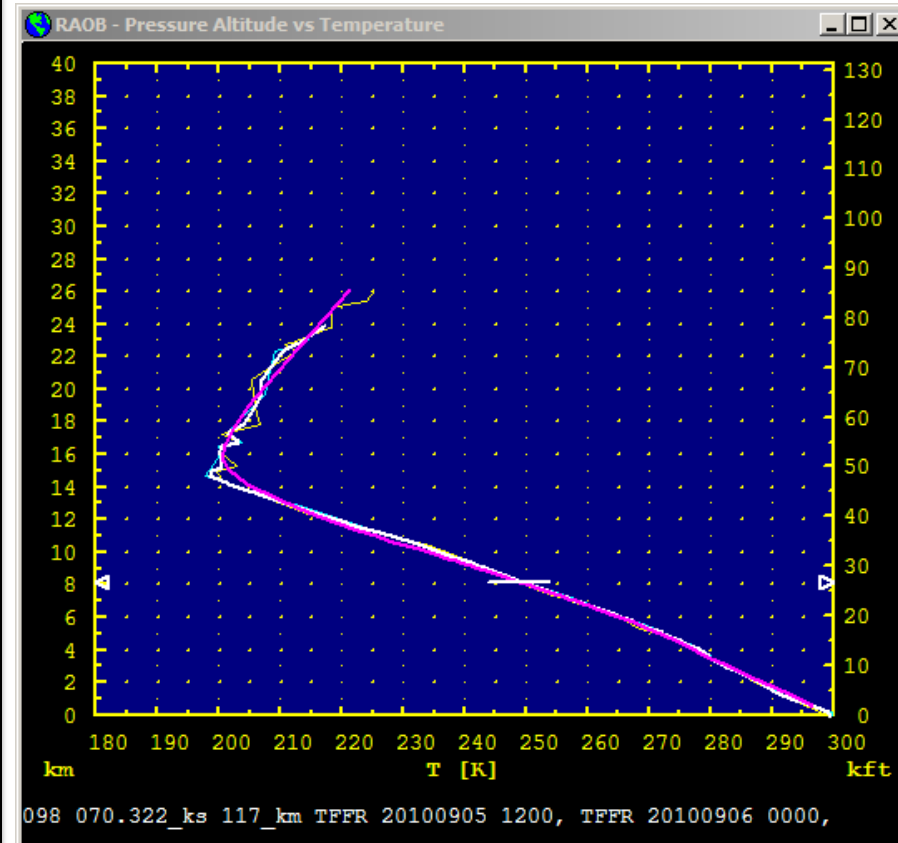
MTP Instrument Overview

- Airborne passive microwave sounding device
- Measures emission in 3 oxygen absorption bands
- Scans from near-nadir to near-zenith
- Internal calibration system uses heated blackbody target and ambient temperature measurement
- 100 m vertical resolution near aircraft
- Profile available every 17 seconds
- Best accuracy within $\pm 6\text{km}$ of flight level



Statistical Temperature Profile Retrieval Method

- 30 measurements of brightness temperature (T_B) from each scan
 - 3 frequencies
 - 10 viewing angles
- Forward radiative transfer model generates T_B database from climatologically similar historical raobs
- Measured T_B matched with modeled T_B to determine most likely profile; concurrent raobs narrow set of possible solutions
- Derived geophysical products:
 - Temperature profiles along flight track
 - Tropopause height
 - Lapse Rate
 - Isentrope (θ) surfaces



MTP temperature profile on
5 September 2010 compared to raob
profiles from Guadeloupe

MTP Performance during PREDICT

- Intermittent problem tuning to proper frequencies
 - often associated with high ice water conditions
- Periods of single frequency measurements
 - 10 data points vs. 30 data points
- Removed from plane for troubleshooting during RF13
- Degraded retrievals performed during single frequency sampling periods; single frequency data merged with standard retrievals



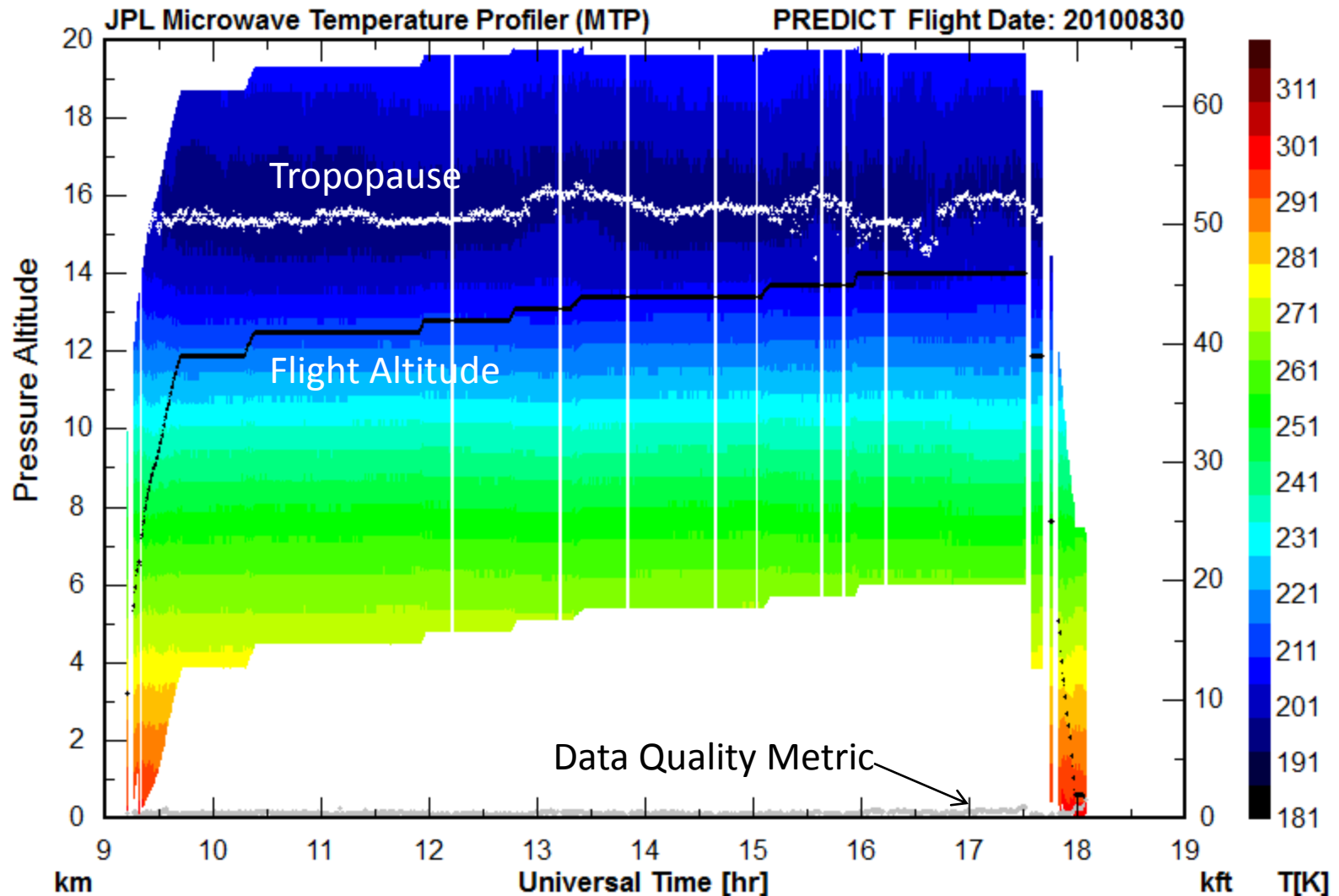
Status

MTP Data Processing

Standard Data	150 flight hours
Single Frequency Data	15 hours

Data availability:

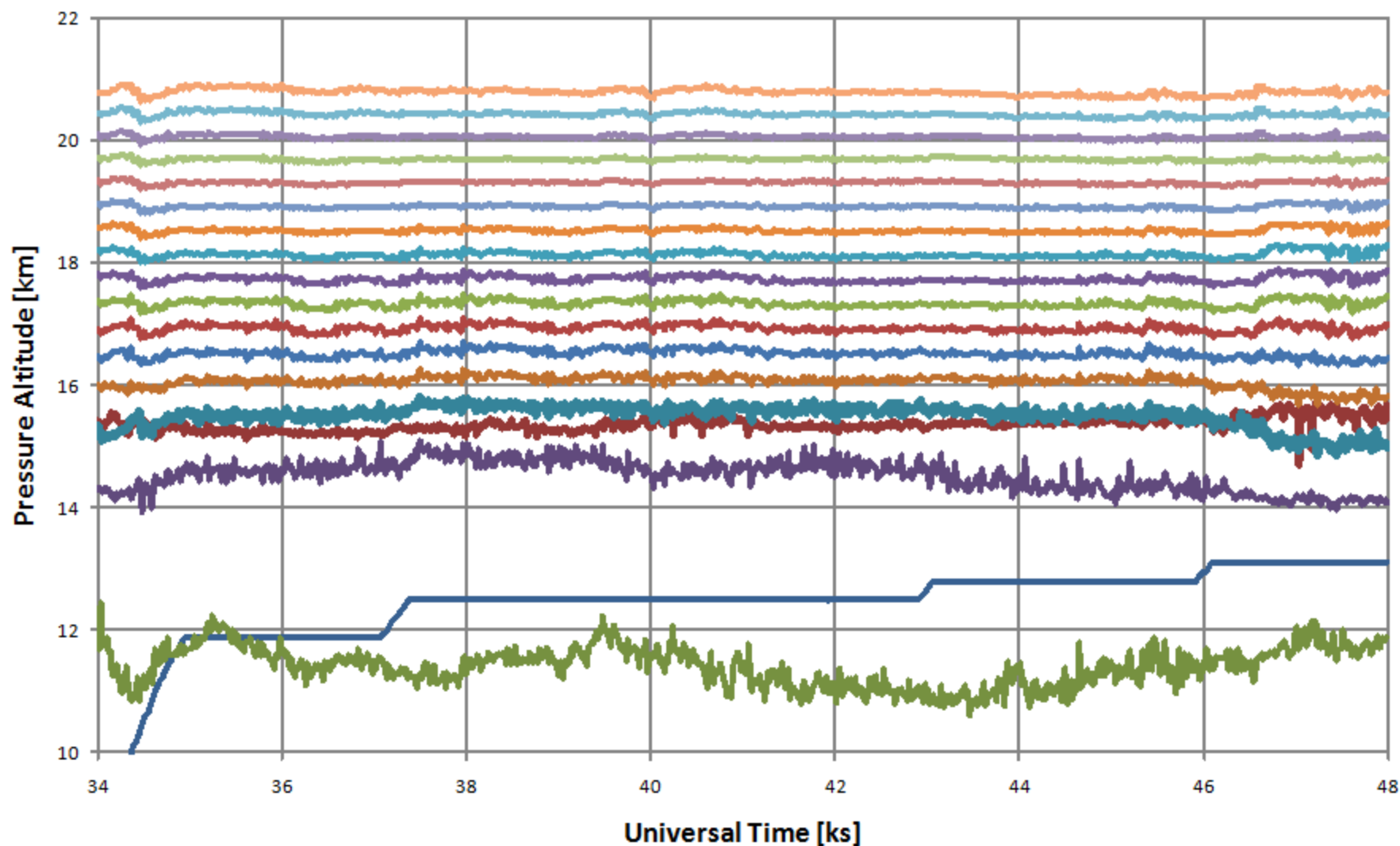
- Production data set recently completed
- Data stored in NASA Ames format
- Comparison with dropsondes planned
- Website contains quick-look graphical products



MTP Temperature Curtain Plot from RF06 (8/30/10)
into PGI36L (TS Fiona)

Isentrope Altitude Cross-Section
PREDICT - NGV 20100830

MTP

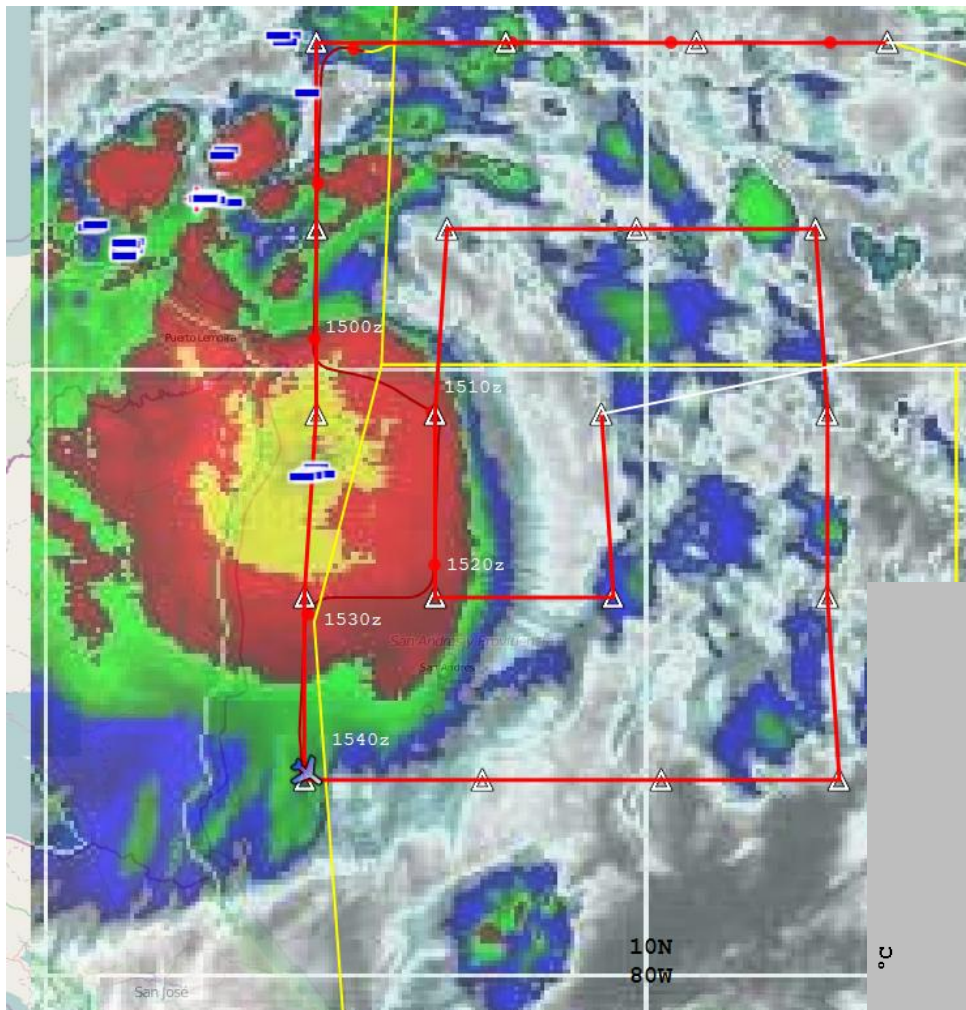


— pALT — Zt1 — 350 K — 360 K — 370 K — 380 K — 390 K — 400 K — 410 K
— 420 K — 430 K — 440 K — 450 K — 460 K — 470 K — 480 K — 490 K — 500 K

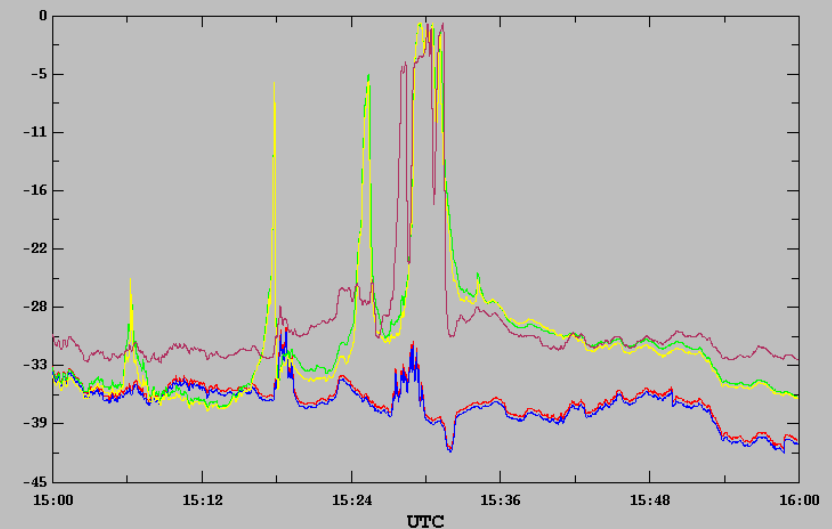
RF23 – 9/24/11

Tropical storm Matthew

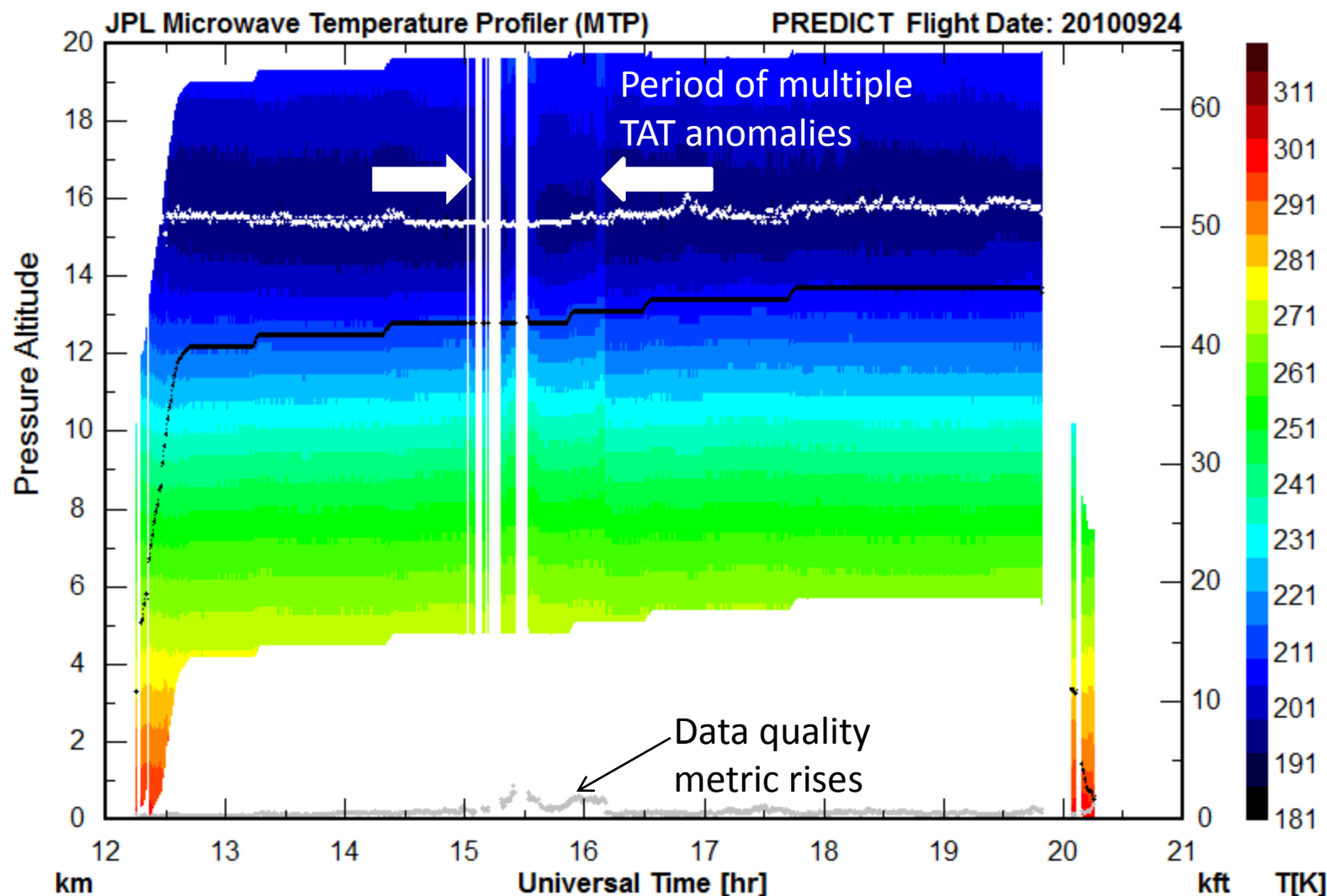
- Total air temperature anomalies during high ice water content conditions
- MTP also experienced problems in these conditions



PREDICT, Flight #rf23
09/24/2010, 15:00:00-16:00:00



	mean	sigma	min	max
IT A (°C), 1 s/sec	-29.66	6.25	-33.47	-0.73
TTHR2 (°C), 1 s/sec	-31.49	7.23	-38.13	-0.67
TTHR1 (°C), 1 s/sec	-30.91	7.33	-37.78	-0.67
TTHR2 (°C), 1 s/sec	-37.53	1.86	-42.16	-30.51
TTHR1 (°C), 1 s/sec	-37.13	1.86	-41.75	-30.04



MTP Temperature Curtain Plot from RF23, including a period with single frequency sampling associated with total air temperature anomalies in the in situ temperature sensors.

Data Access

- “MP” files in NASA Ames format will be submitted to archive
 - ascii files
 - self-describing header followed by profile data
- MTP PREDICT Webpage
 - Data processing procedures summarized
 - Quicklook images with associated data quality comments

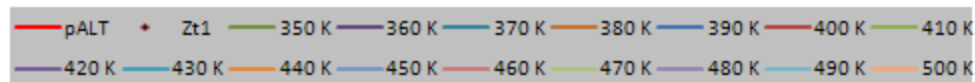
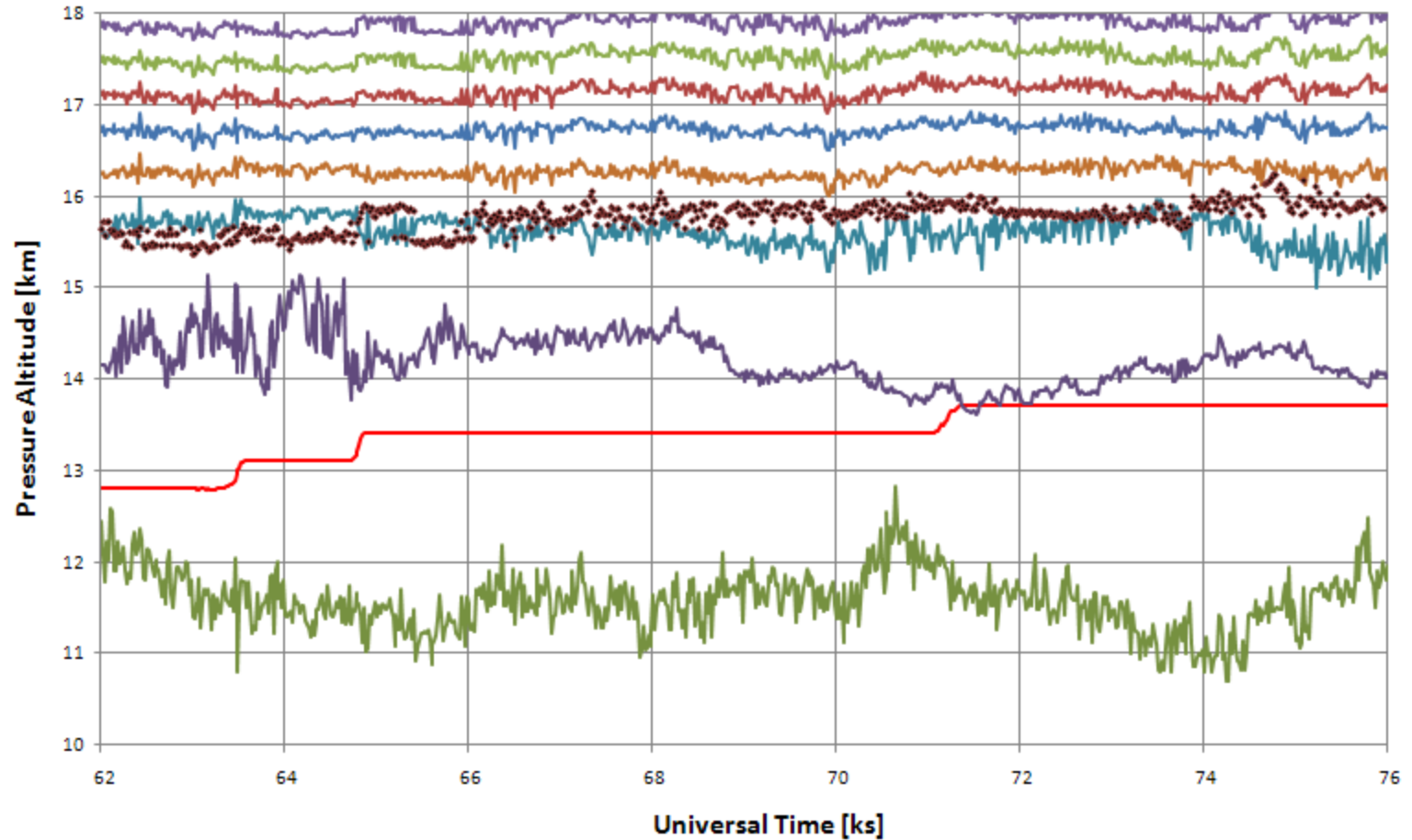
<http://mtp.mjmahoney.net/www/missions/predict/predict.html>

Contact Julie Haggerty: haggerty@ucar.edu

Isentropic Altitude Cross-Section
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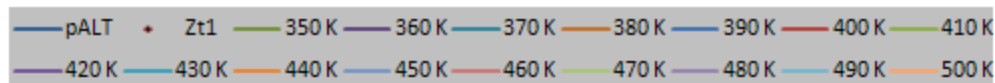
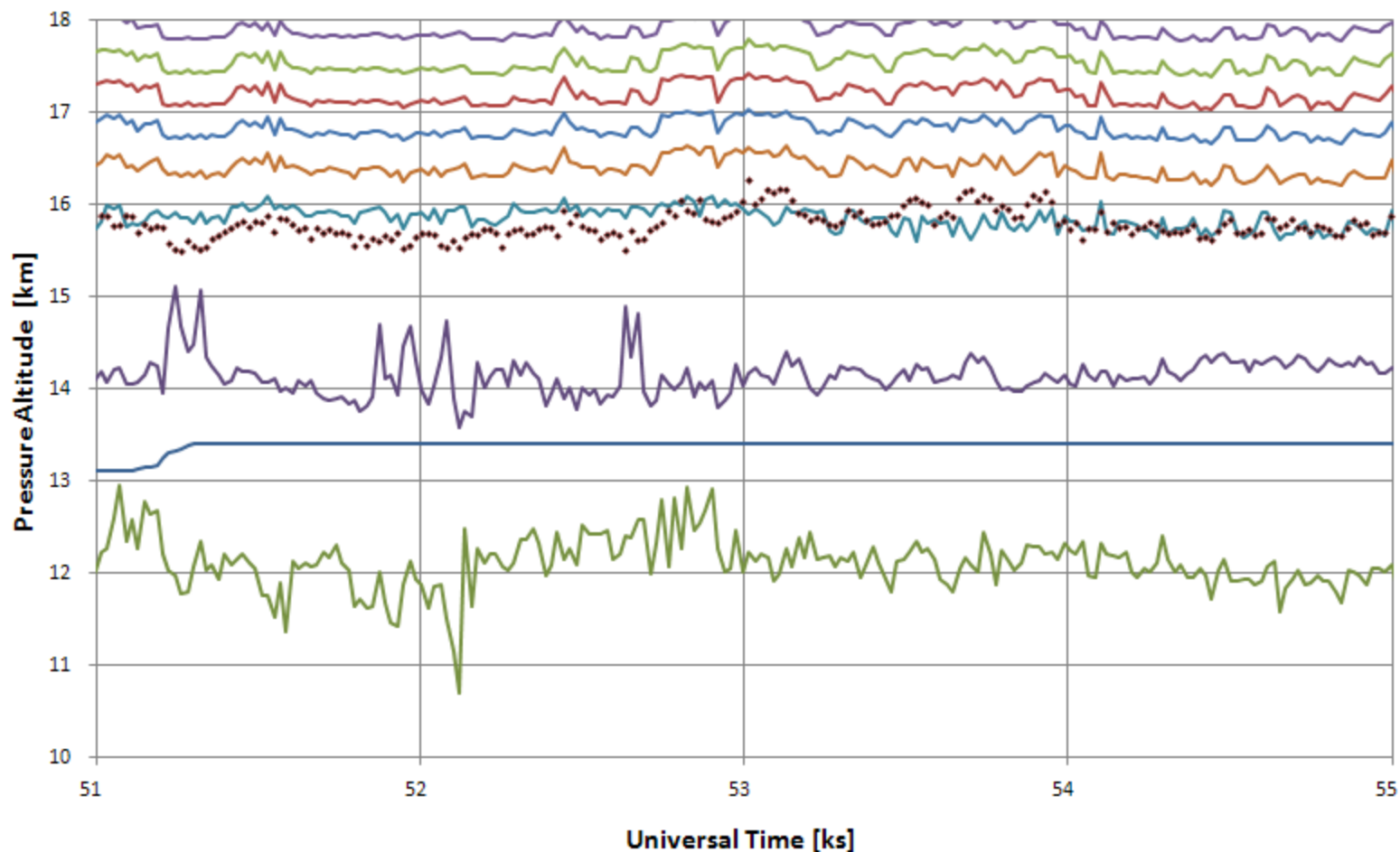


mjm 06-06-2011

Isentrope Altitude Cross-Section
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