

# Microwave Temperature Profiler Data during HIPPO

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# MTP

## Temperature Profiles Above/Below Flight Level

- Profiles available at 17 sec intervals
- Vertical resolution  
~100 m near aircraft
- Best accuracy within  
+/- 6km of flight level
- Uncertainty range  
~0.2-1.5 K



# MTP Data Processing Overview

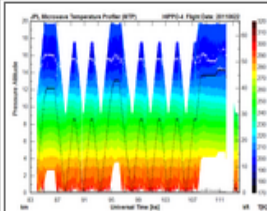
- HIPPO: altitude changes challenging
  - Retrieval method assumes constant altitude for duration of scan (~17 seconds)
  - Limit vertical range of profiles in output files
- Occasional data gaps
  - Radio frequency interference, particularly in Alaska
  - Very steep ascent/descent rates preclude quality retrievals
  - Performance issues with frequency synthesizer
  - Steady improvement in data quality throughout campaign

# Instrument Changes during HIPPO

|         | Frequency Synthesizer | Frequency Synthesizer Location | Frequencies Sampled                                    |
|---------|-----------------------|--------------------------------|--------------------------------------------------------|
| HIPPO-1 | Unit 1 (noisy)        | Back of canister               | Wings of absorption lines                              |
| HIPPO-2 | Unit 2 (borrowed)     | Front of canister              | Peak of absorption lines                               |
| HIPPO-3 | Unit 3 (Gigatronics)  | Back of canister               | Peak of absorption lines (frequency collapse problem)  |
| HIPPO-4 | Unit 3 (Gigatronics)  | Front of canister              | Peak of absorption lines with revised command software |
| HIPPO-5 | Unit 3 (Gigatronics)  | Front of canister              | Peak of absorption lines with revised command software |

# Data Status and Format

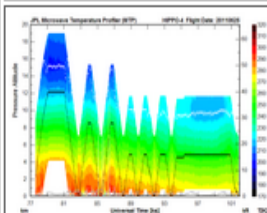
- Final data from HIPPO-1,2,3,4 submitted
- HIPPO-5 expected in April
- NASA Ames format
  - Self-describing header
  - Temperature profiles at 17 sec intervals
  - Uncertainty estimates associated with each data point
  - Stratosphere/troposphere classification in separate files
- Quicklook images and data discussion provided at:  
[http://mtp.mjmahoney.net/www/missions/hippo-\\*/hippo-\\*.html](http://mtp.mjmahoney.net/www/missions/hippo-*/hippo-*.html)



RF04 - 20110622

**Kona, Hawaii to Rarotonga**

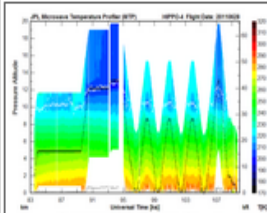
This flight looks very good.



RF05 - 20110625

**Rarotonga to Christchurch, New Zealand**

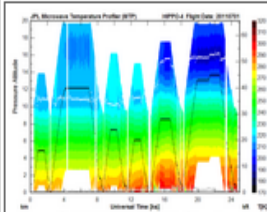
The data for this flight looks excellent. The tropopause determinations are a little erratic during the rapid ascents and descents between 81 and 88 ks.



RF06 - 20110628

**Christchurch, New Zealand to Hobart, Tasmania**

This flight required the most work on retrieval coefficients. This because the NGV entered the polar vortex south of New Zealand. This compromised the retrievals from 90-95 ks, but the results are acceptable.



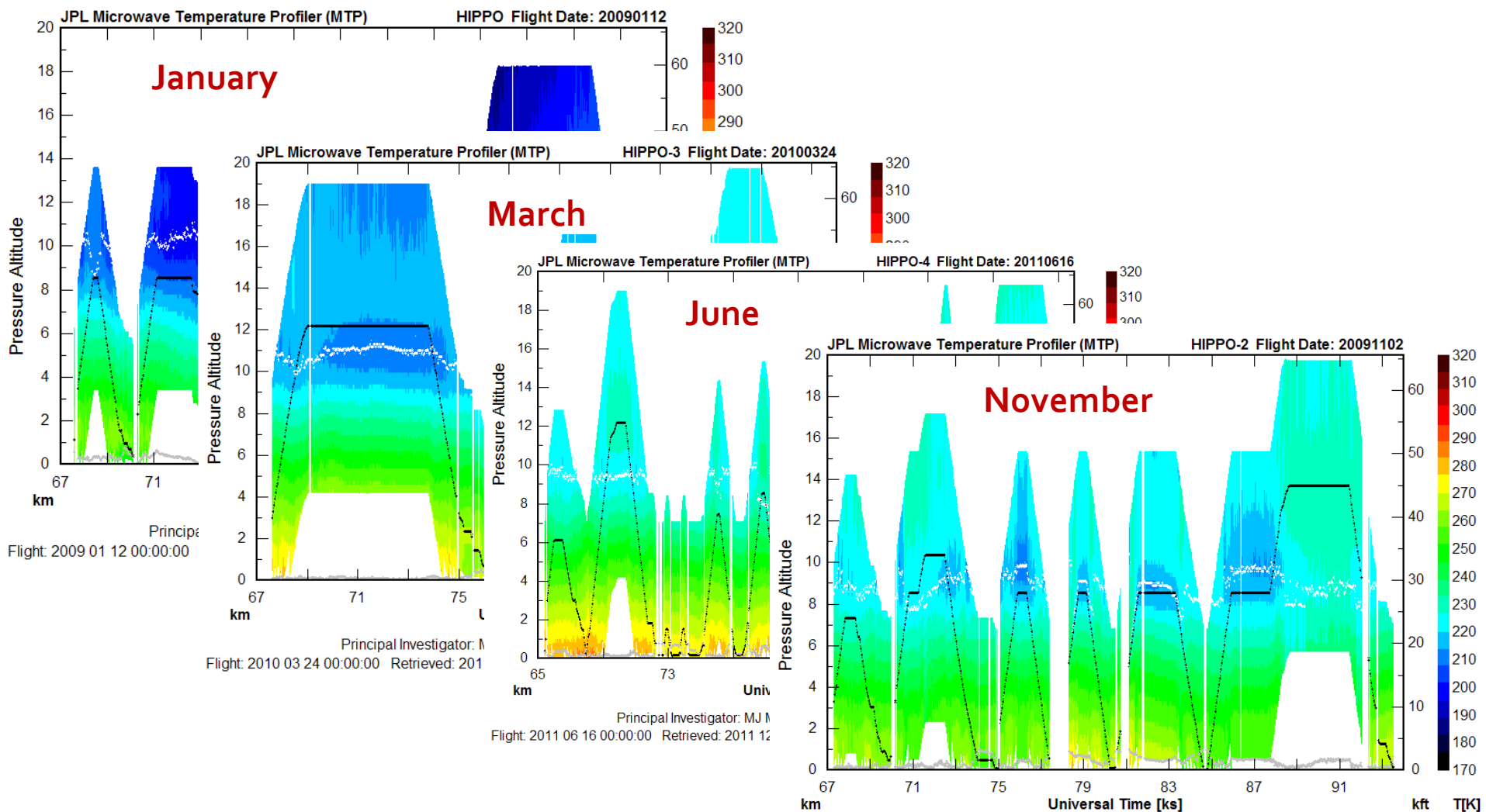
RF07 - 20110701

**Hobart, Tasmania to Darwin, Australia**

The data for this flight looks excellent. The tropopause determinations are a little erratic during the rapid ascents and descents between 14 and 18 ks.

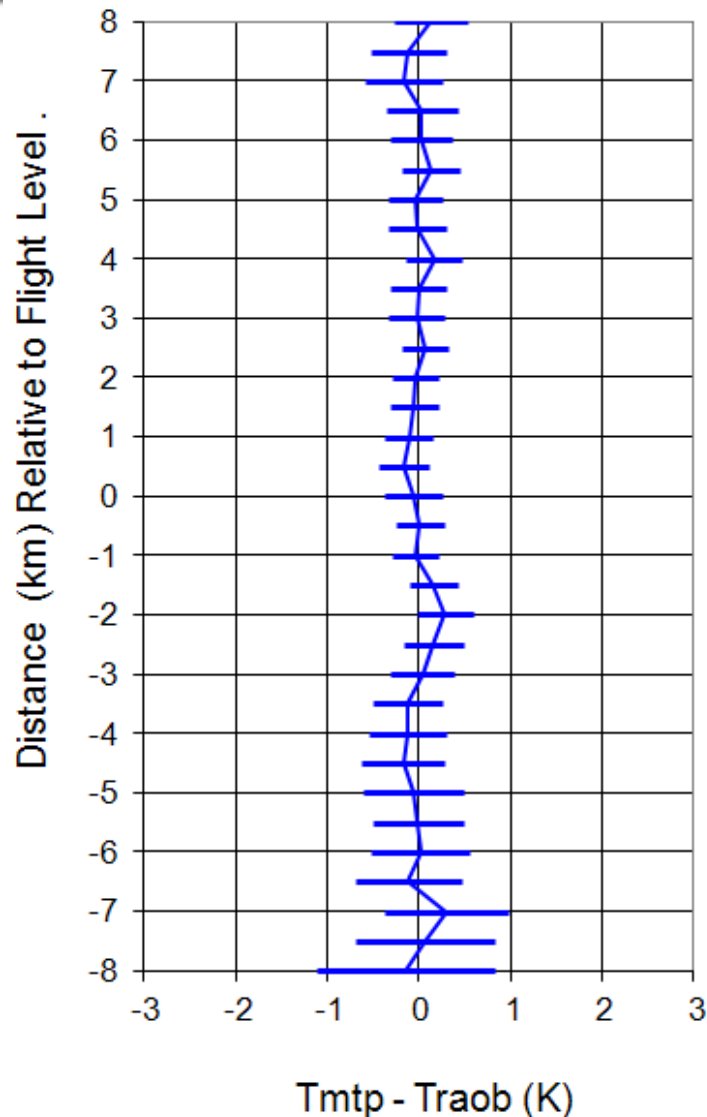
**Darwin, Australia to Salina, Mexico Islands**

# Season Temperature Variation: North polar flights



# HIPPO-4 MTP Profiles vs. Radiosonde

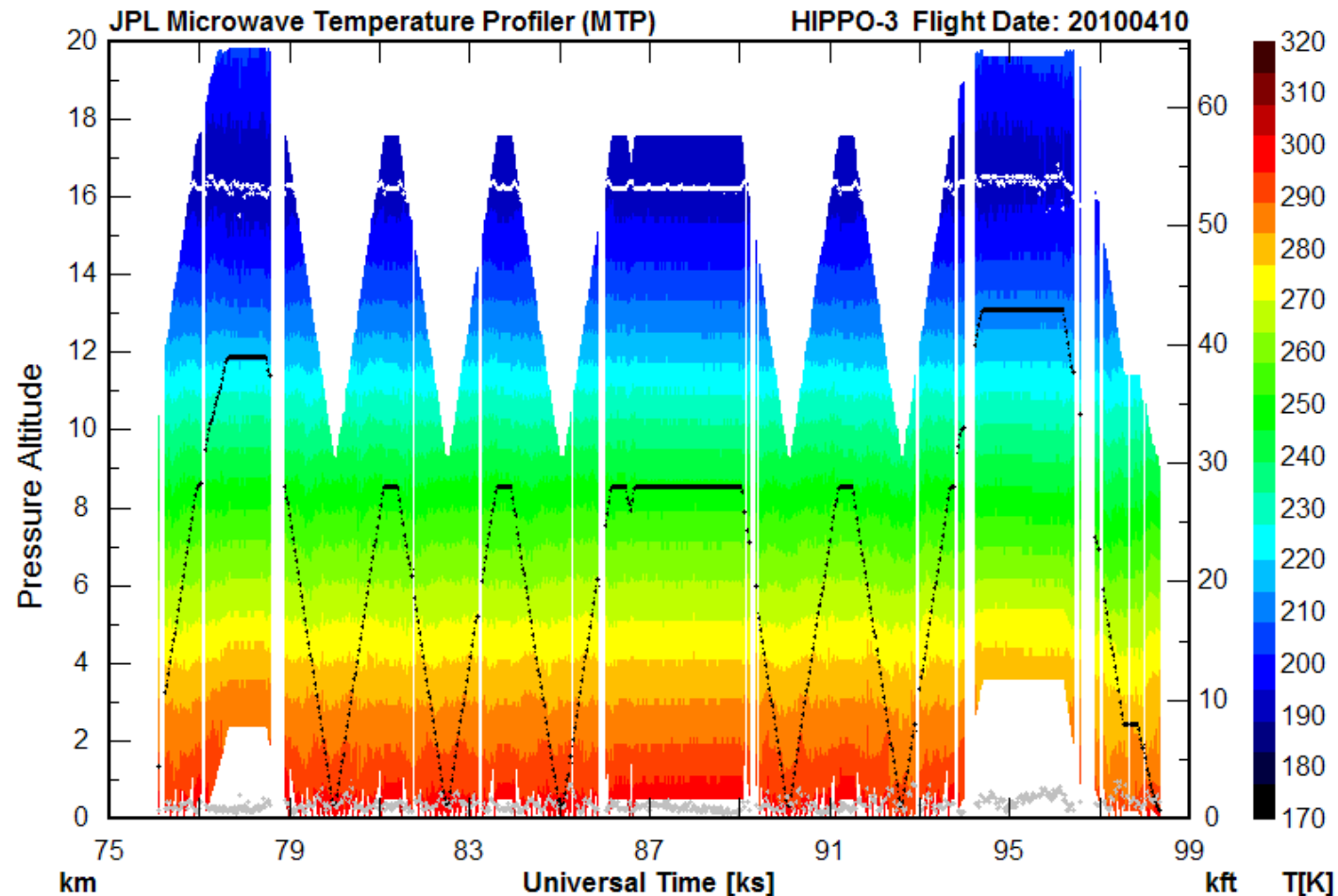
## Mean difference vs. altitude for 53 comparisons





# HIPPO-3

## RFo8: American Samoa to Kona, HI



Principal Investigator: MJ Mahoney (Michael.J.Mahoney@jpl.nasa.gov)

Flight: 2010 04 10 00:00:00 Retrieved: 2011 02 16 11:47:38 Edited: 2011 02 21 17:41:14 Plotted: 2011 02 21

# MTP Calibration Procedures

## 1. Raw Counts to Brightness Temperature

- Internal target provides 1 point relating brightness temperature to counts
- Aircraft in situ temperature provides 2<sup>nd</sup> point  
→ calculate gains

## 2. Temperature Profile Retrieval

- Statistical retrieval uses a priori information from radiosondes
- Retrieval coefficients for real-time processing derived from historical radiosonde database before project
- Post-flight retrieval coefficients calculated from radiosondes near flight track