

# Microwave Temperature Profiler: Status of DEEPWAVE Data Processing Efforts May 2015

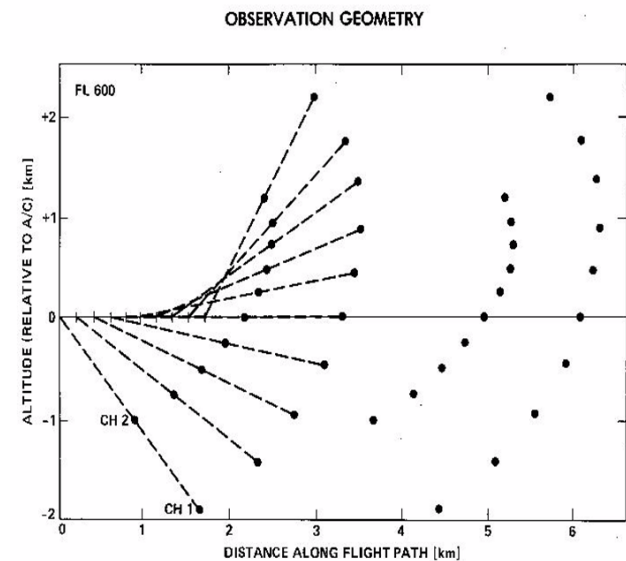
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# MTP

## Specifications

- Samples at three oxygen absorption lines (56.363, 57.612, 58.363 GHz)
- Samples at 10 viewing angles between nadir and zenith
- Two-point calibration uses heated blackbody target and noise diode deflection (real-time) or ambient a temperature (post-processing)
- Profile available every 17 seconds (~4 km horizontal spacing)
- ~150 m vertical resolution near aircraft
- Estimated uncertainty ~0.5 to 1.5 K within +/- 6km of flight level



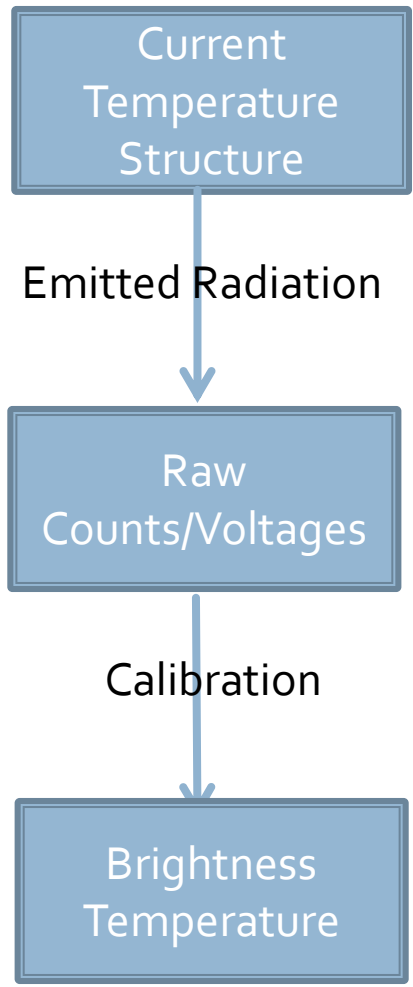
# Summary of MTP on DEEPWAVE Flights

- MTP Operated on:
  - 26 research flights
  - 2 test flights
  - 5 ferry flights
- Sensor performance issues on two flights
  - RF10 – 6/25/14
  - RF20 – 7/10/14
  - Otherwise normal

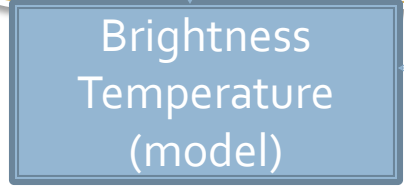
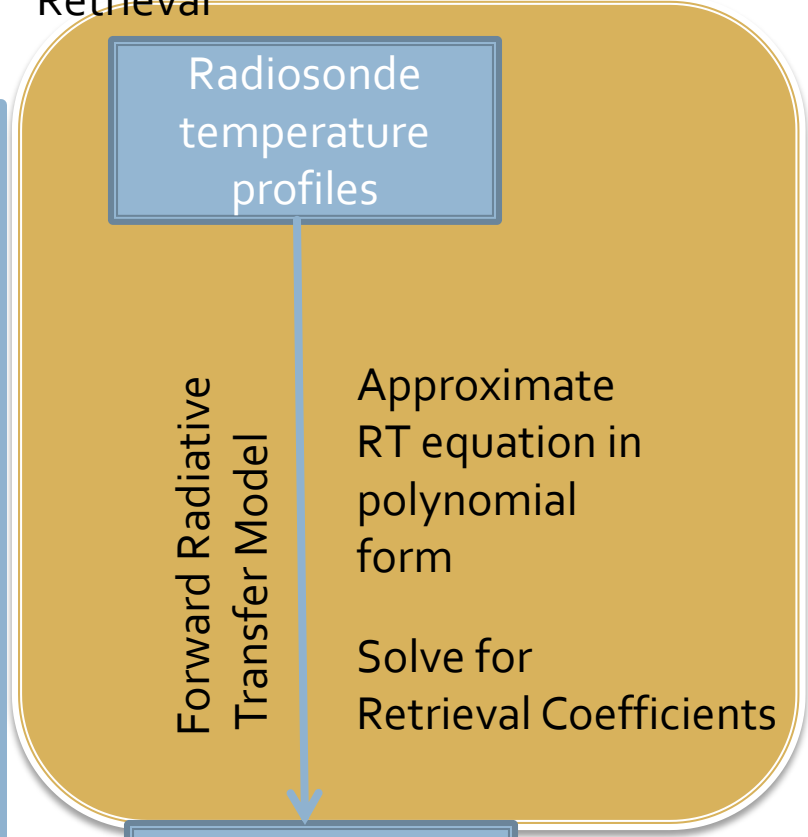
# Temperature Profile Retrieval

Statistical retrieval method using optimal estimation with radiosonde data as a priori information

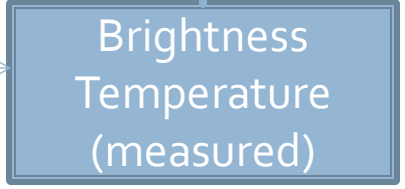
## Measurement



## Retrieval



Find best match; use associated RCs



Retrieval Coefficients

# Retrieval Procedures for DEEPWAVE

- Received special radiosondes from Hokitika, Lauder, Haast, Macquarie, Hobart; collected routine raobs in the region from Univ of Wyoming site
- Identified a set of raobs near flight tracks; used them for radiative transfer calculations to derive a priori information
- Initial pass retrievals showed that New Zealand raobs often did not approximate our observed temperature structure, e.g., over the ocean
- Inclusion of upwind raobs improved our approximation of the observed temperature structure and thereby improved the a priori specification

# Final Data Set Overview

- Releasing 25/26 research flights currently; further work needed on RF10
- Data written to MP text files in NASA Ames format (same as preliminary field data files)
- Scans during rapid ascent/descent and turns have been eliminated
- Temperature curtain plots will be posted to website
- Data quality summary of each flight to be included on website

# MTP File Structure

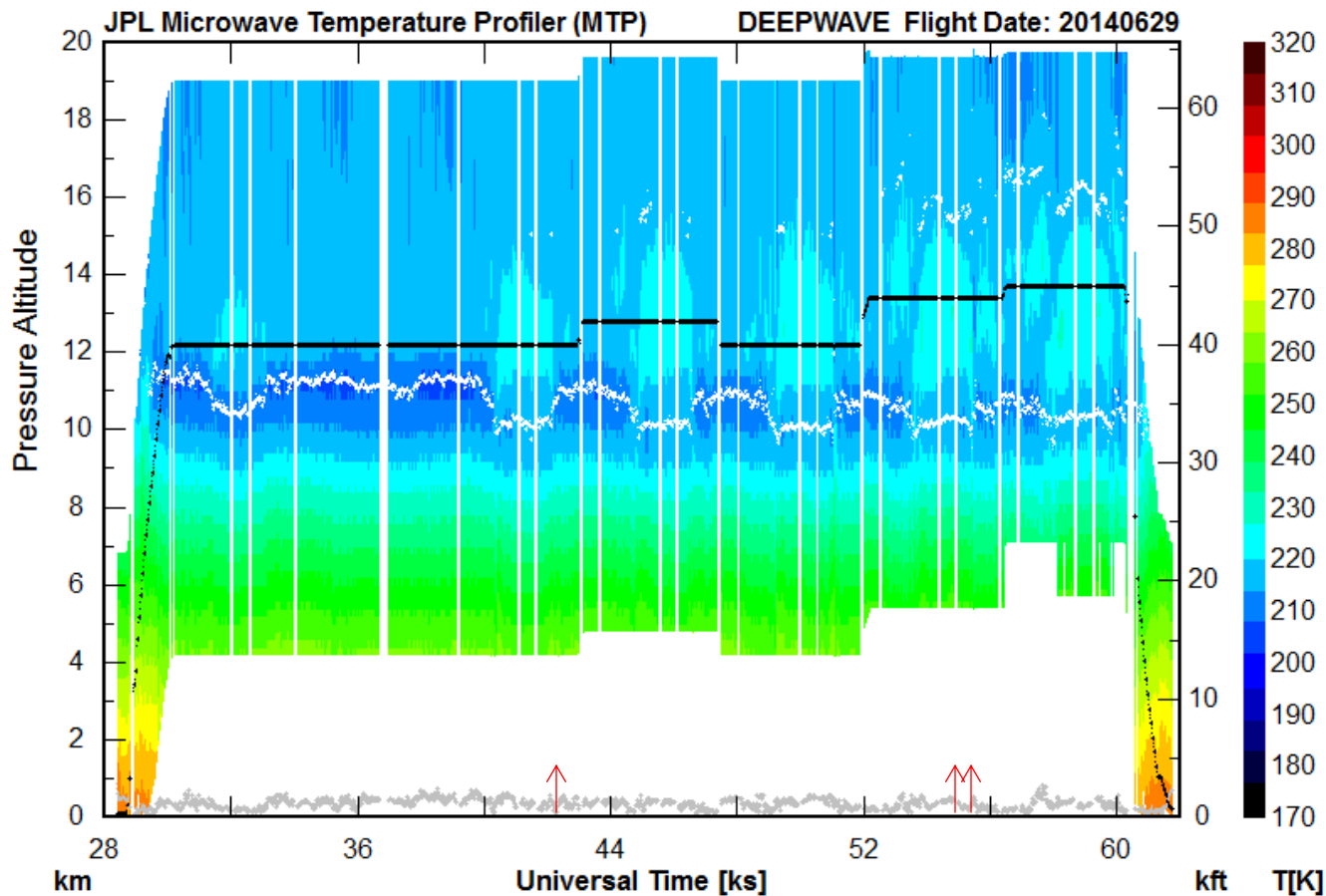
- Text file containing temperature profiles for a single flight
- 64-line self-describing header
- Single header line for each profile, followed by temperature and estimated uncertainty at each altitude
- Matlab code available for reading files and parsing data strings

# Overall Quality Assessment

- Normal raw data and retrievals for majority of flights
- Portions of RF10 and RF20 had anomalous counts/voltages due to a hardware issue; RF20 has been salvaged, still exploring calibration adjustments to RF10
- RF23 shows short-lived irregularity later in flight
- DEEPWAVE environment presented challenges to the standard MTP retrieval method which performs well in horizontally homogeneous conditions → uncertainty is larger than in other projects
- Comparisons of MTP retrievals with dropsonde are generally good despite the additional uncertainty

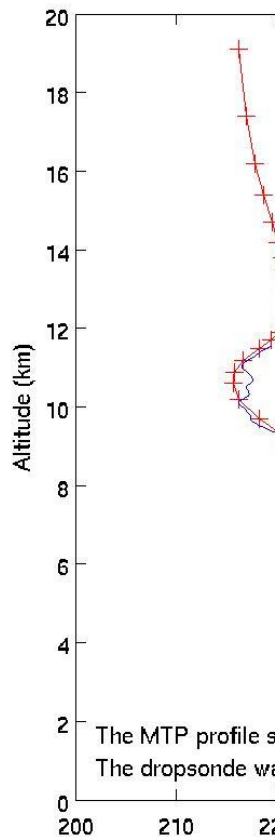


# RF12 – 6/29/15

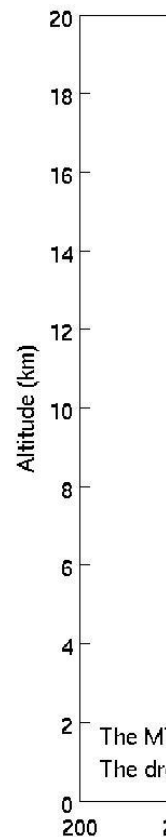


# MTP-Dropsonde Comparisons

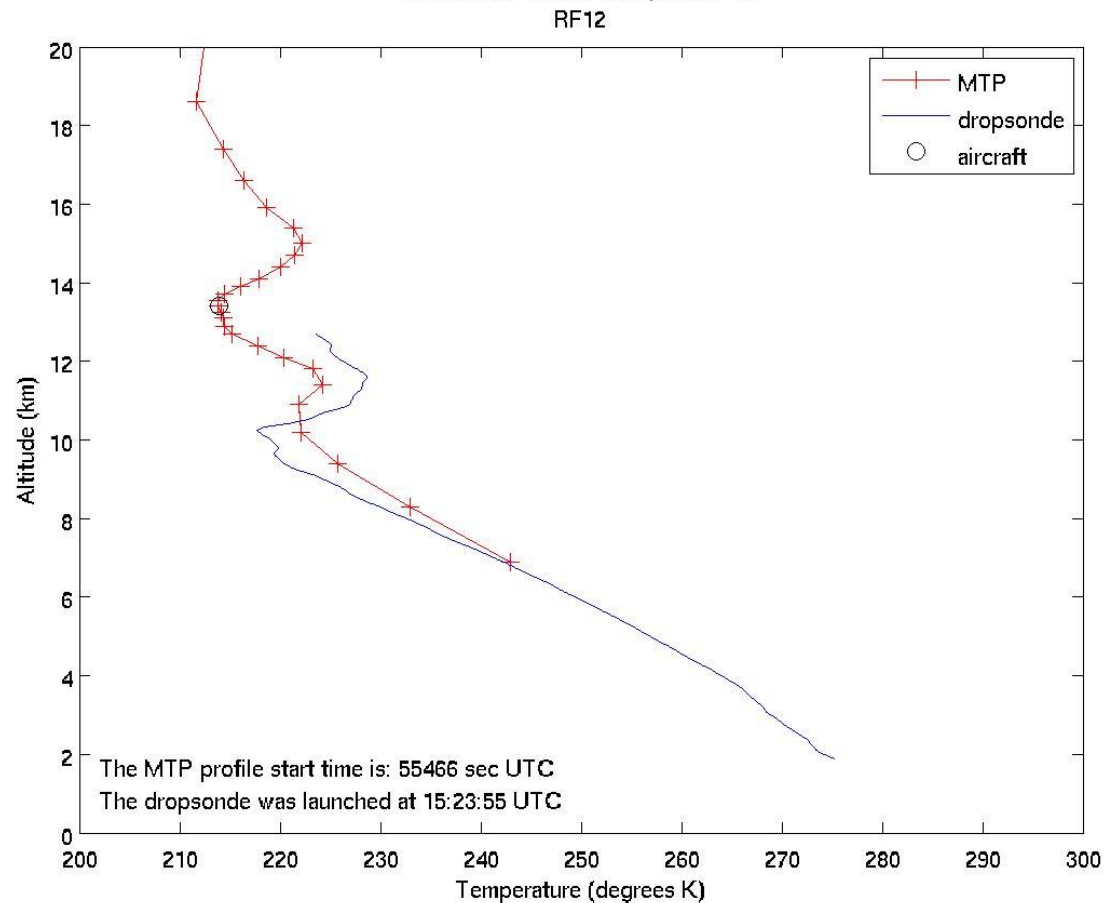
MP20140629.NGV Comparison 11



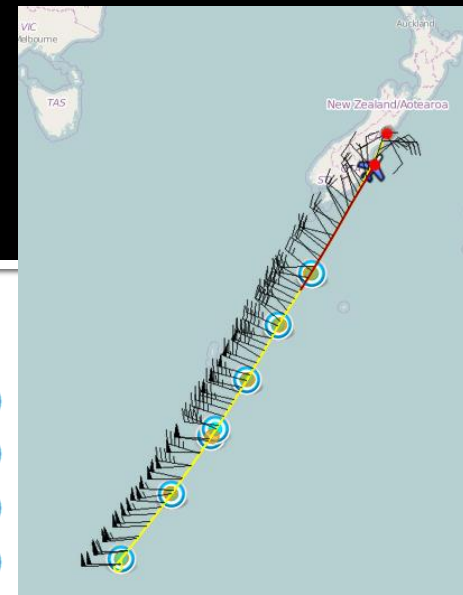
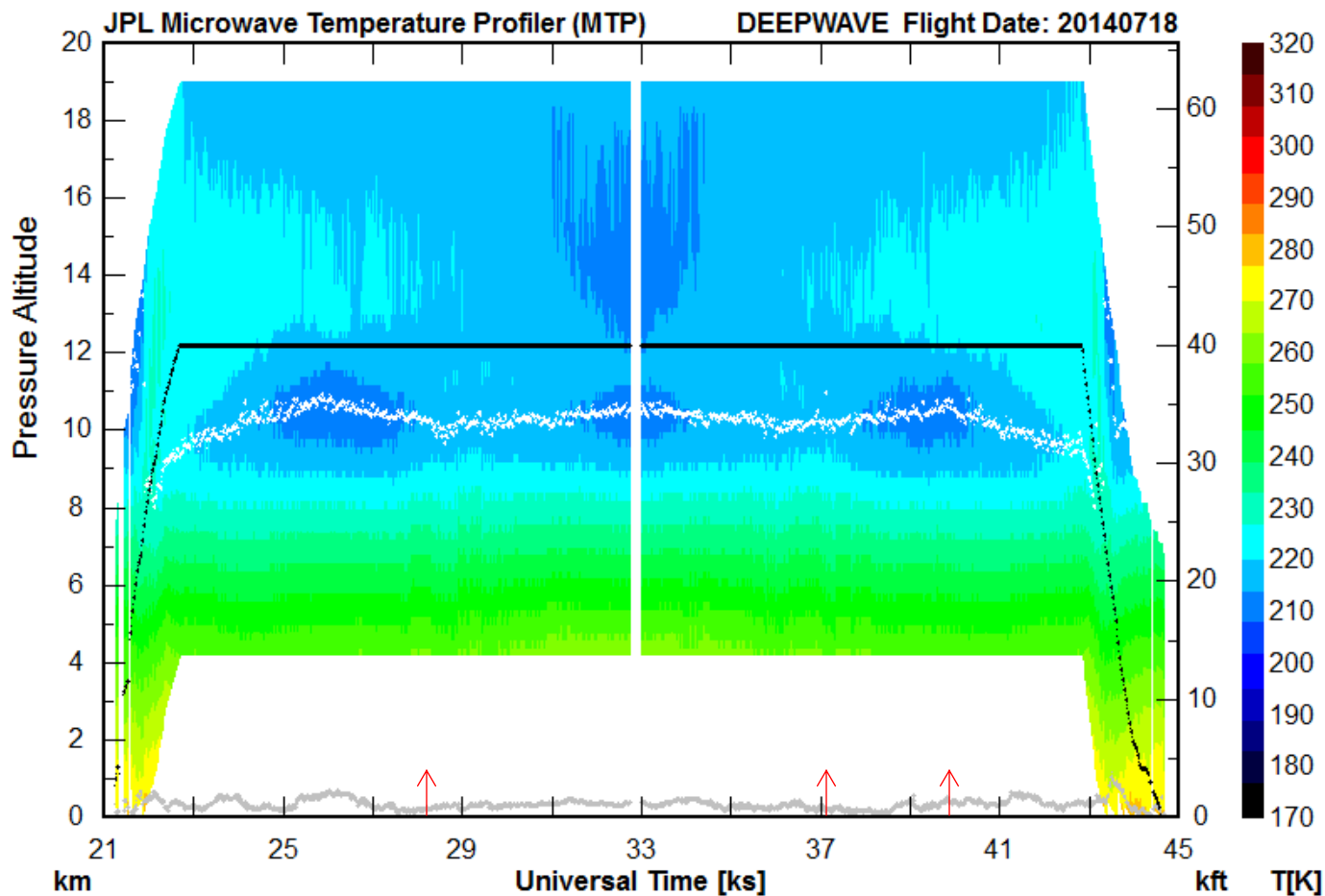
MP20140629.NGV Comparison 17



MP20140629.NGV Comparison 19

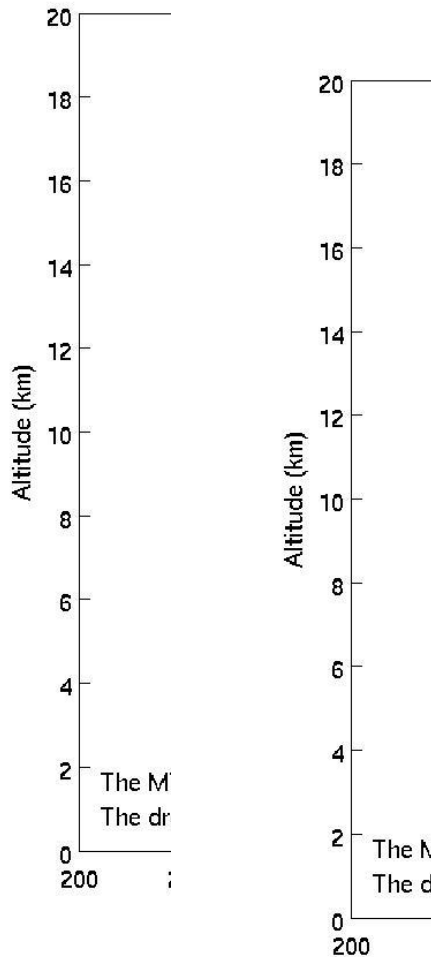


# RF25 - 7/18/14



# MTP-Dropsonde Comparisons

MP20140718.NGV Comparison 3  
RF25



MP20140718.NGV Comparison 11  
RF25

