Microwave Temperature Profiler:
Status of DEEPWAVE Data Processing Efforts
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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


OBSERVATION GEOMETRY
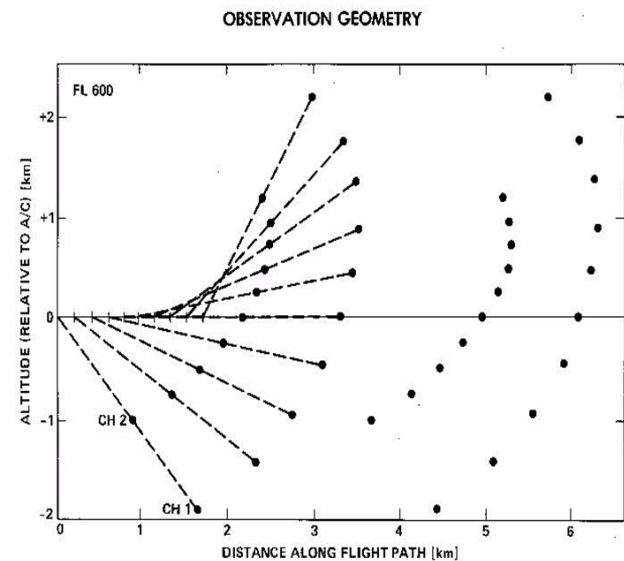
MTP Data Overview from DEEPWAVE

- MTP Operated on:
  - 26 research flights
  - 2 test flights
  - 5 ferry flights

- Preliminary Quality Assessment
  - Normal raw data for majority of flights
  - Portions of 2 flights with anomalous counts/voltages; correctable with calibration adjustments
  - Comprehensive a priori data set available due to special radiosondes at Hokitika, Lauder, Haast sites → should allow good post-project retrievals
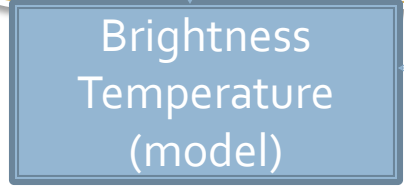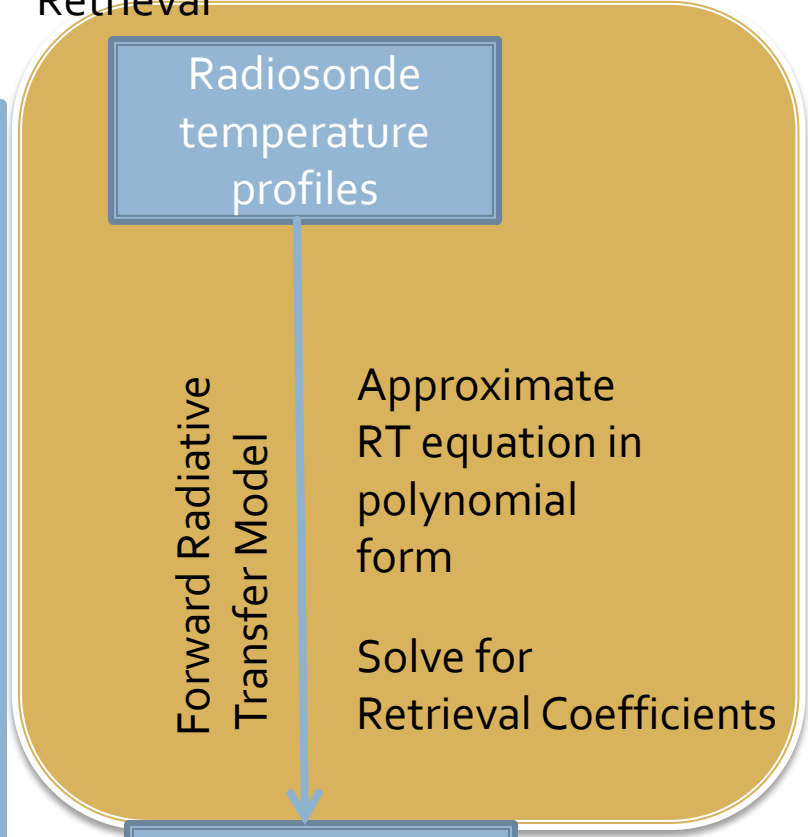
Temperature Profile Retrieval

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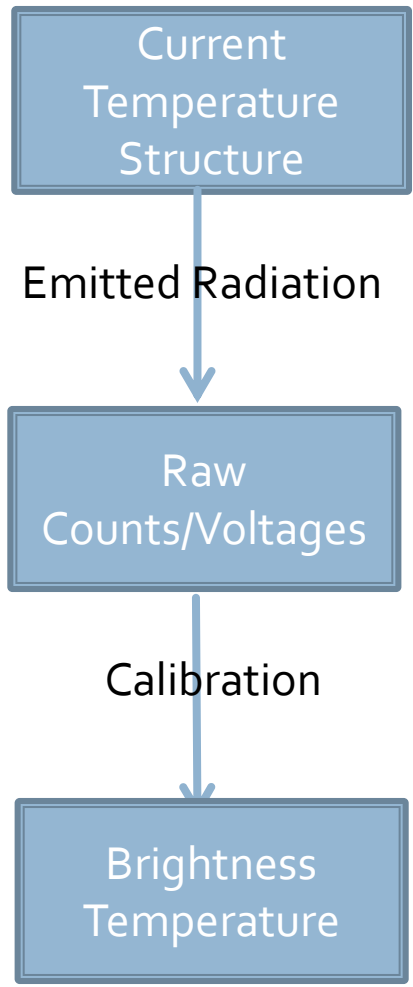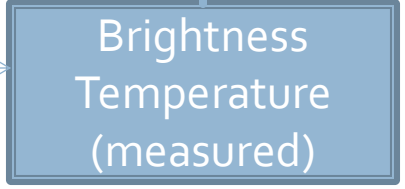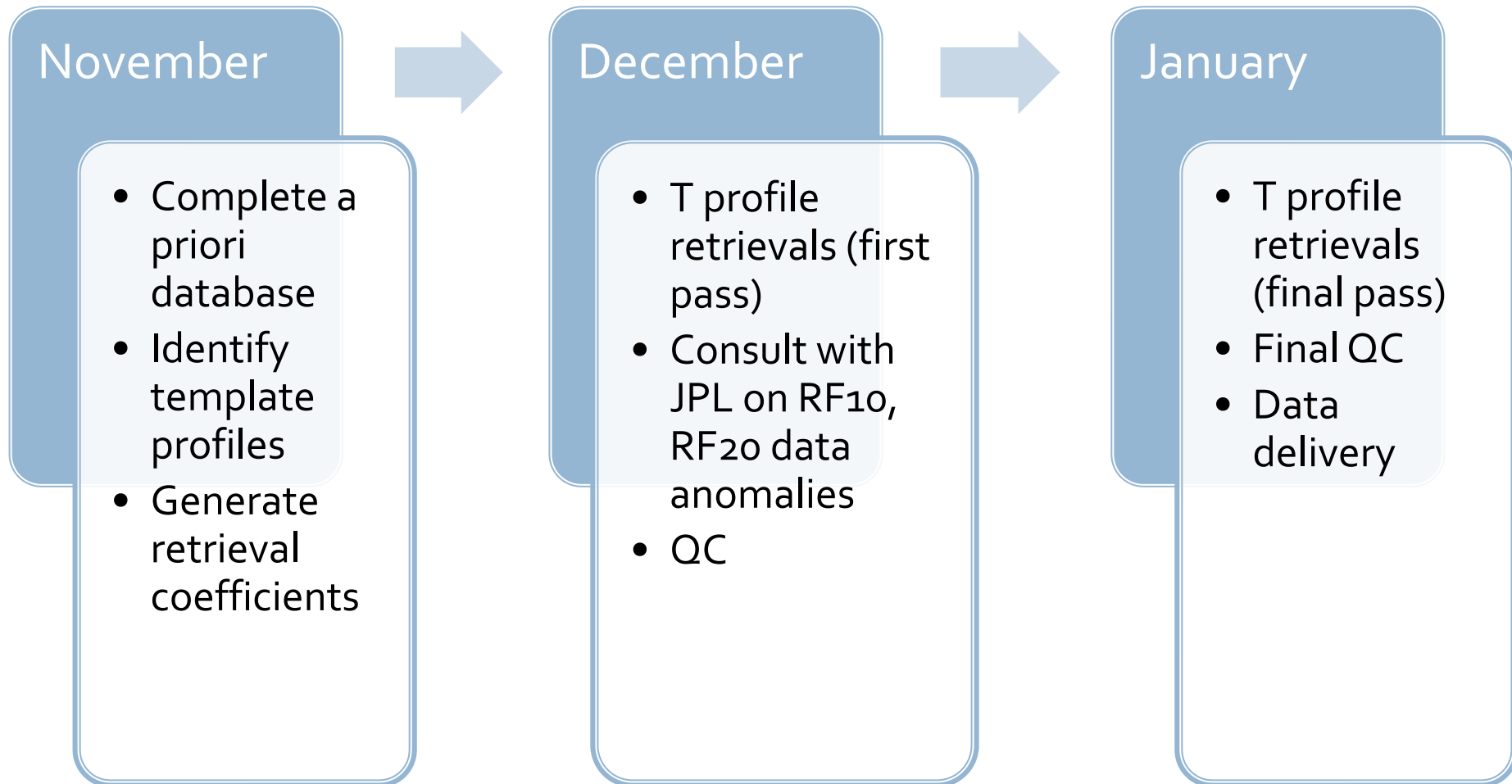
Current Status

- Compilation of a priori data set nearly complete
  - Received EOL (Hokitika) and DLR (Lauder) raobs
  - Awaiting NIWA (Haast) raobs
  - Obtained available routine raobs
  - Reformatting and QC of raob files
- GV in situ temperatures for sensor calibration
  - Re-processed version
- Identified close approaches by aircraft to raob sites
  - Determines template profiles for retrieval coefficient calculation
- Enlisting assistance from JPL MTP scientist to calibrate anomalous data segments on RF10, RF20
  - Contracting delays

Projected Schedule

November

- Complete a priori database
- Identify template profiles
- Generate retrieval coefficients

December

- T profile retrievals (first pass)
- Consult with JPL on RF10, RF20 data anomalies
- QC

January

- T profile retrievals (final pass)
- Final QC
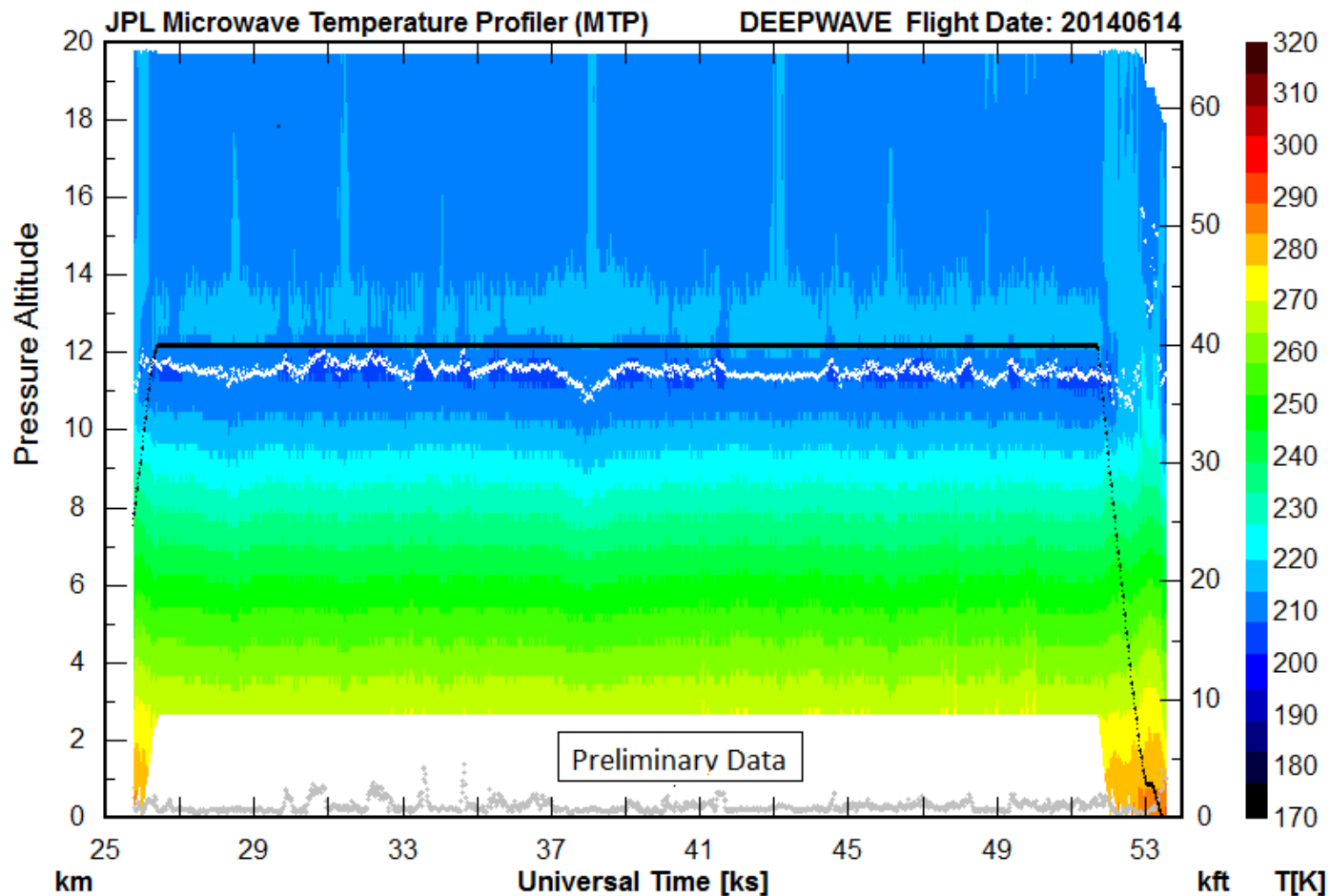- Data delivery

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

Temperature Curtain Plot

Isentrope Plot

Isentrope Altitude Cross-Section
DEEPWAVE - NGV 20140614