Mission Scientist Report (by R.B. Smith) [Part 1 only]

IOP8, RF09

Mission Date: 24 June 2014
Takeoff Time: 0625 UTC (1825 NZST)
Landing Time: 1420 UTC (0220 NZST June 21)
Duration: approximately 8 hours

Science Staff: Ron Smith (co-MS), Jim Doyle (co-MS), Dominique Pautet, Biff Williams, Katrina Bossert

Objective: 1) Predictability targets in the Tasman Sea, 2) Mountain waves over the South Island

Track design: The flight began with a predictability survey west at FL 400 over the Tasman Sea. In the second half, we flew six cross-mountain legs of the Mt Cook 1b track.

Dropsondes: Dropsondes were used for both part of the mission. We dropped 22 sondes in all. Only the first was a fast fall. Data from some others looked unusual, but these may have been due to the turbulent environment in which they were dropped.

Instrument problems: Take off was delayed by 25 minutes due to a confusion about the nose-cone gust probe. The UHSAS stopped part way through the flight.

Results for Part 1: (jim please write this part)

Results for Part 2: The mountain waves were predicted to increase to large amplitudes until midnight. Models showed them breaking between the 13 and 16km levels. These predictions were reasonable accurate. The blocked layer at Hokitika disappeared briefly after 1100UTC and then reappeared by 1400UTC.

Flight level waves were weak on the outbound leg near 0700UTC but stronger when we returned to NZ at 1000 UTC. Finding smooth waves at FL400 we climbed for two legs at 44500ft where wave breaking and turbulence was found. Upstream drops and one curtain of drops along the Mt Cook track were done to understand the flow below the aircraft.
Figure 1: RF09 track with observed flight level winds

Figure 2: Forecast 700hPa winds
Figure 3, ECMWF forecast of divergence aloft. Note lack of wave activity above NZ.

Figure 4: COAMPS energy flux prediction
Figure 5: AIRS perturbation temperatures. No waves over NZ
Fig 6: ISS balloon sounding, Note sharp inversion at 460hPa and turbulent stratosphere.
Fig 7: ISS profiler. Note oscillating low level north westerlies.
Fig 8: COAMPS forecasted Mt Cook cross section