ATTREX Science Flight Report

2014-01-15 Transit Flight

Takeoff: 02:17 UT (12:17 Guam local), landing: 22:08 (08:08 1/17 in Guam), duration: 19.9 hours

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Payload Managers: David Fratello, David Jordan, Jhony Zavaleta

Summary:

The primary objective of this flight was to move the aircraft from DFRC to Andersen AFB on Guam. This flight also presented an opportunity to sample the TTL composition across the Pacific, and by flying a long leg at constant latitude, we could gather unique information about TTL wave motions. Information about the increased fuel burn rate caused by drag from Hawkeye (and its opposite-wing dummy) was also obtained. The flight plan was relatively simple, taking the aircraft southwest from DFRC down to 12.8°N, then heading west at that latitude until we reach Guam.

The combination of climb rate degradation caused by Hawkeye drag and the cold tropopause temperatures en route necessitated modification of the route (see Figures below). The aircraft cruise altitude was ~2 kft lower than our expectation based on previous flights without Hawkeye. Both fuel temperatures and ambient temperatures were colder than desired, and the pilots shifted the path further north to stay in warmer air. Given the increased route length caused by the deviation north, the concerns about total fuel consumption, and the poor communications during the flight, the planned dip in the flight plan was not executed. The entire flight was flown at cruise altitude.

Irridium communications were very poor throughout the flight. The Ku beam we ended up with is mostly over Guam and west of Guam, and we did not enter the zone on the transit until a couple of hours before the end of the flight. After the initial configuration process, Ku communication appeared to be working. We went through the large Inmarsat hole east of Guam, which resulted in limited aircraft communication for multiple hours.

Given the limited communications, not much real-time data was available during the flight. FCDP did occasionally see indications of ice crystals while we were cruising along the tropical tropopause. CPL indicated a great deal of anvil cirrus below the aircraft as well as thin cirrus near 17 km on the last third of the flight (Figure 4). However, the NOAA total H_2O did not indicate appreciable condensed water mass at cruise altitude. It appears that we were skimming just above the cirrus.

Instruments generally performed well on this flight.

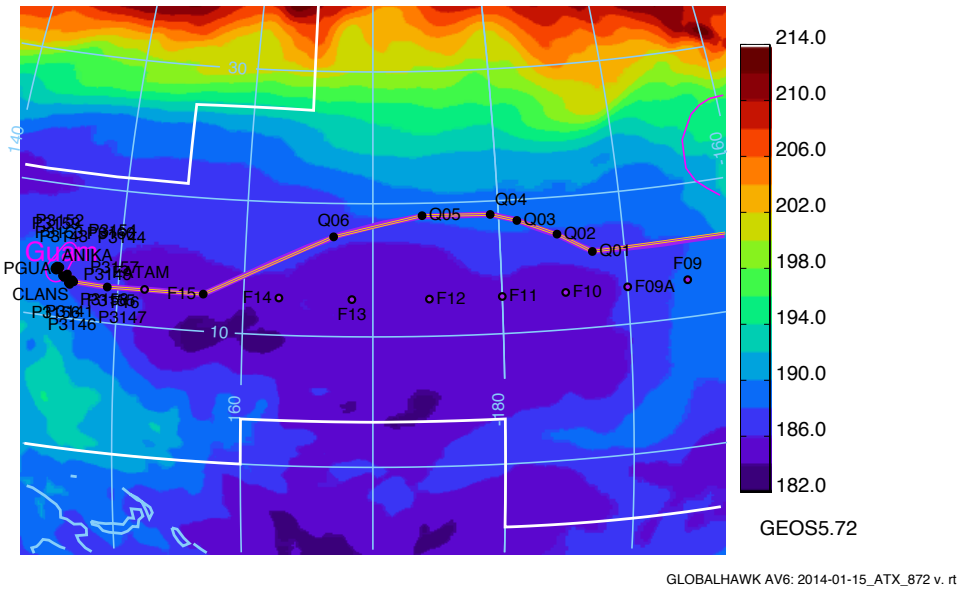

Figure 1. The actual flight path is overlaid on the GEOS5 cold-point temperature field.

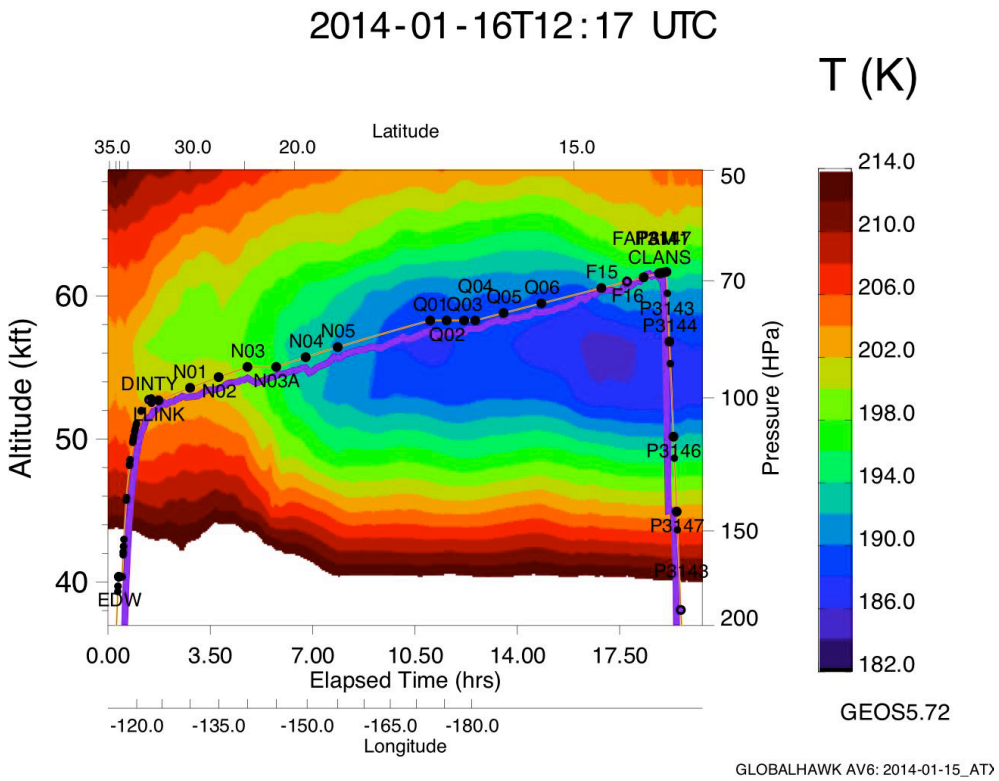

Figure 2. Flight path overlaid on curtain of temperature versus time and height.

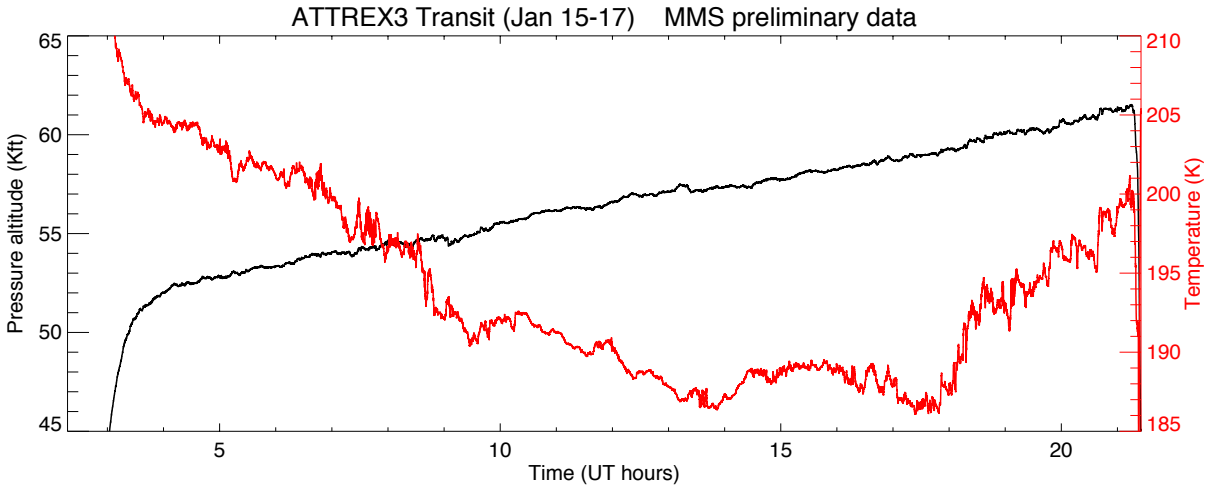

Figure 3. Pressure altitude and temperature from the Meteorological Measurement System are shown versus time for the flight.

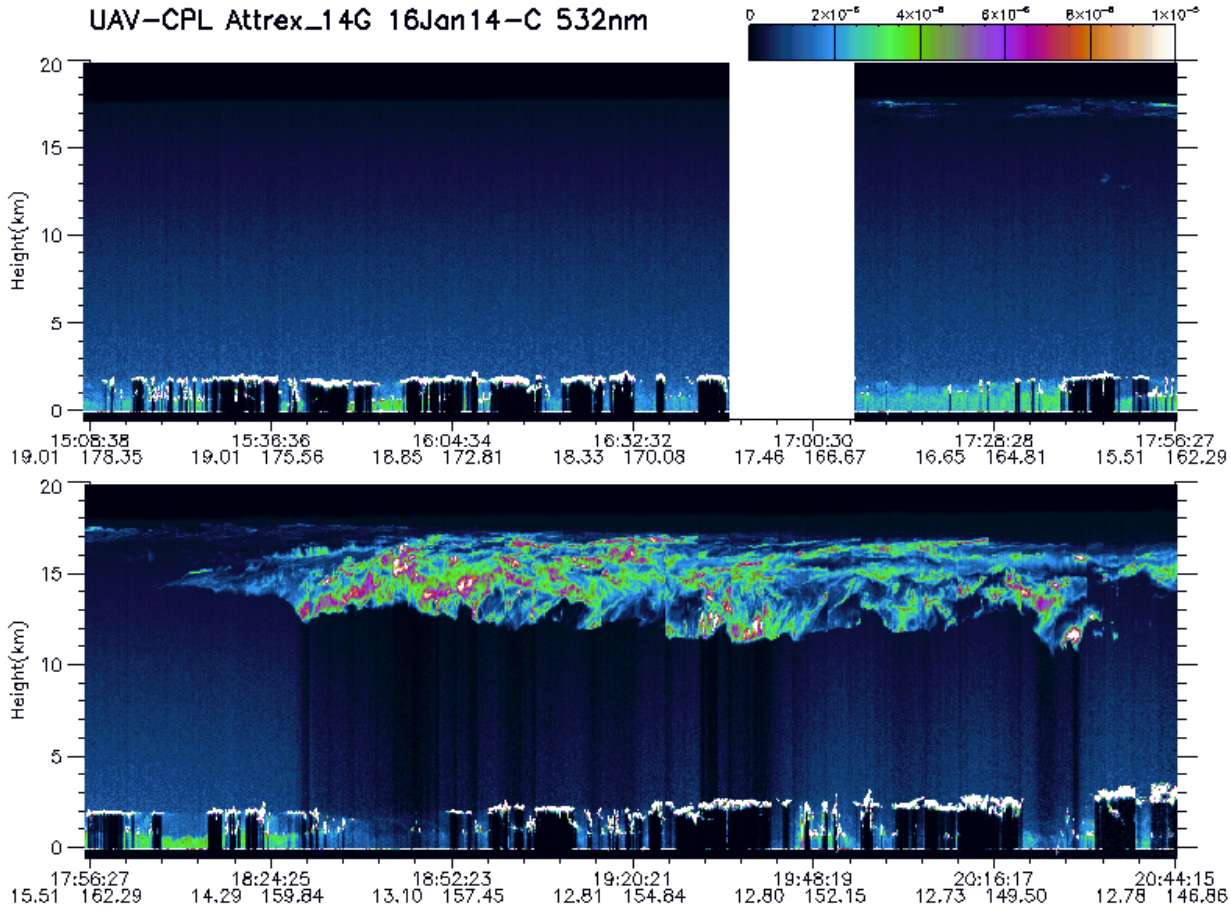

Figure 4. CPL backscatter versus time for the last third of the flight.