

POSIDON Science Flight Report

2016-10-26 RF08

Takeoff: 0110 UT October 26 (11:10 Oct 21 Guam local)

Landing: 0633 UT October 26 (16:33 local), duration: 5.4 hours

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Pilots: Tom Parent, Cary Klemm

Summary:

Sample ice clouds and dehydration in the low temperature region to the southwest of Guam, and explore SO₂ and O₃ distributions in the TTL.

Flight Description:

The flight path took the aircraft southwest to a region of low temperature forecasted by the GMAO GOES5 and other models (Figure 1).

The aircraft headed southwest porpoising through the TTL (45 – 57 kft). Descended to 43 kft at waypoint ADDPO in coordination with an O₃ sonde launch at Palau. After passing ADDPO the aircraft climbed to about 50 kft before turning back. The aircraft porpoised between 48 and 57 kft on the return leg until approximately 100 nm away from Guam. From this point the aircraft was directed to zoom climb up to 62 kft approximate 100 nm north of Guam, then spiraled down to 25 kft before returning to Guam.

Cirrus clouds were observed all over the UT on the flight track, sometimes quick thick. Double tropopause was observed on the return leg. Thin cirrus cloud was obvious just below the second tropopause.

O₃ mixing ratios between 25 and 45 kft were between 20 and 40 ppt near Guam on the ascent. These values increased to 4-60 ppt approximately 100 nm north of Guam during descent, suggesting sharp latitudinal gradient (Figure 2). An apparent latitudinal gradient existed at higher altitudes in the UT, where we had 20 vertical profiles (Figure 3).

SO₂ showed some vertical gradients, with mixing ratios varied from 0 to 30 ppt above 14 km (Figure 4). Enhancement was observed again below 9 km on the return leg (not shown).

An ECC ozone sonde was launched from Palau.

PANTHER suffered a pump malfunction and did not take any data. Problem has been fixed and the instrument is ready. SID3 worked at least in part of the flight, but suffered a computer crash

during data download after flight. It is not clear whether data will be recovered and the instrument will unlikely to work in next flight. The rest of instruments performed well.

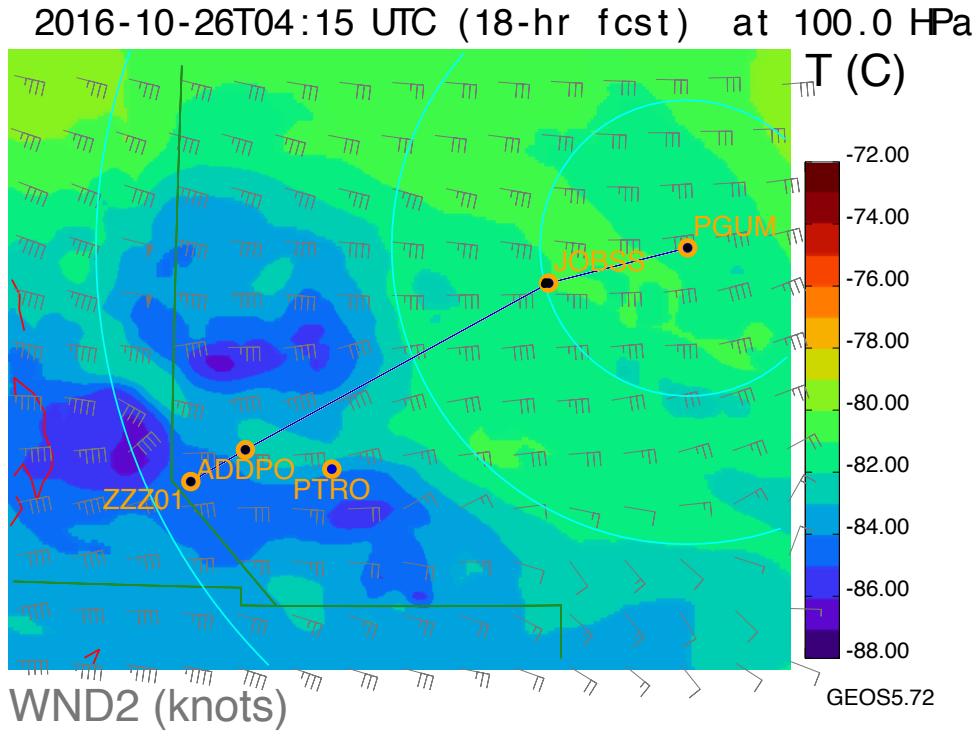


Figure 1. Planned flight path (purple line) overlaid on forecast temperature field.

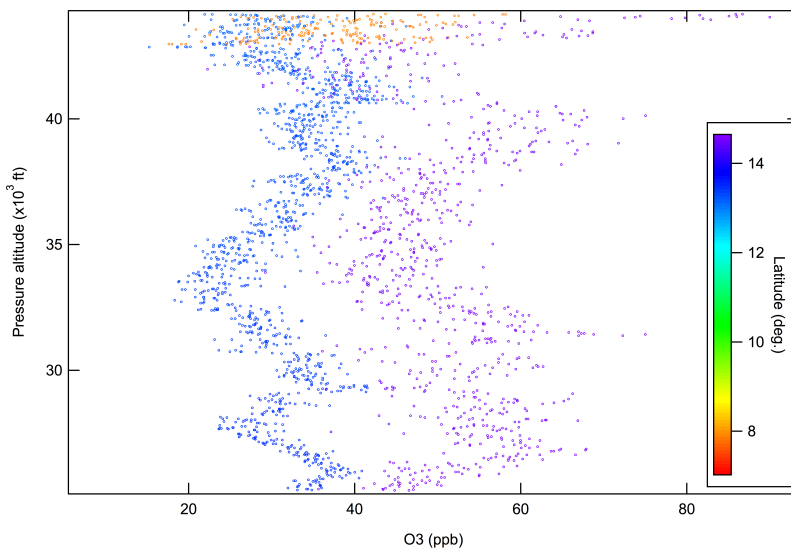


Figure 3. Mid tropospheric O₃.

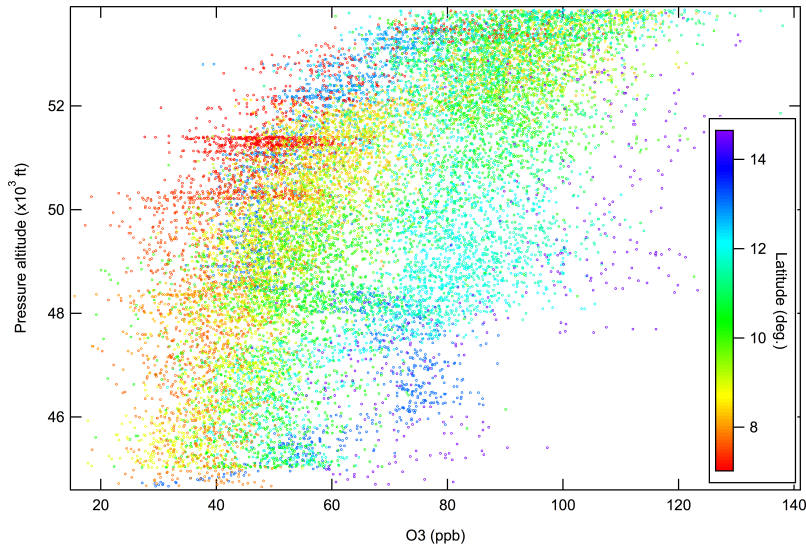


Figure 3. UT O₃

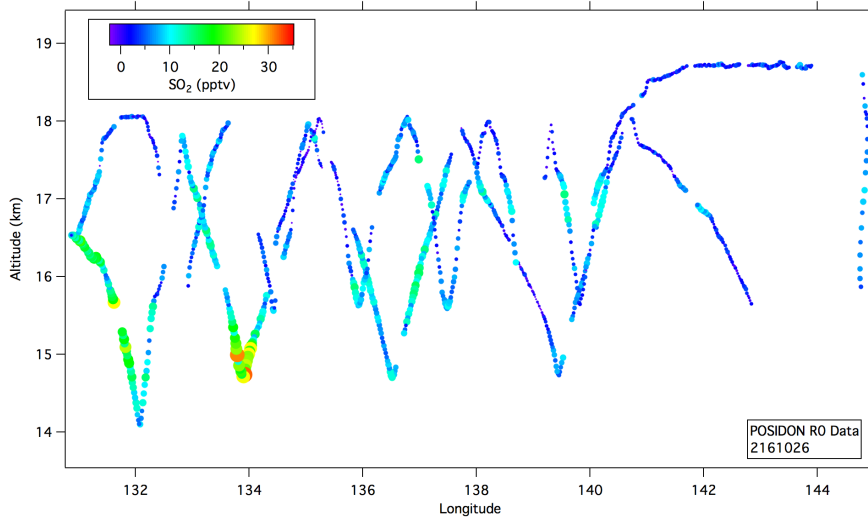


Figure 4. SO₂ mixing ratios between 14 and 19 km.