POSIDON Science Flight Report

2016-10-21 RF06

Takeoff: 0024 UT October 21 (10:24 Oct 21 Guam local)
Landing: 0600 UT October 21 (16:00 local), duration: 5.6 hours
Mission Scientists: Eric Jensen, Ru-Shan Gao
Pilots: Tom Ryan, Cary Klemm

Summary:

This flight is designed to explore the chemical composition in the tropical tropopause layer in the region south of Guam.

Flight Description:

The flight path took the aircraft south-southeast to a region of high SO_2 forecasted by the GMAO GOES5 model (Figures 1 and 2).

The aircraft headed south-southeast porpoising through the TTL (45 – 56 kft). At about ZZZ01 the aircraft was directed to 56 kft to avoid a high convection. A few thin cirrus clouds were encountered en route.

After passing the high convection the aircraft descended to 43 kft before reaching the turning point ZZZ01. Thick cirrus was encountered during the descent. Forecasted high SO_2 was not observed (Figure 3). Note that the low SO_2 (compared to the model prediction) coincided with thick cirrus clouds. Although observed SO_2 values were higher than those encountered in RF2, the modeled values were much higher for this flight.

Relatively high ozone mixing ratios (~30 ppbv) were observed over Guam during both ascent and descent between 5 and 14 km (Figure 4). These air parcels are likely the remnants of the high-O_3 layer observed between Guam and Palau in RF05. O_3 values in the TTL (14-17 km) were close to those observed in the earlier flights (Figure 5). However, O_3 values at tropopause and the lowermost stratosphere were mostly lower than usual (< 120 ppb).

Another ECC ozone/CFH sonde was launched from Guam.

All instruments except SID3 performed well.

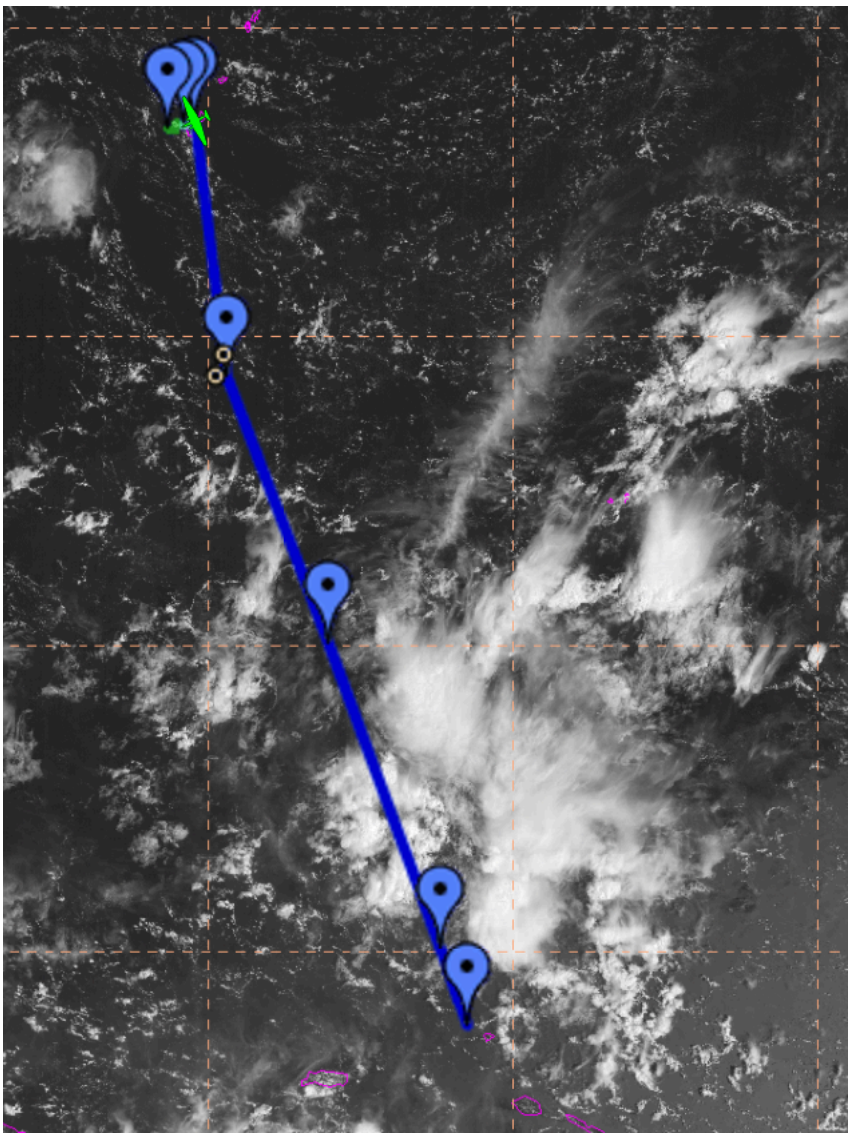

Figure 1. Planned flight path (blue line) overlaid on visible satellite image before takeoff.

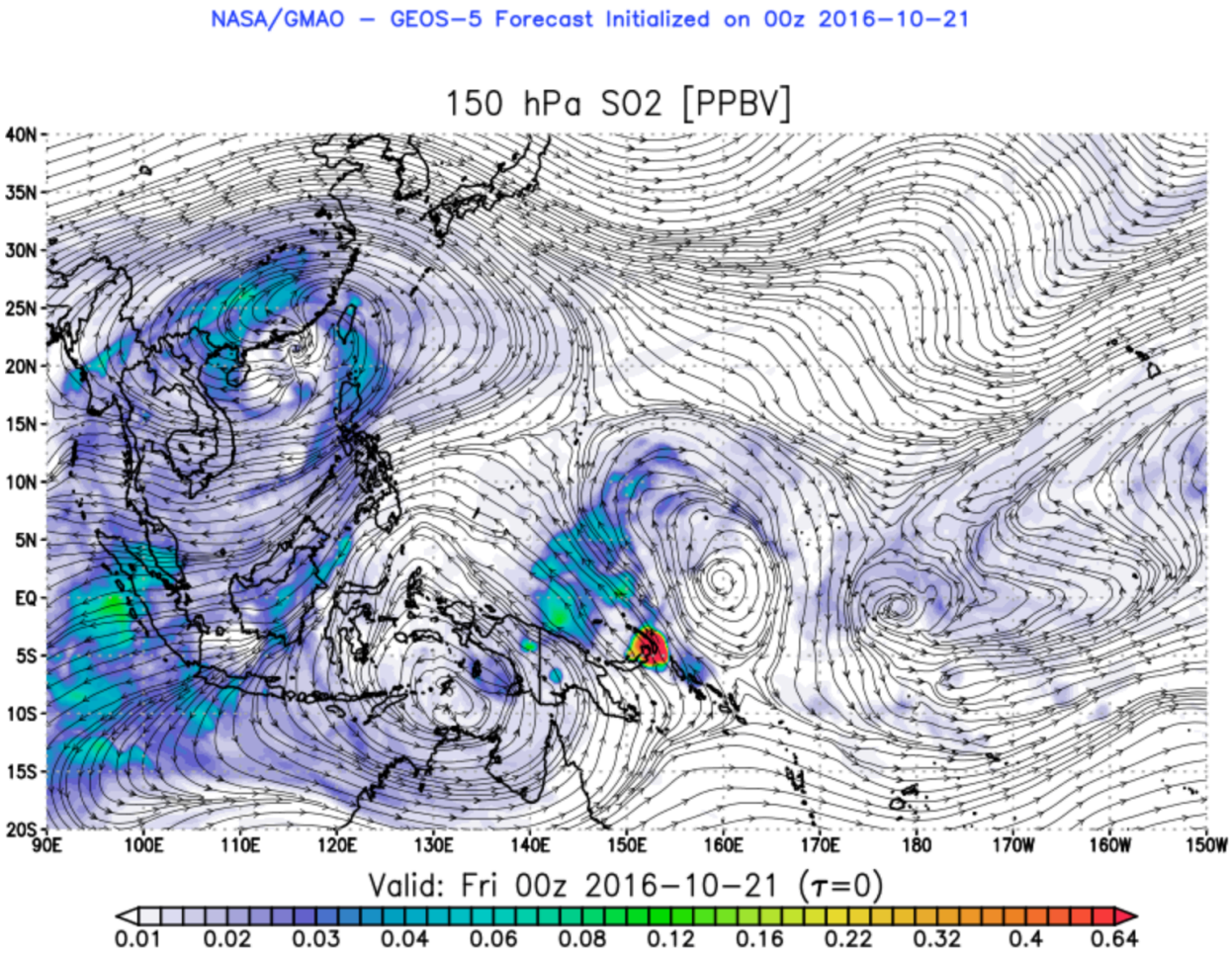

Figure 2. The GMAO GOES5 SO_2 forecast indicating high SO_2 levels in the TTL within the WB-57F range.

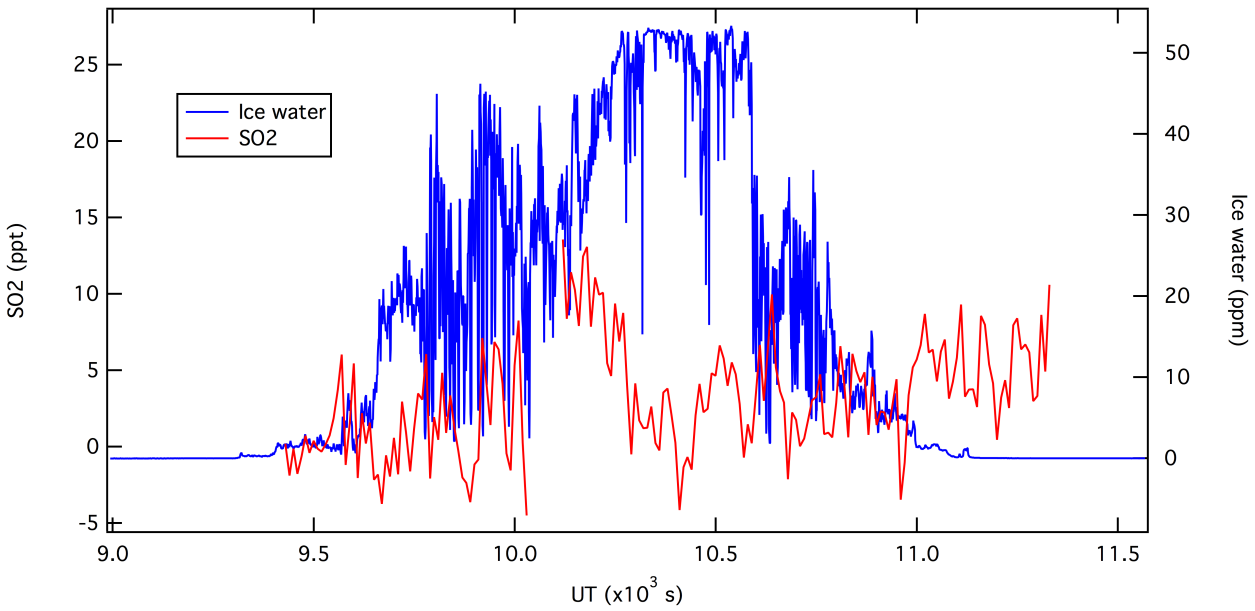

Figure 3. Time series of SO2 and ice water during vertical profile at the southern end of the flight path.

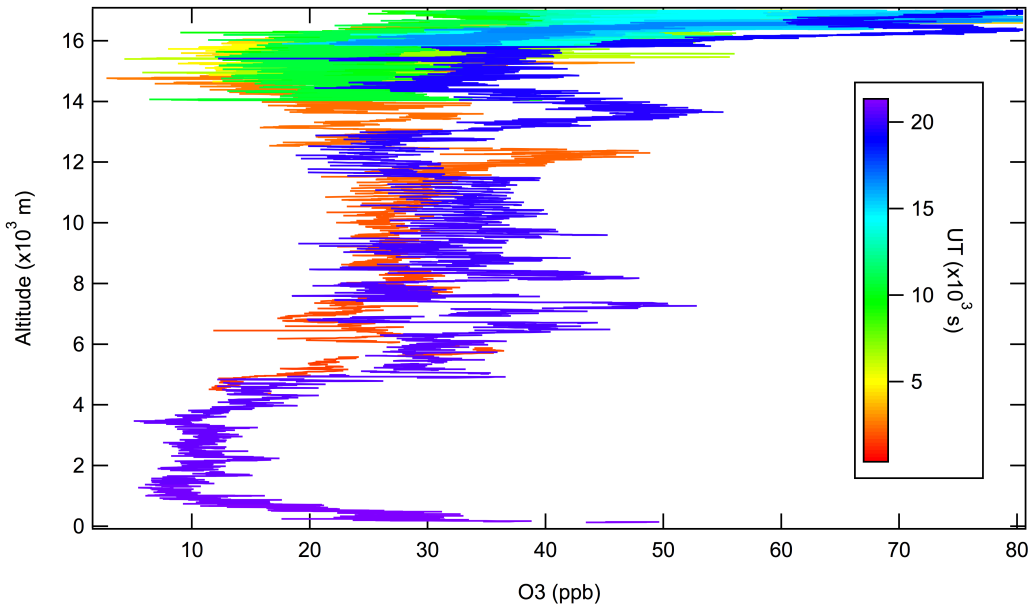

Figure 4. WB-57B observations show higher O_3 values between 5 and 14 km

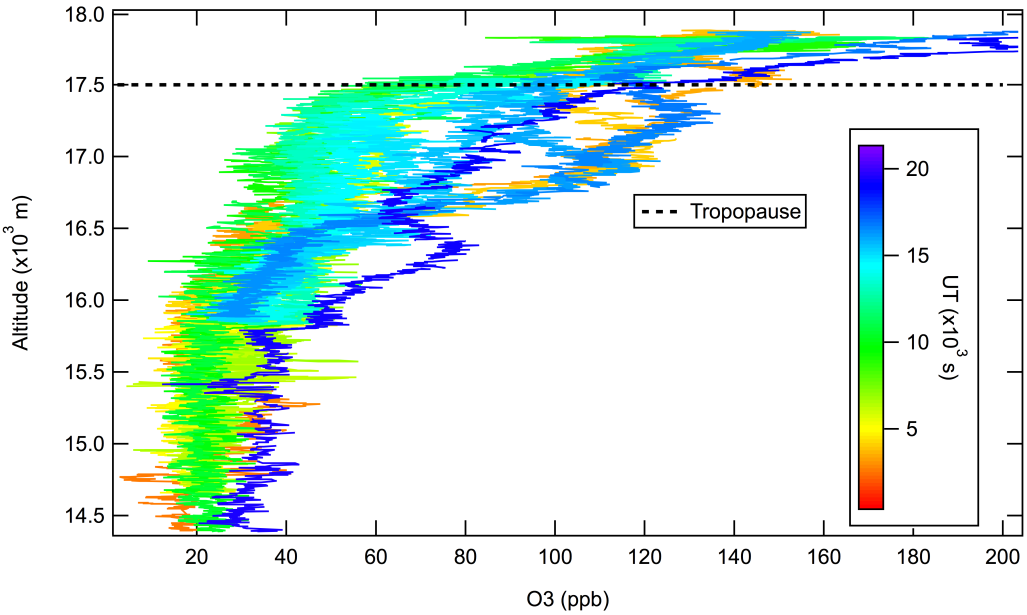

Figure 5. WB-57B observations show lower O_3 values at tropopause and above.