

Ozone and Chemical Composition in the Pacific Region Measured by IAGOS

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Since 1994, the program IAGOS (In-service Aircraft for a Global Observing System) has been equipping commercial aircraft with instruments to monitor the composition of the atmosphere on long-haul flights around the world. Time-series and climatologies of ozone and humidity at cruise altitude now span almost 25 years. With the participation of China Airlines in 2012, the first data over the northern Pacific UTLS were collected. The aircraft are based in Taipei and provide daily measurements of ozone, carbon monoxide, and humidity. We present time-series from the surface to the upper troposphere of ozone, carbon monoxide, and humidity at Taipei focusing on periods influenced by the passage of tropical cyclones. Downstream of the typhoons, high ozone mixing ratios are anti-correlated with relative humidity suggesting stratospheric air, with trajectories also indicating transport from the stratosphere to the troposphere. After the tropical cyclone, the tropospheric column is filled with very low ozone mixing ratios due to the rapid uplift of air from the marine boundary layer. Locally, the passage of typhoons has a positive effect on air quality at the surface, cleansing the atmosphere and reducing the mixing ratios of pollutants. Last year, Hawaiian Airlines joined IAGOS, greatly increasing coverage over the Central and Southern Pacific. We present the first few months of ozone and cloud data from the Hawaiian Airlines flights, relating the large increases in ozone to stratospheric intrusions and the position of the sub-tropical jet in the Southern Hemisphere.

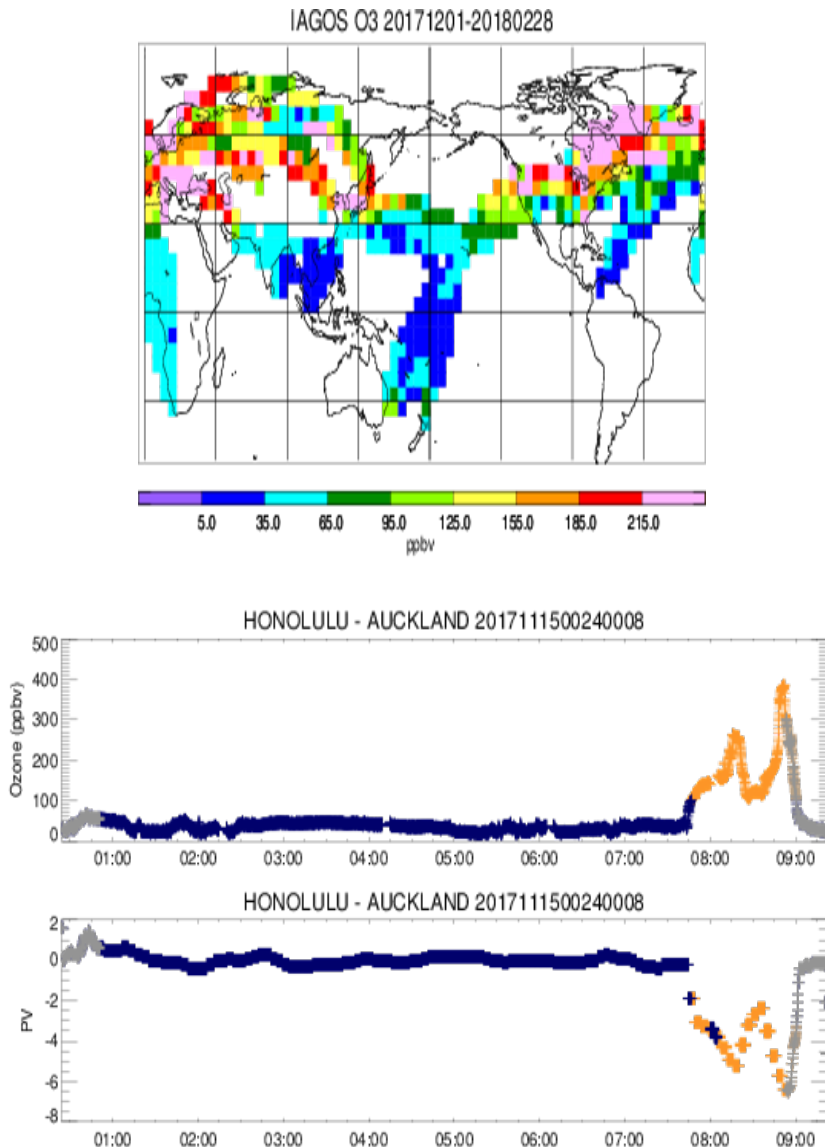


Figure 1. Ozone mixing ratios (ppbv) from IAGOS at 200 hPa during December 2017 - February 2018.

Figure 2. A flight from Honolulu to Auckland on 15 November 2017 showing ozone mixing ratios (top) and potential vorticity (bottom). Measurements during landing and take-off are in grey, measurements at cruise altitude in the troposphere are blue, and measurements which are in the lower stratosphere according to ozone mixing ratio > 100 ppbv or PV > 2PVU are colored in orange.