

Results from Balloon Launches at the Maïdo Observatory On Réunion Island

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As Upper Troposphere-Lower Stratosphere (UTLS) composition plays an important role on Earth's climate system, upper-air observations for climate have been given more attention in recent years. However estimates of UTLS composition (e.g. water vapor, aerosols) are almost entirely based on data from the Northern Hemisphere. The Southern Hemisphere (SH) is a challenging place for climate research. Its vast oceans and the lack of landmass make it particularly difficult to collect information about present climate.

The location of Reunion island (21°S, 55°E) is ideal to study UTLS processes as there are very few multi-instrumented stations in the tropics and stations are particularly lacking in the SH. Since the nineties, atmospheric measurement systems have been deployed at Reunion Island, mainly for monitoring the atmospheric composition in the framework of Network for the Detection of Stratospheric Change/Network for the Detection of Atmospheric Composition Change. In 2012, a new observatory was commissioned in Maïdo at 2200 m a.s.l. on the west side of the island. The Maïdo Observatory hosts various instruments for atmospheric measurements, including LiDAR systems, spectro-radiometers, *in situ* gases/aerosols measurements, and balloonsonde observations. Balloonsonde observations of water vapor, aerosols, and other trace gases in the UTLS are important as they reveal fine-scale features that are below the vertical resolution of satellite sounding systems.

We will present balloon-borne vertical profile measurements of water vapor (CFH) and aerosols (COBALD, POPS) from the Maïdo Observatory since 2014. The balloon measurements are analysed using FLEXible PARTicle dispersion model (FLEXPART) Lagrangian backtrajectories driven by the ECMWF high-resolution operational analyses. Finally, we will present the Flexpart cOnvective Outflow Tool (FOOT) forecasting tool that is used to optimize balloon launch at the observatory. This forecast tool provides an array of FLEXPART Lagrangian trajectories and METEOSAT 7 geostationary satellite observations on a daily basis for the Indian Ocean.

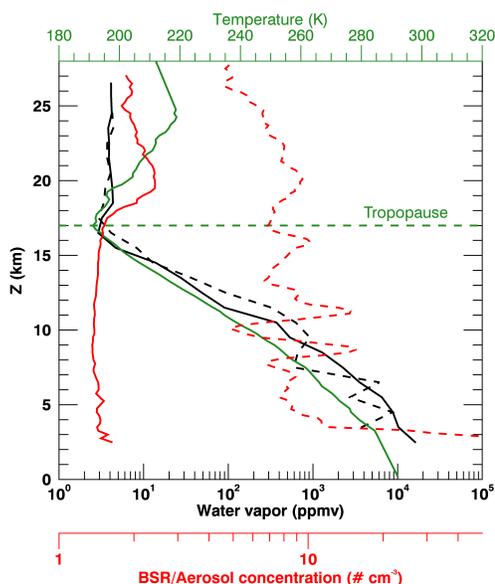


Figure 1. CFH Water vapor profiles on January 25, 2016 (black solid line) and March 23, 2016 (black solid dashed line). COBALD backscatter ratio (BSR) at 940 nm on January 25, 2016 (solid red line) and POPS total aerosol concentration on March 31, 2016 (dashed red line). The mean temperature of 2 flights (January 25 and March 31) is also displayed in green as well as the position of the mean cold point tropopause (dashed green line).