



A statistical approach to study isentropic transport events in the lower stratosphere nearby the southern subtropical barrier.

G. Kirgis (1), T. Portafaix (1), H. Bencherif (1), S. Baldy (1), S. Godin-Beekmann (2), and B. MOREL (1).

(1) Laboratoire de l'Atmosphère et des Cyclones, Reunion Island, France, (2) Service d'Aéronomie, Paris, France (guillaume.kirgis@univ-reunion.fr / Phone: +262 262 93 82 59)

Accurate knowledge of variability in the vertical distribution of ozone is needed to evaluate current understanding of the processes responsible for decreases in the ozone column, and processes responsible for changes in stratospheric ozone.

In the stratosphere, the ozone distribution is meanly influenced by the Brewer-Dobson residual circulation, while in the lower stratosphere, which makes the largest contribution to the total ozone column, the zonal-forcing is dominated by breaking planetary waves. This forcing occurs in the winter hemisphere, and contributes to the dislocation of dynamical barriers, i.e., polar-vortices and subtropical barriers, and thus to isentropic transport and mixing of ozone in the stratospheric.

It is well known that such processes are driven by wave activity that is generated in the troposphere. Any change in tropospheric wave activity or in its inter-annual variability may influence the stratospheric circulation and hence the trace gas and ozone distribution.

An original method has been adapted to analyse in situ ozone profiles from four tropical and subtropical locations (Samoa: 14.2°S, 170.5°W; Fiji: 18.1°S, 178.4°E; Reunion Island: 20.8°S, 55.5°E and Irene: 25.9°S, 28.2°E), operating under the SHADOZ project, and situated on both sides of the southern subtropical barrier. The purpose of the present study is to detect and classify, on a statistical basis, and by the use of the SHADOZ ozonesonde dataset for the 1998-2005 period, all ozone anomalies due to isentropic transport in the tropical/subtropical stratosphere.

This method consists to gather and treat on a hierarchical basis ozone SHADOZ profiles which have common anomalies. Classification criteria are based on the seasonal and inter-annual variability of ozone. An anomaly is detected when variation of ozone concentration is higher or lower than 1.5 sigma, as compared to the climatological values, and when the vertical extension of the laminae is at least higher than 50K.

The work focuses notably on the relationship between QBO, seasonal cycles and ozone laminae distributions. Next step will be a validation with Ertel's potential vorticity time series and satellite data analysis.