



Impact of convection on the upper-tropospheric composition (water vapor/ozone) over a subtropical site (Réunion Island) in the Indian Ocean

Damien Héron (1), Stéphanie Evan (1), Jérôme Brioude (1), Karen Rosenlof (2), Françoise Posny (1), Jean-Marc Metzger (3), and Jean-Pierre Cammas (1)

(1) Laboratoire de l'atmosphère et des cyclones (LACy UMR 8105), Saint denis, Réunion (damien.heron@univ-reunion.fr),

(2) NOAA/ESRL /Chemical Sciences Division, Boulder, Colorado, (3) Observatoire des Sciences de l'Univers de La Réunion, UMS 3365, Saint-Denis de la Réunion, France

Seasonal variations of humidity and ozone concentrations in the troposphere from the subtropical site of Réunion-Island (21°S, 55°E) in the South West Indian Ocean are presented. We used long term observations of PTU sondes (Météo-France soundings) and ozone profiles measured for Southern Hemisphere ADditional OZonesondes (SHADOZ) network. The two dataset are measured at Roland Garros Airport over the period 2013-2016.

Using a statistical method, seasonal variations of low ozone and high water vapor signatures are characterized in the upper troposphere, suggesting a convective influence with a convective outflow altitude ranging between 9 and 13km. As deep convection is rarely observed near Reunion Island, those results suggest an influence of long range transport of convective outflow.

Lagrangian back trajectories calculated by the FLEXPART⁴ dispersive Lagrangian model coupled with European Center for Medium-Range Weather Forecasts (ECMWF) meteorological fields are used to generate maps of lower troposphere origin for the air masses with a low ozone and high water vapor signatures in the upper troposphere. Météosat7 brightness temperature is used to validate the position of deep convective transport in the FLEXPART model. The FLEXPART results are combined with maps of Meteosat 7 brightness temperature to calculate monthly average maps of deep convective clouds that has influenced the upper troposphere above Reunion island. This study provides new insights on the long range impact of deep convective outflow from the inter-tropical convergence zone on the upper troposphere over a subtropical site in the southern Indian Ocean.

⁴FLEXible PARTicle dispersion model