Geophysical Research Abstracts
Vol. 14, EGU2012-8466, 2012
EGU General Assembly 2012


# Long-term tropospheric ozone and halogens measurements in the Eastern Pacific

A. Saiz-Lopez (1), T.D. Hay (1), J. C. Gomez Martin (1), M.C. Parrondo Sempere (2), M. Gil (2), M.V. Agama Reyes (3), and J.F. Paredes Mora (3)

(1) Laboratory for Atmospheric and Climate Science (CIAC) CSIC, Toledo, Spain, (2) Atmospheric Research and Instrumentation Branch, National Institute for Aerospace and Technology (INTA), Huelva, Spain, (3) National Institute for Meteorology and Hidrology (INAMHI), Quito, Ecuador

The low ozone conditions of the equatorial and tropical Pacific troposphere have being identified in a number of field studies, including the PEM-WEST experiments (1) and the SHADOZ program (2). However, high frequency long-term surface ozone measurements in this region have not been reported to date. The standard mechanism for ozone loss including O(1D) photolytical production and loss by $H_2O$ reaction, together with deposition, seems to be unable to explain satisfactorily the extremely low ozone levels (< 5 ppbv) observed in the Galápagos Islands (Ecuador).

In order to shed light on the ozone loss mechanisms operating in the remote equatorial MBL and their potential influence on higher atmospheric layers, time-resolved observations of surface ozone, nitrogen oxides ($NO_x$), halogen compounds, global radiation and meteorological variables, together with radiosonde and ozonesonde launchings, were made in the Galapagos Islands (Ecuador) as part of the Climate and HAlogen Reactivity tropicaL EXperiment (CHARLEX). This on going field campaign, running from September 2010 to the present, is the first long-term ground-based study of atmospheric trace gases in the Eastern Pacific region, aiming at understanding the impact of natural oceanic emissions of halogenated substances on ozone and particle formation. Field measurements are underpinned with a characterisation of the origin and trajectories of air masses arriving at the site using the HYSPLIT dispersion model (3), and ocean colour satellite imagery from MODIS-A (4).

The surface ozone measurements during CHARLEX show a clear seasonal dependence on sea surface temperature and water vapour. However, other factors are also at play, e.g. the origin of the air masses. $NO_x$ show higher concentrations for a few weeks during the warm season when air masses originate in the northern hemisphere, forcing a photolitical ozone daily profile, while during September-October some extent of photolytic destruction potentially driven by halogens is observed, although there is not a well defined ozone daily profile during most of the year. The colder than usual 'Garua' (July-November) season in 2010 was characterised by higher-than-average surface ozone as expected (but overlapping with the SHADOZ 1998-2008 variability), while the close-to-average Garua of 2011 has shown the lowest surface ozone values at San Cristobal reported so far, completely out of the SHADOZ range.

REFERENCES

(1) Crawford, J. et al. J. Geophys. Res. 1997, 102, 28469.
(2) Thompson, A. M. et al. Atmos. Environ. 2011, 45, 2145.
(3) Draxler, R. R. HYSPLIT4 user's guide. NOAA Tech. Memo. ERL ARL-230, NOAA Air Resources Laboratory, 1999
(4) Ocean Color Web. http://oceancolor.gsfc.nasa.gov