QOS2016-329, 2016
Quadrennial Ozone Symposium of the International Ozone Commission

The TICOSONDE Balloon Sounding Project: 11 years of continuous Frostpoint Hygrometer and Ozonesonde Profiling in Costa Rica

J. A. Diaz (1), H. B. Selkirk (2,3), H Vömel (4), G Morris (5), E Corrales (1), A Alan (1), and C Cevallos (1)

(1) GasLAB CICANUM Universidad de Costa Rica, San Jose, COSTA RICA. (jorge.andres.diaz@gmail.com), (2) NASA Goddard Space Flight Center, Greenbelt.MD, USA (Henry.B.Selkirk@nasa.gov), (3) Universities Space Research Association, Columbia.MD, USA (Henry.B.Selkirk@nasa.gov), (4) National Center for Atmospheric Research, Boulder.CO, USA (Voemel@ucar.edu), (5) ST. EDWARD'S UNIVERSITY, Austin.TX, USA (garymorris@stedwards.edu)

The TICOSONDE Project is a joint collaboration among NASA, the Universidad de Costa Rica, the Universities Space Research Association, St. Edward's University, Valparaiso University, NOAA and NCAR that has been making regular balloon sonde measurements of water vapor and ozone in Costa Rica since July 2005. To date, Ticosonde has contributed 479 ozone soundings to SHADOZ and accumulated 193 water vapor soundings. These data have been used for validation of satellite instruments including Aura MLS and HIRDLS and have contributed to our understanding of the spatial and temporal variability of UT/LS H_2O and ozone, the water vapor tape recorder, saturated layers, and cirrus clouds in the tropics.

Ticosonde began as an intensive radiosonde campaign in June-September 2004 to study climate and weather variability during the Central American rainy season with unprecedented frequency and accuracy. Over 300 high-resolution soundings were made four times daily. Over the next three years, four other intensive radiosonde campaigns were conducted.

Water vapor and ozone sonde measurements began in July 2005 with a payload consisting of an ECC ozonesonde and the Cryogenic Frostpoint Hygrometer instrument (CFH, Vömel, et al, J. Geophys. Res., 2007). These soundings were made from the San Jose International Airport (SJO) located at Alajuela and at the Universidad Nacional in Heredia, both in the Central Valley region of Costa Rica. In 2011 the site was moved to the Universidad de Costa Rica in San Pedro, 20 km east of the previous launch sites, where launches continue to this day.

In 2006, lower tropospheric notches in the ozone soundings were first observed and were attributed to increasing emissions of SO_2 from the Turrialba volcano, 30 km ENE of the launch site. In early 2010, fumarolic activity in the Turrialba crater increased dramatically, and the ozone profile notches in our soundings downstream in the San Jose area increased in frequency as well. In July 2013 we began launching dual ozonesonde payloads to quantify the SO_2 plume concentration on a regular basis. These soundings have demonstrated great potential for validation of retrievals of SO_2 from the Aura OMI and Suomi-NPP OMPS as well as the TROPOMI instrument to be launched later this year.

Ticosonde profile data are currently available at both the SHADOZ site (ozone) and the Aura Validation Data Center site (water vapor). In the near future, water vapor profiles will be posted on NDACC and the Ticosonde team will be an active participant in NDACC's new sonde working group. Ticosonde data are also used in the AMS annual State of the Climate Report.

This presentation summarizes the main activities of the Costa Rica site and main findings over the 11 years of continuous measurements in the tropics.