QOS2016-341-2, 2016
Quadrennial Ozone Symposium of the International Ozone Commission

A method to infer SO_2 profiles from ozonesonde data

G.A. Morris (1), H.B. Selkirk (2,3), J.A. Diaz (4), E. Corrales (4), H. Vömel (5), I. Petropavlovskikh (6), E. Hall (6), and B. Johnson (6)

(1) St. Edward's University, Austin, TX, USA (garymorris@stedwards.edu), (2) Universities Space Research Association, Columbia, MD, USA, (3) NASA Goddard Space Flight Center, Greenbelt, MD, USA, (4) Universidad de Costa Rica, San Jose, COSTA RICA, (5) National Center for Atmospheric Research, Boulder, CO, USA, (6) NOAA/ESRL, Boulder, CO, USA

The electrochemical concentration cell (ECC) ozonesonde approach has been deployed around the world for nearly 50 years. The simple, relatively inexpensive technique provides profiles of ozone with a vertical resolution of ∼150 m from the surface to ∼30 km. These data have proved invaluable in satellite data validation, the identification of the ozone hole, long-range transport events from biomass burning, and ozone profile trend analyses. The ECC sonde approach, however, suffers from an interference reaction in the presence of SO_2 such that each molecule of SO_2 is measured as minus one molecule of O_3. These SO_2 features often appear as "notches" in the standard ozone profile, with sharp negative gradients at the bottom of each feature and sharp positive gradients at the top. Morris et al. (2010) described an approach leveraging the interference reaction as part of a dual sonde payload (one instrument with an SO_2 filter and the other without) to measure SO_2 by the difference in the readings of the two sondes. This poster describes an approach that allows us to infer SO_2 profiles based solely on O_3 profiles from stations where SO_2 is likely to be present (e.g., near an active volcano and in some urban locations). We verify the approach through comparisons of the inferred SO_2 profiles with the dual sonde SO_2 profiles from 32 TICOSONDE flights (San Jose, Costa Rica, 2012 - 2015) and apply the approach to the larger TICOSONDE data set (2005 - present) as well as data from the Hilo, Hawaii station to demonstrate both the effectiveness and limitations of the approach.