## 2.139 How well can we assess atmospheric ozone changes? The OzoneSonde Data Quality Assessment (O3S-DQA).

Presenting Author:
**David W. Tarasick**, Environment and Climate Change Canada, 4905 Dufferin Street, Downsview, ON, M3H 5T4 Canada , david.tarasick@canada.ca

Co-Authors:
**Herman G.J. Smit**, Institute for Energy and Climate Research: Troposphere (IEK-8), Research Centre Juelich (FZJ), Juelich, Germany
**Anne M. Thompson**, NASA Goddard Space Flight Center, Greenbelt, Maryland, USA
**Gary A. Morris**, St. Edward's University, Austin, TX, USA
**Jacquelyn C. Witte**, Science Systems and Applications Inc., NASA Goddard Space Flight Center, Greenbelt, Maryland, USA
**Jonathan Davies**, Environment and Climate Change Canada, 4905 Dufferin Street, Downsview, ON, M3H 5T4 Canada

Abstract:

Ozonesondes are the backbone of the global ozone observing network, making inexpensive, accurate measurements of ozone from the ground to 30km, with high vertical resolution (~100 m), for more than 50 years. The data are used extensively for validation of satellite data products, and are also part of merged satellite data sets and climatologies that are used for trend analyses and as a priori data for satellite retrievals. The importance of ECC sondes for trend analyses and as a transfer standard and stable reference for satellite validation recommends research effort to better quantify uncertainties and changes in ECC data.
Comparison with UV-absorption measurements in a number of studies (e.g. JOSIE, BESOS) has shown that small changes in sensor type, preparation or sensing solution can introduce significant inhomogenities in long-term sounding records. The major goal of the O3S-DQA is the homogenization of ozonesonde data sets. Essential aspects of this are the detailed estimation of uncertainties and documentation of the reprocessing.
Corrections to historical data for known issues may reduce biases but introduce additional uncertainties. We take a systematic approach to quantifying these uncertainties by considering the physical and chemical processes involved, and attempt to place our estimates on a firm theoretical or empirical footing. We discuss stoichiometry, sensing solutions, background current, humidity and temperature corrections to pump flow rate, altitude-dependent pump flow corrections, variations in radiosonde pressure offsets, and normalization of sonde total ozone to spectrophotometric measurements.
In the past 20 years ozonesonde precision has improved by a factor of 2, primarily through the adoption of strict standard operating procedures. We identify remaining quality assurance issues that can be better evaluated with further research. We present a "roadmap" for achieving a goal of better than 5% overall uncertainty throughout the global ozonesonde network.