

Development of Trend-Quality Ozonesonde Profile Data through 30 Years of Laboratory and Field Experiments

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Abstract

A significant amount of effort has been invested over the past 30 years to increase the accuracy of ozonesonde measurements and our understanding of their associated uncertainties. Experiments in both laboratory and field settings with electrochemical concentration cell (ECC) ozonesondes have quantified the effects of varying ECC preparation and data processing procedures, as well as differences among ECC manufacturers. This knowledge led the Assessment of Standard Operating Procedures for OzoneSondes (ASOPOS) and ASOPOS 2.0 panels to formulate recommended ozonesonde best practices, and the process by which a station's data record can be "homogenized" to correct for both intentional and unintentional operational modifications. The success of this ozonesonde data quality assurance effort is demonstrated through the characterization of global ozonesonde network data accuracy and stability over the past two decades (since mid-2004). Analysis of 60 global ECC ozonesonde stations with >40,000 profiles demonstrates that ozonesonde total column ozone (TCO) data are stable and accurate relative to satellite TCO measurements within about $\pm 2\%$ since 2004. Stratospheric ozone profiles from the sondes also match Aura Microwave Limb Sounder (MLS) data to within $\pm 5\%$. Advancements in data processing techniques continue with the application of ozonesonde sensor time response and stratospheric pump efficiency corrections that are not necessarily constant throughout the historical record. The result is a global ozonesonde dataset for which ozone profile trends can be computed with confidence from the surface to the mid-stratosphere.

Early Career Scientist

NO, I am not an early career scientist.

IGAC Activities

TOAR: Tropospheric Ozone Assessment Report