

## **Twenty years of SHADOZ: Archiving, Reprocessing, and Uncertainties of tropical ozonesonde profiles**

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SHADOZ (Southern Hemisphere ADditional OZonesondes) is the premier public archive for tropical ozonesonde records (<https://tropo.gsfc.nasa.gov/shadoz>). All SHADOZ sites use electrochemical concentration cell (ECC) ozone sensors that are interfaced with a radiosonde to provide high vertical resolution (~150m) profiles of ozone, winds, and P-T-U. Since 1998, over 7000 ozone profiles have been collected from up to 17 sites within 25 degrees of the equator. ECC launch protocols require a repeatable set of operating procedures (SOPs) to be followed prior to flight to maintain consistency in sensor performance. However, as with any long-term sounding projects, the archive contains an array of SOPs, standard and non-standard sensing solution types, and ozonesonde/radiosonde systems that have caused discontinuities to appear in the ozone data records. Recent advances in reprocessing methods and post processing software capabilities have motivated the SHADOZ community to do a comprehensive reprocessing of their data records. A second major milestone has been to estimate the uncertainty of each ozone profile in the SHADOZ network. Based on community driven consensus, deriving ECC sensor uncertainties is an essential component of reprocessing. Here, we present an overview of reprocessing methods for homogenizing SHADOZ long-term ozone records and show the first estimates of ozone profile uncertainty. Furthermore, we take advantage of these uncertainty estimates to calculate uncertainties in total column ozone (TCO) for the first time. Overall, TCO uncertainties are found to represent ~5-6% of the column measurement. Profile uncertainties are generally within 15% and peak around the tropopause where the signal-to-noise ratio approach unity. Reprocessing and uncertainty results are shown in the context of comparisons with satellite overpass data as a reference where ozonesonde uncertainties, in particular, will be an invaluable barometer for evaluating existing and future satellite ozone profile and column measurements. Reprocessed TCO ozone records have improved the agreement with reference satellite TCO to within  $\pm 5\%$ .

Key words: Ozone, tropics, Ozonesonde, Homogenization

### **References:**

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