

QOS2016-59-1, 2016

Quadrennial Ozone Symposium of the International Ozone Commission

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The Stratospheric Water and Ozone Satellite Homogenized (SWOOSH) database: A long-term database for climate studies

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Vertical profiles of ozone from the upper troposphere to stratosphere have been retrieved from a number of limb sounding and solar occultation satellite instruments since the 1980's. In particular, measurements from the SAGE instruments, UARS MLS, UARS HALOE, and most recently Aura MLS, have provided overlapping data since 1984. In order to quantify interannual- to decadal-scale variability in ozone, it is necessary to have a uniform and homogenous record over the period of interest. With this in mind, we merged the aforementioned satellite measurements to create the Stratospheric Water and Ozone Satellite Homogenized (SWOOSH) data set, which contains vertically resolved zonal-mean (2.5°) monthly-mean water vapor and ozone concentration at levels covering the stratosphere.

In this presentation, we describe the process of merging the satellite data sets, which involves adjusting the data to a reference measurement using offsets calculated from coincident observations taken during instrument overlap periods. Uncertainties associated with individual measurement precision, geophysical variability, and the merging process are quantified and compared to one another. We show that while the SWOOSH data can be used to quantify interannual variability, quantifying long-term trends in SWOOSH is complicated by the various sources of uncertainty, as well as by potential drifts of individual instruments. We assess drift uncertainty through intercomparison with ozonesondes, and discuss the implications ozone trends during depletion and recovery periods.