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Ozone Profile Trends: An SBUV/2 Perspective

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Since the signing of the Montreal Protocol in 1987 and its subsequent agreements the climate community has been anticipating the ability to detect the recovery of the ozone layer. Factors of chemistry, dynamics and climate change complicate the system, and require an examination of the ozone profile in addition to total ozone, and as well as the latitudinal dependence to fully document and comprehend the ozone recovery story. A Cohesive Ozone Profile dataset has been developed from SBUV and SBUV/2 on Nimbus 7 and the NOAA Polar Orbiting Environmental Spacecraft: NOAA-9, -11, -14, -16, -17, -18 and -19 spanning 1978 to 2016. The result is a 38 year record of ozone from a single instrument which removes drifts from algorithm or instrument differences. Only remaining are inter-satellite calibration, and the complications arising from time of measurement and drifting of the equatorial crossing time of the NOAA satellites. This dataset uses the Version 8.6 algorithm to which an adjustment scheme has been applied to remove inter-satellite differences. Integrity of the auxiliary measurements, such as measurement time, or solar zenith angle, for example, is maintained by using a single satellite to represent a time period. This dataset will be extended forward via the OMPS-NP on S-NPP and JPSS satellites. The Hockey Stick approach of Reinsel (2002) is used to evaluate the ozone recovery near-globally (50N-50S), tropically and at mid-latitudes and results compared to climate chemistry models. An investigation of the stability of the results as years of data are added will be presented with a focus on the upper stratosphere. The effects of the adjustment scheme on the stability of the ozone recovery statistics will be explored. Seasonality of the trend results will be examined.

Reinsel, G.C., et al Journal of Geophys. Res., 107, p4078 (2002).