

Past Changes in the Vertical Distribution of Ozone: The SPARC/IO₃C/IGACO-O₃/NDACC (SI²N) Activity and its Outcome

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Peak stratospheric chlorofluorocarbon and other Ozone Depleting Substance (ODS) concentrations were reached in the mid to late 1990s. Detection and attribution of the expected recovery of the stratospheric ozone layer in an atmosphere with reduced ODSs as well as efforts to understand the evolution of stratospheric ozone in the presence of increasing greenhouse gases are key current research topics.

In preparation for the 2014 United Nations Environment Programme/World Meteorological Organization Scientific Assessment of Ozone Depletion, the SPARC/IO₃C/IGACO-O₃/NDACC (SI²N) initiative was designed to study and document changes in the global ozone profile distribution. This required assessing long-term ozone profile data sets in regards to measurement stability and uncertainty characteristics. Some of the data sets have been improved as part of this initiative with updated versions now available.

We will present a short overview of the different available stratospheric ozone profile data sets, noting drifts and biases between those data sets, and finally showing trend analyses for the ozone depletion period (1979/1984 to 1997), and the ozone recovery period (1998-2011). We found that ozone trends in the 1980s and early 1990s are well understood and consistent between different measurement systems. However, the multitude of stratospheric ozone profiling systems in the 2000s during a time period with quite small ozone changes result in an inconsistent trend picture during the ozone recovery period.

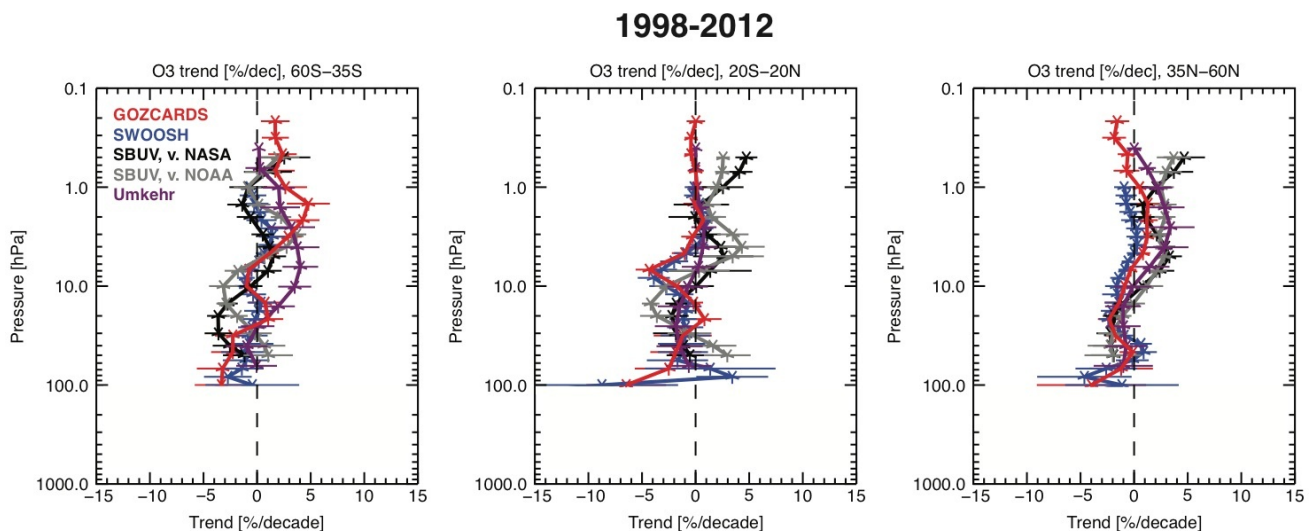


Figure 1. Ozone trends from 1998-2012 in percent per decade for three latitude bands: Northern Hemisphere mid-latitudes (35°N-60°N, left), the tropics (20°N-20°S, middle), and Southern Hemisphere mid-latitudes (35°S-60°S, right). Different colored lines denote trend profiles for different measurement systems.