

The uncertainty in stratospheric ozone trends

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While it has become evident that the ozone trend has changed sign around the mid-1990s, the debate is still open as to how uncertain the profile trend estimates are. There is currently no community-wide consensus whether there is statistically significant observational evidence for the recovery of stratospheric ozone. As a step forward, we review the studies that have been carried out in recent years, e.g., in the context of the WCRP/SPARC SI2N initiative and the last WMO/UNEP ozone assessment, with particular focus on how the uncertainties in trends have been estimated. In these frameworks many satellite and ground-based ozone monitoring teams have provided high-quality, long-term measurement records of the vertical distribution of ozone at global and local scales from the ground up to the mesosphere. Comprehensive inter-comparisons of these data records have provided substantial insight into, e.g., the long-term stability of individual data records, one of the main sources of uncertainty in single-instrument ozone trend estimates. The combined use of the observations acquired by different instruments has definitely helped to reduce the statistical uncertainty in regression analyses for the post-2000 period. However, doing so also introduces the intricate problem of quantifying the systematic uncertainty in multi-instrument trend estimates, since other factors than long-term stability come into play as well. We discuss the merits and the limitations of past and recent evaluations. Since most important prerequisites are met, we make a case for a coordinated effort to take one of the remaining crucial hurdles and obtain more realistic uncertainty estimates for stratospheric ozone trend assessments. We are hopeful that this will soon pave the way for a concordant picture on the second stage of ozone recovery.