

Observed composition trends and variability in the upper troposphere / lower stratosphere (OCTAV UTLS)

Peter Hoor (1), Gloria Manney (2), and Irina Petropavlovskikh (3)

(1) Institute for Atmospheric Physics, Physics, University Mainz, Germany (hoor@uni-mainz.de), (2) NorthWest Research Associates, Socorro, NM, USA, (3) NOAA ESRL Global Monitoring Division, Boulder, CO, USA

The upper troposphere / lower stratosphere (UTLS) is affected by the Brewer Dobson Circulation (BDC) as well as transport across the tropopause and the jets. The effect of changes in the dynamical properties on the distribution of tracers in the UTLS is therefore difficult to detect, since it involves the coupling of transport and mixing processes on very different temporal and spatial scales.

Further complications arise from the short term variability of the tropopause and jet locations, which introduces variability in tracer distributions, particularly for those with strong gradients at the tropopause. It is therefore essential to account for the dynamically induced variability by, e.g. the tropopause location when looking at trends of trace gas distributions and long-term changes.

The Stratosphere-troposphere Processes And their Role in Climate (SPARC) emerging activity OCTAV-UTLS (Observed Composition Trends and Variability in the UTLS) aims to reduce the uncertainties in trend estimates by accounting for these dynamically induced sources of variability. Achieving these goals by using existing UTLS trace gas observations from aircraft, ground-based, balloon and satellite platforms requires a consistent analysis of these different data with respect to the tropopause or the jets. Therefore, a central task for OCTAV-UTLS is the development of a common metrics which is applicable to the different types of data sets to account for the dynamically induced tracer variability. Particularly we will compare different UTLS datasets using geophysically-based coordinate systems including tropopause and upper tropospheric jet relative coordinates derived from the JETPAC tool (Jet and Tropopause Products for Analysis and Characterization).

We will address the problems of accounting for the dynamically induced UTLS trace gas variability using different geophysically-based coordinate systems derived from reanalysis products and will present the approach that is being used in the emerging SPARC activity OCTAV-UTLS.