Seminar on Physics and Chemistry
of the Atmosphere
26.04.2019, SoSe 2019, IUP Bremen

Retrieval of ozone profiles from OMPS limb observations and merging with other data sets to study long-term stratospheric ozone changes

Carlo Arosio
(IUP)

Abstract

Satellite observations of trace gases in limb geometry provide highly spatially and temporally resolved data sets with a good vertical resolution. After the strong stratospheric ozone depletion occurred in the last decades of the 20th century, the interest of the scientific community is focused on the detection and monitoring of the expected ozone recovery.

In this study, a retrieval scheme is applied to OMPS Limb Profiler (LP) observations to derive ozone profiles, extensively adapting the existing algorithm used for SCIAMACHY. The final aim is the merging of the two satellite data sets to study ozone changes in the stratosphere.

In this presentation, the ozone retrieval algorithm is firstly described and characterized in terms of error budget and vertical resolution. The validation of the obtained OMPS-LP ozone time series covering the period 2012-2018 has been performed using independent data, such as MLS observations and ozonesondes profiles.

Then, the merging of the OMPS-LP data set with SCIAMACHY and SAGE II time series is presented, introducing the followed approaches. The focus is on the SCIAMACHY/OMPS-LP merged data set, which is zonally resolved and was created to study long-term ozone changes over the last 15 years as a function of altitude, latitude and longitude. To this aim, we applied a multi-linear regression model to the merged time series.

The trend results will be presented. In particular, the ozone recovery in the upper stratosphere at mid- and high-latitudes has been detected, starting from the end of 1990s. We identified a fluctuation in the trends in the middle tropical stratosphere and found a large variability as a function of longitude, especially at northern high-latitudes.