昭和基地における上部成層圏のオゾン回復

宮川幸治[1]、Irina Petropavlovskikh[2]、Robert D. Evans[3]
[1] *気象庁高層気象台*
[2] *コロラド大学環境科学研究所*
[3] *米国海洋大気庁地球システム研究所*

Ozone recovery in the upper stratosphere from Umkehr measurement over Syowa, Antarctica

Koji Miyagawa[1], Irina Petropavlovskikh[2], Robert D. Evans[3]
[1]*Aerological Observatory, Japan Meteorological Agency*
[2]*Cooperative Institute for Research in Environmental Sciences (CIRES)/NOAA*
[3]*NOAA/OAR/ESRL Climate Monitoring Division, 325 Broadway, Boulder, Colorado USA 80305*

The long-term changes in Ozone-Depleting Substances (ODS) are often represented by the Equivalent Effective Stratospheric Chlorine (EESC) data. While at middle latitudes the ODS reached the maximum in the stratosphere by the end of 1990s, at high latitudes the turning in the growth rate of the ODS has been delayed by several years. Analysis of Umkehr observation help to understand the influence of the ODS on ozone in the middle and upper stratosphere. Ozone data derived from the Dobson Umkehr measurements since 1977 at the Syowa ground based station in Antarctica (69.0S, 39.6E) showed a significant decrease in ozone above 4 hPa during the 1980s and 1990s. Ozone values over Syowa have remained low since ~2001. Assessment of the SBUV V8.6 ozone profiles derived from several NOAA/2satellite platforms in regards to the ground-based data help to determine biases between the overpass data (+/-4 degrees, 24 hours) and the Umkehr profiles. Zonal mean ozone values over Syowas are often affected by the vortex. Therefore, 70-75 S zonally averaged data appears to be in a better agreement with Syowa Umkehr data as compared to 65-70 S averages, even though the latter ones are geographically closer to 69 S location of Syowa station (Figure 1). After homogenization of the SBUV satellite datasets (removal of the biases) the time series of upper stratospheric ozone are found to be in qualitative agreement with Syowa station Umkehr ozone time series. Ozone recovery during the austral spring over Syowa station appears to be slower than predicted by the WMO recommended EESC curve, which indicates that Polar stratospheric ozone is also affected by other than ODS depletion processes. Detection of stratospheric ozone recovery in the Antarctic region requires careful consideration of counteracting contributions from both chemical and dynamical processes.

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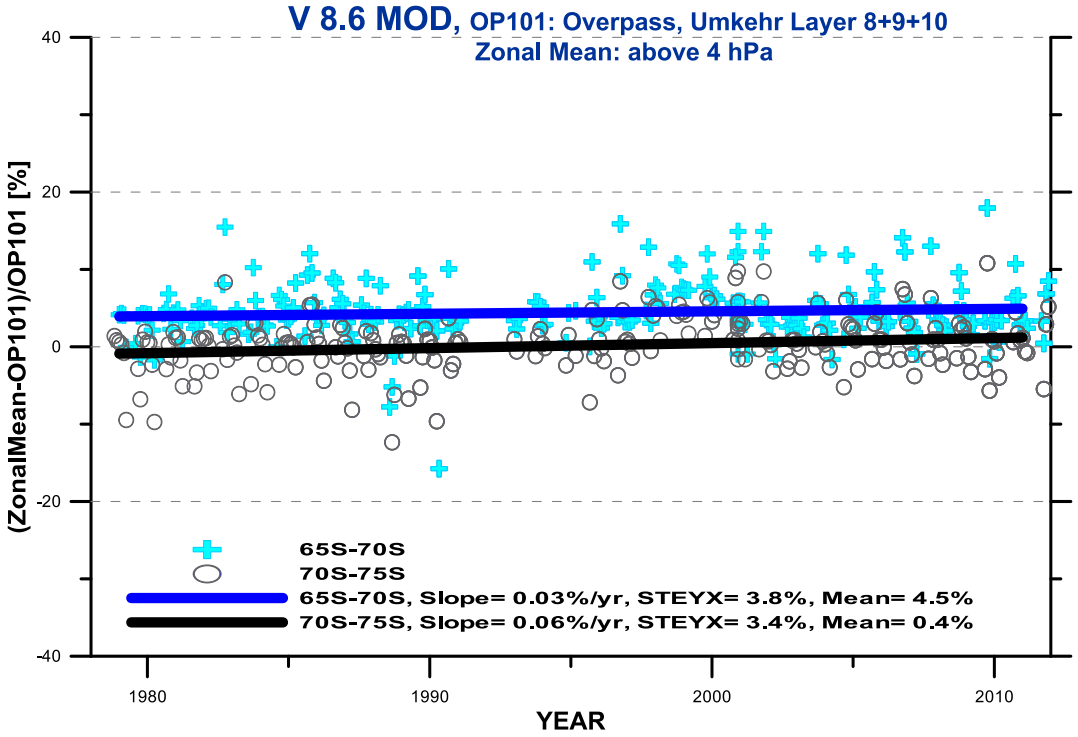

Figure 1. Ozone difference between 65-70 S and 70-75 S zonal mean.
The MOD (Merged Ozone Data sets) are monthly-mean zonal and gridded average products constructed by merging individual SBUV/SBUV/2 satellite version 8.6 data sets.