

Symptoms of total ozone recovery inside the Antarctic vortex during Austral spring

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The latest Ozone Assessment Reports have confirmed the stabilization of ozone loss in Antarctica since 2000. The challenge now is to assess the impact of the observed reduction in the concentration of ozone depleting substances (ODS). During the last decade, several studies have been carried out to quantify a possible increase in total ozone column in the Antarctic polar vortex in spring directly linked to ODS decrease in the polar stratosphere. Most analyses use multi-parameter regression models with different proxies to represent the interannual variability of ozone during specific periods (between September and November), others studies use Ozone Mass Deficit (ozone columns lower than 220DU) as a metric to avoid dependency on vortex area and finally simulations of chemical-transport or chemical-climate models in order to isolate chemical effect from radiative and dynamical contributions.

In this study, total ozone springtime trend analysis in Antarctica was performed over the 1980-2016 period using a multilinear regression model based on various proxies (heat flux, Quasi-Biennial Oscillation, solar flux, Antarctic Oscillation and aerosols). Annual total ozone column corresponding to the mean monthly values inside the vortex in September and during the period of maximum ozone depletion from September 15th to October 15th are used. The baroclinicity of the polar vortex has been considered and two different satellite datasets have been used. A new dynamical proxy was also developed for the multi-linear regression analysis that improved the trend model results. The multi-linear regression analysis provides significant positive trend after 2001 for September and smaller positive and hardly significant for the 15Sept-15Oct period.