



## Long Term Changes in the Polar Vortices

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As the amount of halogens in the stratosphere is slowly declining and the ozone layer slowly recovers it is of interest to see how the meteorological conditions in the vortex develop over the long term since such changes might alter the foreseen ozone recovery. In conjunction with the publication of the WMO Antarctic and Arctic Ozone Bulletins, WMO has acquired the ERA Interim global reanalysis data set for several meteorological parameters. This data set goes from 1979 - present. These long time series of data can be used for several useful studies of the long term development of the polar vortices. Several “environmental indicators” for vortex change have been calculated, and a climatology, as well as trends, for these parameters will be presented. These indicators can act as yardsticks and will be useful for understanding past and future changes in the polar vortices and how these changes affect polar ozone depletion. Examples of indicators are: vortex mean temperature, vortex minimum temperature, vortex mean PV, vortex “importance” (PV\*area), vortex break-up time, mean and maximum wind speed. Data for both the north and south polar vortices have been analysed at several isentropic levels from 350 to 850 K. A possible link between changes in PV and sudden stratospheric warmings will be investigated, and the results presented. The unusual meteorological conditions of the 2015 south polar vortex and the 2010/11 and 2015/16 north polar vortices will be compared to other recent years.