Changes in the Polar Vortex: Effects on Antarctic Total Ozone Observations at Various Stations and Antarctic Surface Climate Characteristics

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October mean total column ozone data from four Antarctic stations form the basis for understanding the evolution of the ozone hole since 1960. While these stations show similar emergence of the ozone hole from 1960 to 1980, the records are divergent in the last two decades. The effects of long-term changes in vortex shape and location are considered by gridding the measurements by equivalent latitude. A clear eastward shift of the mean position of the vortex in October with time is revealed, which changes the fraction of ozone measurements taken inside/outside the vortex for stations in the vortex collar region. After including only those measurements made inside the vortex, ozone behavior in the last two decades at the four stations is very similar. This suggests that dynamical influence must be considered when interpreting and intercomparing ozone measurements from Antarctic stations for detecting ozone recovery and ozone-related changes in Antarctic climate. As a next step, changes in Antarctic tropospheric temperatures and sea ice extent will be related to the observed changes in the polar vortex and possible connections evaluated.

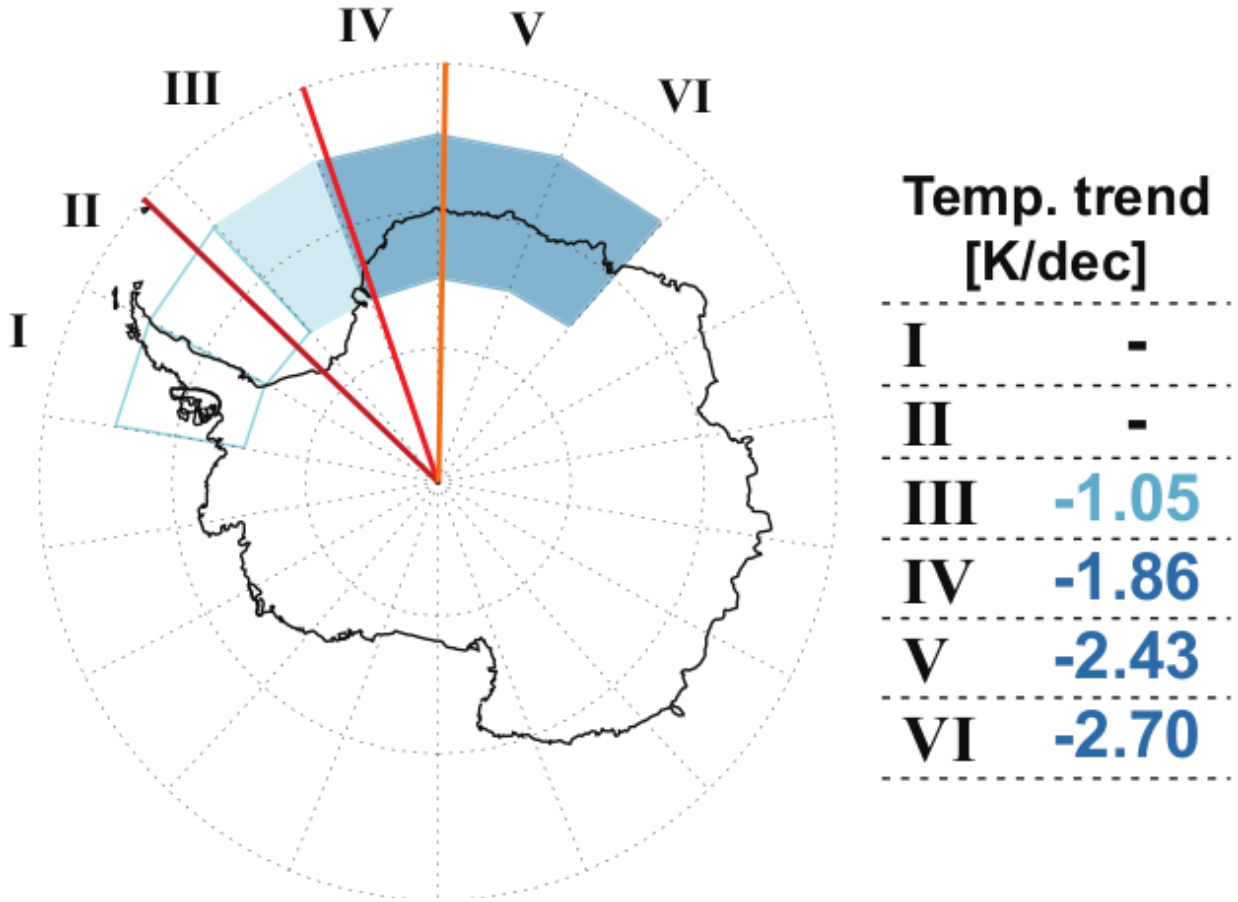

Figure 1. October Microware Sounding Units Temperature Lower Stratosphere temperature trends, 1979-2008, average for 65°S – 75°S and 20° longitude bins. Red lines indicate the average minimum temperature for the 1980s (44°W), the 1990s (18°W) and the 2000s (1°E). Dark blue to light blue areas represent trends significant on a 2σ (1σ) level.