Characteristics of total ozone measured in the western Antarctica

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To figure out the temporal variation and spatial distribution of Antarctic ozone loss, we investigate the characteristics of long-term (at least longer than 15 years) total ozone columns measured by Dobson or Brewer spectrophotometer at five ground stations in the western Antarctica: King Sejong, Marambio, Belgrano, Halley, and Belgrano stations. All measured total ozone columns, well evaluated through an inter-comparison with OMI total ozone measurements, recently show the recovery pattern, particularly in September. They are generally analogous but often different during the austral springtime when the stratospheric ozone loss strongly occurs. As shown in the comparison of potential vorticity among stations, regional differences of total ozone are attributed to the spatial scale of polar vortex. Additional analyses of other meteorological factors also indicate the large spatiotemporal variations of atmospheric pattern over the western Antarctica. This probably implies that the total ozone variation in this region has higher sensitivity to the large-scale circulation and even climate change compared to the eastern Antarctica. We also find the well-known positive correlation between total ozone and lower stratospheric air temperature all the year round, particularly at 50-100 hPa heights during austral spring. But this positive correlation is not apparent in the upper stratosphere (higher than 10 hPa). Correlation with tropical sea surface temperature is not clear, but the signal looks meaningful and somewhat asymmetry between austral spring and summer. Further analysis will be required for better understanding of this feature.

Keywords: Antarctica, Ozone, Brewer, Dobson