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Performance of satellite total column ozone products at the edge of southern polar vortex

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The edge of southern polar vortex provides a unique opportunity to study both polar and subpolar air masses. During the ozone-hole period (usually from mid-August to the end of November), the frequent air mass alterations bring ozone-rich or ozone-poor air, so that both depleted and non-depleted ozone layer can be observed from a single point. Marambio Base, situated at the Seymour Island in the Antarctic Peninsula Region, is a good location to study ozone variability at the edge of southern polar vortex. Therefore, in February 2010, the Czech Hydrometeorological Institute installed the B199 Brewer Spectrophotometer there. Since then, the instrument carries out UV radiation and ozone measurements, including the calculation of daily total ozone column (TOC). In this study, four different satellite daily TOC products (OMI TOMS, OMI DOAS, GOME-2, and SCIAMACHY) were compared to the B199 daily TOC during a three-year sample period 2011–2013. Together with the shape of the ozone profile (depleted and non-depleted), various characteristics, such as the B199 daily TOC, solar zenith angle, and stratospheric temperature, were considered in the analysis. The agreement of the studied data products was generally good, with mean differences ranging between 0.0–2.5 %. However, over the studied period, a significant overestimation of mean B199 TOC was found in all data products except OMI(TOMS) and greater differences were found on days with a depleted ozone layer. The differences between the B199 daily TOC and the studied data products were in most cases significantly correlated with solar zenith angle, B199 TOC, and stratospheric temperature in different geopotential heights (100, 70, 50, and 30 hPa). The B199 daily TOC was best represented by OMI(TOMS); nevertheless, even this data product showed a significant overestimation of daily TOC on days with a depleted ozone layer and a significant relationship with solar zenith angle and stratospheric temperature.