

# **Regional Differences of Ozone Correlations in The Antarctic Region Using MERRA-2 Reanalysis Data**

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## **Abstract**

Antarctic stratospheric ozone depletion in austral spring not only increases harmful UV radiation that reach to the Earth's surface but also affects Southern Hemisphere circulation changes. In this study, we examined the regional differences of correlations between Antarctic stratospheric ozone and meteorological parameters (Temperature, Potential Vorticity) during austral spring season over 40 years period from 1980 to 2019 using MERRA-2 Reanalysis data. We used data within the range of 50-100hPa, which corresponds to the altitude where stratospheric ozone depletion occurs most strongly. The region was divided into four zones based on latitude, ranging from 90-50°S, with intervals of 10°. Additionally, the longitude was divided into eight zones (labeled as R1 to R8), starting from 180°W and intervals of 45°. It varied by year, but generally, from 90-70°S, there was weak negative correlation or no correlation between ozone and meteorological fields. However, from 70-60°S, annular pattern of positive correlation was observed. Furthermore, as confirmed in many studies, the general position of the polar vortex tends to be skewed towards the northwest so that leads regions with intense ozone depletion also skewed towards the northwest. Therefore, correlations varied differently depending on regions R1, 6-8, corresponding to the northwest of Antarctica, and regions R2-5, representing the southeast, confirming that the annular pattern of positive correlation is skewed towards the northwest. Additionally, we plan to investigate the impact of regional differences in the stratosphere on surface Temperature.

## **Early Career Scientist**

NO, I am not an early career scientist.