

TEMPORAL VARIATION OF TROPOSPHERIC OZONE AND SPRINGTIME OZONE DEPLETION EVENTS AT KING SEJONG STATION, ANTARCTICA

Sora Seo

Sora Seo^{1*}, *Tae Siek Rhee*¹, *Keyhong Park*¹ and *Sang-Jong Park*¹

¹*Korea Polar Research Institute, Korea*

westsora@kopri.re.kr

ABSTRACT

Tropospheric ozone concentration and meteorological factors were measured from 2009 to 2013 at King Sejong station (KSG) located at the tip of the Antarctic peninsula, King George Island. The trend estimation of ozone for each month did not show any significant increasing or decreasing trends during the study period. However, tropospheric ozone concentration showed seasonal variation of 14~34 ppbv with high and low concentration in winter and summer, respectively. Ozone depletion events (ODEs), which are natural phenomena that background ozone rapidly drops near zero level, were frequently found during the austral spring from August to November. The monthly mean depleted ozone concentration due to ODEs was 0.7~2.1 ppbv, which can affect the polar chemical processes, radiation budgets, and further climate. In addition to the seasonal variation, diurnal variation of ozone derived from the solar radiation was found with the range of 0.4~0.8 ppbv, although this change is small compared to other non-polar regions due to low NO_x concentration. For simple calculation of tropospheric ozone budget in high latitude region of Southern Hemisphere based on ozone data at KSG, a conceptual box model was developed. This model showed that the net loss term including photochemical destruction and deposition is balanced with the net gain term of stratospheric entrainment. Also, we found that ODEs at KSG are significantly related with not only specific meteorological conditions including lower temperature, higher wind speed, and easterly wind but also air masses advected from the Weddell Sea covered by the extended sea-ice through the backward trajectory analysis.