

Investigation on the vertical structure of the temperature variations in the mesosphere and lower thermosphere region during northern SSW

Jeong-Han Kim¹, Geonhwa Jee¹, Young-In Won², Baek-Min Kim¹, Hyesun Choi¹, Seong-Joong Kim¹

¹Division of Polar Climate Change Research, Korea Polar Research Institute, Incheon, Republic of Korea

²NASA/GSFC, USA

We analyzed the temperature data obtained from Aura/MLS and the polar cap index (PCI) of MERRA re-analysis data during the period of 2004 through 2013, in order to statistically investigate the variations of the stratospheric and mesospheric temperatures during northern sudden stratospheric warming (SSW) event. In this study, we investigated the height profiles of the correlation coefficients between MERRA daily PCI anomalies at 10hPa and MLS daily temperatures of 55 height levels in the range of 1 km to 100 km during northern winter seasons. Our results showed that there is a weak and broad negative correlation between PCI and temperature anomalies in entire mesospheric region during the period without SSW. Furthermore, our results indicate that there is a strong positive correlation between the PCI anomalies and upper mesospheric temperatures during major SSWs, whereas a strong negative correlation appears in lower mesosphere region. This is good agreement with the result of Siskind et al. (2005) which studied the correlation coefficients derived from TIMED/SABER temperatures for three SSW events. In this study, we also present the comparison of our results from observation and re-analysis data with those from WACCM simulation and the discussions about the difference will be addressed.