Observations of OI630.0 nm Nightglow from the Upper Thermosphere in the Antarctica

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A ground-based Fabry-Perot interferometer has been operating to measure atomic oxygen nightglow (OI 630.0 nm) from the thermosphere at King Sejong station (KSS, geographic: 62.22S, 301.25E; geomagnetic: 50.65S, 7.51E), Antarctica. While numerous studies have been performed on high-latitude dynamics using ground-based Fabry-Perot interferometers in the Northern Hemisphere, the thermospheric measurements in the Southern Hemisphere are relatively new and sparse [Smith et al., 1994]. Therefore, the nightglow measurements at KSS should play an important role in extending the thermospheric studies to the Southern hemisphere. The location of KSS is unique for an optical investigation of the southern thermosphere because it is at high-latitude geographically, but middle-latitude geomagnetically; where the thermosphere is therefore subject to unusual varieties of driving forces [Kim, et al., 1990]. In this study, we investigated the effects of the geomagnetic and solar activities on the thermospheric neutral winds and temperatures that have been measured at KSS in 1989 and 1997. The mean values of F10.7 (a measure of solar activity) are 186 and 79 (in unit of 10-22 Wm-2Hz-1), and the Aps (geomagnetic activity index) are 122 and 7 for 1989 and 1997 observing period, respectively. The average value of the measured temperatures is ~1450 K in 1989 and ~800 K in 1997, reflecting the solar activities in the periods. The temperature variations with the UT (Universal Time) are compared with the values calculated from empirical models (MSIS-86 and semi-empirical VSH). The measured thermospheric wind speed is typically about 100 m/s in 1997, but with large variance. The wind vectors are also compared with the current models such as VSH and HWM models. Our database will improve the empirical and semi-empirical thermospheric models in the region of southern mid to high-latitudes.