

Response of the global ionospheric current system to stratospheric sudden warmings

YAMAZAKI, Yosuke^{1*}, YUMOTO, Kiyohumi¹, LIU, Huixin¹, Daniel McNamara², HIROOKA, Toshihiko¹, UOZUMI, Teiji¹, KITAMURA, Kentarou³, ABE, Shuji¹, IKEDA, Akihiro¹

¹Kyushu University, ²Manila Observatory, ³Tokuyama College of Technology

Recent studies have shown the possible impact of the stratospheric sudden warming (SSW) on the ionospheric weather, and have attracted much attention as new evidence of the vertical atmospheric coupling. During SSWs, the counter-electrojet, a reversal of the equatorial electrojet from eastward to westward, is often observed, indicating the amplification of the semidiurnal tide. In the past studies, however, the observations were limited to the equatorial region, and thus it was not clear whether the tidal amplification is a local or global effect. In the present study, the response of the global ionospheric current system to SSWs is examined. The global ionospheric current systems during winter-time SSWs of 2001-2002 and 2002-2003 are derived from ground magnetometer data of the Circum-pacific Magnetometer Network (CPMN). Our results show that the occurrence of the counter-electrojet during these SSWs is due to an addition of the enhanced lunar current system that extends over both the Northern and Southern Hemispheres.

Keywords: Ionospheric dynamics, Stratospheric sudden warming, Vertical coupling of the Earth's atmosphere, Tides and planetary waves, Geomagnetic field, Global observation