EE-index長期解析に基づく赤道ジェット電流の月潮汐変動

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Lunar tide variation of Equatorial Electrojet based on the long-term EE-index

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Today human activity and society extend to the space. The monitoring of space weather environment is needed to allow us the safety life involving the space weather. Especially EEJ (equatorial electrojet) is an extremely interesting phenomenon from the view of connecting the ionosphere to the atmosphere, which have different physical backgrounds caused by the sun and the magnetosphere. Recently many researchers are trying to comprehensively understand the interaction/coupling among these different regions by analyzing simultaneously whole regions. The consecutive monitoring of equatorial magnetic variations requires an indicator not affected by the magnetospheric environment.

In 2008, International Center for Space Weather Science and Education, Kyushu University (ICSWSE) proposed the EE-index (Uozumi et al., 2008; Fujimoto et al., 2016), which is an index to monitor quantitatively various equatorial geomagnetic phenomena in real time. EE-index separates the magnetic disturbances in the equatorial region into the global (EDst) and local (EUEL) magnetic variations. Especially, the detail analysis of EUEL index provides the quantitative and visible information in order to reveal the electromagnetic phenomena affecting the fundamental structure of Equatorial Electrojet (EEJ), in terms of the space weather and space climate. For example, Fujimoto et al. (2016) reported the solar cycle variation of EEJ peak by the time series analysis of 17-year EUEL index.

We examined 6-year EUEL of EE-index to demonstrate the lunar tide variation superposed on EEJ variation observed at Ancon station in Peru and Davao in Philippines. We found that EUEL modulation of EEJ significantly has the semimonthly variation, with the stronger modulated amplitude in January and weaker around July. The semiannual EEJ variation is amplified in March and September. In other words, the amplitude of EEJ is weaker during solstices (January and July). An explanation of modulation differences between in January and in July is the relationship among the sun, earth and moon. The moon locates perigee in January and apogee in July. It means that the lunar tides is relatively stronger in January than in July. We will discuss sources controlling the semimonthly EEJ modulation.