Equatorial magnetic field variations using EE-index (MAGDAS project)

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MAGDAS project is the global ground-based magnetic field observation network and participates in the project "Study of coupling processes in solar-terrestrial system" that was approved by the Master Plan 2014 of Science Council of Japan and the Roadmap 2014 of MEXT. The MAGDAS magnetometer network allows to understand the energy transfer and propagation process from the poles to the equator, in the terms of the coupling the solar-magnetosphere-ionosphere-atmosphere.
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). This paper will show some examples applying EE-index to the equatorial magnetic variation: solar cycle variation of EEJ peak, semiannual EEJ variation and semidiurnal EUEL variation. The amplitude of semidiurnal EUEL variations increased in January and decreased around July. The seasonal dependence of semidiurnal variation agrees with the seasonal profile of atmospheric neutral wind (2.2) mode. The semiannual EEJ variation has two peaks in March and September. In other words, the amplitude of EEJ is weaker during solstices (January and July). We demonstrated these characteristics with time series analysis of EE-index. We are trying to understand the sources affecting the total current intensity flowing the equatorial ionosphere by separating the different contributing factors from the magnetic field variations.

Keywords: Global magnetic filed obsevartion, Equatorial electorjet (EEJ), MAGDAS project

