

Multi point measurements of geomagnetically induced currents in the Chugoku region

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With cooperation from Yamaguchi power management office of the Chugoku Power Electric Co., we installed instruments of the geomagnetically induced current (GIC) measurement in Higashi-Yamaguchi and Shin-Yamaguchi electric power substations on March 2018 and March 2019, respectively. We analyzed correlations between the GIC from the two substations and magnetometer data for Space weather events, such as magnetic sudden commencements, magnetic pulsations, substorm positive bay etc. Our results show that the GIC at Higashi-Yamaguchi and Shin-Yamaguchi substations mainly correlates with east-west component of magnetic field or north-south component of the induced electric field. On the other hands, intensities of the GIC at Shin-Yamaguchi substation are 2-4 times larger than that at Higashi-Yamaguchi. The Chugoku region is characterized by power lines parallel to coasts extending east and west. Shin-Yamaguchi substation is located at the west end of the two trunk power lines from the Sanyo- and Sanin-region, whereas Higashi-Yamaguchi substation is in the middle of the power line network. The geometric feature may be a main cause to amplify the GIC at Shin-Yamaguchi.

Keywords: geomagnetically induced current, low latitude, induced electric field, Substorm, magnetic sudden commencement