

Application of magneto-impedance sensor to geomagnetic field measurements for constructing Distributed Arrays of Small Instruments (DASI)

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Magneto-impedance (MI) effect was discovered about 25 years ago and micro-size magnetic sensors that utilizes this effect become commercially available. MI sensors are much less expensive than fluxgate sensors. We are developing a low-cost system to measure the geomagnetic field using the MI sensor, which is named MIM-Pi. MIM-Pi includes a Raspberry Pi, low-cost 24-bit AD converters, and power supply circuits for generating a stable power supply voltage.

For the period of June 17 to June 25, 2020, we conducted experimental observations of geomagnetic field variations with MIM-Pi at Inabu observation site in Japan (26.8°, -152.5° in geomagnetic coordinates). Inabu observation site is operated by Nagoya University. Data obtained with MIM-Pi were compared with those from the fluxgate magnetometer that has been working at the site. Results showed that MIM-Pi recorded Sq variations and geomagnetic pulsations with amplitudes of ~2 nT that were also detected with the fluxgate magnetometer.

In presentation, we will show long term observations by MIM-Pi and discuss the possibility of using this system for construction of Distributed Arrays of Small Instrument (DASI). We will also show the result of an attempt to remove artificial noises by placing multiple observation systems at neighboring observation points and performing independent component analysis.

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