R006-21
A 会場 ：11/6　AM2 （10:45-12:30）
12:00〜12:15

#前田　大輝 [1)], 能勢　正仁 [1)], 野村　太志 [1)], 足立　匠 [1)], 市原　寛 [2)], 岩永　吉広 [3)], 河野　剛健 [3)], 浅利　晴紀 [4)], 平原　秀行 [4)], 海東　恵 [4)], 長町　信吾 [4)]
([1] 名大・宇地研,[2] 名古屋大学地震火山研究センター,[3] 愛知製鋼株式会社,[4] 気象庁地磁気観測所

Low-cost magnetometer using magneto-impedance (MI) sensors

#Taiki Maeda[1)], Masahito Nose[1)], Hiroshi Nomura[1)], Takumi Adachi[1)], Hiroshi Ichihara[2)], Yoshihiro Iwanaga[3)], Takeshi Kawano[3)], Seiki Asari[4)], Hideyuki Hirahara[4)], Megumi Kaitou[4)], Shingo Nagamachi[4)]
([1]ISEE, Nagoya Univ.,[2]Nagoya University,[3]Aichi Steel Corporation,[4]Kakioka Magnetic Observatory, JMA,

Magneto-impedance (MI) effect was discovered about 30 years ago and a micro-size magnetic sensor that utilizes this effect becomes commercially available. We made some modifications to the commercially available MI sensors as they can cover the range of the geomagnetic field. For the period of March 30 to April 27, 2018, we conducted experimental observations of geomagnetic field variations with the MI sensors at Mineyama observation site, which is located about 100 km north-west of Kyoto. Data obtained with the MI sensors were compared with those from the fluxgate magnetometer that has been working at the site. Results showed that the MI sensor recorded geomagnetic variations with amplitudes of ˜1 nT that were also detected with the fluxgate magnetometer. This suggests that MI sensors are useful for researches in geomagnetism or space physics, although they are much less expensive than fluxgate magnetometers.

Nomura [2021] developed a triaxial magnetometer which is composed of the MI sensors, Raspberry Pi, low-cost 24-bit A/D converters, and stable power supply circuits. This magnetometer is named MIM-Pi, and the cost of MIM-Pi is about one-tenth of that of fluxgate magnetometer. However, the result of the test at Inabu observation site in Japan (26.8º, − 152.5º in geomagnetic coordinates) showed that MIM-Pi had step noises with amplitudes of 2 − 3 nT which originated from an A/D converter. Therefore, we replaced the A/D converter with a new A/D conversion module (ADPi) and confirmed that the modified MIM-Pi did not have such step noises. We performed a long-term observation at Inabu with MIM-Pi for the period of Nov. 19, 2021 to Jan. 14, 2022. Results shows that MIM-Pi can record Sq variations and geomagnetic pulsations with amplitudes of 1 − 2 nT that were also detected with the fluxgate magnetometer. We also performed a long-term observation at Kakioka Magnetic Observatory and found that MIM-Pi succeeded in capturing Pc4. For the deployment of MIM-Pi to construct a dense magnetometer network in Kanto-Tohoku area, we made a jig for MI sensors and a case for the controller. In presentation, we will show the MIM-Pi data and discuss future plan.