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Residual magnetism measurements needed for magnetometers onboard QSAT-EOS

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We have two 3-axis fluxgate magnetometers onboard the Kyushu Satellite for Earth Observation System Demonstration (QSAT-EOS). We call these instruments Science Magneto Sensors(SMS). The main object of SMS is to observe fluctuation of magnetic field with Field Aligned Current(FAC)

However, residual magnetic field(of the spacecraft) and dynamic magnetic field (generated by electric currents inside the spacecraft) affect the SMS measurements. Therefore we need to separate these noises from the measurement to observe fluctuation of magnetic field with FAC accurately. Then, in this research, we devised a measuring and analysis system of residual magnetism of each onboard instrument. The object of this research is to acquire fundamental data needed for data correction.

We used MAGDAS magnetometer(3-axis fluxgate magnetometers) belonging to Space Environment Research Center of Kyushu Univ. We measured angle characteristic of magnetic field around onboard instruments, rotating them with a turntable.

In some residual magnetism measurements, calculation method was to approximate magnetic field as eccentricity dipole or quadrupole moment. On the other hand, in this research, we placed importance on the specification of the magnetic structure of each instrument. We specified them from waveform of actual fluctuation of magnetic field.

Furthermore, we will conduct another experiment using flight model(FM) of QSAT-EOS. Using this data which can be acquired by the experiment, we will define magnetic offset adopted during actual operation of QSAT-EOS. Then, using the offset, we aim to implement SMS science mission.

Keywords: residual magnetism, QSAT-EOS, Science Magneto Sensors, MAGDAS magnetometer, measurements of Earth's magnetic field, Field Aligned Current(FAC)