

# Period characteristics of Mercury's external magnetic field from MESSENGER magnetometer observation

\*Takaaki Katsura<sup>1</sup>, Hiroaki TOH<sup>2</sup>

1. Solar-Planetary Electromagnetism Laboratory, Department of Geophysics, Graduate School of Science, Kyoto University, 2. Data Analysis Center for Geomagnetism and Space Magnetism Graduate School of Science, Kyoto University

MESSENGER (MErcury Surface, Space Environment, Geochemistry, and Ranging) is the first probe launched into Mercury centric orbit and has been observed electromagnetic circumstances including magnetic field over about four years since 2011. From this data the average shape and location of Mercury's magnetopause and bow shock have determined (Winslow et al., 2013). Furthermore, from the studies of magnetic fields induced at the top of Mercury's core by time-varying magnetospheric fields, the radius of Mercury's core is determined (Johnson et al., 2016).

At present, however for the period of external magnetic variations, annual variation due to Mercury's high orbital eccentricity alone is considered. In general more precision information about conductivity structure of planetary bodies e.g. separation of the thickness and conductivity of spherical body (or shell) would be expected to be given by multi-frequency sounding. Accordingly we focus on subsolar distance as an index of the time variation of Mercury's external magnetic field in order to estimate the period characteristics of external field. Since magnetopause is determined by the balance between planetary intrinsic magnetic field and solar wind, subsolar distance is able to be regarded as an index of the variation of external magnetic field.

We identify the location of Mercury's magnetopause from vector magnetic field data by MESSENGER observation in fifteen Mercury years and study the period characteristics of Mercury's external magnetic field by converting the data of magnetopause into that of subsolar distance and analyzing the time-variation of them, and report the result.

Keywords: Mercury, MESSENGER, Magnetopause