

PPS023-09

Room:303

Time:May 26 11:15-11:30

Toward future magnetic exploration of moons and planets

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Exploration of lunar and planetary interiors aims at clarifying their origin and evolutionary processes. The present interior structure of moons and planets is a consequence of their thermal history after their formation. It is also possible to understand the dynamics of the Moon and planets if their precise structures are known.

Magnetic exploration enables us to obtain information on lunar and planetary interior structure, which is independent of those estimated through seismic measurement, heat-flux measurement, and gravity measurement. Existence of lunar and planetary intrinsic magnetic field implies that there is energy to generate magnetic field by dynamo action in their interior. Magnetic anomalies can be a clue to investigate a possibility of ancient dynamo process. Electromagnetic response of moons and planets contains information on their electrical conductivity structure, from which thermal structure can also be inferred. Thus, lunar and planetary magnetic exploration is very important to understand their interior structure, origin and evolution.

In the future, based on the above, we should promote the following plans; electromagnetic sounding at the lunar surface to estimate lunar interior structure; determination of the origin and age of lunar magnetic anomalies to understand lunar evolution; detail mapping of Martian magnetic anomalies to understand Martian evolution; and electromagnetic sounding at the Martian surface to estimate Martian interior structure.

Keywords: magnetic exploration, planets, moons, interior structure