Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

PPS024-06 会場:103 時間:5 月 22 日 17:45-18:00

月磁気異常の広域および全球マッピング
Regional and global mapping of surface vector fields of the lunar magnetic anomalies

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The lunar magnetic anomalies give key information about the evolution of the lunar interior, in particular, a possible dynamo of the early Moon. There are two main problems of the origin of the lunar magnetic anomalies, the ambient field and the magnetization acquisition process. Based on the Apollo and Lunar Prospector observations, the basin-forming impact model was proposed to explain that several strong anomalies are located near antipodes of large impact basins [1]. However recent study of the Kaguya observations indicates that there are relatively weak magnetic anomalies almost over the Moon, suggesting an ancient global magnetic field such as an early lunar dynamo [2]. This possibility is supported by a numerical dynamo simulation assuming a dichotomy of the thermal condition at the lunar core-mantle boundary [3] and by the results from reanalysis of the previous dataset [4]. Thus the origin of the magnetic field recorded by the lunar magnetic anomalies should be reexamined although the basin-forming impact model has been believed so far.

For the study of the magnetization acquisition process, more detailed maps of the lunar magnetic anomalies are needed when compared with the geological and topographical data. Therefore we have developed a new method for mapping surface vector fields of the lunar magnetic anomaly field using the magnetic field observations by a satellite magnetometer (see Poster by Tsunakawa et al. at JpGU Meeting 2011). The surface vector mapping method has been applied to the Kaguya and Lunar Prospector datasets of low altitudes. We will report the results of regional and global mapping of the surface vector fields and discuss possible processes of the lunar magnetic anomalies.

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キーワード: 月, 磁場, 磁気異常, かぐや
Keywords: Moon, Magnetic field, Magnetic anomaly, Kaguya