

Global mapping of the lunar magnetic anomalies at the surface: implications for the sub-surface igneous event

TSUNAKAWA, Hideo^{1*}, TAKAHASHI, Futoshi¹, SHIMIZU, Hisayoshi², SHIBUYA, Hidetoshi³, MATSUSHIMA, Masaki¹

¹Department of Earth and Planetary Sciences, Tokyo Institute of Technology, ²Earthquake Research Institute, University of Tokyo, ³Department of Earth and Environmental Sciences, Kumamoto University

We have developed a new method to map three components of the lunar magnetic anomaly field at the surface with a high spatial resolution. This method has been applied to the low altitude observations by the magnetometer of Kaguya (MAP-LMAG) and Lunar Prospector. Regional maps at the same altitudes from the two datasets show good agreement, for example, the anomalies in and around the South Pole-Aitken basin. Connecting regional maps of 15 deg x 15 deg size, a global map of the lunar magnetic anomalies was provided for three components from the Lunar Prospector dataset. As a result, the lunar magnetic anomalies are distributed almost over the lunar surface and show many lineated patterns with some spot-like ones. These patterns suggest ~4 Ga global event of the magnetic anomaly formation in the dynamo field of the early Moon. It is inferred from the Rima Sirsalis anomaly region that the lineated magnetic anomalies are originated from dike-like intrusions. If it is a case, the lineation indicates a direction of the horizontal maximum stress field in the early lunar crust. We will discuss a possible subsurface igneous event of the early Moon.

Keywords: moon, magnetic anomaly, dynamo, Kaguya, igneous activity, stress field