Experimental study on the structure of shock remnant magnetization

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The history of planetary magnetism is a key to understanding the evolution of planets. We focus on shock remnant magnetization (SRM) as a record of the magnetic field of planets: the magnetic anomaly field from SRM of a planetary crust can be measured by spacecraft magnetometers. It is essential to understand the structure of SRM for estimating planetary paleofield from magnetic field data because the observed magnetic anomaly field above craters is determined by the sum of the contribution of the materials beneath the crater with the SRM. In this study, the structure of SRM is experimentally investigated by using a two-stage light gas gun placed at the Institute of Space and Astronautical Science(ISAS) of Japan Aerospace and Exploration Agency(JAXA). We measured the SRM of 3 mm cube samples cut from basalt cylinders shocked in the weak magnetic field. The characteristic features of SRM structure are as follows: (1) The intensity of SRM tends to increase with increasing the distance in less than ~10 mm from the collision point. (2) The intensity of SRM tends to decrease with increasing the distance in more than ~10 mm from the collision point. Then the intensity of SRM of blocks are compared with the pressure and temperature from iSALE (Impact-SALE) calculation. In this talk, we will discuss the structure of SRM and the relationship between the SRM structure and the calculated change in pressure and temperature.

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