E111-004 **Room: 301B** **Time: May 28 9:45-10:00**

Irreversible changes in anisotropy of magnetic susceptibility by stress waves

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Magnetic data provide valuable information on buried impact craters. An understanding of how stress waves change magnetic properties of rock is critical for correct interpretation of magnetic data, especially in case that rock samples are not available. Effects of relatively weak shock for those of rocks in crater wall have been poorly studied. In this context, we investigated shock effects on magnetic properties through studies of experimentally impacted basaltic andesite, and basalt from natural impact crater (Lonar crater).

An initial peak pressure of 5 GPa was generated in a block of basaltic andesite containing Ti-rich titanomagnetite with the impact of a cylindrical projectile. Effects of decaying stress waves on magnetic properties were subsequently quantified. Natural remanent magnetization (NRM) was partially but significantly demagnetized at peak pressures higher than 1 GPa. High-coercivity part of NRM, even higher than 80 mT, was partially demagnetized. At higher pressure (3-5 GPa), low-field magnetic susceptibility was significantly reduced and coercivity was increased, probably due to increased internal stress. Different patterns of change in AMS were observed at different distance from the impacted surface. In high-pressure range (3-5 GPa), the anisotropy degree was increased, the minimum susceptibility was oriented toward the shock direction, and the average susceptibility was decreased. This feature is consistent with the result of a previous shock experiment. The initial orientations of AMS were however significantly changed at around 0.4-3 GPa; The maximum susceptibility was induced parallel to the shock direction, and superposed on the initial AMS. This kind of changes in the AMS parameters has been never reported.

Basalt samples were collected from flows in the crater wall, ejecta clasts, and flow outside the rim of Lonar crater. Irreversible thermomagnetic curves and the maximum Curie temperature of 500-560$ˆ¥circ$C indicated presence of Ti-poor titanomagnetite and its oxidized phase as the main magnetic minerals in Lonar basalts. The result of AMS measurement of both inside and outside samples showed relatively weak anisotropy degree (P less than 1.03), which is similar to that of basalt from outside the crater rim. The samples from the crater wall showed predominantly oblate shape of AMS ellipsoid, with tightly clustered vertical distribution of the minimum principal axes. Substantial, but not strict, parallelism between the maximum principal axes and the radial direction from the crater center was observed only for the samples from the lower part of the crater wall. This fact and the result of the shock experiment indicates that radially expanding stress waves reoriented the initial AMS.