The Temporal Change of Remanent Magnetization of Stressed Rocks and the Correlative Precursor to Earthquake

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Hitherto the study on the variation of geomagnetic field before earthquake is dominated by piezomagnetic theory. The piezomagnetic effect has been confirmed experimentally and proved by some field observation to a certain extent. However, there are still some discrepancies between the theory and earthquake precursors. Some studies indicate that the variation of as high as 10 nT in local geomagnetic field appears during a rather long period, e.g. one or two years, while the tectonic stress in seismic area does not change a lot in the meantime. In contrast, no obvious variation of geomagnetic field companies with abrupt stress drop at the occurrence of earthquake. It seems that these phenomena can hardly be explained by only piezomagnetic theory.

In recent years, the laboratory piezomagnetic study has been conducted in some specific conditions, such as cyclic stress application (Martin III,1980; Revol et al.,1978), the effect of microcracking(Hao,1992) and so on. In an uniaxial compression experiment, dynamic response for magnetic susceptibility of dacite sample is discovered by Hamano et al.(1989). At two stress levels of 1.3 and 6.0 MPa during the term of 1000s, the susceptibility decreases about 1% and 2% respectively.

In the present study, the term of time is introduced into the experimental process as an initiative variable and the change of remanent magnetization with time is then obtained. As a simple simulation of the long process before and after earthquake, time-dependent dynamic changes in remanence associated with the constant loading and removal of the loading have been discovered in this study.

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