New paleointensity data of the Archean: new results from Canada, and preliminary results from Zimbabwe and South Africa.

*Arata Yoshihara[1] ,Yozo Hamano [1]

Faculty of Science, University of Tokyo[1]

The intensity of the Earth's magnetic field in the Archean is an very importnat source of information about the evolution of the Earth's core. However, because of a shortage of data of this period, it cannot be settled how the geomagnetic field intensity of the Archean is characterized, and accumulation of reliable data is required.

New paleointensity data were evaluated from the Late Archean diabase dikes intruded into the Yellowknife greenstone belt of the Slave Province, Canada. The dike set used is referred to as 8a dikes, and their age is ca. 2.6Ga. Paleomagnetic directional data after thermal demagnetization and all of three field tests(reversal test, baked contact test, comparison with Early Proterozoic dikes) suggested that their characteristic remanences have been acquired at ca. 2.6Ga. Several rockmagnetic studies indicated that the main magnetic mineral was magnetite or titanomagnetite, and that the grain size of the samples was small enough to be in the single-domain or pseudo-single domain state. These results suggest that the 8a dikes samples are suitable for paleointensity determinations. Thelliers' method including some consistency was used for the paleointnesity determinations, and two of the dikes yielded the mean values of 31and 44 micro-tesla. The corresponding VDM calculated from these two results are very similar to the present day value, indicating about 80% and 110% of the present value, respectively. These moderate VDM values suggest that, in the Earth's core, the dynamo process of comparable activity to that of the present day has already existed at ca. 2.6Ga.

For older period than 2.6 Ga, preliminary results of paleomagnetism and paleointensity determinations using komatiites obtained from Belingwe of Zimbabwe and Barberton of South Africa will be also discussed. The ages of komatiite samples of Belingwe and Barberton are estimated to be ca. 2.7Ga and 3.5Ga, respectively. Some komatiites samples were stable to thermal demagnetization, and the NRMs seem to consist of mainly two components. These samples showed similar unblocking temperatures, indicating that the main carrier of the remanence was magnetite. Hale(1983) reported very low paleointensities using this komatiite of Barberton. However, there seem to be some problems about the experimental procedures in his study, and some drawbacks about the origin of magnetizations of the samples have been pointed out. Therefore, more rock magnetic studies and more reliable paleointensity detereminations are necessary for the komatiite samples of Barberton.