Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SEM34-04 Room:102A Time:May 24 11:00-11:15

Measurement of dynamic magnetization in time domain and frequency domain

KODAMA, Kazuto[1*]

[1]Center for Advanced Marine Core Research, Kochi University

Measurement of transient magnetization induced by a pulsed field with duration of ∼10 ms was carried out for a set of synthetic and natural samples with a new instrumentation using a commercial pulse magnetizer. Results from the synthetic samples showed considerable differences from those measured by a quasi-static method using a VSM, due to time-dependent electromagnetic effects, such as magnetic viscosity, eddy current loss, demagnetizing field, shape anisotropy, and magnetic relaxation. Results from the natural samples (volcanic rocks) were characterized by the transient magnetization *vs* field curves that were largely comparable to the corresponding portions of the hysteresis loops. The magnetization remained at the end of a pulse decayed exponentially within 3 ms after a pulse, indicating rapid magnetic relaxation that could be interpreted in terms of domain wall displacement. To better understand such magnetic relaxations, we carried out measurement in the frequency domain that was performed by measuring low-field magnetic susceptibility over a wide band of frequencies. We used the same samples as in the time domain studies. Resulting frequency spectra of susceptibility were converted into the time domain on the basis of linear response theory and computer simulation. Results in the two different domains were mostly consistent, but not identical in detail. We discuss the advantage, disadvantage, and limitations of these two methods, as well as their potential applications to rock magnetism and environmental magnetism.

Keywords: dynamic magnetization, rock magnetism, magnetic relaxation, frequency spectrum, Fourier transfom