# 考古試料に対する地磁気を利用した年代推定法の提案

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# The dating for archeological materials using viscous remanence

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Chronology holds a pivotal position within the Earth sciences and archeology. Traditional radiometric dating, such as radiocarbon and U-Pb, provides a formation age of materials. However, it is difficult to determine the reworked age of rocks and stone tools. To overcome the fundamental setback, we focus on the magnetism in rocks. Most rocks contain an assemblage of ferrimagnetic particles that record the geomagnetic field as a natural remanence. When the rock has been reworked and stabilized in new orientation, subset particles change the direction with changes in the current magnetic field direction. The secondary remanence is a viscous remanence which grow with elapsed time. The theoretical framework of viscous remanence in single domain grains is from Neel's thermal relaxation theory. The traditional approach for determining the age of viscous remanence is to employ a time-temperature relation by assuming Neel's relaxation theory of single-domain magnetite. If single-domain magnetite can acquire viscous remanence in a magnetic field at low temperature over a long relaxation time, the remanence is demagnetized in the absence of magnetic field at high temperature over a short relaxation time. As a typical example, we found that the viscous remanence in four coral tsunami boulders on Ishigaki Island, Japan. The timing of tsunamis estimated from demagnetized temperatures of viscous remanence was compared with radiocarbon accelerator mass spectrometer ages directory obtained from the surface coral boulders. The viscous remanence ages of two boulders were good agreement with the assigned radiocarbon ages although the others showed older age. Our results suggest that the relationship between time and temperature of viscous remanence suggest a potential use as a chronometer for stone tools up to 0.78 million years old.