HIGH TEMPERATURE OXIDATION OF TITANOMAGNETITE GRAINS AND ITS POSSIBLE INFLUENCE TO THELLIER PALEOINTENSITY DETERMINATIONS

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There are two types of commonly used methods for determining absolute paleointensity from volcanic rocks: the Thellier-type method (Thellier and Thellier, 1959) and the Shaw-type method (Shaw, 1974). Most paleomagnetists have regarded the former method as the most reliable, but evidence is accumulating which indicates that the Thellier-type method is not always robust for historical basaltic samples. There have been a relatively increasing number of studies to clarify possible causes of incorrect Thellier paleointensity determinations obtained from historical lava flows. It seems that many authors prefer ‘multi domain (MD) grains’ as the predominant cause. However, apart from the MD grains, we think high-temperature (HT) oxidation states of titanomagnetite (TM) grains might also influence to resultant Thellier paleointensities: (1) low to middle degree of magnetostatic interactions are expected for low to middle HT oxidized TM grains (low to middle numbers of ilmenite lamellae) possibly resulting in about 10~30 % high Thellier paleointensity; (2) high degree of magnetostatic interactions as well as acquisitions of thermochemical remanent magnetization (TCRM) are expected for middle to high HT oxidized TM grains (abundant ilmenite lamellae) possibly resulting in about 20~70 % high Thellier paleointensity. This conjecture is based on the thorough experimental results obtained from the Hawaiian (Kilauea 1960) and Japanese (Sakurajima 1914 and 1946) historical lava flows. We will introduce the detail in the talk.

Thellier method, high temperature oxidation, titanomagnetite grains

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