To The Determinations Of Absolute Paleointensity On Contemporaneous Flows From Kamchatka And Antarctica

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A preliminary study of contemporary flows from Kamchatka and Western Antarctica, erupted in 20-th century, has been conducted in order to understand conditions under which we obtain true results of absolute paleointensity (H_{anc}) determinations. Most of the 11 Antarctica samples showed rather good thermal stability. Mineralogically, they can be divided into two groups: with near-magnetite carriers of the NRM and those of having a mixture of near-magnetite and TM ($T_c \approx 200$ °C) grains. Despite the good thermal stability, a low successful rate in the paleointensity determinations by the Thellier experiments was found. The first group shows two-segment Arai-Nagata plots when the low-temperature segment gives too higher H_{anc} while the high-temperature segment yields the opposite result. This strong curvature of the plots cannot be related to MD nature of the NRM carriers as their B_{cr}/B_c and M_{rs}/M_c ratios are typical PSD ones. However, determinations carried out for the second group over low-temperature range brought a few reasonable Thellier results over the low-temperature TM segment, also, by the express Wilson method (Fig. 1).
Experiments with 6 samples from Kamchatka Kluchevskoi volcano, erupted in 2013, brought two successful Thellier results yielding the "paleointensity" H_{anc} = 48 and 51 μT which are close to the value 52 μT given by the IGRF (Fig. 2). According to thermomagnetic curves, samples contain magnetite or TM with $T_c \approx$ (200-300) °C grains or a mixture of them. The electron microscopic studies of fresh samples showed the presence of two generations of the ferromagnetic grains. Fresh samples contain partially oxidized coarse (5-20 μm in sizes) TM grains and fine submicrone particles which likely contain much less titanium. The successful samples, again, gave the expected result over the low-temperature TM segment, apparently, from the thermally stable fine TM grains.

Keywords: paleointensity, contemporary flows, Thellier method, Wilson method

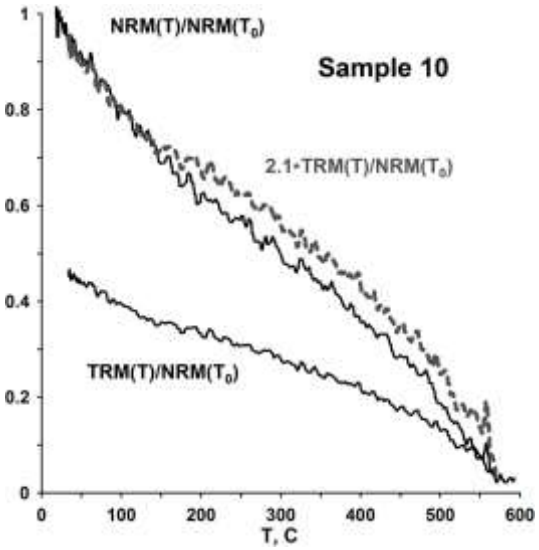

Figure 1: Thermomagnetic curve obtained by the Wilson's method. From the temperature interval (20, 150) °C, H_{anc} = 42 μT versus the measured field = 40 μT

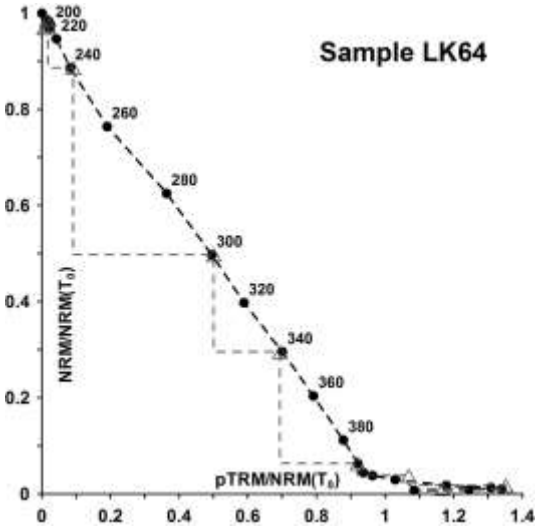

Figure 2: Arai-Nagata plot for Kamchatka sample from 1987 year eruption. "Paleointensity" H_{anc} obtained for the interval (200, 400) °C is H_{anc} = 51 μT. The true field calculated from the IGRF is 52 μT.