Lower archeointensity results obtained from a floor of the reconstructed (simulated) ancient kiln.

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Yamamoto et al. (2015) reported that baked clay samples from the floor of a reconstructed (simulated) ancient kiln provided a reliable Tsunakawa-Shaw archeointensity (AI) estimate. The simulated reconstruction was conducted in 1972 to reproduce an excavated kiln of the seventh century in Japan and Sue-type potteries of contemporary style were also fired (Nakajima et al., 1974). Two of the potteries with reddish color were subjected to the Tsunakawa-Shaw archeointensity determinations, resulting in reliable AI estimates when specimens were heated in air in laboratory (Yamamoto et al., 2017 JpGU-AGU Joint Meeting). We have had another opportunity to take samples from a new reconstructed (simulated) ancient kiln at Miki, Hyogo, Japan, which was fired in autumn 2016.

The samples are ones taken from a kiln floor, an inner wall of the kiln body, and two Sue-type (bowl-type and plate-type) potteries with grayish color. They were cut into mini specimens and then subjected to the Tsunakawa-Shaw experiment with two different heating conditions (either in air or vacuum). Yamamoto et al. (2017 AGU Fall Meeting) reported the experimental results except for the kiln-floor samples: successful results were obtained from 26 specimens and the resultant AI estimates are indistinguishable between the heating conditions; except the mean AI estimate obtained from the plate-type pottery heated in air, the sample-mean AI estimates are consistent with the IGRF field of 47.4 microT at the reconstructed location in 2016.

We have newly obtained experimental results from the kiln-floor samples: AIs of the successful results are 29.5-45.7 microT (N=12) for the specimens heating in air, and 29.6-44.3 microT (N=12) for the specimens heating in vacuum. Each upper limit is close to the IGRF field of 47.4 microT at the reconstructed location in 2016, but each mean (38.3 +/- 5.4 microT for air; 34.9 +/- 4.9 microT for vacuum) is significantly lower than the IGRF field. Similar lower AIs were obtained from samples taken from the positions 20 cm below the floor (−20-cm level) of the 1972 reconstructed kiln, and they were probably originated from insufficient acquisition of thermoremanent magnetization (TRM) during the firing (Yamamoto et al., 2015). Natural remanent magnetizations of the present kiln-floor samples also probably were not full TRM but partial TRM resulting in the lower AIs.