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Archeomagnetic dating of the eruption of Xitle volcano (Mexico) from a reappraisal of the paleointensity with the MSP-DSC protocol.

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The Xitle volcano, located south of Mexico City, is a monogenic volcano that has provided seven lava flows in a time interval of a few years. The age of these eruptions, estimated by means of radiocarbon dates on charcoal from beneath the flows, is still very poorly known, ranging from 4765±90 BC to 520±200 AD (see Siebe, JVGR, 2000 for a review). This lava field was emplaced over the archaeological city of Cuicuilco whose occupation is estimated between 700 BC and 150 AD. Thus a question is still pending: Is the downfall of Cuicuilco directly attributable to the eruption of Xitle? It seems that the answer is negative if we consider the latest radiocarbon dating by Siebe (2000), which sets the age of the eruption to 280±35 AD, that is significantly younger to the abandon of the city. Because this new age has direct implications on the history of the movements of ancient populations in the Central Valley of Mexico, we propose in the present study to check this estimate by archaeomagnetic dating. Xitle lava have been investigated several times for paleomagnetism, including directional analyses and absolute paleointensity determinations (see Alva, EPS, 57, 839-853, 2005 for a review). The characteristic Remanence direction is precisely determined. It is much more difficult to estimate precisely the paleointensity with the Thellier method: values scatter between 40 and 90 μT in a single flow (Alva, 2005). We propose here to estimate the paleointensity by means of the MSP-DSC protocol (Fabian and Leonhardt, 2010) with the new ultra-fast heating furnace FUReMAG developed in Montpellier (France). The sampling was performed along four profiles, one vertical through the entire thickness of the flow and three horizontal (at the top, middle and the bottom of the flow). Our preliminary results show that there is no difference between the values found in the different profiles, all providing a value around 62 μT. The comparison of our results (Dec = 359.0°, Inc = 35.2°, F=62.8±1.1 μT) with the model CALS3K.4 for secular variation provided an Archaeomagnetic age between 176 BC and 58 BC at 95% significance value. This age is consistent with the hypothesis of archaeological destruction and the abandonment of Cuicuilco during the eruption of the Xitle volcano.