



Archeointensities from Peruvian ceramics: Implications for the occurrence of archeomagnetic jerks and their relationship to climatic changes

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Well dated potsherds of Peruvian ceramics, comprising nine different cultural epochs from 1000 BC to 1400 AD were studied providing the unique opportunity to establish a geomagnetic field intensity curve for Peru. Archeointensities are determined using a modified Thellier-type technique (MT4), including checks for magnetomineralogical changes during laboratory treatment and multidomain remanence bias. Additionally, TRM anisotropy tensors and cooling rate dependencies are measured and corrected for. Both experiments emphasize that these corrections are critical factors in archeointensity determinations. For the determination of the mean intensity of a potsherd, a new sampling technique is introduced. Two samples (5mm) were taken from each sherd, one drilled perpendicular to the surface and the other one within the plane of the sherd. This technique exposed to be very suitable to test the efficiency of the anisotropy correction. Our new high quality dataset shows that the average intensity of the investigated period is about 35% higher than the present day local geomagnetic field. Besides three intensity maxima at 350 ± 50 BC, 210 ± 120 AD and 720 ± 100 AD a significant decline around 250 ± 50 BC to $25\mu\text{T}$, complying with today's local magnetic field strength is found. Data from earlier studies of this region are characterized by an enormous scatter of intensity values and exhibit mostly higher intensities in comparison to our new data. This difference is interpreted to be related to unrecog-

nized errors particularly in dating of the potsherd, anisotropy of TRM, and cooling rate differences. Comparing the new established intensity curve with French and Syrian data, almost no concordance is found. In contrary to a slow increase of the Peruvian archeointensities between 1000 BC and 1400 AD, the intensities of the European and Syrian data decline. Beneath the intensity maximum in the year 200 AD two further outlier of the epoch of the “middle horizon” (620-820 AD) and the epoch of the “late intermediate period” (1000-1400 AD) give hints of three archeomagnetic jerks, which fit very well to the French jerks. Comparing the occurrence of intensity peaks of the new Peruvian data with fluctuations of the sea level of lake Titicaca and the degree of desertification of the Peruvian west coast suggest that a short term increase of the Earth’s magnetic field (jerk) coincide with a decrease of the sea level and an increase of aridization.