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Holocene Paleosecular variation from dated lava flows on East Maui (Hawaii)

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Most records that document the geomagnetic field variations during the past millenia were obtained from well-dated Hawaiian lava flows from the Big Island, Hawaii. We have conducted a paleomagnetic study of 13 sites of basaltic lava flows from the Maui island with ^{14}C ages between 10.3 and 0.015 Ka. Two other sites dated at 45 Ka and 730 Ka were also sampled. Eight to ten samples from each site were demagnetized using thermal treatment and companion specimens from the same samples were demagnetized by alternating fields (af). Thermomagnetic and hysteresis measurements indicated that magnetite (575∞C) in fine grains was the dominant magnetic carrier, although in many cases we observed also a low-temperature phase which is likely carried by titanomagnetite with low titanium content. The existence of relatively high coercivities associated with these two mineralogical phases generated overlaping components which could not be properly isolated using af demagnetization. Successful results were obtained after thermal demagnetization for 13 sites with a mean inclination of 34.2∞+/-9∞. The mean inclination (Inc = 36.3∞) of the eleven sites younger then 10.5 Ka is very close to the value (37.5∞) of the geocentric axial dipole (GAD) at the site latitude, but the angular dispersion of 6.3∞ for the VGPs about the spin axis is significantly lower than the predictions of the models of paleosecular variation at this latitude. The curve of the inclination variations as a function of time match well with previous detailed dated records from the Big Island which are similarly characterized by low dispersion of the VGPs (s= 9.3∞). Similar values of dispersion were obtained after averaging the records within age windows and after thinning the data within 500

years intervals. We also resampled the curve at regular time intervals which slighlty improved the match of the mean inclination with the GAD value. Thus, we did not detect any evidence for a magnetic anomaly under Hawaii during this period. The very low and abnormal dispersion of the VGPs is compatible with the concept of the non-dipole low during the Holocene but the results obtained for previous periods suggest that this is a transient phenomenon.