Reversal records recorded on long volcanic sequences along the Hawaiian Island chain: past, present and future perspectives

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Abstract: In principle, the thick volcanic sequences of the Hawaiian Island chain have recorded the long and short-term behavior of the geomagnetic field, i.e. from the present back to ~5.7 Ma. The real challenge is to find the lavas that have recorded such paleofield fluctuations. New paleomagnetic measurements, coupled with Argon–Argon ($^{40}Ar/^{39}Ar$) and Potassium-Argon (K-Ar) radioisotopic dating, are revolutionizing our understanding of the geodynamo by providing detailed terrestrial lava records of the short-term behavior of the paleomagnetic field. Here we report the progress made in the recent past, current and future perspectives of our full vector studies (i.e. directional as well as absolute paleointensity) of back to back reversals such as the Gilbert-Gauss (ca. 3.55 Ma), the Lower (ca. 3.33 Ma) and Upper Mammoth (ca. 3.233 Ma) Subchrons recorded on the Waianae Volcano, the Lower (ca 3.06 Ma) and Upper Kaena (ca. 2.89 Ma) Subchrons and single excursions and reversals such as Cryptochron-Halawa C2r.2r-1 (ca. 2.514 Ma), recorded in the Koolau, Volcano, Oahu. Hawaii and the Gilsa (ca. 1.6 Ma) recorded on Lanai. We will discuss the paleomagnetic, rock magnetic and absolute paleointensity (i.e the Thellier-Coe method) results such as a.f. and thermal demagnetization experiments coupled with Curie point determinations, magnetic granulometry and some magnetic microscopy results. Last but not least we will show preliminary results of our research of future studies of the Gauss-Matuyama reversal boundary (ca. 2.60 Ma) and the Reunion I Subchron (2.20 Ma) recorded in the Koolau Volcano at a site known as Makapuu Point. We will discuss in detail the transitional/excursional geometric VGP characteristics of the above mentioned records.

Keywords: geomagnetic reversal records, absolute radiometric Ar/Art and K/Ar dating