

A paleointensity study on historical and ^{14}C dated lavas in Hawaii Island using the Tsunakawa-Shaw method

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In 1987 and 1991, historical and ^{14}C dated lava flows distributed in Hawaii Island were collected from 37 sites by Masaru Kono, Hidefumi Tanaka and others. Tanaka and Kono (1991) and Tanaka et al. (1995) reported absolute paleointensities determined for samples from the 7 sites using the Thellier-type method, but many samples have been stored and reserved for a further analysis. We have conducted absolute paleointensity measurements on 172 samples at 36 sites using the Tsunakawa-Shaw method, and obtained 149 successful results. Applying the site-level selection criteria with (1) minimum of three successful results for a site ($N \geq 3$) and (2) the successful results giving site mean paleointensities with their standard deviations less than 15 percent ($\text{stdev} \leq 15$ percent), 24 well-defined site mean paleointensities are discriminated. They range between 16.8 and 67.8 microT for a period from -21890 to 1960 yr AD (last 0-24 kyr), and associate with Q_{PI} (Biggin and Paterson, 2144) of 4/5 (AGE=1, STAT=0/1, TRM=1, ALT=1 and MD=1).

For that period, 72 site-mean Hawaiian paleointensities obtained by the Thellier-type method with pTRM checks can be selected from the GEOMAGIA50.v3 database (Brown et al., 2015), applying the same site-level selection criteria. 48 site-means of them are from surface lavas mainly covering the last 5 kyr (4 data, Coe et al. (1978); 5 data, Tanaka and Kono (1991); 12 data, Mankinen et al. (1993); 1 data, Cottrell and Tarduno (1999); 1 data, Chauvin et al. (2005); 18 data, Pressling et al. (2006); 7 data, Pressling et al. (2007)) while the other 24 site-means are from the Hawaiian Scientific Drilling Project (HSDP) cores mainly spanning the last 5-24 kyr (12 data, Teanby et al. (1991); 1 data, Laj and Kissel (1999); 11 data, Laj et al. (2002)). They show a general increasing trend from about 25 microT at around -22000 yr AD toward about 60 microT at around -3000 yr AD, and a high intensity period of the last 5 kyr with the average of 57.2 microT (standard deviation of 12.3 microT). Our new data appear to confirm basically this trend as well as this high intensity period, but to result in somewhat lower paleointensities as is evidenced by the average intensity of 45.8 microT (standard deviation of 10.0 microT) for the last 5 kyr.

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