Supporting Information Text S3 - ^{210}Po-^{210}Pb dating

Volcanic glass was chipped from lava sample upper surfaces with a chisel, gently crushed with a stainless steel mortar, sieved, washed repeatedly with purified water (18 MΩ) in a sonic bath and dried in an oven at 40°C. 250-500 um glass chips were subsequently hand-picked under a binocular microscope for ^{210}Po analysis. Sample and spike particulars are given in Supporting Table S4. Sample digestion and analysis details are given in Rubin et al., 2005. Enough sample was dissolved to allow for 3 or 4 ^{210}Po analyses per sample, which was then spiked with a calibrated ^{209}Po tracer, and stored in 6N HCl until aliquots were removed for ingrowth analysis at roughly 1 half-life intervals. Radiometric analysis of sample aliquots were continued until 1200 to 1500 counts of ^{210}Po alpha particles were detected (generally 4 to 6 weeks). Detector efficiencies in the Univ. Hawaii Canberra Alpha Analyst are 30-33%; chemical yields of the plating procedure were 75-100%. Detector background was subtracted from alpha particle spectra for each sample. Peaks were integrated over three regions of interest (encompassing a narrow energy range near the peak top, a medium range, and a broad range, of approximately 4, 8 and 10 times FWHM, using spectral landmarks to assign these regions of interest). ^{210}Po was determined from the means of these individual results for each aliquot of each sample. The means of the each energy range were also compiled as separate numbers to estimate analytical errors and their resulting effects on the age dating results. The precision of the ^{210}Po analyses and data reduction method was determined by analysis of 4 independent dissolutions of in-house Kilauea basalt standard K1919 to be 0.28% 1 sigma.

Calculated ^{210}Po sample ages in Table 3 were determined by fitting an exponential radioactive decay function to the ^{210}Po time series for each sample by least-squares minimization of y-

residuals, to yield a best fit function of ^{210}Po with time (Rubin et al., 1994). Maximum ^{210}Po-^{210}Pb eruption ages were determined from the t=0 intercept of these curves. Regression analysis indicates that one sample collected molten had 9% of its eventual full Po value in it on the day it was collected, which corresponds to 15 days of ingrowth. All other sample ages were therefore corrected for this same amount of potential Po retention, effectively limiting the age resolution to 2 weeks per sample. The error on maximum ages was determined from the propagation of three separate sources of error: (a) regression intercept error (basically a function of the goodness of fit, R^2); (b) the range of ages resulting from regression through each energy range (narrow, medium, full) for each aliquot; and (c) an empirical parameter based on how long after eruption the first ^{210}Po analysis began. The latter is an estimate of increased intercept uncertainty at constant analytical variance on the first sample aliquot the longer after eruption the analysis begins.