



Assessing the potential for luminescence dating of basalts

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Luminescence dating has been proven a powerful tool in dating various kinds of Quaternary sediments using quartz and K-feldspars. We have been investigating the potential for applying some of the new developments, e.g. the single aliquot regenerative dose (SAR) protocol for equivalent dose determination, to volcanic materials such as basalts. We have used known-age basalts to test whether we can obtain ages close to the independent ages determined by cosmogenic ^{36}Cl surface exposure dating and K-Ar dating. Five basalts from the Cima volcanic field in California, ranging from ~ 12 ka to 0.3-0.6 Ma, were used. All the samples contain small amounts of olivine, clinopyroxene and plagioclase phenocrysts embedded in a glassy groundmass. The bulk samples were gently crushed and sieved to obtain a grain size between 90-125 μm for luminescence measurements. Optically and infrared stimulated luminescence (OSL and IRSL) were measured with detection at UV and blue wavelengths, respectively. The SAR protocol was used to determine the equivalent dose. Anomalous (athermal) fading was measured for the OSL and IRSL signals at various delays after artificial irradiation of the samples. Using an established correction procedure, fading-corrected ages were obtained and the effectiveness of the correction method for these samples will be discussed by comparing the results with the independent ages.