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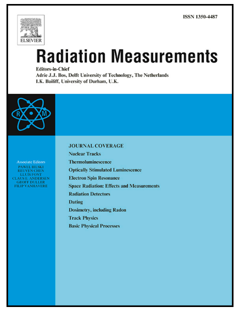

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Age determination using feldspar: evaluating fading-correction model performance

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Abstract

The recent introduction of post-IR IRSL measurement protocols has prompted a resurgence in luminescence applications using feldspar, some of which are affected by anomalous fading related signal loss. Many fading-corrected feldspar ages are reported in the literature, however few of those ages have been corrected using the model of Huntley (2006) *[Huntley, D.J., 2006. An explanation of the power-law decay of luminescence. Journal of Physics: Condensed Matter 18(4), 1359-1365]*. Here we present a new **R** function that calculates fading-corrected ages using the model of Huntley (2006), implemented with either a single-saturating exponential (1EXP) or general-order kinetic (GOK) fit. We evaluate the performance of the model through (i) contrasting measured and modelled field saturation values for a suite of 41 published saturated samples, and (ii) through using the model to fading-correct feldspar ages of samples with independent age control. Our results indicate that when implemented with 1EXP this model has an accuracy of 10 % for predicting sample saturation, but that independent ages may be overestimated when the model is used to fading-correct samples across a range of timescales. In contrast, providing that the dose response curve has been characterised beyond 600 Gy, implementing the Huntley (2006) model with a GOK fit yields accurate age estimations. Modelled age overestimation for 1EXP is associated with dose response curve deviation from a single saturating exponential. Finally we contrast the laboratory measured light levels of a suite of 50 saturated samples with their corresponding fading rates. We show that these saturated samples may yield D_e values below $2D_0$, and thus that $2D_0$ is not an effective screening criterion for sample saturation where no anomalous fading correction is made.

1. Introduction