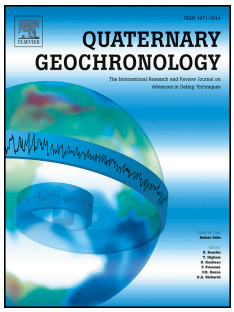
# Accepted Manuscript

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# Testing the applicability of a partial bleach method for post-IR IRSL dating of Holocene-aged K-feldspar samples

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***Abstract:*** In this article we test the potential use of a partial bleach method, which was traditionally used in thermoluminescence dating, for the post-infrared infrared stimulated luminescence (pIRIR) dating of K-feldspar, with an aim to correct for the impact of remnant dose on Holocene-aged K-feldspar samples. We show that the solar bleaching decay of the pIRIR signal can be described using several components with different sensitivities upon exposure to sunlight. An improved partial bleach pIRIR (PB-pIRIR) method based on a multi-aliquot regenerative (MAR) protocol is proposed, which can isolate the rapidly bleaching components from the pIRIR signal for the dating purpose. Natural and experimental factors that can affect the PB-pIRIR $D_e$ are investigated by numeric simulation and dose recovery experiments. A plateau test is proposed to assess a proper laboratory bleaching time in the PB-pIRIR measurement. Dating known-age samples indicates that for well-bleached samples the PB-pIRIR method can yield reliable ages; whereas for poorly-bleached samples this technique can produce pIRIR ages consistent with expected ages or improve the pIRIR dating results. We deduce that the efficacy of the PB-pIRIR approach for dating insufficiently bleached samples is related to the significance of the remnant dose relative to the burial dose, as well as the degree of heterogeneity of the grains' bleaching before deposition. Our results suggest the partial bleach method has the potential to reduce or even eliminate the impact of insufficient bleaching on K-feldspar pIRIR dating. This method is more suitable for insufficiently bleached samples for which all or most of the K-feldspar grains have been exposed shortly to sunlight before the last burial.

***Keywords:*** Partial bleach method, insufficient bleaching, K-feldspar, post-IR IRSL, Holocene, remnant dose