Supplementary Material

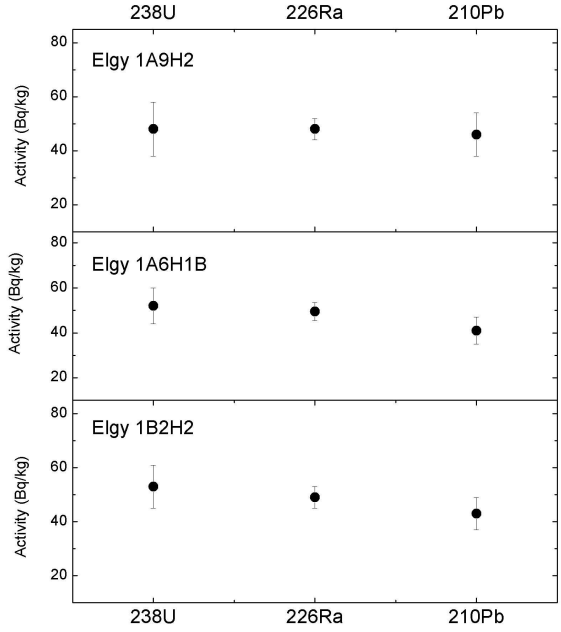

Fig. S1: Activities of the U-series products for the three samples measured at VKTA Rossendorf. If the decay series is in equilibrium the activities of all daughters agree within 2-sigma errors with the activity of the mother. The error bars shown in the graphs represent the 2-sigma errors.

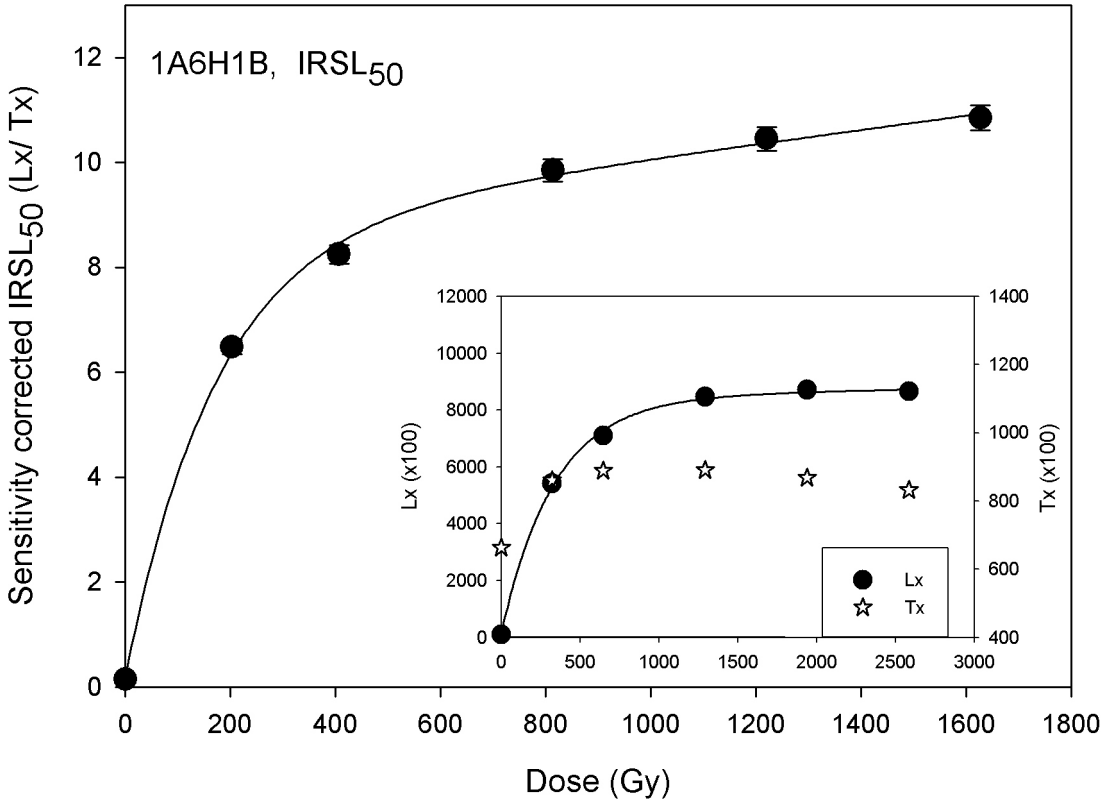

Fig. S2: Dose response curve of sample 1A6H1B fitted to a single exponential plus linear function. The IR_{50} protocol was applied with 7 dose steps up to a maximum beta dose of ~ 2500 Gy. The deconvolution (inset) of the dose response curve (L_x/T_x) shows a pseudo-increase, i.e the regenerated $IRSL_{50}$ signal (L_x) is in saturation and the corresponding test dose signal (T_x) is decreasing with each regeneration cycle. The test dose was kept constant.

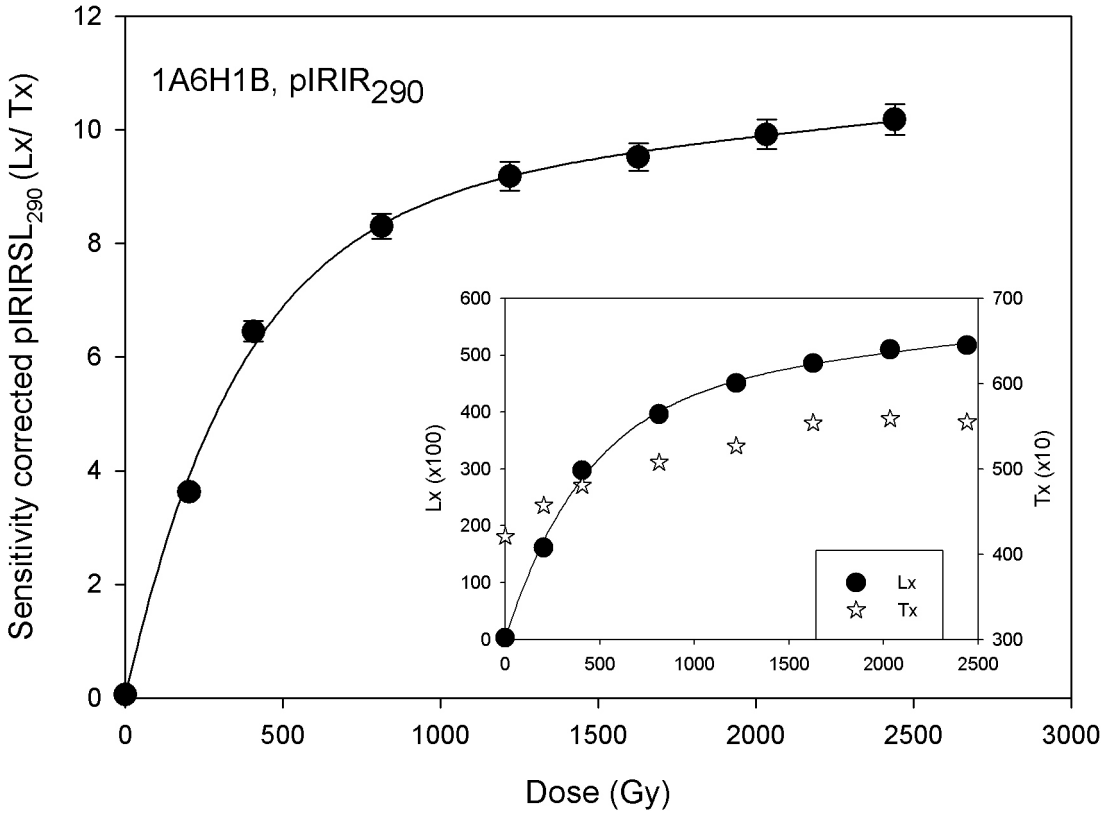

Fig. S3: Saturation dose response curve of sample 1A6H1B fitted to a single exponential plus linear function. The $pIRIR_{290}$ protocol was applied with 7 dose steps up to a maximum beta dose of ~ 2500 Gy. The deconvolution (inset) of the dose response curve (L_x/T_x) shows a real increase with each regeneration cycle, i.e the regenerated $pIRIR_{290}$ signal (L_x) and the corresponding test dose signal (T_x) are increasing. The test dose was kept constant.

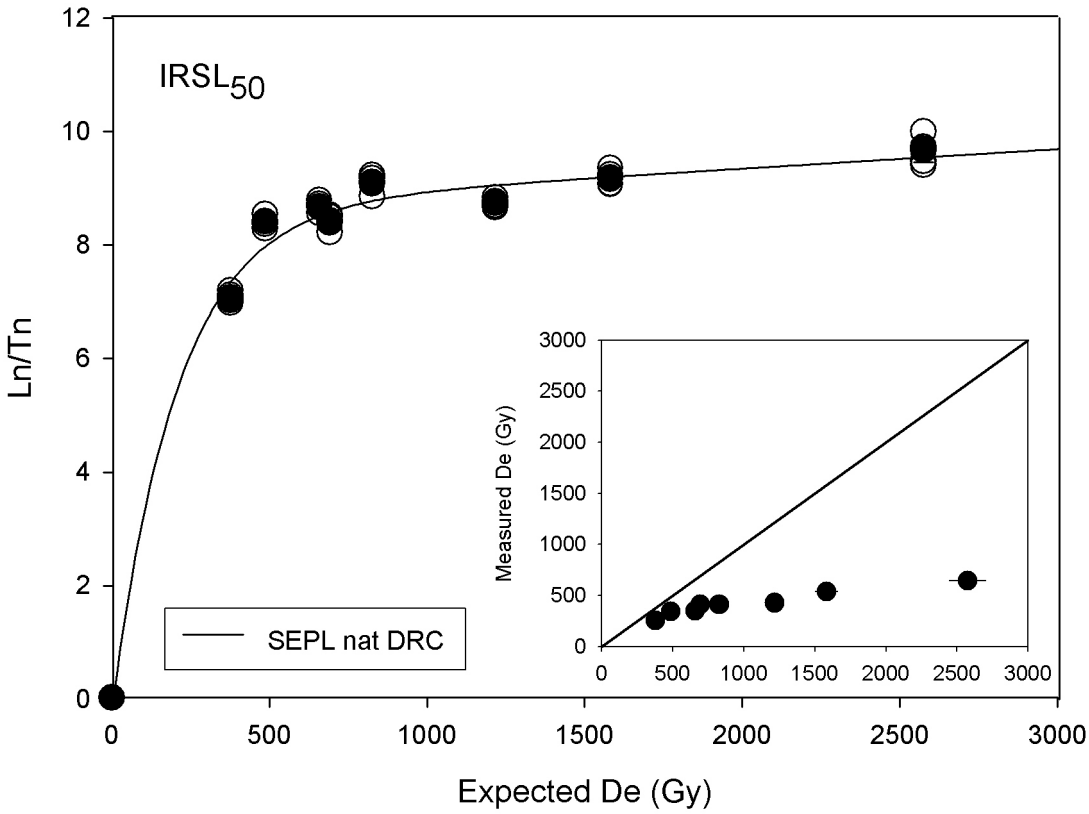

Fig. S4: Test dose normalised natural optically stimulated luminescence signals (L_n/T_n) of the eight samples used for the standard SAR-IRSL protocol plotted against their expected equivalent dose values (D_e) (see Chapot et al., 2012). The expected D_e of each sample was calculated by multiplying the environmental dose rate by the expected age. The inset shows the severe divergence between measured and expected De. The solid line is the 1:1 line.

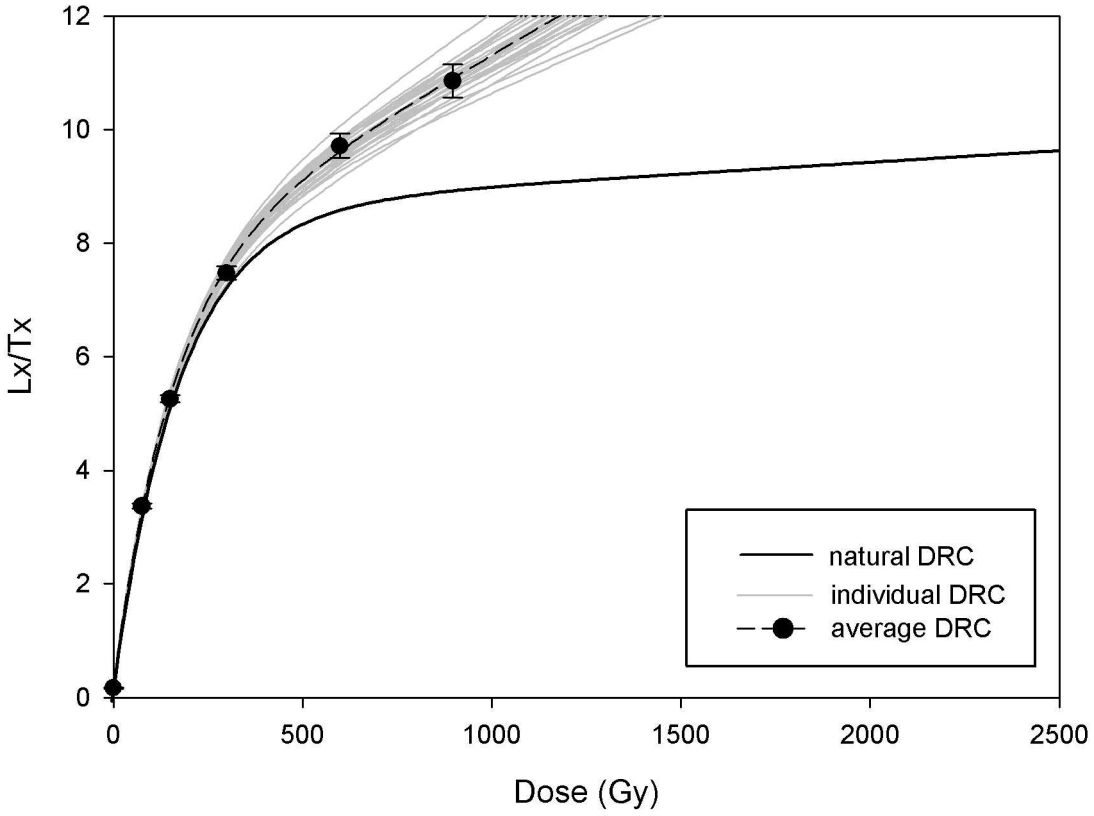

Fig. S5: Comparison of the natural dose response curve (DRC) from Fig. S4 with the single aliquot regenerative DRCs of the aliquots used to construct the natural DRC.