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Summary

OSL-samples with a deposition age close-to-zero were taken from small island within the river Danube close to the city of Vienna, Austria (fig.1). It is demonstrated, that the OSL signal in both quartz and feldspar is not completely but differentially bleached in the grains. It is also shown that residual ages in feldspars are significantly higher than those calculated for quartz. Analysing measurement-time dependent equivalent dose estimates is no suitable method to identify partial bleaching in the investigated sediment grains.

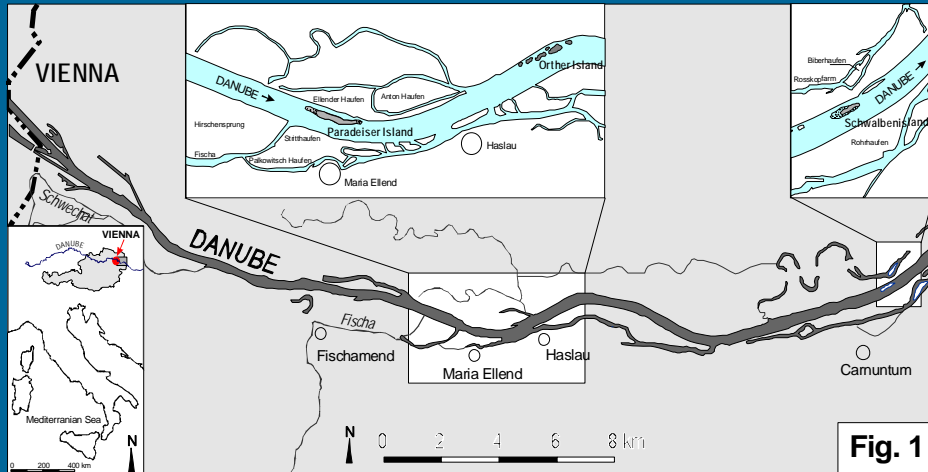


Fig. 1

Geological setting



Fig. 2a

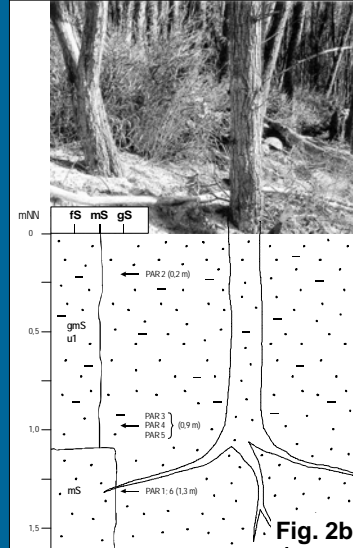


Fig. 2b

All islands (Orther, Schwalben- and Paradeiser Island) investigated here are not on the historical maps from the year 1875 and are thus definitely not older than 130 years. In 1980, Paradeiser Island was a gravel plain free of any fine (sandy) sediment. The fine sediment samples from Paradeiser Island (PAR 1-6) have been deposited during the huge flooding event that occurred in the year 2002. Sediment attributed to this flooding event still covers the lowest meter around the trees on Paradeiser Island.

Fig. 2 shows a photo of a tree with its roots below one meter of sediment (at the bottom of the shovel). In fig. 2b a sketch displays the position of the samples (PAR1 - PAR6) in relation to the flood sediments of 2002.

Results

Fig. 3: Representative shine-down and dose-response curve (inlet) of quartz (a) and K-feldspars (b) from sample PAR1.

Fig. 4: Dose distribution plots of sample PAR1 (a) and PAR3 (b) for both quartz (closed symbols) and feldspars (open symbols). The insets show the same plot at exaggerated scale by excluding values above 100 Gy to allow a better illustration of scatter of low D_e values.

Fig. 5: Z versus D_e [1 s] plot for single-aliquots of quartz (a) and K-feldspars (b) from the different samples investigated in the present study. The plot reveals no clear positive correlation between Z value and D_e .

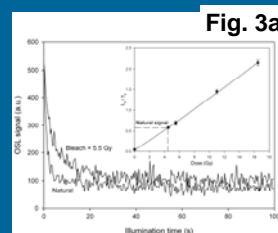


Fig. 3a

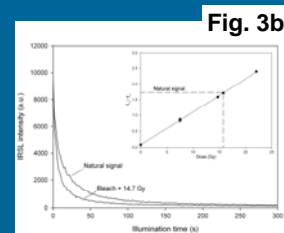


Fig. 3b

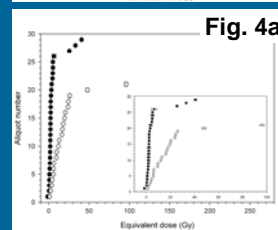


Fig. 4a

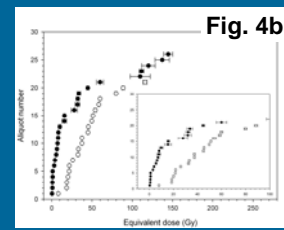


Fig. 4b

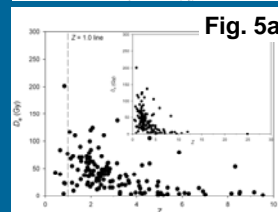


Fig. 5a

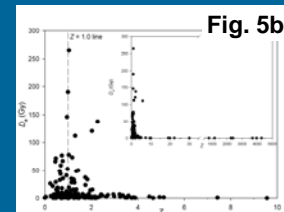


Fig. 5b

Discussion and conclusions

It is clearly demonstrated by the scatter of replicate measurements that both the OSL and IRSL signals of the investigated samples are differentially bleached prior to deposition. It is also shown that analysing measurement-time dependent D_e estimates is of very limited use to identify aliquots representing incompletely bleached luminescence signals. The degree of overestimation of apparent age is significant and much higher than it was expected for such depositional environments than previously reported. We learned later in this study, that gravel was artificially added to the River Danube a few kilometres up-stream to prevent erosion of the channel floor. As a consequence, the results presented here may not be representative for typical large flooding event but for such an event effected by an important short distance transport and high mass input component. In nature, a similar situation is represented by the proximal input of mass movements, such as landslides into a river system.