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The last 30,000 to 600,000 years ago: unravelling the timing of human settlement for the Palaeolithic site of Kozarnika (Bulgaria)

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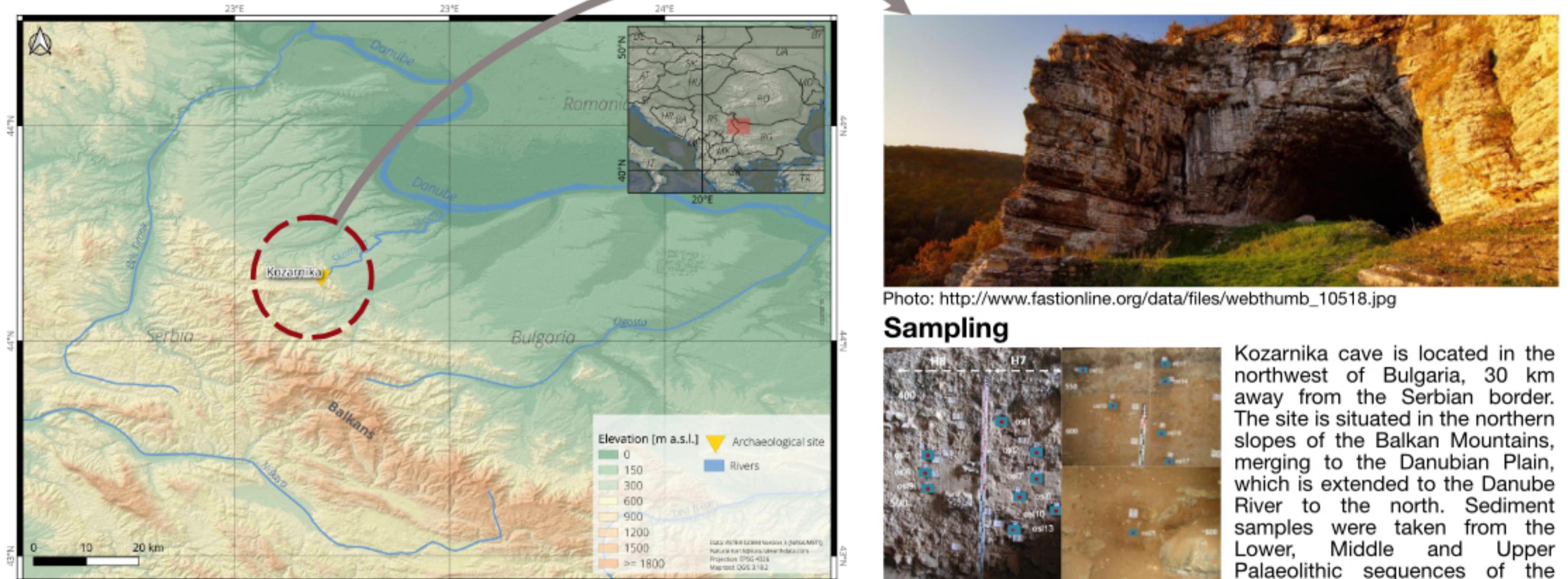
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1 Introduction

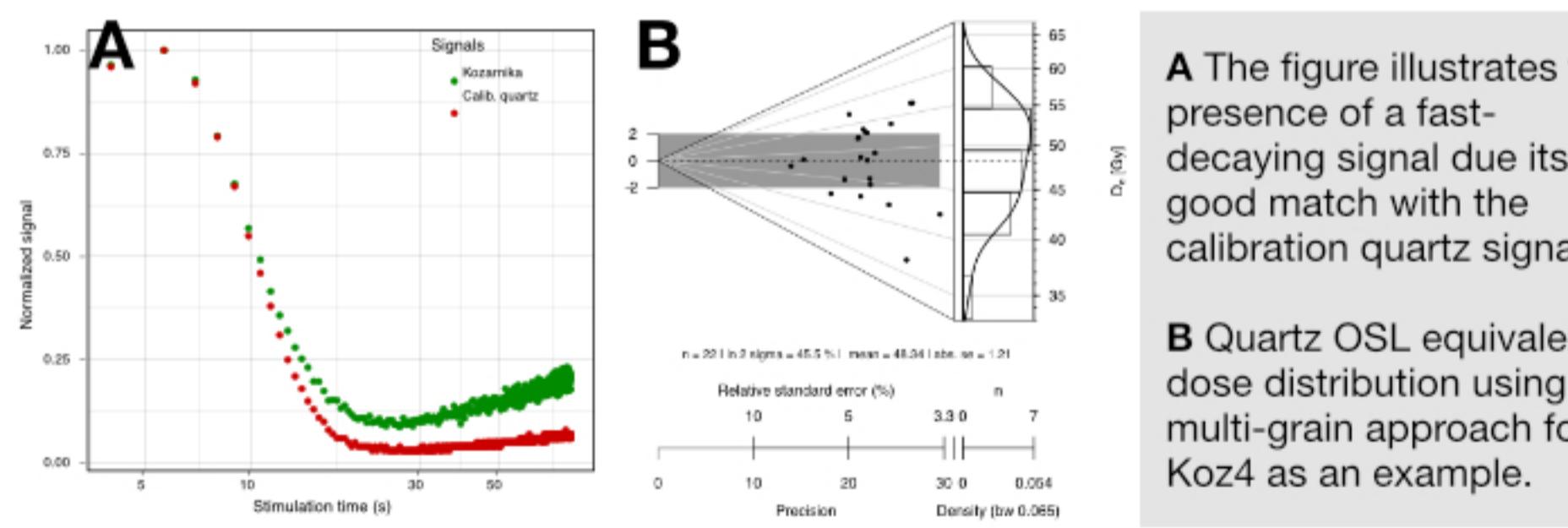
- Kozarnika cave is a renowned prehistoric site in the Balkans. It contributes significantly to our understanding of the human past due to its rich assemblages associated with the Lower to Upper Palaeolithic periods. The cave was first mentioned in the prehistoric survey carried out before 1933. Years after, in 1996, the site was excavated systematically by Bulgarian-French researchers [1].
- Various chronological dating methods have been employed alongside the excavation to unravel the timing of humans' occupation in Kozarnika.
- This study presents our contribution of employing luminescence-dating methods (OSL, IRSL, pIRIR, VSL, IR-RF) to unravel the reliable timeframes for several geological units and archaeological assemblages. A vast body of techniques has been put together, enabling us to date sediment samples containing the assemblages attributed earlier to the Upper, Middle, and Lower Palaeolithic periods [2,3].
- Our results show that the inhabitants of Kozarnika occupied that region from ca 30 to 600 ka, showing general accordance with the previous dating.

2 Site location



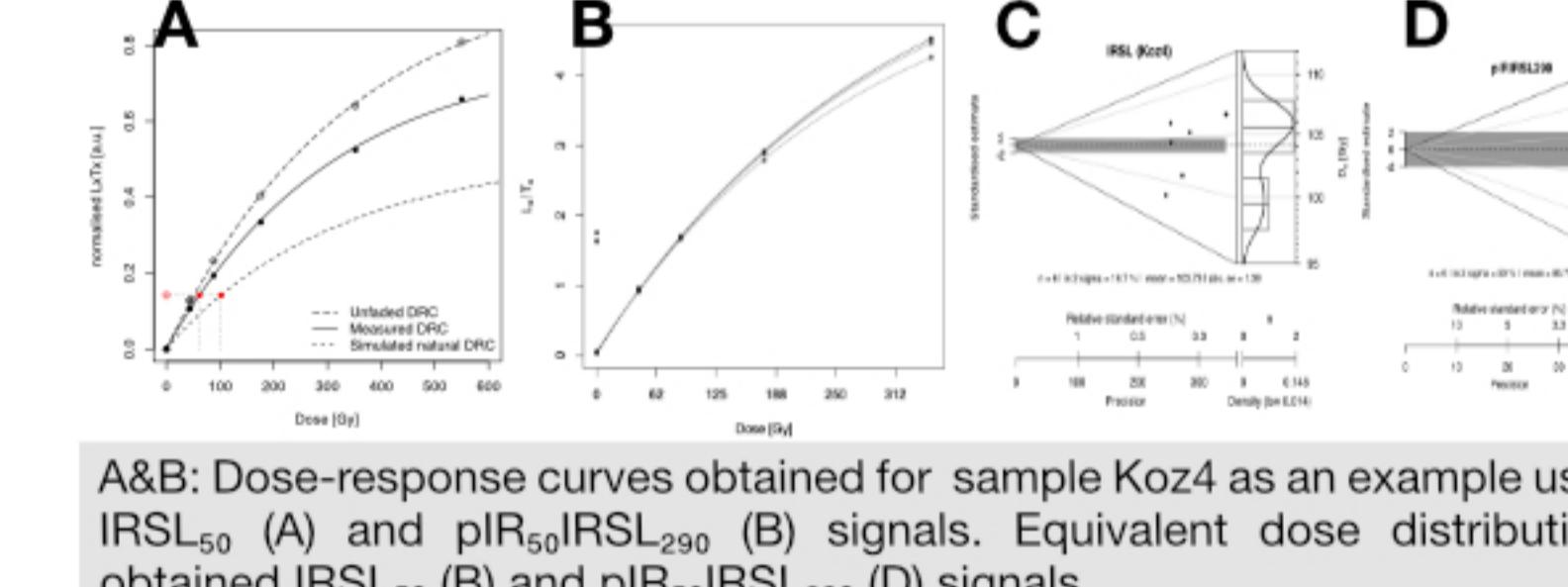
3 Dating

1 Optically stimulated luminescence (OSL)

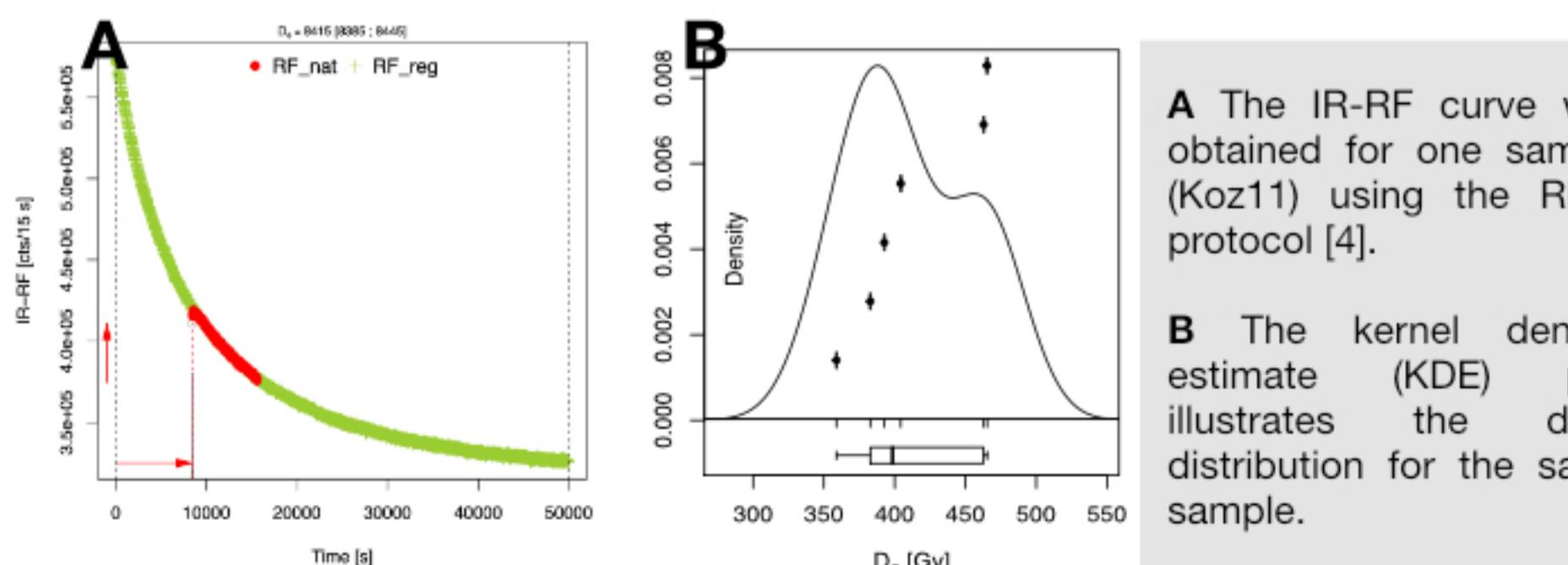


Signal measurement

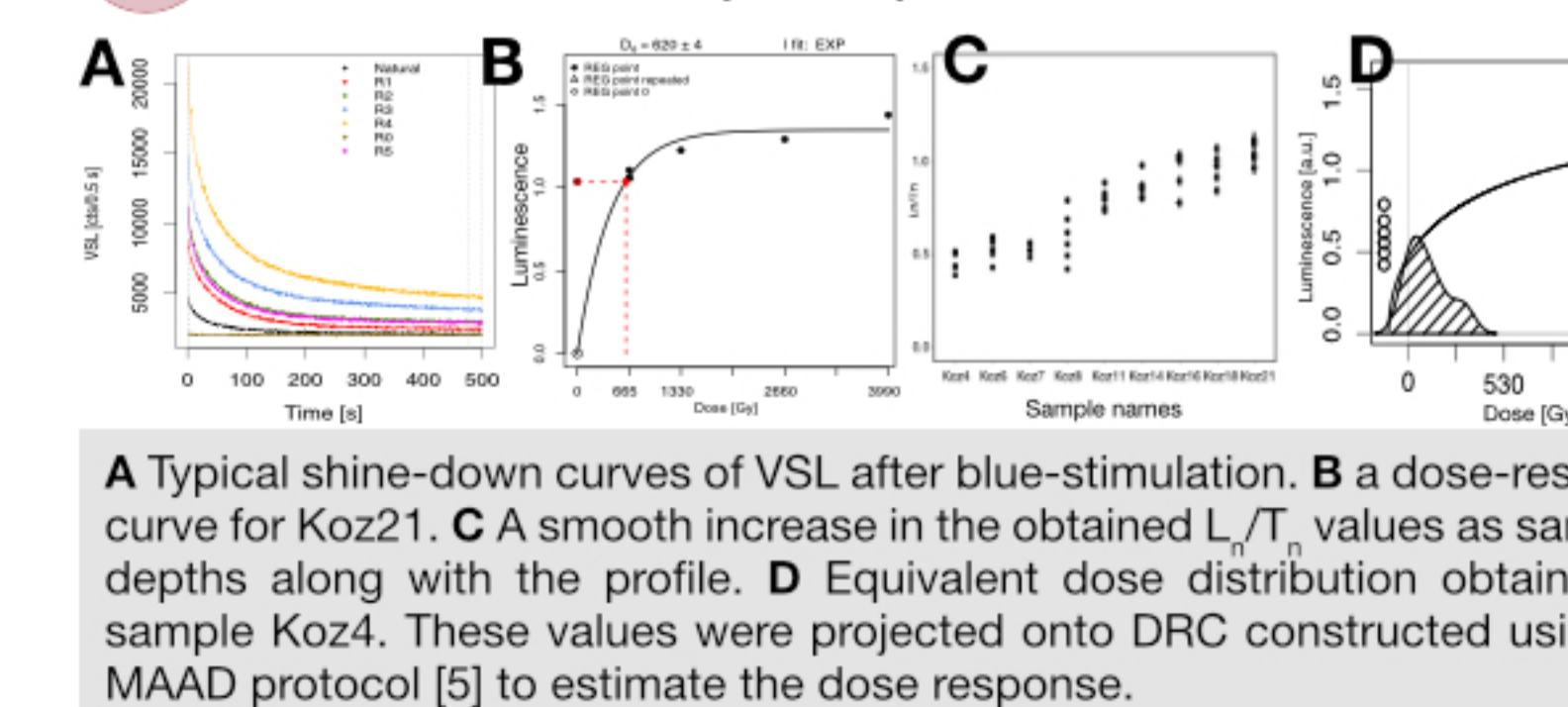
2 IRSL₅₀/pIR₅₀IRSL₂₉₀



3 Infrared radiofluorescence (IR-RF)

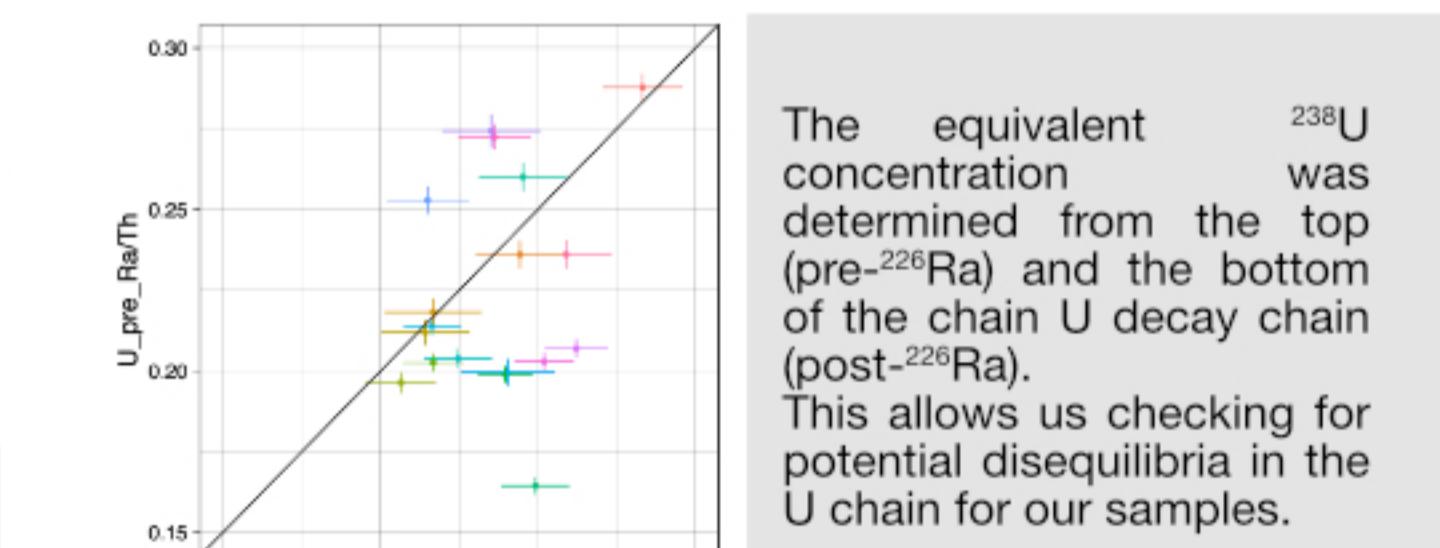


4 Violet OSL (VSL)

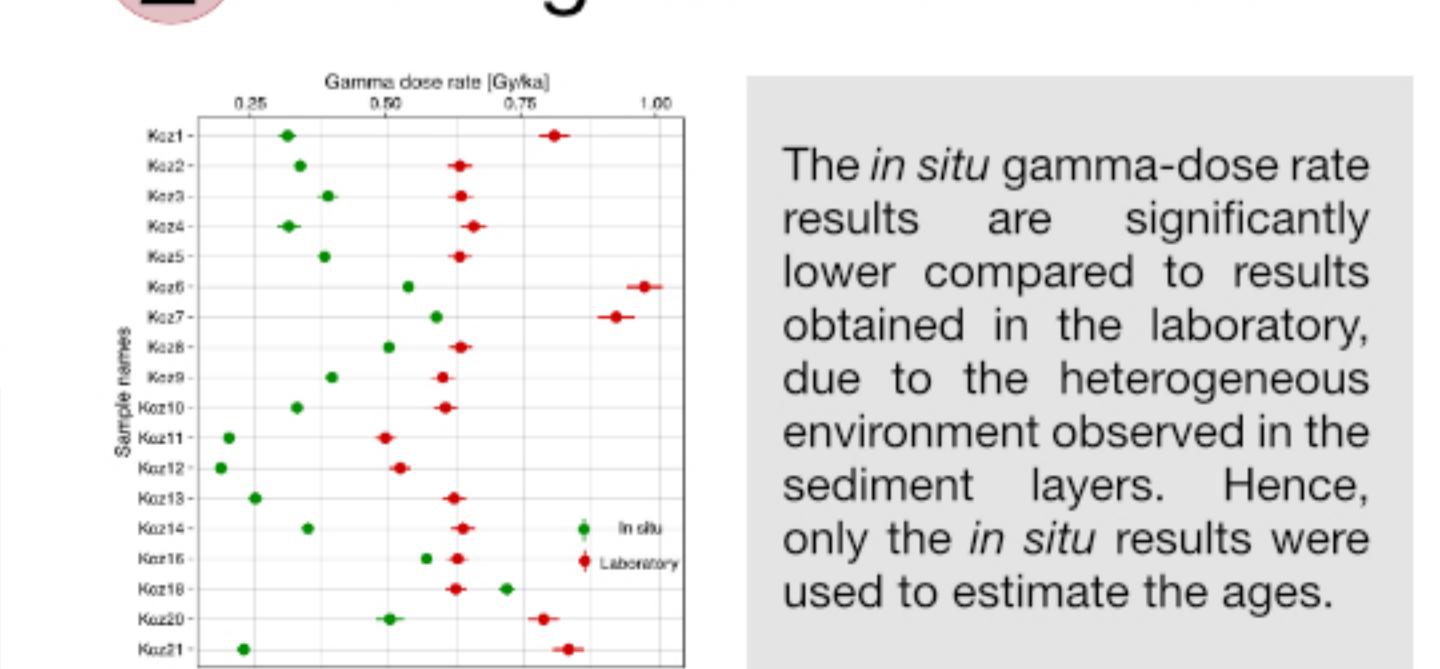


Dose rate

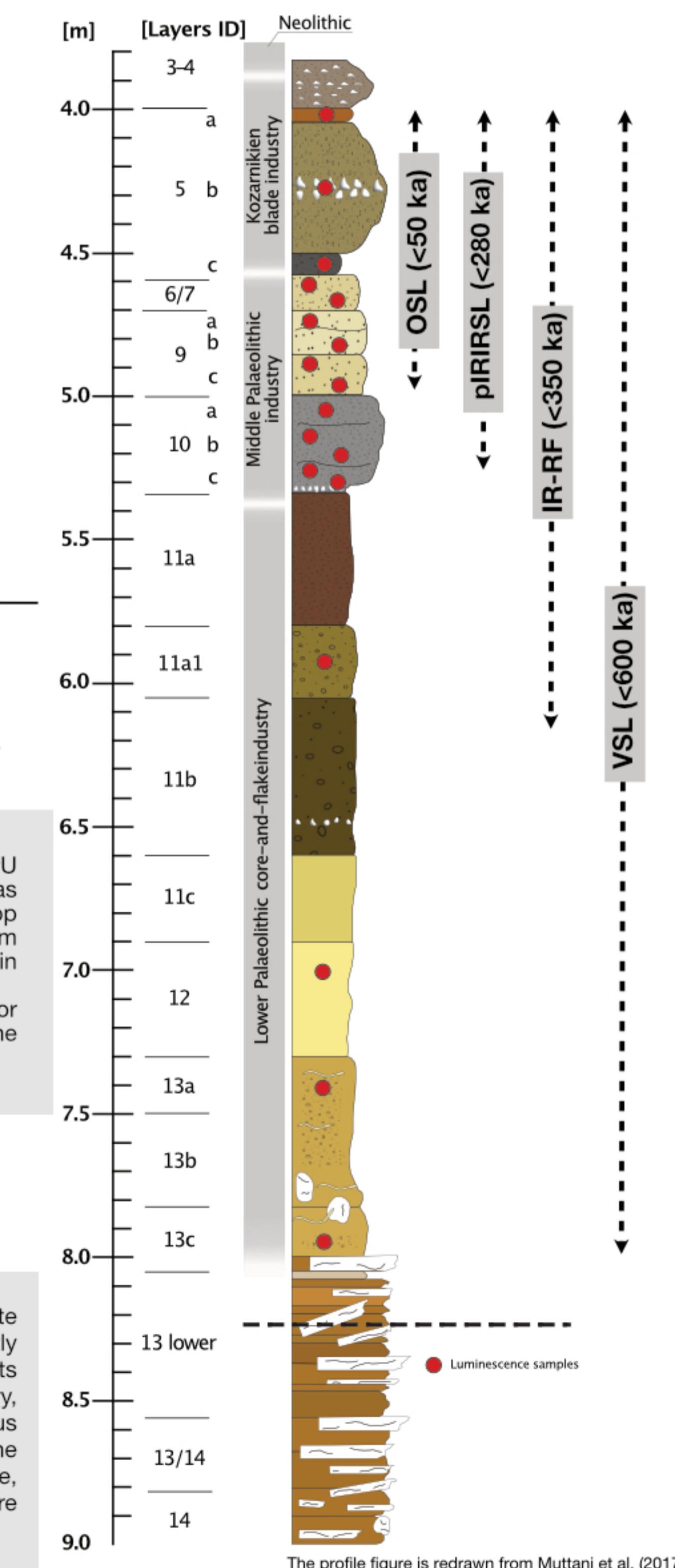
1 Gamma-ray spectrometry



2 In-situ gamma-dose rate



4 Chronology



5 Summary

- The luminescence-based chronology at Kozarnika's cave covers 30 to 600 ka
- The overall accordance between the OSL with the pIR₅₀IRSL₂₉₀ ages for the upper part of the sequence makes it likely that both signals were completely bleached before mineral deposition.
- Muttoni et al. (2017) [6] assigned the Brunhes-Matuyama reversal (780 ka) to the layer beneath 13c using Palaeomagnetic dating. VSL in combination with MAAD protocol resulted in ages consistent with the Brunhes-Matuyama reversal.
- The independent age available for layer 13a-c (with the range of 600-750 ka) also might indicate that the IR-RF ages represent the minimum age for the layers.

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