



The Stalać loess-paleosol sequence: pIRIR dating of polymineral fine grains and component analysis investigating dose dependency of quartz fine grains

J. Böskén¹, N. Klasen², I. Obreht¹, C. Zeeden¹, F. Lehmkuhl¹



Introduction

Who?

- > Collaborative research centre 806 "Our way to Europe" investigates the population dynamics & dispersal processes of early mankind
- > B1: "eastern trajectory" of modern migration to Europe links Middle East, Anatolia, Balkans, and Black Sea. Special focus: Pannonian Basin.
- > goal: researching climatic variability and its influence on dispersal of homo sapiens sapiens

What?

- > establishing geochronology of the section as basis for further paleoclimatic investigations
- > investigating luminescence characteristics

Where?

- > loess-paleosol sequence Stalać in central Serbia, northwest of Niš, close to Kruševac

Methods

CW-OSL measurements on Risø TL/OSL DA 20 reader

Quartz fine grains - SAR [1]

- > preheat plateau test [1]
- > dose recovery test [2]
- > component fitting using *CW-fit* function of R Luminescence package [3]

Polymineral fine grains - pIRIR₂₉₀ [4]

- > prior IR stimulation temperature test [5]
- > dose recovery test: after bleaching for 24h in solar simulator a given beta dose was tried to be recovered
- > measurement of residuals after bleaching for 24h in solar simulator
- > De measurement

Quartz 4-11µm

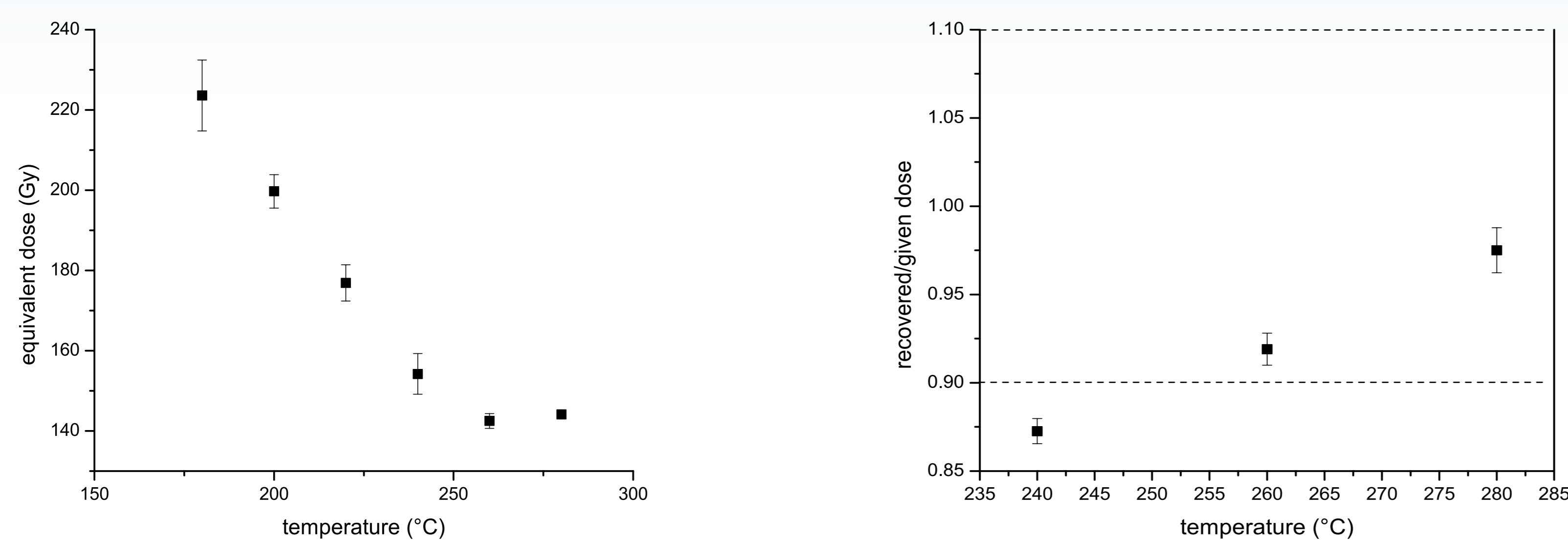


Fig. 1 Measurements undertaken on St 10. Left: preheat plateau test shows dependency of De on preheat temperature. Right: dose recovery test using 3 different preheat temperatures. Lowermost does not pass the desired ratio.

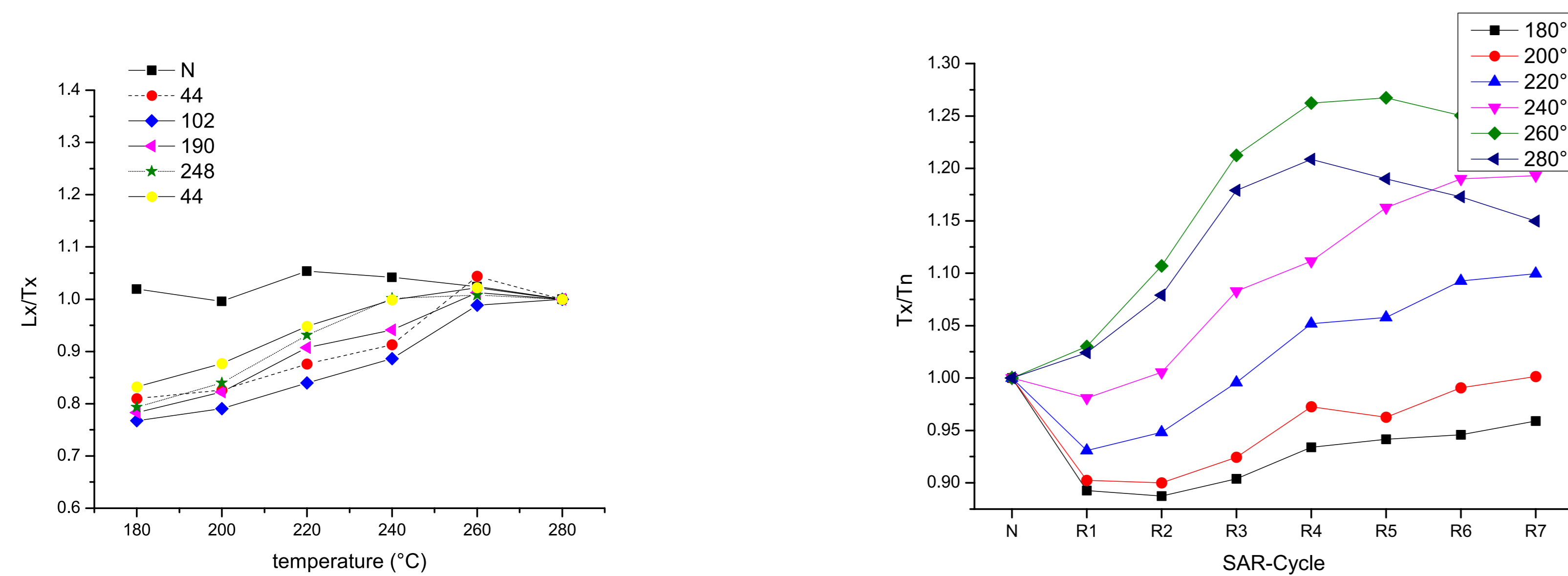


Fig. 2 left: Normalized luminescence signal at different preheat temperatures. Points normalized to 280°C. Right: Tx/Tn ratio throughout the measurements. Different aliquots behave similar.

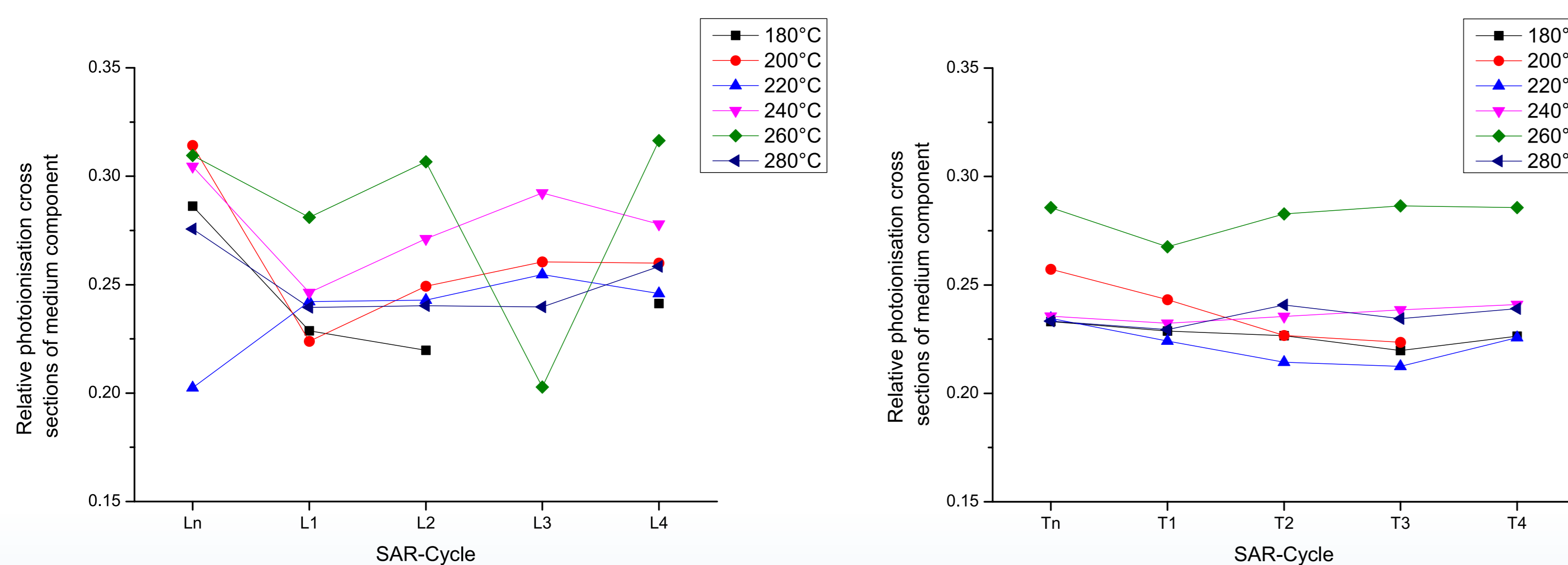


Fig 3: Component analysis of the preheat plateau test of St 10 revealed changing photo ionisation cross sections of fast, medium and slow components throughout the SAR-Cycle. Plots show the relative distribution of the medium component (Lx left, Tx right) with regard to the fast component. Average value found in literature is 0.2 [6]. Strong inter-aliquot scatter not shown.

References

- [1] A.S. MURRAY & A.G. WINTLE (2000): Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol. *Radiation Measurements* 32, pp. 57-73.
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Acknowledgments

This project is affiliated to the CRC 806 "Our way to Europe". We thank the German Science Foundation (DFG) for funding this project. Moreover, thanks go to our Serbian, Hungarian and Romanian colleagues who contribute by supporting field work and scientific discussions. And finally thanks to the colleagues in the Cologne Luminescence Lab for support and feedback

Polymineral 4-11µm

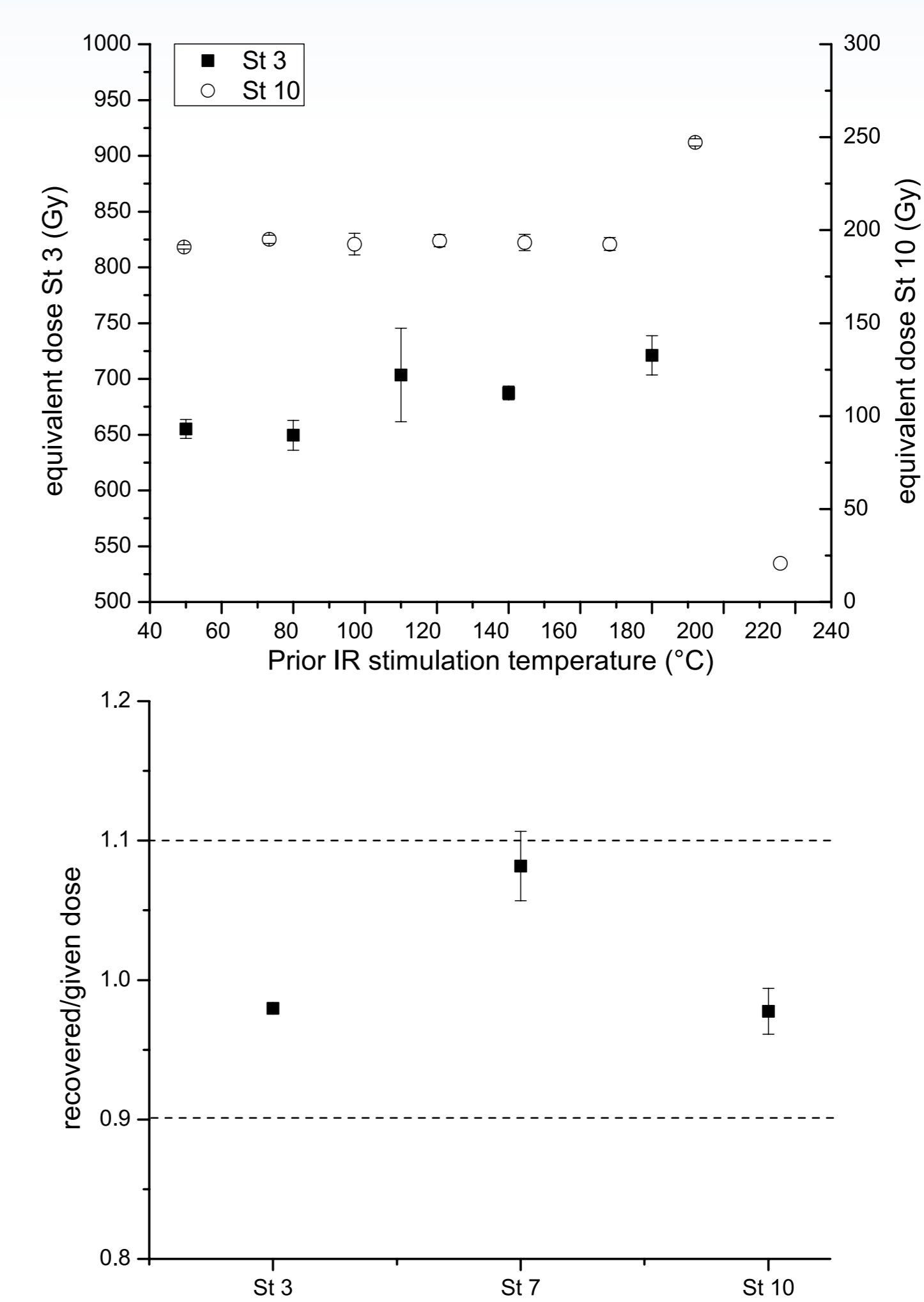
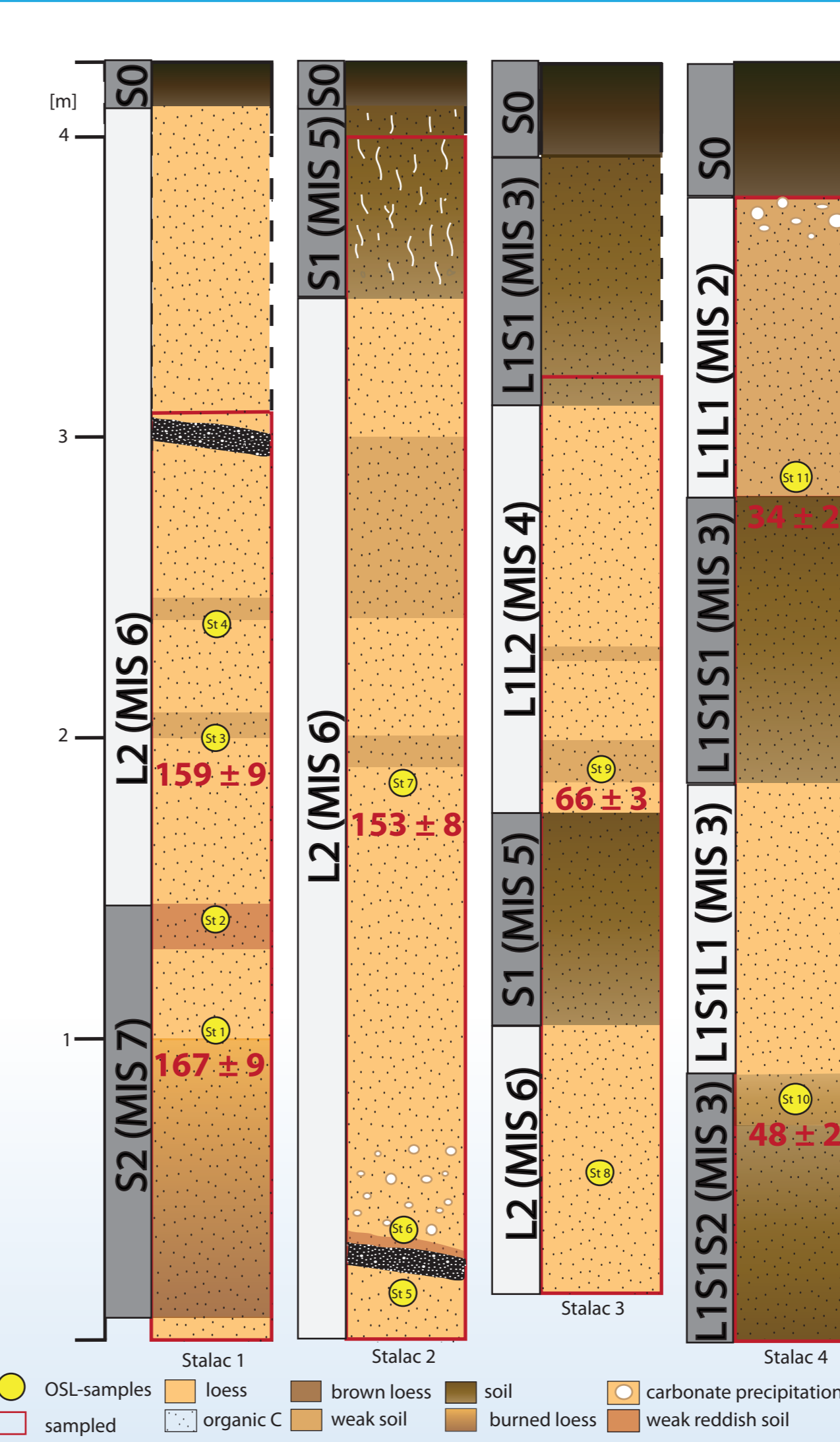


Fig. 4 top: prior IR stimulation temperature test to detect proper first IR stimulation temperature. Especially St 10 shows a perfect plateau between 50°C and 170°C. Bottom: dose recovery test for three samples with a first IR temperature of 50°C. Samples have been bleached for 24h in a solar simulator. All samples pass the test with a ratio between 0.9 and 1.1. Standard errors shown.

Conclusion



- > geochronology successfully established ranging from MIS 3-6
- > L2 tephra sandwich dated to 160 ± 9 – 153 ± 8 ka
- > thorough investigation important to detect problematic quartz behaviour
- > preheat plateau test is a good indicator of problematic behaviour

- > good behaviour of polymineral samples makes them ideal candidates for measurement with the pIRIR₂₉₀ protocol and encourages the validity of the ages