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## Can moisture content estimates from nuclear magnetic resonance improve optically stimulated luminescence dating - first results on Loess samples from Toshan/Iran

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Dating of loess deposits using optically stimulated luminescence (OSL) enable us to extract important information about the climate during the last ~150 ka. A good estimation of the dose rate during the past is essential for OSL and depends, among others, on the history of the moisture content in the proximity of the dated sample. While the current moisture content can be measured by heating/drying, the history of the moisture variations of a sample is generally unknown. Reference values reported on similar materials and climate conditions may provide a range for the expected moisture variations in the past, but these values are generally rough guesses and not depth- and time-specific.

Nuclear magnetic resonance (NMR) relaxometry targeting the hydrogens of the pore fluid can estimate the current moisture content of a sample without heating. Additionally, the NMR relaxation time distribution yields information of the expected moisture content for a given field potential (e.g. wilting point). This can help to estimate a sample-specific range of likely moisture variation in a quick (several min) and no-invasive way.

We discuss this new approach on a loess profile from Toshan (Iran) published previously by (Lauer et al., 2017) and (Vlaminck, 2018). The later pointed out inconsistencies in the obtained age model. The estimated sample specific moisture content for the wilting point (15 to 35 wt.%) provide the low boundary for the moisture content estimate, which is higher than previously assumed (5 wt.%). The new dose rate calculated for these sample specific moisture content values lead to clearly older and more consistent ages (less age inversions).

We suggest that NMR derived moisture content data is valuable for obtaining information on the moisture content of samples. Especially the minimum moisture can be derived reliably, giving more robust water content estimates for OSL dating.

### References

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