

LUMINESCENCE DATING: APPLICATIONS IN EARTH SCIENCES AND GEOARCHAEOLOGY

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Measuring time in the geological record is fundamental to the study of the geological processes shaping the Earth's surface. Luminescence dating is a major chronometric tool for late Quaternary studies, it provides a means to measure the time elapsed since minerals were last exposed to daylight, and hence the dating of most types of sediment on the Earth's surface.

Generally, the preferred choice of mineral is quartz because of its common occurrence. However, the typical saturation level of the OSL signal generally limits its application to between 10 and 150,000 years (Wintle and Murray, 2006). K-feldspars typically display significantly higher dose saturation levels, allowing the dating of older deposits up to circa 500,000 years, with indications that the upper limit of the technique can be extended even further (Murari, 2019). However, routine use of feldspar is hampered by anomalous fading (Wintle, 1973), a phenomenon leading to systematic age underestimation if not accounted for. One of my research interests is to try to overcome such limitations for both quartz and feldspar minerals, and to develop new ways of obtaining reliable and accurate age estimates for Plio/Pleistocene sequences.

In this presentation I aim to discuss some of the state-of-the-art innovations with regards to extending the upper luminescence dating limit to million years, and to highlight some of the enduring challenges of classical and newly proposed luminescence dating techniques. I will also present our new luminescence dating facility at Stony Brook University.

References:

Murari, M., Kreutzer, S., Fuchs, M., 2018, Further investigations on IR-RF: dose recovery and correction. *Radiation Measurements*, v.120, p.110-119, <https://doi.org/10.1016/j.radmeas.2018.04.017>

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Wintle, A.G., 1973, Anomalous fading of thermoluminescence in mineral samples, *Nature*, v. 245, p.143-144, <https://doi.org/10.1038/245143a0>