New frontiers of Luminescence: rocks surface dating

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PhD student at the University of Sassari, she is working on Luminescence dating to define both Quaternary stratigraphy and the interaction between recent tectonic and sedimentation. Recent interest are toward new branch of luminescence; that is, rock surface dating.

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As it happens in quartz and k-feldspar sediment grains during transport, the daylight exposition resets the luminescence signal of the same minerals present on the rock surface.
Sohbati et al. 2011 were the first proposing a reproducible methodology to investigate the bleaching effect at depth of rocks (or boulders). Drilling the rock and cutting the core in millimetre slices, it is possible to measure the residual charge increasing with depth. They found that the residual charge at the surface, if this remained uncovered, is expected to be near zero and it increases with depth toward the saturation or the maximum dose that could be accumulated by the rock. This depth is variable from few to 20 millimetres, and is function of the exposure time and rock forming mineral characteristics (opaque and/or transparency).
Sohbati et al. (2012) developed a mathematical model to calculate the age of rock exposed to sunlight. This considers the variation of the De with depth and allows dating the time to which the rock has been exposed to sunlight.
Until now, this method has been successfully used to date fluvial cobbles (Jenkins et al. 2018), marine coastal boulders (Brill et al. 2017), rock fall events (Chapot et al, 2012) and glacier fluctuations (Lehmann et al. 2018).
Although the method is still young, several potential applications could be hypothesised: the dating of different morphological erosive features (wave cut platform, incised valley, etc…), gravelly coarse deposits (debris flow, gravel beaches, moraines, etc…) and fault and impact surfaces (tsunamis, meteorites, etc...).

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