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SOURCES OF ERROR AND BIAS IN LUMINESCENCE DATING

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The recent *Nature Reviews Methods Primers* article on optically stimulated luminescence (OSL) dating using quartz includes selective bias in reporting of basic functions, techniques and uncertainties, alongside exclusion of important articles and special methodologies of OSL. Consequently, the value of the review is oftentimes rendered deficit and unfair. The aspects of quartz OSL dating discussed in this Primer cover several reviews on methods and materials previously published in the last 5-10 years but fails to mention and/or discuss any new major advancement (see e.g 1, 2).

It must be stressed that the 5 – (overoptimistically) 10% error of this polyparametric method has not improved its accuracy since its initial applications (as TL and later OSL) in the 1970 and 80s. For example, reliable extension of OSL dating to older ages is not yet routinely achieved; disequilibrium of the ^{238}U decay series can be a serious source of error in dose rate evaluation of sediments and speleothems, however, the authors assert that, in most cases, disequilibria has a small effect on the OSL age (3). Further, the quoted age calculation does not include a discussion on the unorthodox, and occasionally misleading, blind use of available software.

Of the 395 citations in the main article, approximately 140 (35%) — and 31% in the supplement — are self-citations. This implies that the subject is mainly studied by half a dozen scientists globally, which is misleading. Missing references include detailed experimental work with cautionary remarks on the bleaching, dose growth, phototransfer and preheating in various types of sedimentary and volcanic rock types and conversion factors (4,5).

The issue of daylight exposure of rock surfaces (of quartz bearing rocks) is insufficiently covered by the Primer. Total bleaching of surficial luminescence in masonry was first discussed by Liritzis (1994) with an overview in 2011 followed by several successful case studies in Egypt, Greece and other places (6 and refs therein).

Several works on the inverse problem — dating the length of daylight exposure of a rock surface — are omitted (7, 8).

The single aliquot regeneration (SAR) technique is discussed in detail, despite multiple complications, assumptions and criteria applied. In contrast, the single aliquot added dose (SAAD) is incompletely presented in the Primer. It is reported as first presented by the corresponding author (9 in ref.87) instead of Duller in 1991 (10). Compared to SAR, no pros and cons are given. SAAD for quartz and feldspar is well-documented, though little attention is drawn to these studies.

Also missing from the Primer is the exploration of SAR and multiple-aliquot methods for quartz violet stimulated luminescence (VSL) dating. Several other important case studies should have been mentioned and could have been cited by referencing the respective websites of OSL groups around the world (11, 12). Other excluded references cover works on experimentation, analysis, evaluations and applications, the limited space here restricts to cite (13-15).

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