Absorbed dose, equivalent dose, measured dose rates, and implications for OSL age estimates: Introducing the Average Dose Model - DTU Orbit (16/01/2019)

Absorbed dose, equivalent dose, measured dose rates, and implications for OSL age estimates: Introducing the Average Dose Model

Luminescence ages are calculated by dividing an absorbed dose by the dose rate to which the natural dosimeter has been exposed. In practice, one measures an equivalent dose, De; in the absence of an alpha dose contribution, this should be indistinguishable from the dose absorbed in nature. Here we first review the relationship between absorbed dose, equivalent dose and dose rate, and the measurements that lead to their estimation; we restate that, in contrast to recent suggestions, an equivalent dose is not a physically different quantity from a beta or gamma dose absorbed by quartz grains. Statistical analysis of OSL data is of great importance when dealing with single grain data, since such data commonly exhibit significant scatter. However, dose rate measurements provide an arithmetic mean of dose rates absorbed by individual grains; in this article, we propose a new model to estimate the average dose absorbed by the grains. We thus introduce a new model for OSL age estimates: the Average Dose Model (ADM). We argue that ADM ages should be more accurate than Central Age Model (CAM) based ages, and we provide experimental evidence supporting this expectation. We also argue that the use of the Finite Mixture Model should be avoided. Finally, we discuss the implications for multi-grain age estimates derived from well-bleached samples.

General information
State: Published
Organisations: Center for Nuclear Technologies, Radiation Physics, Université Bordeaux Montaigu, Universite de Nantes, Aarhus University
Pages: 163-173
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Quaternary Geochronology
Volume: 41
ISSN (Print): 1871-1014
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.17 SJR 1.972 SNIP 1.287
Web of Science (2017): Impact factor 3.44
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.3 SJR 1.738 SNIP 0.984
Web of Science (2016): Impact factor 2.46
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.22 SJR 2.158 SNIP 1.367
Web of Science (2015): Impact factor 3.142
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.86 SJR 1.953 SNIP 1.218
Web of Science (2014): Impact factor 2.687
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.89 SJR 2.512 SNIP 1.344
Web of Science (2013): Impact factor 2.476
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 3.77 SJR 2.783 SNIP 1.856