Symbols in TL & optical dating: provisional list

Martin Aitken
Research Laboratory for Archaeology, 6 Keble Road, Oxford OX1 3QJ, UK.

At a recent meeting of the Scientific Committee of the TL & ESR Dating Seminars it was agreed that papers submitted for the proceedings of the Vienna 1993 seminar would be required to use standardized symbols, terminologies and forms of date citation. The purpose of this note is to set the ball rolling† in respect of symbols so that there is adequate time for discussion within the community and amendment if appropriate. It is also desirable that there should be compatibility with the system developed for ESR.

In respect of terminology and citation it seems to me that most of the hard work has been done by the Editor of *Ancient TL* and published as a preamble to the Date List supplements. I suggest therefore that we use this preamble as a basis for discussion of those two aspects. Here I will do no more than reiterate, and to some extent extend, the symbols.

This basic list of symbols is primarily relevant to dating reports; in a research paper it is inevitably necessary to define additional symbols *ad hoc*.

General

α, β, γ, c	subscripts to be used to indicate type of radiation (but only when distinction is necessary; often β or γ can be assumed)

Luminescence measurement

L	observed level of luminescence, preferably as 'kilocounts per second (kc/s)'. Alternative units: 'Mc/s', 'c/s'; also 'Mc', 'kc', or 'c' per stated time interval (or per stated temperature interval). 'Normalized L' may also be appropriate and, if unavoidable, 'L (a.u.)'
R (Gy)	applied laboratory dose [D should not be used here because of conflict with dose-rate]
L_i and R_S	for use in the case when growth with dose has the form of a saturating exponential, i.e. $L=L_i\,[1-\exp(-R/R_S)]$, where L_i is the value of L for infinite R
E (Gy)	dose intercept in the case of linear fitting to a plot of growth with laboratory dose of a laboratory-reset sample, i.e. the supralinearity correction shown in Fig.2.2 of Aitken (1985). [use of I is undesirable on account of that letter's use for 'intensity' in ESR]
Q (Gy)	ditto for a sample not reset in the laboratory, but in this case Q should be taken as positive when the intercept is negative; see Fig.2.1 of Aitken (1985) where Q is called 'Equivalent Dose'. The commonly-used abbreviation ED is undesirable for use in mathematical expressions
P (Gy)	paleodose, the best estimate of the effective dose received since resetting in antiquity
χ	incremental growth of L with R, i.e. incremental sensitivity
k-, a-, b-values	indication of α particle effectiveness; for b use ($pGy \cdot m^2$) by preference
S_0, S_N, and S_β	as in pre-dose dating

Dose-rate measurement

D'_α	alpha dose-rate after allowance for effectiveness
D	(Gy/ka; mGy/a; or with 'yr' replacing 'a') total effective dose-rate with suffix 'dry' if no allowance has been made for water content. Use subscripts for components of D; thus $D = D'_\alpha+D_\beta+D_\gamma+D_c$
f	fraction of effective dose-rate due to type of radiation as indicated by subscript
c	(Bq/kg) activity, with appropriate suffix; alternatively radioactivity can be specified in terms of element concentration: ppm or %
α_o	unsealed alpha count-rate, either $Ms^{-1}.mm^{-2}$ or ks^{-1} with area specified; electronic threshold fraction also to be stated
$\alpha_1, \alpha_2, \alpha_3$ ...	sealed ditto, duration of sealing to be stated
W	saturation water content as (wt.water/dry wt.)
F	fractional uptake

Citation

A (ka or a)	age, with ± error limits at 68% level of confidence that include influence of all quantifiable sources of error, random plus systematic
NOTE	the terminology BP should be avoided since it is used in C-14 with special implications; the plain statement that the age is 'so many years' is usually adequate but if emphasis of absoluteness is desirable then 'so many calendar years' can be used

References

Aitken M.J. (1985) *Thermoluminescence Dating*. Academic Press.

PI Ann Wintle

There are about 100 papers per year which present the results of luminescence dating programmes on material ranging from pottery and burnt flint, to volcanic ash, and to unheated sediments. These are published in a range of journals, but are more commonly being accepted in journals specializing in Quaternary Geology. Over the years different notations have developed, some of which relate to the use of different types of measurement procedures for either luminescence or radioactivity measurements. However, it is time that the luminescence community attempted to present a united front and this is being initiated by Martin Aitken.

† *Ed. note* Comments, or proposals in the form of short papers, should be sent to the Editor.