Ancient TL

www.ancienttl.org · ISSN: 2693-0935

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Compiled by Ann Wintle

Letters

•*Vlasov & Kulikov's method*

In their paper published in 1989, Vlasov and Kulikov (*Physics and Chemistry of Minerals* **16**, 551-558, 1989) provide the most comprehensive description yet of the method they use to obtain TL dates from quartz. Since some of these are over a million years this is obviously of great interest. The paper is not particularly accessible and I thought it would be worthwhile to provide a summary to the best of my ability. At the end I shall make some comments of my own. The reader is advised that I may well have misinterpreted some aspects of the paper and that what follows should not be regarded as a faithful representation of the original, but is my interpretation.

The following refers to the light sum (i.e. TL intensity) for the "high-temperature" quartz peak at 310 °C. They show that it is necessary to anneal their irradiated samples at 200 °C for 20 minutes in order to separate this peak.

(a) The rate equation used is:

$$dn/dt = (n_o - n)^2 . \sigma_1 . P_{eff} - n/\tau$$

Here the first term represents trap filling by the radiation and the second term represents thermal trap emptying.

n	is the concentration of filled traps at time t,
n_o	is the total concentration of traps,
P_{eff}	is the dose-rate,
σ_1	is the trapping cross section, and
τ	is the mean trapped charge lifetime due to thermal emptying.

(b) The equation is solved for the case of laboratory environmental irradiation in which case the second term is omitted. The solution yields the following relation between lab dose and light sum:

$$1/\Delta S = a + b/D$$

where, D = lab dose; $\Delta S = S_\infty - S$; S = light sum and S_∞ is its value in the limit $D = \infty$; $a = 1/(S_\infty - S_{nat})$; $b = a/(n_o - n_{nat})\sigma_1$