Ancient TL

www.ancienttl.org · ISSN: 2693-0935

Issue 32(1) - June 2014
https://doi.org/10.26034/la.atl.v32.i1

Ancient TL

A periodical devoted to Luminescence and ESR dating

Department of Geography and Earth Sciences, Aberystwyth University, Ceredigion SY23 3DB, United Kingdom

Volume 32 No.1 June 2014

ISSN 0735-1348

Ancient TL

Started by the late David Zimmerman in 1977

Ancient TL

A periodical devoted to Luminescence and ESR dating

Web site: http://www.aber.ac.uk/ancient-tl

Department of Geography and Earth Sciences
Aberystwyth University SY23 3DB
United Kingdom

Tel: (44) 1970 622606 Fax: (44) 1970 622659 E-mail: ggd@aber.ac.uk

A further note on the variance of a background-corrected OSL count

Galbraith R.

Department of Statistical Science, University College London, Gower Street, London WC1E 6BT, UK

(Received 6 March 2014; in final form 7 March 2014)

Abstract

Galbraith (2002) gave formulae for calculating the relative standard error of a background-corrected optically stimulated luminescence (OSL) count. This note extends those formulae to the case where the number of channels used to estimate the background is not necessarily a multiple of (and may indeed be less than) the number used to estimate the signal. The theoretical formulae are unchanged, but the estimate of the background is expressed in a more general notation and I comment further on how the Poisson over-dispersion may be estimated. I will use the same notation as in Galbraith (2002) and will repeat enough of the text there for this note to be self-contained.

Derivation

The usual scenario is as follows. Optical stimulation of an aliquot of quartz produces a series of counts —a number of recorded photons for each of N equal length consecutive time intervals (channels). The optically stimulated luminescence (OSL) "signal" is measured from the total count in the first n channels minus an estimate of the contribution to this count from "background" sources, which here are taken to include all sources other than the signal to be estimated. The background emission rate is assumed to be constant over the whole period used, and is estimated from counts later in this period, where the contribution from the signal is assumed to be negligible.

Mathematically, the above may be expressed as follows. Let y_i denote the OSL count from channel i, for $i = 1, 2, \dots , N$, and let $Y_0 = y_1 + y_2 + \dots + y_n$ be the total count over the first n channels. Write

$$Y_0 = S_0 + B_0$$

where S_0 and B_0 are the contributions to Y_0 from the signal (or source of interest) and background respectively. Of course S_0 and B_0 are not observed directly. Assume that S_0 and B_0 are independent random quantities with expectations μ_S and μ_B, and variances σ_S^2 and σ_B^2, respectively. Then the observed count Y_0 will have expectation $\mu_S + \mu_B$ and variance $\sigma_S^2 + \sigma_B^2$. An estimate of the signal μ_S is thus obtained by subtracting an estimate of μ_B from Y_0, i.e.,

$$\hat{\mu}_S = Y_0 - \hat{\mu}_B$$

We want to calculate the relative standard error of this estimate. An estimate of μ_B is usually obtained from the formula

$$\hat{\mu}_B = \frac{n}{m} Y_1 = \frac{1}{k} Y_1$$

where Y_1 denotes the total count over m later channels chosen so that the mean count per channel can be assumed to equal that for B_0, and $k = m/n$. It is desirable to choose m to be large enough to provide a sufficiently precise estimate of μ_B and it is convenient to choose $m = nk$ for some integer k that is large enough to assess any over-dispersion (with respect to Poisson variation) in total background counts made over different sets of n channels. However, k need not be an integer and the data used to estimate any over-dispersion need not be exactly the same as those used to estimate μ_B. Furthermore, k could be less than 1. That is, m could be chosen to be smaller than n, though the smaller m is, the less precise is the estimate of μ_B (other things being equal) and hence of μ_S. We here adapt the formulae of Galbraith (2002) to include this case explicitly.

Assume that all counts from individual channels that contribute to the background are independent random quantities from a distribution with mean μ_b and variance σ_b^2. This includes the y_is for the m channels that contribute to Y_1 as well as the unobserved counts that contribute to B_0. Then $\mu_B = n\mu_b$ and $\sigma_B^2 = n\sigma_b^2$ and the expected value and variance of Y_1 are $m\mu_b = k\mu_B$, and $m\sigma_b^2 = k\sigma_B^2$, respectively. So $\hat{\mu}_B$ has expectation μ_B and variance

$$\mathrm{var}(\hat{\mu}_B) = \left(\frac{1}{k}\right)^2 k\sigma_B^2 = \sigma_B^2 / k$$

Hence the variance of the estimated signal (corrected for background) is

$$\mathrm{var}(\hat{\mu}_S) = \mathrm{var}(Y_0) + \mathrm{var}(\hat{\mu}_B) = \sigma_S^2 + \sigma_B^2 + \sigma_B^2 / k \quad (1)$$

and the relative standard error is

$$\mathrm{rse}\,(\hat{\mu}_S) = \frac{\sqrt{\sigma_S^2 + \sigma_B^2 + \sigma_B^2 / k}}{\mu_S} \quad (2)$$

These formulae agree exactly with equations (1) and (2) of Galbraith (2002). In order to calculate this relative standard error in practice, we need estimates of σ_S^2 and σ_B^2 in addition to the estimate of μ_S.

If S_0, B_0 and Y_1 are all assumed to have Poisson distributions, then $\sigma_S^2 = \mu_S$ and $\sigma_B^2 = \mu_B$, and Equ. 1 becomes $\mathrm{var}(\hat{\mu}_S) = \mu_S + \mu_B + \mu_B / k$, which may be estimated as $Y_0 + \hat{\mu}_B / k = Y_0 + Y_1 / k^2$. Substituting these estimates into Equ. 2 gives the following estimated relative standard error:

$$\mathrm{rse}\,(\hat{\mu}_S) \approx \frac{\sqrt{Y_0 + Y_1 / k^2}}{Y_0 - Y_1 / k} \quad (3)$$

This is the same as equation (3) of Galbraith (2002) with $\bar{Y}$ replaced by Y_1/k.

If the background counts do not have a Poisson distribution, but are over-dispersed, we may write, as in Galbraith (2002),

$$\sigma_B^2 = \mu_B + \sigma^2$$

for some positive value of σ^2 to be estimated. There are several possible ways to estimate σ^2. One is to use

$$\hat{\sigma}^2 = s_Y^2 - \bar{Y} \quad (4)$$

provided that this is positive, where $\bar{Y}$ and s_Y denote the sample mean and standard deviation of total counts for sets of n channels that contribute to Y_1. (There are $[k]$ such total counts, where $[k]$ denotes the largest integer less than or equal to k.) This is the same as Equ. 4 of Galbraith (2002), but, as pointed out there, we would like an estimate based on a reasonable number of degrees of freedom, and it makes sense to obtain a pooled estimate from several different series. Such a pooled estimate of over-dispersion could be used for each series, while at the same time using separate estimates of background level.

Another method is to use

$$\hat{\sigma}^2 = n\left(s_y^2 - \bar{y}\right) \quad (5)$$

provided that this is positive, where $\bar{y}$ and s_y denote the sample mean and standard deviation of the m counts for single channels that contribute to Y_1. This has the advantage of having more degrees of freedom, but the possible drawback of being based on variation between single channels rather than between sums over n channels. In theory, if the individual y_is are independent with constant variance σ_b^2, then sums of them over non-overlapping sets of n channels will be independent with variance $n\sigma_b^2$. However, in practice it is possible that the estimates based on Equ. 4 and Equ. 5 may not agree, and it is really Equ. 4 that is more relevant here. In any case, if m is small, a more reliable estimate of σ^2 may again be obtained by averaging the estimates for several series.

It is not so straightforward to obtain a corresponding estimate of σ_S^2 because the expected counts change rapidly at the start of the stimulation period. But there is perhaps a case for assuming that S_0 does have a Poisson distribution, while B_0 does not. The former comes from pure OSL emissions while the latter comes, at least partly, from other sources such as scattered light and instrument noise, which may not exhibit Poisson variation. Then we still have $\sigma_S^2 = \mu_S$ and the resulting estimated relative standard error is

$$\mathrm{rse}\,(\hat{\mu}_S) \approx \frac{\sqrt{Y_0 + Y_1 / k^2 + \hat{\sigma}^2 (1 + 1/k)}}{Y_0 - Y_1 / k} \quad (6)$$

This is the same as equation (6) of Galbraith (2002) with $\bar{Y}$ replaced by Y_1/k.

Further comments

Li (2007) discussed the estimation of the error variance of background-corrected OSL counts, where he distinguished between two sources of background — namely, the "slow" component of the signal and "instrumental background". On the basis of laboratory experiments, he argued that it was just the counts from the latter source that were over-dispersed with respect to Poisson variation, and furthermore that such over-dispersion would be approximately the same for all analyses that used the same instrumental conditions. He therefore advocated the use of his Equation 6, which is equivalent to equation (6) of Galbraith (2002) and Equ. 6 above, with $\hat{\sigma}^2$ obtained from appropriate laboratory experiments and used for all analyses made under the same instrumental conditions. For his experiments, the estimate of over-dispersion based on variation between single channels was very similar to that based on variation between totals for sets of *n* channels.

Experiments to identify and measure specific sources of variation are to be encouraged, though it is also good practice to check that empirical estimates, such as those based on Equ. 4 or 5 or averages of them from several series, agree with those obtained from such experiments.

Finally, in practice an estimated background-corrected signal is usually divided by a similar background-corrected estimate obtained from a response to a test dose, in order to allow for a possible "sensitivity change" in the response to optical stimulation. The resulting quantity is usually denoted by L_x/T_x and its relative standard error may be calculated as the sum in quadrature of the separate relative standard errors of L_x and T_x. That is,

$$\mathrm{rse}\left(\frac{L_x}{T_x}\right) \approx \sqrt{[\mathrm{rse}(L_x)]^2 + [\mathrm{rse}(T_x)]^2}$$

where $\mathrm{rse}(L_x)$ and $\mathrm{rse}(T_x)$ are each given by $\mathrm{rse}\left(\widehat{\mu}_S\right)$ in Equ 6 applied to the appropriate series of counts.

References

Galbraith R., (2002) A note on the variance of a background-corrected OSL count. Ancient TL, 20, 49–51.

Li B., (2007) A note on estimating the error when subtracting background counts from weak OSL signals. Ancient TL, 25, 9–14.

Reviewer

G.A.T. Duller

Bibliography
Compiled by Daniel Richter

From 1st December 2013 to 31st May 2014

Ackermann, O., Greenbaum, N., Bruins, H., Porat, N., Bar-Matthews, M., Almogi-Labin, A., Schilman, B., Ayalon, A., Horwitz, L. K., Weiss, E., and Maeir, A. M. (2014). Palaeoenvironment and anthropogenic activity in the southeastern Mediterranean since the mid-Holocene: The case of Tell es-Safi/Gath, Israel. *Quaternary International* **328–329**, 226-243.

Ahmed, M. T. T., Sato, S., and Tajima, Y. (2013). Quantitative Estimation of Longshore Sediment Transport Based on Thermoluminescence: Two Case Studies around Tenryu and Nile River Mouths. *Journal of Coastal Research*, 537-547.

Alexanderson, H., and Håkansson, L. (2014). Coastal glaciers advanced onto Jameson Land, East Greenland during the late glacial-early Holocene Milne Land Stade. *Polar Research* **33**, 20313.

Anechitei-Deacu, V., Timar-Gabor, A., Fitzsimmons, K., Veres, D., and Hambach, U. (2014). Multi-method luminescence investigations on quartz grains of different sizes extracted from a loess section in Southeast Romania interbedding the Campanian Ignimbrite ash layer. *Geochronometria* **41**, 1-14.

Arnold, L. J., Demuro, M., Parés, J. M., Arsuaga, J. L., Aranburu, A., Bermúdez de Castro, J. M., and Carbonell, E. (2014). Luminescence dating and palaeomagnetic age constraint on hominins from Sima de los Huesos, Atapuerca, Spain. *Journal of Human Evolution* **67**, 85-107.

Asena, A., Crowe, S. B., Kairn, T., Dunn, L., Cyster, M., Charles, P. H., Smith, S. T., and Trapp, J. V. (2014). Response variation of optically stimulated luminescence dosimeters. *Radiation Measurements* **61**, 21-24.

Astakhov, V. I., and Mangerud, J. (2014). To the chronology of the last ice age on the Lower Yenissei. *Doklady Earth Sciences* **455**, 219-222.

Athanassas, C., and Bassiakos, Y. (2012). Optically stimulated luminescence dating of artefact bearing archaeological layers at “Kerame”, Ikaria, Eastern Aegaean: Field observations, laboratory procedures, and limitations. *Folia Quaternaria* **80**, 55-62.

Athanassas, C., Fountoulis, I., Mariolakos, I., Bassiakos, Y., Karotsieris, Z., Triantaphyllou, M., and Theodorakopoulou, K. (2013). Comments on the neotectonics of the coastal zone of western Messenia based on luminescence dating and geoarchaeological evidence. *Zeitschrift für Geomorphologie* **57**, 49-62.

Backhouse, P. N., Feathers, J. K., Mahoney, M., and Macuen, K. (2014). An assessment of the applicability of luminescence dating to developing an absolute chronology for the production and use of sand-tempered plain ceramics in south Florida. *Journal of Archaeological Science* **45**, 150-158.

Bailey, R. M., and Thomas, D. S. G. (2014). A quantitative approach to understanding dated dune stratigraphies. *Earth Surface Processes and Landforms* **39**, 614–631.

Bailiff, I. K., French, C. A., and Scarre, C. J. (2014). Application of luminescence dating and geomorphological analysis to the study of landscape evolution, settlement and climate change on the Channel Island of Herm. *Journal of Archaeological Science* **41**, 890-903.

Bakraji, E., Boutros, N., and Abboud, R. (2014). Thermoluminescence (TL) dating of ancient Syrian pottery from six different archaeological sites. *Geochronometria* **41**, 24-29.

Balco, G. (2014). Simple computer code for estimating cosmic-ray shielding by oddly shaped objects. *Quaternary Geochronology* **22**, 175-182.

Barrows, T. T., Williams, M. A. J., Mills, S. C., Duller, G. A. T., Fifield, L. K., Haberlah, D., Tims, S. G., and Williams, F. M. (2014). A White Nile megalake during the last interglacial period. *Geology* **42**, 163-166.

Bateman, M. D., Hitchens, S., Murton, J. B., Lee, J. R., and Gibbard, P. L. (2014). The evolution of periglacial patterned ground in East Anglia, UK. *Journal of Quaternary Science* **29**, 301-317.

Bates, M. R., Champness, C., Haggart, A., Macphail, R. I., Parfitt, S. A., and Schwenninger, J.-L. (2014). Early Devensian sediments and palaeovenvironmental evidence from the excavations at the Royal Oak Portal Paddington, West London, UK. *Proceedings of the Geologists' Association* **125**, 41–55.

Blöthe, J. H., Munack, H., Korup, O., Fülling, A., Garzanti, E., Resentini, A., and Kubik, P. W. (2014). Late Quaternary valley infill and dissection in the Indus River, western Tibetan Plateau margin. *Quaternary Science Reviews* **94**, 102-119.

Bouvier, A., Guibert, P., Blain, S., and Reynaud, J.-F. (2013). Interdisciplinary Study of the Early Building Phases of St Irénée's Church (Lyon, France): The Contribution of Luminescence Dating. *ArchéoSciences* **37**, 155-173.

Brass, M., and Schwenniger, J.-L. (2013). Jebel Moya (Sudan): new dates from a mortuary complex at the southern Meroitic frontier. *Azania-Archaeological Research in Africa* **48**, 455-472.

Brooke, B. P., Olley, J. M., Pietsch, T., Playford, P. E., Haines, P. W., Murray-Wallace, C. V., and Woodroffe, C. D. (2014). Chronology of Quaternary coastal aeolianite deposition and the drowned shorelines of southwestern Western Australia – a reappraisal. *Quaternary Science Reviews* **93**, 106-124.

Bulur, E., Kartal, E., and Saraç, B. E. (2014). Time-resolved OSL of natural zircon: A preliminary study. *Radiation Measurements* **60**, 46-52.

Burbidge, C. I., Trindade, M. J., Dias, M. I., Oosterbeek, L., Scarre, C., Rosina, P., Cruz, A., Cura, S., Cura, P., Caron, L., Prudêncio, M. I., Cardoso, G. J. O., Franco, D., Marques, R., and Gomes, H. (2014). Luminescence dating and associated analyses in transition landscapes of the Alto Ribatejo, central Portugal. *Quaternary Geochronology* **20**, 65-77.

Bussmann, J., Stele, A., Haertling, J. W., Zielhofer, C., and Fuchs, M. C. (2014). Holocene Sediment Dynamics in the Vicinity of a Roman battlefield near Osnabruck (NW-Germany). *Zeitschrift für Geomorphologie* **58**, 97-117.

Campbell, G. E., Walker, R. T., Abdrakhmatov, K., Schwenninger, J. L., Jackson, J., Elliott, J. R., and Copley, A. (2013). The Dzhungarian fault: Late Quaternary tectonics and slip rate of a major right-lateral strike-slip fault in the northern Tien Shan region. *Journal of Geophysical Research: Solid Earth* **118**, 5681-5698.

Carvalhido, R. P., Pereira, D. I., Cunha, P. P., Buylaert, J.-P., and Murray, A. S. (2014). Characterization and dating of coastal deposits of NW Portugal (Minho–Neiva area): A record of climate, eustasy and crustal uplift during the Quaternary. *Quaternary International* **328–329**, 94-106.

Cassen, S., Blain, S., Guibert, P., Querré, G., and Chaigneau, C. (2013). Les pierres dressées de la forêt du Gâvre (Loire-Atlantique) : nature et origine des matériaux, premiers éléments de chronologie (14C, OSL). *ArchéoSciences* **37**, 173-188.

Chapot, M. S., Duller, G. A. T., and Roberts, H. M. (2014). Assessing the impact of pulsed-irradiation procedures on the thermally transferred OSL signal in quartz. *Radiation Measurements* **65**, 1-7.

Choi, J. H., Kim, M. J., Cheong, C. S., and Hong, D. G. (2014). Development of OSL system using two high-density blue LEDs equipped with liquid light guides. *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* **323**, 19-24.

Choi, K. H., Choi, J.-H., and Kim, J. W. (2014). Reconstruction of Holocene coastal progradation on the east coast of Korea based on OSL dating and GPR surveys of beach-foredune ridges. *The Holocene* **24**, 24-34.

Clemmensen, L. B., Bendixen, M., Hede, M. U., Kroon, A., Nielsen, L., and Murray, A. S. (2014). Morphological records of storm floods exemplified by the impact of the 1872 Baltic storm on a sandy spit system in south-eastern Denmark. *Earth Surface Processes and Landforms* **39**, 499-508.

Cordier, S., Frechen, M., and Harmand, D. (2014). Dating fluvial erosion: fluvial response to climate change in the Moselle catchment (France, Germany) since the Late Saalian. *Boreas* **43**, 450-468.

Doğan, M., and Meriç, N. (2014). 650 nm Laser stimulated dating from Side Antique Theatre, Turkey. *Radiation Physics and Chemistry* **96**, 60-68.

Douka, K., Jacobs, Z., Lane, C., Grün, R., Farr, L., Hunt, C., Inglis, R. H., Reynolds, T., Albert, P., Aubert, M., Cullen, V., Hill, E., Kinsley, L., Roberts, R. G., Tomlinson, E. L., Wulf, S., and Barker, G. (2014). The chronostratigraphy of the Haua Fteah cave (Cyrenaica, northeast Libya). *Journal of Human Evolution* **66**, 39-63.

Dube-Loubert, H., Roy, M., Allard, G., Lamothe, M., and Veillette, J. J. (2013). Glacial and nonglacial events in the eastern James Bay lowlands, Canada. *Canadian Journal of Earth Sciences* **50**, 379-396.

Fan, Q., Ma, H., Wei, H., and An, F. (2014). Holocene lake-level changes of Hurleg Lake on northeastern Qinghai-Tibetan Plateau and possible forcing mechanism. *The Holocene* **24**, 274-283.

Fan, Y., Chen, X., Fan, T., Jin, M., Liu, J., and Chen, F. (2013). Sedimentary and OSL dating evidence for the development of the present Hobq desert landscape, northern China. *Science China Earth Sciences* **56**, 2037-2044.

Fiebig, M., Herbst, P., Drescher-Schneider, R., Lüthgens, C., Lomax, J., and Doppler, G. (2014). Some remarks about a new Last Glacial record from the western Salzach foreland glacier basin (Southern Germany). *Quaternary International* **328–329**, 107-119.

Fitzsimmons, K. E., Stern, N., and Murray-Wallace, C. V. (2014). Depositional history and archaeology of the central Lake Mungo lunette, Willandra Lakes, southeast Australia. *Journal of Archaeological Science* **41**, 349-364.

Fuchs, M. C., Gloaguen, R., Krbetschek, M., and Szulc, A. (2014). Rates of river incision across the main tectonic units of the Pamir identified using optically stimulated luminescence dating of fluvial terraces. *Geomorphology* **216**, 79-92.

Gaar, D., Lowick, S., and Preusser, F. (2014). Performance of different luminescence approaches for the dating of known-age glaciofluvial deposits from northern Switzerland. *Geochronometria* **41**, 65-80.

Gallen, S. F., Wegmann, K. W., Bohnenstiehl, D. R., Pazzaglia, F. J., Brandon, M. T., and Fassoulas, C. (2014). Active simultaneous uplift and margin-normal extension in a forearc high, Crete, Greece. *Earth and Planetary Science Letters* **398**, 11-24.

García, A. F., and Mahan, S. A. (2014). The notion of climate-driven strath-terrace production assessed via dissimilar stream-process response to late Quaternary climate. *Geomorphology* **214**, 223-244.

Garcia, A. L., Knott, J. R., Mahan, S. A., and Bright, J. (2014). Geochronology and paleoenvironment of pluvial Harper Lake, Mojave Desert, California, USA. *Quaternary Research* **81**, 305-317.

Gliganic, L. A., Cohen, T. J., May, J.-H., Jansen, J. D., Nanson, G. C., Dosseto, A., Larsen, J. R., and Aubert, M. (2014). Late-Holocene climatic variability indicated by three natural archives in arid southern Australia. *The Holocene* **24**, 104-117.

Gong, Z., Li, S.-H., and Li, B. (2014). The evolution of a terrace sequence along the Manas River in the northern foreland basin of Tian Shan, China, as inferred from optical dating. *Geomorphology* **213**, 201-212.

Gong, Z., Sun, J., Lü, T., and Tian, Z. (2014). Investigating the optically stimulated luminescence dose saturation behavior for quartz grains from dune sands in China. *Quaternary Geochronology* **22**, 137-143.

González, J. L., Shen, Z., and Mauz, B. (2014). New constraints on holocene uplift rates for the baudo mountain range, northwestern Colombia. *Journal of South American Earth Sciences* **52**, 194-202.

Greenbaum, N., Ekshtain, R., Malinsky-Buller, A., Porat, N., and Hovers, E. (2014). The stratigraphy and paleogeography of the Middle Paleolithic open-air site of ‘Ein Qashish, Northern Israel. *Quaternary International* **331**, 203-215.

Guedes, C. C. F., Sawakuchi, A. O., Giannini, P. C. F., Dewitt, R., and Aguiar, V. A. P. (2013). Luminescence characteristics of quartz from Brazilian sediments and constraints for OSL dating. *Anais Da Academia Brasileira De Ciencias* **85**, 1303-1316.

Guérin, G., and Lefèvre, J.-C. (2014). A low cost TL-OSL reader dedicated to high temperature studies. *Measurement* **49**, 26–33.

Guerreiro, R. L., Stevaux, J. C., Parolin, M., and Assine, M. L. (2013). Late Pleistocene and Holocene paleoenvironments in ponds and alluvial sediments of Upper Parana river, Brazil. *Revista Brasileira De Paleontologia* **16**, 39-46.

Gunderson, K. L., Pazzaglia, F. J., Picotti, V., Anastasio, D. A., Kodama, K. P., Rittenour, T., Frankel, K. F., Ponza, A., Berti, C., Negri, A., and Sabbatini, A. (2014). Unraveling tectonic and climatic controls on synorogenic growth strata (Northern Apennines, Italy). *Bulletin of the Geological Society of America* **126**, 532-552.

Gurrola, L. D., Keller, E. A., Chen, J. H., Owen, L. A., and Spencer, J. Q. (2014). Tectonic geomorphology of marine terraces: Santa Barbara fold belt, California. *Geological Society of America Bulletin* **126**, 219-233.

Han, W., Ma, Z., Lai, Z., Appel, E., Fang, X., and Yu, L. (2014). Wind erosion on the north-eastern Tibetan Plateau: constraints from OSL and U-Th dating of playa salt crust in the Qaidam Basin. *Earth Surface Processes and Landforms* **39**, 779-789.

Henshilwood, C. S., van Niekerk, K. L., Wurz, S., Delagnes, A., Armitage, S. J., Rifkin, R. F., Douze, K., Keene, P., Haaland, M. M., Reynard, J., Discamps, E., and Mienies, S. S. (2014). Klipdrift Shelter, southern Cape, South Africa: preliminary report on the Howiesons Poort layers. *Journal of Archaeological Science* **45**, 284-303.

Hoffecker, J. F., Holliday, V. T., Stepanchuk, V. N., Brugère, A., Forman, S. L., Goldberg, P., Tubolzev, O., and Pisarev, I. (2014). Geoarchaeological and Bioarchaeological Studies at Mira, an Early Upper Paleolithic Site in the Lower Dnepr Valley, Ukraine. *Geoarchaeology* **29**, 61-77.

Housley, R. A., MacLeod, A., Armitage, S. J., Kabaciński, J., and Gamble, C. S. (2014). The potential of cryptotephra and OSL dating for refining the chronology of open-air archaeological windblown sand sites: A case study from Mirkowice 33, northwest Poland. *Quaternary Geochronology* **20**, 99-108.

Hu, G., Yi, C.-L., Zhang, J.-F., Liu, J.-H., Jiang, T., and Qin, X. (2014). Optically stimulated luminescence dating of a moraine and a terrace in Laohugou valley, western Qilian Shan, northeastern Tibet. *Quaternary International* **321**, 37-49.

Huckleberry, G., and Rittenour, T. (2014). Combining radiocarbon and single-grain optically stimulated luminescence methods to accurately date pre-ceramic irrigation canals, Tucson, Arizona. *Journal of Archaeological Science* **41**, 156-170.

Jamšek Rupnik, P., Benedetti, L., Preusser, F., Bavec, M., and Vrabec, M. (2014). Geomorphic evidence of recent activity along the Vodice thrust fault in the Ljubljana Basin (Slovenia) – a preliminary study. *Annals of Geophysics* **56**, 10.4401/ag-6252. .

Junjie, R., Xiwei, X., Yeats, R. S., and Shimin, Z. (2013). Latest Quaternary paleoseismology and slip rates of the Longriba fault zone, eastern Tibet: Implications for fault behavior and strain partitioning. *Tectonics* **32**, 216-38.

Kaiser, K., Küster, M., Fülling, A., Theuerkauf, M., Dietze, E., Graventein, H., Koch, P. J., Bens, O., and Brauer, A. (2014). Littoral landforms and pedosedimentary sequences indicating late Holocene lake-level changes in northern central Europe — A case study from northeastern Germany. *Geomorphology* **216**, 58-78.

Kalbe, J., Sharon, G., Porat, N., Zhang, C., and Mischke, S. (2014). Geological setting and age of the Middle Paleolithic site of Nahal Mahanayeem Outlet (Upper Jordan Valley, Israel). *Quaternary International* **331**, 139-148.

Kalita, J. M., and Wary, G. (2014). Thermoluminescence study of X-ray and UV irradiated natural calcite and analysis of its trap and recombination level. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* **125**, 99-103.

Kars, R. H., Reimann, T., and Wallinga, J. (2014). Are feldspar SAR protocols appropriate for post-IR IRSL dating? *Quaternary Geochronology* **22**, 126-136.

Kaur, N., Singh, M., Singh, L., and Lochab, S. P. (2013). Investigation of thermoluminescence characteristics of gamma irradiated phlogopite mica. *Radiation Physics and Chemistry* **87**, 26-30.

Kehl, M., Burow, C., Cantalejo, P., Durán, J. J., Henselowsky, F., Klasen, N., Medianero, F. J., Ramos, J. J., Reicherter, K., Schmidt, C., and Weniger, G.-C. (2013). The Palaeolithic site Sima de Las Palomas de Teba, Southerrn Spain – Site formation processes and chronostratigraphy. In "Proc. of the VIII Reunión de Cuaternario Ibérico." pp. 136-140, La Rinconada, Sevilla.

Kijek, N., and Chruścińska, A. (2014). Estimation of OSL trap parameters by optical "cleaning" — a critical study. *Geochronometria* **41**, 160-167.

Kim, K.-B., and Hong, D.-G. (2014). Kinetic parameters, bleaching and radiation response of thermoluminescence glow peaks separated by deconvolution on Korean calcite. *Radiation Physics and Chemistry* **103**, 16-21.

King, G. E., Robinson, R. A. J., and Finch, A. A. (2014). Towards successful OSL sampling strategies in glacial environments: deciphering the influence of depositional processes on bleaching of modern glacial sediments from Jostedalen, Southern Norway. *Quaternary Science Reviews* **89**, 94-107.

Kortov, V. S., Zvonarev, S. V., Pustovarov, V. A., and Slesarev, A. I. (2014). Features of thermoluminescence in anion-defective alumina single crystals after highdose irradiation. *Radiation Measurements* **61**, 74-77.

Koul, D. K., Patil, P. G., Oniya, E. O., and Polymeris, G. S. (2014). Investigating the thermally transferred optically stimulated luminescence source trap in fired geological quartz. *Radiation Measurements* **62**, 60-70.

Kreutzer, S., Lauer, T., Meszner, S., Krbetschek, M., Faust, D., and Fuchs, M. (2014). Chronology of the Quaternary profile Zeuchfeld in Saxony-Anhalt/Germany - a preliminary luminescence dating study. *Zeitschrift für Geomorphologie* **58**, 5-26.

Kunz, A., Pflanz, D., Weniger, T., Urban, B., Krüger, F., and Chen, Y.-G. (2014). Optically stimulated luminescence dating of young fluvial deposits of the Middle Elbe River Flood Plains using different age models. *Geochronometria* **41**, 36-56.

Küster, M., Fülling, A., Kaiser, K., and Ulrich, J. (2014). Aeolian sands and buried soils in the Mecklenburg Lake District, NE Germany: Holocene land-use history and pedo-geomorphic response. *Geomorphology* **211**, 64-76.

Lai, Z., and Fan, A. (2014). Examining quartz OSL age underestimation for loess samples from Luochuan in the Chinese Loess Plateau. *Geochronometria* **41**, 57-64.

Lai, Z., Mischke, S., and Madsen, D. (2014). Paleoenvironmental implications of new OSL dates on the formation of the “Shell Bar” in the Qaidam Basin, northeastern Qinghai-Tibetan Plateau. *Journal of Paleolimnology* **51**, 197-210.

Larsen, N. K., Funder, S., Kjær, K. H., Kjeldsen, K. K., Knudsen, M. F., and Linge, H. (2014). Rapid early Holocene ice retreat in West Greenland. *Quaternary Science Reviews* **92**, 310-323.

Lauer, T., von Suchodolete, H., Vollmann, H., Meszner, S., Frechen, M., Tinapp, C., Goldmann, L., Mueller, S., and Zielhofer, C. (2014). Landscape aridification in Central Germany during the late Weichselian Pleniglacial - results from the Zauschwitz loess site in western Saxony. *Zeitschrift für Geomorphologie* **58**, 27-50.

Lee, S. Y., Seong, Y. B., Owen, L. A., Murari, M. K., Lim, H. S., Yoon, H. I., and Yoo, K.-C. (2014). Late Quaternary glaciation in the Nun-Kun massif, northwestern India. *Boreas* **43**, 67-89.

Lehmkuhl, F., Schulte, P., Zhao, H., Hülle, D., Protze, J., and Stauch, G. (2014). Timing and spatial distribution of loess and loess-like sediments in the mountain areas of the northeastern Tibetan Plateau. *CATENA* **117**, 23-33.

Leighton, C. L., Thomas, D. S. G., and Bailey, R. M. (2014). Reproducibility and utility of dune luminescence chronologies. *Earth-Science Reviews* **129**, 24-39.

Li, B., Roberts, R. G., Jacobs, Z., and Li, S.-H. (2014). A single-aliquot luminescence dating procedure for K-feldspar based on the dose-dependent MET-pIRIR signal sensitivity. *Quaternary Geochronology* **20**, 51-64.

Li, G., Jin, M., Wen, L., Zhao, H., Madsen, D., Liu, X., Wu, D., and Chen, F. (2014). Quartz and K-feldspar optical dating chronology of eolian sand and lacustrine sequence from the southern Ulan Buh Desert, NW China: Implications for reconstructing late Pleistocene environmental evolution. *Palaeogeography, Palaeoclimatology, Palaeoecology* **393**, 111-121.

Liu, D., Chen, G., Lai, Z., Wei, H., Zhou, G., and Peng, M. (2013). Late Glacial and Holocene vegetation and climate history of an alpine wetland on the Qinghai-Tibetan Plateau. *Geological Quarterly* **57**, 261-268.

Liu, H., Takagawa, T., and Sato, S. (2014). Sand Transport and Sedimentary Features Based on Feldspar Thermoluminescence: A Synthesis of the Tenryu–Enshunada Fluvial System, Japan. *Journal of Coastal Research* **30**, 120–129.

Long, H., Shen, J., Tsukamoto, S., Chen, J., Yang, L., and Frechen, M. (2014). Dry early Holocene revealed by sand dune accumulation chronology in Bayanbulak Basin (Xinjiang, NW China). *The Holocene* **24**, 614-626.

López-Recio, M., Silva, P. G., Tapias, F., Roquero, E., Baena, J., Carrancho, A., Arteaga, C., Morín, J., Rus, I., and Villalaín, J. J. (2014). Geochronology and geoarchaeology of Pleistocene fluvial deposits in the Prados-Guatén Depression (Madrid Basin, Central Spain). *Quaternary International* **328–329**, 120-135.

Lü, T., Sun, J., Li, S.-H., Gong, Z., and Xue, L. (2014). Vertical variations of luminescence sensitivity of quartz grains from loess/paleosol of Luochuan section in the central Chinese Loess Plateau since the last interglacial. *Quaternary Geochronology* **22**, 107-115.

Lubinski, P. M., Feathers, J., and Lillquist, K. (2014). Single-Grain Luminescence Dating of Sediment Surrounding a Possible Late Pleistocene Artifact from the Wenas Creek Mammoth Site, Pacific Northwest, USA. *Geoarchaeology* **29**, 16-32.

Madsen, D. B., Lai, Z., Sun, Y., Rhode, D., Liu, X., and Brantingham, P. J. (2014). Late Quaternary Qaidam lake histories and implications for an MIS 3 "Greatest Lakes" period in northwest China. *Journal of Paleolimnology* **51**, 161-177.

Marković, S. B., Timar-Gabor, A., Stevens, T., Hambach, U., Popov, D., Tomić, N., Obreht, I., Jovanović, M., Lehmkuhl, F., Kels, H., Marković, R., and Gavrilov, M. B. (2014). Environmental dynamics and luminescence chronology from the Orlovat loess–palaeosol sequence (Vojvodina, northern Serbia). *Journal of Quaternary Science* **29**, 189-199.

Marks, L., Gałązka, D., Krzymińska, J., Nita, M., Stachowicz-Rybka, R., Witkowski, A., Woronko, B., and Dobosz, S. (2014). Marine transgressions during Eemian in northern Poland: A high resolution record from the type section at Cierpięta. *Quaternary International* **328–329**, 45-59.

Martini, M., Fasoli, M., and Villa, I. (2014). Defect studies in quartz: Composite nature of the blue and UV emissions. *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* **327**, 15-21.

McDowell Peek, K., Mallinson, D. J., Culver, S. J., and Mahan, S. A. (2014). Holocene Geologic Development of the Cape Hatteras Region, Outer Banks, North Carolina, USA. *Journal of Coastal Research* **30**, 41–58.

Medialdea, A., Thomsen, K. J., Murray, A. S., and Benito, G. (2014). Reliability of equivalent-dose determination and age-models in the OSL dating of historical and modern palaeoflood sediments. *Quaternary Geochronology* **22**, 11-24.

Meier, H. A., Driese, S. G., Nordt, L. C., Forman, S. L., and Dworkin, S. I. (2014). Interpretation of Late Quaternary climate and landscape variability based upon buried soil macro- and micromorphology, geochemistry, and stable isotopes of soil organic matter, Owl Creek, central Texas, USA. *Catena* **114**, 157-168.

Moncel, M.-H., Despriee, J., Voinchet, P., Tissoux, H., Moreno, D., Bahain, J.-J., Courcimault, G., and Falgueres, C. (2013). Early Evidence of Acheulean Settlement in Northwestern Europe - La Noira Site, a 700 000 Year-Old Occupation in the Center of France. *Plos One* **8**.

Munyikwa, K., and Brown, S. (2014). Rapid equivalent dose estimation for eolian dune sands using a portable OSL reader and polymineralic standardised luminescence growth curves: Expedited sample screening for OSL dating. *Quaternary Geochronology* **22**, 116-125.

Murray, A. S., Schmidt, E. D., Stevens, T., Buylaert, J. P., Marković, S. B., Tsukamoto, S., and Frechen, M. (2014). Dating Middle Pleistocene loess from Stari Slankamen (Vojvodina, Serbia) — Limitations imposed by the saturation behaviour of an elevated temperature IRSL signal. *CATENA* **117**, 34-42.

Nagar, Y. C. G., Ashwagosha; Satyawali, Promod K.; Juyal, Navin. (2013). Preliminary optical chronology suggests significant advance in Nubra valley glaciers during the Last Glacial Maximum. *Current Science* **105**, 96-101.

Nazari, H., Ritz, J. F., Walker, R. T., Salamati, R., Rizza, M., Patnaik, R., Hollingsworth, J., Alimohammadian, H., Jalali, A., Firouz, A. K., and Shahidi, A. (2014). Palaeoseismic evidence for a medieval earthquake, and preliminary 0 Cross Mark estimate of late Pleistocene slip-rate, on the Firouzkuh strike-slip fault in the Central Alborz region of Iran. *Journal of Asian Earth Sciences* **82**, 124-135.

Neudorf, C. M., Roberts, R. G., and Jacobs, Z. (2014). Assessing the time of final deposition of Youngest Toba Tuff deposits in the Middle Son Valley, northern India. *Palaeogeography, Palaeoclimatology, Palaeoecology* **399**, 127-139.

Neudorf, C. M., Roberts, R. G., and Jacobs, Z. (2014). Testing a model of alluvial deposition in the Middle Son Valley, Madhya Pradesh, India — IRSL dating of terraced alluvial sediments and implications for archaeological surveys and palaeoclimatic reconstructions. *Quaternary Science Reviews* **89**, 56-69.

Nichol, J. E., and Nichol, D. W. (2013). Pleistocene loess in the humid subtropical forest zone of East Asia. *Geophysical Research Letters* **40**, 1978-1983.

Nunes, E. H. M., Lameiras, F. S., Houmard, M., and Vasconcelos, W. L. (2013). Spectroscopic study of natural quartz samples. *Radiation Physics and Chemistry* **90**, 79-86.

Pagonis, V., Morthekai, P., and Kitis, G. (2014). Kinetic analysis of thermoluminescence glow curves in feldspar: evidence for a continuous distribution of energies. *Geochronometria* **41**, 168-177.

Pan, M., Wu, Y., Zheng, Y., and Tan, L. (2014). Holocene aeolian activity in the Dinggye area (Southern Tibet, China). *Aeolian Research* **12**, 19-27.

Pascucci, V., Sechi, D., and Andreucci, S. (2014). Middle Pleistocene to Holocene coastal evolution of NW Sardinia (Mediterranean Sea, Italy). *Quaternary International* **328–329**, 3-20.

Pederson, J., Burnside, N., Shipton, Z., and Rittenour, T. (2013). Rapid river incision across an inactive fault-Implications for patterns of erosion and deformation in the central Colorado Plateau. *Lithosphere* **5**, 513-520.

Pitkäranta, R., Lunkka, J.-P., and Eskola, K. O. (2014). Lithostratigraphy and Optically Stimulated Luminescence age determinations of pre-Late Weichselian deposits in the Suupohja area, western Finland. *Boreas* **43**, 193-207.

Plotzki, A., May, J. H., Preusser, E., and Veit, H. (2013). Geomorphological and sedimentary evidence for late Pleistocene to Holocene hydrological change along the Rio Mamore, Bolivian Amazon. *Journal of South American Earth Sciences* **47**, 230-242.

Qiu, W.-L., Zhang, J.-F., Wang, X.-Y., Guo, Y.-J., Zhuang, M.-G., Fu, X., and Zhou, L.-P. (2014). The evolution of the Shiwanghe River valley in response to the Yellow River incision in the Hukou area, Shaanxi, China. *Geomorphology* **215**, 34-44.

Ren, J., Zhang, S., Meigs, A. J., Yeats, R. S., Ding, R., and Shen, X. (2014). Tectonic controls for transverse drainage and timing of the Xin-Ding paleolake breach in the upper reach of the Hutuo River, north China. *Geomorphology* **206**, 452-467.

Reynaud, J. F., Guibert, P., Bouvier, A., Lanos, P., and Dufresne, P. (2012). Saint-Irénée (Lyon): Une église funéraire des Ve-VIIe-Xe siècles. *Revue archéologique de l'Est* **61**, 223-258.

Richter, D., Angelucci, D. E., Dias, M. I., Prudêncio, M. I., Gouveia, M. A., Cardoso, G. J., Burbidge, C. I., and Zilhão, J. (2014). Heated flint TL-dating for Gruta da Oliveira (Portugal): dosimetric challenges and comparison of chronometric data. *Journal of Archaeological Science* **41**, 705-715.

Roberts, P., Delson, E., Miracle, P., Ditchfield, P., Roberts, R. G., Jacobs, Z., Blinkhorn, J., Ciochon, R. L., Fleagle, J. G., Frost, S. R., Gilbert, C. C., Gunnell, G. F., Harrison, T., Korisettar, R., and Petraglia, M. D. (2014). Continuity of mammalian fauna over the last 200,000 y in the Indian subcontinent. *Proceedings of the National Academy of Sciences* **111**, 5848-5853.

Rockwell, T. K., Ragona, D. E., Meigs, A. J., Owen, L. A., Costa, C. H., and Ahumada, E. A. (2014). Inferring a Thrust Related Earthquake History from Secondary Faulting: A Long Rupture Record of La Laja Fault, San Juan, Argentina. *Bulletin of the Seismological Society of America* **104**, 269-284.

Roman-Lopez, J., Correcher, V., Garcia-Guinea, J., Rivera, T., and Lozano, I. B. (2014). Thermal and electron stimulated luminescence of natural bones, commercial hydroxyapatite and collagen. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* **120**, 610-615.

Rosina, P., Voinchet, P., Bahain, J.-J., Cristovão, J., and Falguères, C. (2014). Dating the onset of Lower Tagus River terrace formation using electron spin resonance. *Journal of Quaternary Science* **29**, 153-162.

Sanjurjo-Sanchez, J., Alves, C., and Lobarinhas, D. (2013). Estimating the Age of Lime Mortars by Luminescence to Measure Pollution Rates. In "Advanced Materials Forum Vi, Pts 1 and 2." (A. M. P. Pinto, and A. S. Pouzada, Eds.), pp. 598-603. Materials Science Forum.

Sanjurjo-Sánchez, J., and Montero Fenollós, J.-L. (2014). A Late Bronze Age site and fluvial environmental context in the Middle Euphrates Valley (Northeast Syria). *The Holocene* **24**, 743-748.

Schaetzl, R. J., Forman, S. L., and Attig, J. W. (2014). Optical ages on loess derived from outwash surfaces constrain the advance of the Laurentide Ice Sheet out of the Lake Superior Basin, USA. *Quaternary Research* **81**, 318-329.

Shao, Q., Bahain, J.-J., Dolo, J.-M., and Falguères, C. (2014). Monte Carlo approach to calculate US-ESR age and age uncertainty for tooth enamel. *Quaternary Geochronology* **22**, 99-106.

Shitaoka, Y., Miyoshi, M., Yamamoto, J., Shibata, T., Nagatomo, T., and Takemura, K. (2014). Thermoluminescence age of quartz xenocrysts in basaltic lava from Oninomi monogenetic volcano, northern Kyushu, Japan. *Geochronometria* **41**, 30-35.

Sholom, S., and McKeever, S. W. S. (2014). Emergency OSL dosimetry with commonplace materials. *Radiation Measurements* **61**, 33-51.

Sim, A. K., Thomsen, K. J., Murray, A. S., Jacobsen, G., Drysdale, R., and Erskine, W. (2014). Dating recent floodplain sediments in the Hawkesbury-Nepean River system, eastern Australia using single-grain quartz OSL. *Boreas* **43**, 1-21.

Skinner, A. R., Blackwell, B. A. B., Kleindienst, M. R., Smith, J. R., Kieniewicz, J. M., Adelsberger, K. A., Churcher, C. S. R., Deely, A. E., Mashriqi, F., Spiller, K. V., Blickstein, J. I. B., Gong, J. J. J., and Long, R. A. (2013). Reconstructing Paleoenvironments in the Western Desert, Egypt: ESR Dating Freshwater Molluscs from Kharga Oasis. In "Archaeological Chemistry Viii." (R. A. Armitage, and J. H. Burton, Eds.), pp. 321-364. ACS Symposium Series.

Solongo, S., Richter, D., Begzjav, T., and Hublin, J.-J. (2014). OSL and TL characteristics of fine grain quartz from Mongolian prehistoric pottery used for dating. *Geochronometria* **41**, 15-23.

Sprafke, T., Thiel, C., and Terhorst, B. (2014). From micromorphology to palaeoenvironment: The MIS 10 to MIS 5 record in Paudorf (Lower Austria). *CATENA* **117**, 60-72.

Stauch, G., Pötsch, S., Zhao, H., and Lehmkuhl, F. (2014). Interaction of geomorphological processes on the north-eastern Tibetan Plateau during the Holocene, an example from a sub-catchment of Lake Donggi Cona. *Geomorphology* **210**, 23-35.

Sun, Y., Qiang, X., Liu, Q., Bloemendal, J., and Wang, X. (2013). Timing and lock-in effect of the Laschamp geomagnetic excursion in Chinese Loess. *Geochemistry Geophysics Geosystems* **14**, 4952-4961.

Svendsen, J. I., Krüger, L. C., Mangerud, J., Astakhov, V. I., Paus, A., Nazarov, D., and Murray, A. (2014). Glacial and vegetation history of the Polar Ural Mountains in northern Russia during the Last Ice Age, Marine Isotope Stages 5–2. *Quaternary Science Reviews* **92**, 409-428.

Teixeira, M. I., and Caldas, L. V. E. (2014). OSL technique for studies of jasper samples. *Radiation Physics and Chemistry* **95**, 148-150.

Thiel, C., Horváth, E., and Frechen, M. (2014). Revisiting the loess/palaeosol sequence in Paks, Hungary: A post-IR IRSL based chronology for the 'Young Loess Series'. *Quaternary International* **319**, 88-98.

Topaksu, M., Dogan, T., Yüksel, M., Kurt, K., Topak, Y., and Yegingil, Z. (2014). Comparative study of the thermoluminescence properties of natural metamorphic quartz belonging to Turkey and Spain. *Radiation Physics and Chemistry* **96**, 223-228.

Trauerstein, M., Lowick, S. E., Preusser, F., and Schlunegger, F. (2014). Small aliquot and single grain IRSL and post-IR IRSL dating of fluvial and alluvial sediments from the Pativilca valley, Peru. *Quaternary Geochronology* **22**, 163-174.

Tsukamoto, S., Kataoka, K., Oguchi, T., Murray, A. S., and Komatsu, G. (2014). Luminescence dating of scoria fall and lahar deposits from Somma–Vesuvius, Italy. *Quaternary Geochronology* **20**, 39-50.

Vandenberghe, D. A. G., Flas, D., De Dapper, M., Van Nieuland, J., Kolobova, K., Pavlenok, K., Islamov, U., De Pelsmaeker, E., Debeer, A. E., and Buylaert, J. P. (2014). Revisiting the Palaeolithic site of Kulbulak (Uzbekistan): First results from luminescence dating. *Quaternary International* **324**, 180-189.

Visocekas, R., Barthou, C., and Blanc, P. (2014). Thermal quenching of far-red Fe3+ thermoluminescence of volcanic K-feldspars. *Radiation Measurements* **61**, 52-73.

Wacha, L., Galovic, L., Koloszar, L., Magyari, A., Chikan, G., and Marsi, I. (2013). The chronology of the Sarengrad II loess-palaeosol section (Eastern Croatia). *Geologia Croatica* **66**, 191-203.

Wang, P., Chen, J., Dai, F., Long, W., Xu, C., Sun, J., and Cui, Z. (2014). Chronology of relict lake deposits around the Suwalong paleolandslide in the upper Jinsha River, SE Tibetan Plateau: Implications to Holocene tectonic perturbations. *Geomorphology* **217**, 193-203.

Wang, S., Lu, H., Zhang, H., Sun, X., Yi, S., Chen, Y., Zhang, G., Xing, L., and Sun, W. (2014). Newly discovered Palaeolithic artefacts from loess deposits and their ages in Lantian, central China. *Chinese Science Bulletin* **59**, 651-661.

Wang, X., van Balen, R., Yi, S., Vandenberghe, J., and Lu, H. (2014). Differential tectonic movements in the confluence area of the Huang Shui and Huang He rivers (Yellow River), NE Tibetan Plateau, as inferred from fluvial terrace positions. *Boreas* **43**, 469-484.

Wang, X. L., Wintle, A. G., and Adamiec, G. (2014). Post-IR IRSL production in perthitic feldspar. *Radiation Measurements* **64**, 1-8.

Yang, S., Forman, S. L., Song, Y., Pierson, J., Mazzocco, J., Li, X., Shi, Z., and Fang, X. (2014). Evaluating OSL-SAR protocols for dating quartz grains from the loess in Ili Basin, Central Asia. *Quaternary Geochronology* **20**, 78-88.

Youn, J. H., Seong, Y. B., Choi, J. H., Abdrakhmatov, K., and Ormukov, C. (2014). Loess deposits in the northern Kyrgyz Tien Shan: Implications for the paleoclimate reconstruction during the Late Quaternary. *CATENA* **117**, 81–93.

Zaidner, Y., Frumkin, A., Porat, N., Tsatskin, A., Yeshurun, R., and Weissbrod, L. (2014). A series of Mousterian occupations in a new type of site: The Nesher Ramla karst depression, Israel. *Journal of Human Evolution* **66**, 1-17.

Zhang, Y., Huang, C. C., Pang, J., Zhou, Y., Zha, X., Wang, L., Zhou, L., Guo, Y., and Wang, L. (2014). A luminescence dating study of the sediment stratigraphy of the Lajia Ruins in the upper Yellow River valley, China. *Journal of Asian Earth Sciences* **87**, 157-164.

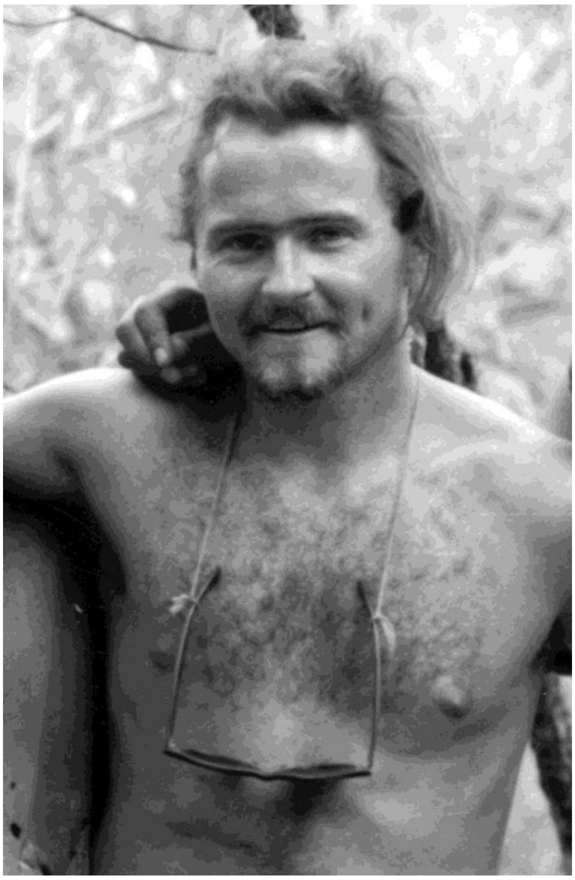
Zheng, W.-J., Zhang, H.-P., Zhang, P.-Z., Molnar, P., Liu, X.-W., and Yuan, D.-Y. (2013). Late Quaternary slip rates of the thrust faults in western Hexi Corridor (Northern Qilian Shan, China) and their implications for northeastward growth of the Tibetan Plateau. *Geosphere* **9**, 342-354.

Zheng, W.-J., Zhang, P.-Z., Ge, W.-P., Molnar, P., Zhang, H.-P., Yuan, D.-Y., and Liu, J.-H. (2013). Late Quaternary slip rate of the South Heli Shan Fault (northern Hexi Corridor, NW China) and its implications for northeastward growth of the Tibetan Plateau. *Tectonics* **32**, 271-293.

Zöller, L., Richter, D., Masuth, S., Wunner, L., Fischer, M., and Antl-Weiser, W. (2013). Luminescence chronology of the Grub-Kranawetberg site, Austria. *Eiszeitalter & Gegenwart / Quaternary Science Journal* **62**, 127–135.

Obituary

Stephen Stokes
(1964-2014)



Stephen Stokes, luminescence chronologist and Quaternary scientist, passed away on Monday 24 March 2014 after a long illness at the age of 50: Stephen had been diagnosed with amyotrophic lateral sclerosis, also known as motor neurone disease.

Stephen was born in Liverpool, England, on March 17th 1964. When he was 6, his family moved to New Zealand where he surfed through school and college, undertaking his BSc and Masters under the guidance of Professor David Lowe at Waikato. His first paper, Stokes and Lowe 'Discriminant function analysis of late Quaternary tephras from five volcanoes in New Zealand using glass shard major element chemistry' was published in *Quaternary Research* in 1988. Stephen returned to his birth land on securing a scholarship to study at Oxford where, under the tutelage of Martin Aitken, luminescence dating pioneer, and Andrew Goudie, desert geomorphologist, he gained his D.Phil. in 1994, having worked on the application of OSL to secure new chronologies of aeolian sedimentation in the southwest USA. Crucially, he showed the evolution of US sand seas to be more complex, and spread over more accumulation phases, than had previously been widely acknowledged. His thesis also pioneered technical advances in optical dating. His love of travel, fieldwork and technical challenges meant that he often got drawn into other projects while a doctoral student. This, and his wit, is captured in his thesis acknowledgement:

"Mandela is free, Nixon is dead, Thatcher is out of office, the Soviet Union has split, England are not in the World Cup, all my friends are marrying, Cliff Richard has (finally) stopped making records, and I have two grey hairs- it must be time to finish up!"

With his abundant talent and supreme ability to inspire students, it was no surprise that he continued in the School of Geography at Oxford, first as a Departmental Demonstrator then as a University Lecturer and Fellow of St Catherine's College. He was a true scholar and academician, equally at home with the most inexperienced undergraduates and senior academics alike, never afraid to challenge established theory and the establishment, to explore ideas, and to constantly push boundaries, especially in terms of the application of luminescence dating. Stephen was the first to apply OSL to marine sediments, and the first to take its application into various desert realms, including parts of the Sahara and Sahel, Kalahari, and Arabia. He loved to talk science- his doctoral viva was over six hours long, not because there was a problem, but because he wanted to talk. He had extremely fruitful working relationships with established academics including Gary Haynes, Ashok Singhvi and Warren Wood, but most notably with students. His outstanding lectures inspired undergraduates such as Simon Armitage, Sallie Burrough, Sarah Feakins and Abi Stone, who went on to doctorates with other supervisors and then to their own academic careers. He directly or jointly supervised the doctorates of several now-established academics, such as Morteza Fattahi, Lee Arnold, Zhongping Lai, Julie Rich and Tom Stevens, while taking on others such as Richard Bailey and Chantal Tribolo in postdoctoral positions. All owe something, and often a lot, to the catalyst that was Stephen Stokes.

In the midst of his career, Stephen Stokes envisioned a somewhat different perspective in what could be his contribution to society. He was awarded an MBA in his mid-forties and joined the private sector. He brought a refreshing new angle to the issues of environmental assessment in a world shifting from dire exploitation to sustainable development. In 2007, he joined AMR Research (Gartner) in Boston as a business analyst. As an Oxford academic and down-to-earth thinker, he helped redefine sustainability in the whole supply chain.

Stephen authored almost 80 papers in his short academic career. Many are landmark papers in luminescence dating and its application to dune and lake sediments, to major archaeological questions, and even to dating fault movements. His last paper (to date), Singhvi, Stokes et al. ‘Changes in natural OSL sensitivity during single aliquot regeneration procedure and their implications for equivalent dose determination’, was published in *Geochronometria* in 2011.

In 2003, Stephen’s life changed irreversibly when a woman from Montreal happened to visit Oxford. Stephen and Marie-Josée Duquette embarked on an always-surprising adventure together that included the birth of a daughter, Laurence, now 9 years old. This small family brought Stephen immeasurable joy. He is also survived by family in New Zealand and London. Stephen’s life was lived to the full, it burned bright and short, and his death leaves a gap that it will not be possible to fill.

David Thomas, University of Oxford
Michel Lamothe, Université du Québec à Montréal

(The text of this obituary was originally published in *Quaternary Geochronology* and is reprinted here with kind permission of the editors of that journal and Elsevier)

Submission of articles to Ancient TL

Reviewing System

In order to ensure acceptable standards and minimize delay in publication, a modification of the conventional refereeing system has been devised for Ancient TL:

Articles can be sent directly by authors to a member of the Reviewers Panel chosen on the basis of the subject matter, but who is not in any of the authors' laboratories. **At the discretion of the Editor**, reviewers who are not listed in the Panel may be used.

The reviewing system aims to encourage direct dialogue between author and reviewer. The Editor should be kept advised of the progress of articles under review by sending him copies of all correspondence. He is available for advice where reviewing difficulties have arisen. Authors whose mother tongue is not English are required to have their manuscript revised for English *before* submitting it.

We ask reviewers to specify (where required) the minimum of revision that is consistent with achieving a clear explanation of the subject of the paper, the emphasis being on *rapid* publication; reviewers are encouraged to make a brief written comment for publication at the end of the paper. Where a contribution is judged not to meet an adequate standard without substantial modification, the author will be advised that the contribution is not suitable for publication. Articles that are not considered to be of sufficient interest may also be rejected.

Procedures

1. Articles should be submitted to an appropriate member of the Reviewing Panel or Editorial Board, chosen on the basis of the subject matter, but who is not in any of the authors' laboratories.
2. Articles should not normally exceed the equivalent of 5000 words inclusive of diagrams, tables and references. Greater space will be appropriate for certain topics; for these the Editor should first be consulted.
   Short notes and letters are also invited. These should not exceed two printed pages in Ancient TL, including diagrams, tables and references (equivalent to ~1400 words of text).
3. Diagrams and labels should be ready for direct reproduction and not normally exceed 12 cm wide by 10 cm high. Where possible, high quality electronic versions of figures should be submitted. Separate figure captions should be supplied. Inappropriately scaled drawings and labels will be returned for alteration.
4. Authors are asked to submit the paper, including diagrams, to the Reviewer and a duplicate copy to the Editor.
   The final version of the text must be submitted to the Editor electronically using a standard format (Microsoft Word for PC is currently used for producing Ancient TL). Electronic copies of Diagrams and Tables should also be submitted.
5. Upon receipt of an article, the Editor will send an acknowledgement to the author. If the Reviewer is unable to deal with the contribution within **4 weeks** he/she will inform the author and advise the Editor.

Requirements under various situations

When agreement concerning an article has been reached:
The Editor should receive a copy of the final version of the paper, both as hard copy and electronically. The Reviewer should send their final decision, including comments for publication if any, to the Editor.

If the article has not been rejected, but agreement on its final form cannot be reached or where there are protracted delays in the reviewing process:
The Editor may request an assessment from the Reviewer and responsibility passes to the Editor.

If the article is rejected:
The Editor and author receive notification from the Reviewer, with an indication of the reason for rejection.

Thesis abstracts are to be sent to the Editor and in principle do not need reviewing. However, authors are requested to make sure that the English is correct before submission. Thesis abstracts should not exceed 750 words, and figures and tables are not accepted.

Advertising. Formal information on equipment can be published in Ancient TL. It should not exceed one printed page. Current charges are displayed on the website (http://www.aber.ac.uk/ancient-tl)

Subscriptions to Ancient TL

Ancient TL is published 2 times a year and is sent Airmail to subscribers outside the United Kingdom. While every attempt will be made to keep to publication schedule, the Editorial Board may need to alter the number and frequency of issues, depending on the number of available articles which have been accepted by reviewers.

The subscription rate for 2014 is £15 for individual subscribers and £25 for Institutional subscription, plus any taxes where required. Payment must be in pounds sterling. Enquiries and orders must be sent to the Editor. Payment may be by cheques, made payable to 'Aberystwyth University', by credit/debit cards or by bank transfers. Further information on subscriptions is available on the Ancient TL web site (http://www.aber.ac.uk/ancient-tl)