



ENGLISH HERITAGE

EH Research Department Reports Series

Since January 2006, technical reports commissioned by the English Heritage Scientific Dating Service have been issued in the Research Department Reports Series (*EH Res Dep Rep Ser*), which replaces the former Ancient Monuments Laboratory (AML) and Centre for Archaeology (*CfA*) Reports Series. These are usually interim reports, making available the results of specialist investigations in advance of full publication, and their conclusions may have to be modified in the light of information not available at the time of the investigation. The list below details reports on luminescence dating issued in 2005–07.

Summaries of all the reports are available through the EH Research Department Reports Database, accessible online at:

<http://test.english-heritage.org.uk/researchreports/>

Hard copies of full reports can be obtained by e-mailing: res.reports@english-heritage.org.uk
or by telephone: +44 (0)23 9285 6700
or by writing to: English Heritage, Fort Cumberland, Eastney, Portsmouth PO4 9LD

A small charge is made for copying (4p per page) and there is a minimum charge of £1.50. Outside the EU postage costs an extra £2.50.

J-L Schwenninger, Optically stimulated luminescence (OSL) dating of coversand deposits from Flixborough, Lincolnshire. *CfA Rep* **8/2005**. 22pp.

A series of samples was collected from two trenches near Flixborough in Lincolnshire for OSL. The dates were obtained from sand-sized quartz grains and palaeodose determinations were made using an SAR protocol. The environmental dose rate for each sample was calculated using the results obtained by neutron activation analysis (NAA) and *in situ* gamma-ray spectroscopy measurements. The concentrations of radioactive elements were above detection limits and the samples and their luminescence characteristics were generally found to be close to optimal for obtaining reliable luminescence age estimates.

P S Toms, Luminescence dating for the Bletchingley excavations, Surrey. *CfA Rep* **9/2005**. 24pp.

Three sediment samples and six burnt flints obtained from section A11 of the Bletchingley excavations were submitted for OSL and TL dating, respectively, by English Heritage. An attempt to quantify the accuracy of all luminescence age estimates was made using signal analysis methods to detect partial resetting of datable signals prior to sample interment,

and through consideration of the influence of varying moisture content and cosmic dose rate over the burial period. Optical dating evolved a chronology of sedimentation, not necessarily continuous, from *c.* 32 ka (30,000 BC) through to *c.* 2.8 ka (800 BC). Three flints were excluded from the study owing to evidence of insufficient heating prior to burial. The remaining flints, located in close proximity to each optical dating sample, generated age estimates of *c.* 7 to 12 ka (5000 to 10,000 BC) consistent with age expectations premised upon microliths recovered from equivalent levels across the site. However, a significant inversion in age between the lowermost optical dating sample and underlying flint sample was recorded. After considering the accuracy of *De* and dose rate estimates for both sample types, this anomaly was attributed to displacement of the flint sample from its primary context by anthropogenic activity or gravitational effects coupled with low adhesion afforded by the sand matrix within which all the flint samples were located. Similar displacement for all the flint samples that have yielded age estimates in this study cannot be dismissed. The juxtaposition of Mesolithic burnt flints and Iron Age sediments and charcoal in the uppermost dated unit evidences a period of land surface stability and repeated human occupation.

J-L Schwenninger and E J Rhodes, Optically stimulated luminescence (OSL) dating of fluvial sediments from a Middle Palaeolithic site at Lynford Quarry, Norfolk. *CfA Rep* **25/2005**. 25pp.

This report presents details of the application of OSL dating to sediment samples collected during the excavation of a Middle Palaeolithic open-air site in Lynford Quarry near Mundford, Norfolk. The dates were obtained from sand-sized quartz grains and palaeodose determinations were made using a multi-grain SAR protocol. The environmental dose rate for each sample was calculated using the results obtained from instrumental neutron activation analysis (INAA) and *in situ* gamma-ray spectroscopy measurements.

H M Roberts and A J Plater, Optically stimulated luminescence (OSL) dating of sands underlying the gravel beach ridges of Dungeness and Camber, south-east England, U.K. *CfA Rep* **27/2005**. 84pp.

Holocene sands underlying the gravel beach ridges of Dungeness and Camber were dated using optically stimulated luminescence (OSL) applied to coarse (sand-sized) quartz grains. The 39 sand samples dated proved sufficiently sensitive and responsive to enable well-resolved dating using the SAR measurement protocol. The OSL chronology for the sub-gravel sands of the Dungeness foreland places the early formation of the underlying shoreface at about 5000 years ago in the region of Broomhill, with ages decreasing progressively eastwards to approximately 2000 years ago beneath Denge Marsh, and 1000–600 years ago under the present ness.

J-L Schwenninger, E J Rhodes, M R Bates, R M Briant, and F Wenban-Smith, Optically stimulated luminescence (OSL) dating of Quaternary deposits from the Sussex/Hampshire Coastal Corridor. *EH Res Dep Rep Ser* **20/2006**. 50pp.

A total of 43 samples were collected from different sites across the West Sussex coastal plain, the Western and Eastern Solent, the Test Valley, and the Isle of Wight for optically stimulated luminescence (OSL) dating. The dates were obtained from sand-sized quartz grains, and palaeodose determinations were made using a single aliquot regenerative-dose (SAR) protocol. The environmental dose rate for each sample was calculated using the results of neutron activation analysis (NAA) and *in situ* gamma-ray spectroscopy measurements. The concentrations of radioactive elements were nearly always above detection limits and the samples and their

luminescence characteristics were generally considered to be suited for OSL dating.

G A T Duller and H M Roberts, Swale/Ure Washlands: single-grain optically stimulated luminescence (OSL) measurements of fluvial and fluvioglacial sediments. *EH Res Dep Rep Ser* **31/2007**. 16pp.

Eight samples of fluvioglacial origin and one from a Holocene fluvial deposit were collected from the area around Ripon, with the aim of providing chronological constraints on the deglaciation of the area at the end of the Devensian. The depositional environments are such that there was a concern that not all the mineral grains in the sediment may have been exposed to daylight at deposition. Therefore, luminescence measurements were made on single sand-sized grains of quartz. The signals from these were generally very dim, with only very few grains (0.9%–2.2%) giving detectable optically stimulated luminescence (OSL). In spite of rigorous sample preparation to extract pure quartz, investigations demonstrated that many of these OSL signals originated from non-quartz minerals, probably feldspar inclusions. After rejecting grains with these signals, only 0.1–0.6% of grains remained for the eight fluvioglacial samples, and this was insufficient to allow an age to be determined. For the one fluvial sample a slightly higher proportion (1.0%) of grains was accepted. Statistical analysis was problematic because of the low recovery of suitable grains, but the results broadly agreed with independent age control.

E J Rhodes, Barford Road, St Neots, Cambridgeshire: Optically stimulated luminescence dating of single grains of quartz from sedimentary fills of two cursus monuments. *EH Res Dep Rep Ser* **32/2007**. 59pp.

Fifteen sediment samples forming two vertical sequences, one located in the fill of each of two cursus monuments at the site of Barford Road, St Neots, Cambridgeshire were dated using new luminescence methods based on the Optically Stimulated Luminescence (OSL) from single grains of quartz. From the main suite of results it is concluded that grains showing signs of incomplete zeroing are relatively rare, though more common in basal fill samples. Most samples have a significant grouping of single-grain ages which is likely to represent the depositional age of the sediment. Grains providing significantly younger apparent ages are present in many samples, especially closer to the surface, and probably represent the effects of post-depositional root activity or other bioturbation

processes. A novel approach based on the radiocarbon calibration programme OxCal was developed and applied to provide age estimates for the single grain measurements. The age estimates derived in this manner had relatively high uncertainties, but suggest that the lowermost fill of both cursus monuments began to be deposited in the early to mid 5th millennium BC, and the uppermost samples for both structures were laid down around the 3rd millennium BC.

J-L Schwenninger, J Williams, J Aram, J Hambly, and J Rackham, Welton-le-Wold, Lincolnshire: optically stimulated luminescence (OSL) dating of Pleistocene glacial tills and interglacial gravels. *EH Res Dep Rep Ser* **36/2007**. 26pp.

A series of ten samples were collected for optically stimulated luminescence (OSL) dating from exposed faces and boreholes at a disused quarry near the village of Welton-le-Wold in Lincolnshire. The reinstated former sand and gravel pit is a designated geological Site of Special Scientific Interest (SSSI) due to the presence of an extensive sequence of glacial tills overlying thick deposits of silts, sand, and gravel containing Palaeolithic artefacts and faunal remains. The site is recognized as being of national interest to our understanding of Middle/Lower Palaeolithic human occupation of the region and of critical importance for establishing the glacial history of Eastern England. Much controversy has surrounded the dating of this Pleistocene sequence, and the recent re-exposure of key quarry faces provided an opportunity to reassess the stratigraphic record and apply novel sampling methods and dating techniques.

J-L Schwenninger, M R Bates, R M Briant, and F Wenban-Smith, Further optically stimulated luminescence (OSL) dates of Quaternary deposits from the Sussex/Hampshire Coastal Corridor. *EH Res Dep Rep Ser* **55/2007**. 23pp.

A series of 14 samples were collected from different sites in the Sussex/Hampshire coastal corridor for optically stimulated luminescence (OSL) dating. The results complement a series of optical dates presented in a previous study funded by EH through the ALSF scheme in 2003. OSL age estimates were obtained from sand-sized quartz grains and palaeodose determinations were made using a single aliquot regenerative-dose (SAR) measurement protocol. The environmental dose rate for each sample was calculated using the results of elemental analysis by ICP-MS and occasionally by *in situ* gamma-ray

spectroscopy measurements. The concentrations of radioactive elements were well above detection limits and the samples and their luminescence characteristics were generally considered to be well suited for OSL dating.

J-L Schwenninger, D R Bridgland, A J Howard, and T White, Pleistocene sediments from the Trent Valley: optically stimulated luminescence (OSL) dating. *EH Res Dep Rep Ser* **57/2007**. 29pp.

A total of 33 samples were collected from 16 different sites within the Trent Valley for dating by optically stimulated luminescence (OSL). Luminescence age estimates were obtained from sand-sized quartz grains and palaeodose determinations were made using a single aliquot regenerative-dose (SAR) measurement protocol. The environmental dose rate for each sample was calculated using the results of elemental analysis by ICP-MS and *in situ* gamma-ray spectroscopy measurements. The concentrations of radioactive elements within the sediments were well above detection limits but the quartz used for dating was often characterized by low sensitivity to laboratory induced irradiation. This problem combined with the common occurrence of contaminant feldspar minerals provided challenging conditions for luminescence dating. Despite these limitations, meaningful age estimates could be obtained for the majority of samples and the results provide a much improved and robust chronological framework for terrace development and landscape evolution of the Middle and Lower Trent Valley.

J-L Schwenninger, F Wenban-Smith, M R Bates, and R M Briant, Fluvial sediments from the Medway Valley: optically stimulated luminescence (OSL) dating. *EH Res Dep Rep Ser* **96/2007**. 22pp.

A total of 27 samples collected from Pleistocene aggregate deposits in north Kent and southeast Essex were used for dating by optically stimulated luminescence (OSL). The samples originated from fluvial terrace deposits associated with the river Medway in the Medway Valley north of Maidstone, the Hoo peninsula, and the southeast quarter of Essex, up to Clacton-on-Sea. The OSL age estimates were obtained on sand-sized quartz grains and palaeodose determinations were made using a single-aliquot regenerative dose (SAR) measurement protocol. For each sample the environmental dose rate was calculated from the concentrations of radioactive elements derived by ICP-MS analysis using a fusion sample preparation method. The

concentrations of uranium, thorium, and potassium were well above detection limits and the samples and their luminescence characteristics were generally considered to be well suited for OSL dating.

R M Bailey, N P Branch, and J Stallard, North Park Farm Quarry, Bletchingley, Surrey: optically stimulated luminescence (OSL) dating of a Mesolithic archaeological site, Stage 1. *EH Res Dep Rep Ser* **98/2007**. 15pp.

Eight Optically Stimulated Luminescence (OSL) dates were obtained from the Mesolithic site at North Park Farm Quarry, Surrey, to provide a chronological framework for natural and cultural events. The OSL measurements indicate that redeposited Lower Greensand material accumulated prior to Mesolithic activity between c 764-500,000 years ago and around 24,000 years ago. This process continued during the period of human activity as shown by the results from below and above an in-situ Mesolithic hearth.

H M Roberts, Gwithian, Cornwall: optically stimulated luminescence dating of sands from a Bronze Age archaeological site. *EH Res Dep Rep Ser* **103/2007**. 16pp.

Two windblown sand units found at the Bronze Age site at Gwithian, near Hayle, West Cornwall, were dated using optically stimulated luminescence (OSL) applied to coarse (sand-sized) quartz grains. The quartz proved sufficiently sensitive to enable well-resolved dating using the Single Aliquot Regenerative dose (SAR) measurement protocol.

The OSL ages are indistinguishable within errors, showing that the two sand units were deposited in relatively rapid succession approximately 3500 years ago, with only a brief period of stabilisation due to cultivation in between. The OSL ages are in agreement with independent evidence from radiocarbon dating of intervening and overlying stratigraphic units.