Geophysical Research Abstracts,
Vol. 11, EGU2009-11529-2, 2009
EGU General Assembly 2009

Optically stimulated luminescence dating of storm surge sediments: a test case from the Netherlands

A. C. Cunningham (1), J. Wallinga (1), S. van Heteren (2), and M. A.J. Bakker (2)

(1) Netherlands Centre for Luminescence dating, Delft University of Technology, Delft, The Netherlands (a.c.cunningham@tudelft.nl), (2) Deltares, Utrecht, the Netherlands

The prediction of extreme storm surge levels is of paramount importance in low lying coastal regions, especially in regions where relative sea level is expected to rise. Sedimentary records of extreme storm surges have the potential to improve the accuracy of these predictions, since they provide evidence of surge heights which do not appear in the observational (tide-gauge) record. To this end, accurate dating of such deposits is vital, and this may also allow improved correlation of storminess with other climate variables.

We are testing the applicability of optically stimulated luminescence (OSL) dating to storm surge deposits, using an example from the Netherlands. The use of OSL dating for such deposits has the advantage that the material of interest, sand-sized grains of quartz, is usually abundant. Furthermore, the method can be used to date sediments over a large age range of ∼10 a to >100 ka. On the other hand, since the OSL signal is light-sensitive, dark or gloomy conditions during the storm surge may prevent the OSL signal from being fully reset at the time of deposition, and this can lead to an overestimate of the age.

Testing of this method has been carried out on a storm surge sediment from Heemskerk, the Netherlands, which initial measurements suggest was deposited in the late 18th century. The storm surge sediment can be found within coastal dune sand, and consists of convoluted sand and shells with occasional pieces of brick and coal. Individual storm-surge layers are 10-20 cm thick, but locally several layers are found superimposed. The layer undulates in height over a distance of several hundred metres with a maximum elevation of over 6 m above mean sea level. We will present the results of over 25 OSL dates from the site, which relate to samples taken from the storm surge layer itself, and also the surrounding dune sand. We will try to answer the following questions:

1. What does the OSL evidence from the site tell us about the age of the storm surge sediment, and how does this compare with the historical record?
2. Is it possible to obtain an OSL age directly from the (more challenging) storm surge layer itself, which is consistent with the bracketing OSL ages and independent evidence?