



Luminescence and Radiocarbon dating of roman time harbour sediments from Cologne - A comparison of different methods

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Optically stimulated luminescence (OSL) dating was applied to fluvial and colluvial deposits which were taken from a roman time harbour basin in Cologne.

Hence, independent age control was given by roman artefacts (coins, bricks) of known age and by three radiocarbon data.

For one sample (well sorted fluvial sand), a single aliquot regenerative (SAR) protocol was applied to coarse grain quartz. A large number of equivalent doses (80) were collected and after De-measurements, different statistical approaches were tested. The results show, that calculating the age by using the Mean or Median of all accepted De-values yields OSL ages of 3.5 ± 0.3 ka and 2.8 ± 0.3 ka, respectively, what would be significantly too old.

The application of the Leading Edge Method (Lepper & McKeever 2002), the statistical approach after Fuchs & Lang (2001) or the Minimum Age Method (MAM3) after Galbraith et al. (1999) yield OSL age estimates of 2.0 ± 0.1 ka, 2.1 ± 0.1 ka and 1.7 ± 0.6 ka, respectively. Those ages fit very well to the ^{14}C -ages and are in better agreement with the known archaeological background.

For the colluvial sample, the quartz OSL signal was effected by feldspar impurities. For this sample, different methodological approaches were tested to see which one has the best potential to minimize the feldspar contribution. Therefore the post-IR blue stimulated quartz luminescence was recorded. The quartz signal was measured using continuous wave (CW) and pulsed OSL (POSL). For the CW measurements, it was tested if a prior IR-bleach @ 50°C or @ 225°C has better potential for minimizing the feldspar signal.

In this case, an IR-bleach @ 225°C (Buylaert et al. in press) was the most effective way to obtain a higher purity of the quartz OSL signal.

Buylaert, J.P., Murray, A.S., Thomsen, K.J., Jain, M.: The effect of preheating on the IRSL signal from feldspar. In press. – Radiat. Meas., special issue, LED08.

Fuchs, M. & Lang, A. (2001): OSL dating of coarse-grain fluvial quartz using single-aliquot protocols on sediments from NE Peloponnese, Greece. – Quaternary Science Reviews, 20: 783-787.

Galbraith, R. F., Roberts, R. G., Laslett, G. M., Yoshida, H. & Olley, J. M. (1999): Optical dating of single and multiple grains of quartz from Jinmium Rock Shelter, northern Australia: Part 1, experimental design and statistical models. - Archaeometry, 41: 339-364.

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