
Archaeomagnetic Dating Applied to Colluvial Sediments

Schnepp Elisabeth*¹, Eileen Eckmeier², Christian Rolf³, and Renate Gerlach⁴

¹MU Leoben – Lehrstuhl für Geophysik Paläomagnetiklabor Gams Gams 45 A-8130 Frohnleiten, Autriche

²RWTH Aachen – RWTH Aachen - Geographisches Institut Templergraben 55 D - 52056 Aachen, Allemagne

³LIAG Hannover – Leibniz-Institut für Angewandte Geophysik (LIAG) Sektion S5, Dienstbereich Grubenhagen OT Rotenkirchen, Fredelsloher Straße 3 37574 Einbeck, Allemagne

⁴LVR Amt für Bodendenkmalpflege im Rheinland – Endenicher Straße 133 53115 Bonn, Allemagne

Résumé

The colluvial sediments west of Cologne provide a major geoarchaeological archive of the past 7000 years. Here the impact of men on sedimentation processes, geomorphology and landscape evolution can be studied. Archaeological finds or features have been preserved in many colluvial layers, which help to construct a rough relative sedimentary chronology because few natural science dating methods are suitable.

Our study tests the applicability of archaeomagnetic dating to such colluvial sediments. Three vertical sections were sampled at the open lignite pit Inden (Germany) for their paleomagnetic signal, and also for sedimentological investigations and optically stimulated luminescence (OSL) dating. They comprise an archaeological site and two depressions filled with colluvium. Profile WW1 is the intersection of two superimposed Iron Age trenches. Profile WW2 sampled a succession of colluvial layers. No archaeological material was present, but sedimentology identified at least four layers of re-deposited soil dating between Iron Age and High Medieval period by comparison with other colluvial sediments of the region. OSL dating provided a Medieval and two Late Bronze Age ages. Profile W134 comprises three colluvial layers deposited at a former bank of river Rur. According to Roman finds, they were formed during or after this period.

Paleomagnetic investigations confirm stable magnetizations for most samples. Profiles WW1 and W134 provide archaeomagnetic mean-directions which allow for dating. The trenches were filled shortly after their construction in agreement with archaeology. The archaeomagnetic dating provides two possible ages: the Roman and High Medieval periods. A further discrimination is not possible because the archaeomagnetic secular variation curve shows similar directions in these periods. Nevertheless both ages are compatible with the presence of Roman finds which provide a maximum age. Archaeomagnetic directions of profile WW2 are very scattered because this section was disturbed by many fissures in the sediments. Here dating is difficult, but magnetic susceptibility allows for distinction of the colluvial layers in agreement with the sedimentological results.

In conclusion paleomagnetic investigations together with sedimentology and OSL-dating are able to characterize the age of colluvial sediment layers when the sediments were quickly deposited without disturbances.

*Intervenant