Geoarchaeological studies of man-environment-interaction at Glauberg, Wetterau, Germany.

Annette Kadereit[1] Ulrich Dehner[2], Leif Hansen[3], Christopher Pare[3] & Günther A. Wagner[1]

[1] Forschungsstelle Archäometrie der Heidelberger Akademie der Wissenschaften am Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, D-69117 Heidelberg
[2] Fachbereich Geowissenschaften, Geographisches Institut, Johannes Gutenberg - Universität Mainz, D-55099 Mainz
[3] Institut für Vor- und Frühgeschichte, Johannes Gutenberg - Universität Mainz, Schillerstr. 11 Schönborner Hof - Südflügel, D-55116 Mainz

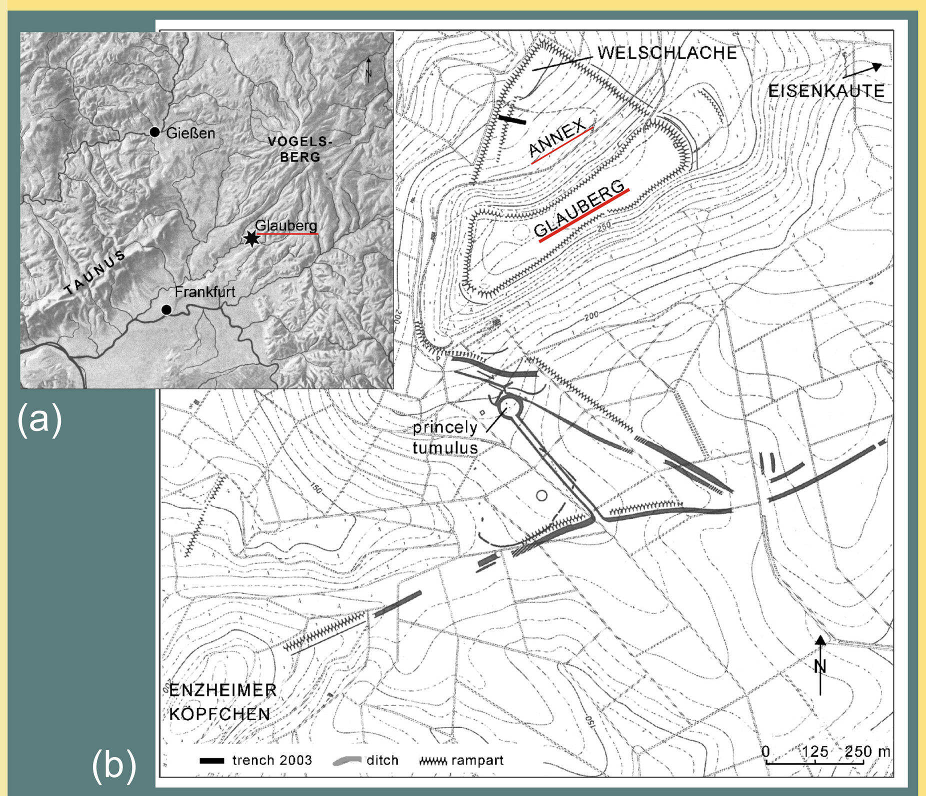

Fig. 1: The Glauberg hillfort with the annex on the northern slope of the Glauberg. The 'princely' tumulus south of the Glauberg is associated with a complex system of ramparts and ditches. Most of the earthworks have been levelled, and have been detected by magnetometer prospection.

Introduction

The Glauberg in Hesse, Germany, is a basaltic foothill of the Tertiary Vogelsberg volcano rising 150 m above the fertile Wetterau basin (**fig. 1a**). In this unique topographic position an impressive Iron Age hillfort is located on top of the plateau (**fig. 1b**). The discovery of extremely richly furnished „princely graves" (**fig. 2**) directly to the south of the Glauberg suggests that during the late Hallstatt and early La Tène periods (600 - 250 BC) the Glauberg was the centre of an Iron Age 'princely' dynasty. In order to understand the 'Early processes of centralisation and urbanisation.' and 'The origin and development of early Celtic 'princely seats' and their territories' research has been taken up at the Glauberg together with other important central European Iron Age sites (e.g. Heuneburg, Ipf, Hohenasperg, Mont Lassois) within a priority research programme (SPP 1171) of the German Science Foundation (DFG.). At Glauberg, geoarchaeological studies have been taken up to gain a precise knowledge of the settlement history against the background of landscape development and use. The present study analyses the annex, a complex enclosure of ramparts and ditches on the northern Glauberg slope (**fig. 1**).

Fig. 2: View from the North over the tumulus above the princely graves and the surrounding landscape.

Fieldwork and methods

In 2003 an archaeological trench was excavated through the rampart-ditch system of the annex enclosure (**fig. 1b + 3**). Soil horizons were classified according to the German Soil Survey description (AG Boden 1994). Soil analyses include the determination of pH-value by the CaCl2 method, grain-size distribution by sieving and sedimentation after Köhn, CaCO3 after Scheibler and total organic carbon by loss-on-ignition. A chronometry was established using 14C-dating of organic components and optical stimulated luminescence (OSL) dating of the mineral grains. We used the single aliquot regeneration (SAR) protocol (Wintle & Murray 2000) adopted for infrared-stimulated (IRSL) fine-grains (Kadereit 2002). It may be applied with varying stimulation/read-out times, which allows closer investigation and detection of insufficient bleaching (**fig. 3**). This variant of the SAR-protocol seems to improve the analyses of fine-grained colluvial sediments which have been reworked only over short transport distances and maximum ages may be more closely narrowd down. Such analytical improvements are of special interest for geoarchaeological investigations, when relatively young Holocene sediment samples may correspond to a variety of cultural periods in question. IRSL-measurements were carried out on a TL/OSL-reader DA12 equipped with an internal 90Sr/90Y-source for -irradiation (~2 Gy/min), a ring of TEMT484-diodes for IR-stimulation (880 80 nm, ~40mW/cm² at sample position) and a photomultiplier EMI9235Q for OSL-signal detection. Cutheat and preheat were for 120 s @ 220 °C, detection of the blue feldspar signal (~ 410 nm) occured through a set of Schott glass filters (BG39, BG3, GG400, BG3, 3 mm each). For a-value determination external 241-Am sources (~4.2 Gy/min) were used..

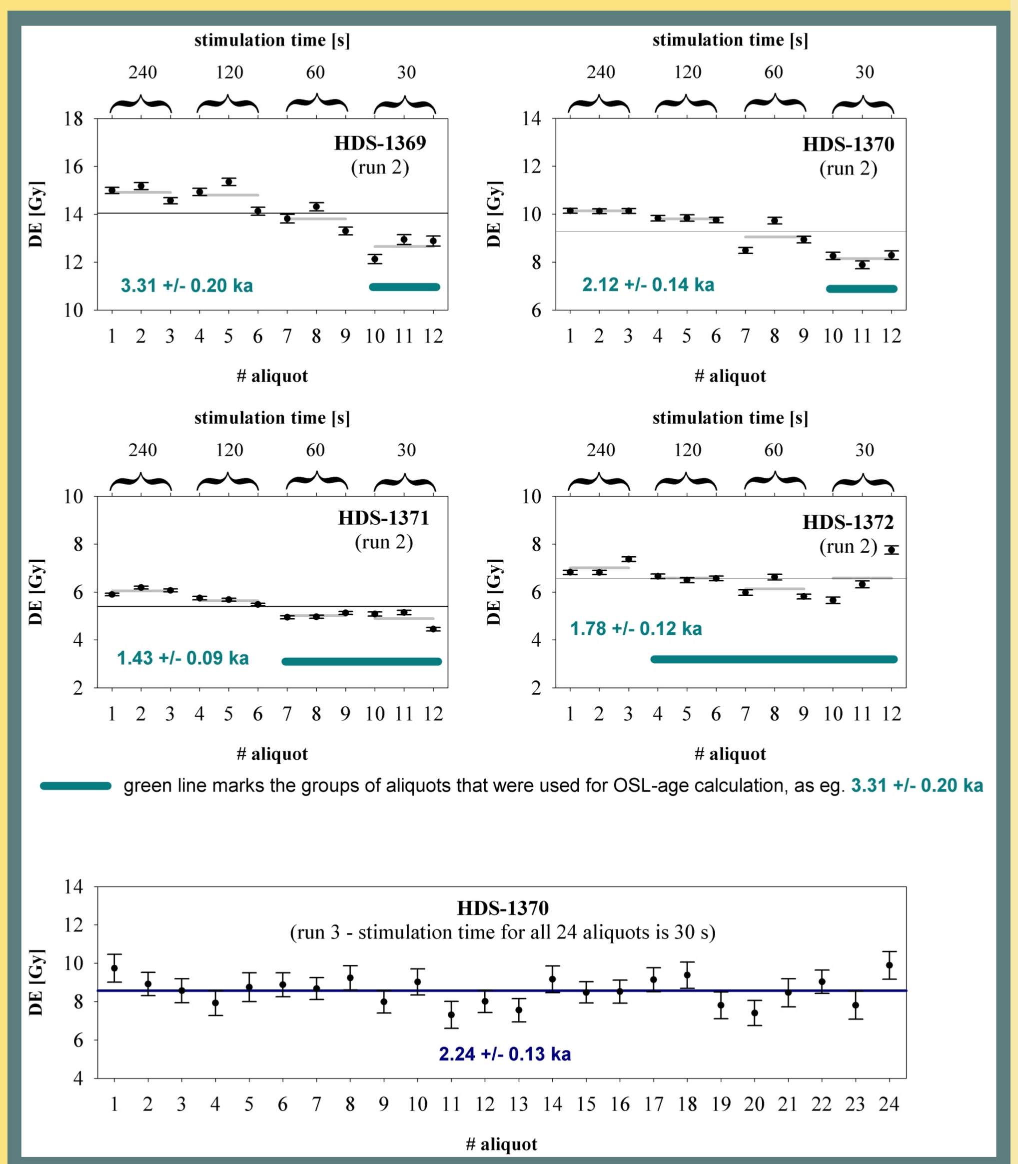

Fig. 3: IRSL-dating based on the SAR protocol with varying stimulation/readout times declining from 240 s (longest interval) to 30 s (shortest interval). For each interval 3 aliquots were used. Partial bleaching is indicated by failed plateau tests. The true age is best narrowed, if the age is calculated from the groups of aliquots giving the lowest palaeodoses or equivalent doses (DE), respectively. To improve the precision for sample HDS-1370 an extra measurement with 24 aliquots at 30 s readout time was carried out.

Results

In 2003 archaeological excavations in front of the inner annex rampart uncovered a ditch measuring ca. 11 m in width and about 2.0 m deep (**fig. 5**). With its gradually sloping inner side and steep outer side, it had an unfamiliar shape. The ditch fill appears to have been washed in from the rampart slope by processes of soil erosion. The existence of the ditch so close (8.6 m) to the outer rampart is surprising, and the relationship between the two rampart-ditch structures must be clarified by future excavations. The stratigraphy of the rampart and ditch is illustrated in **figs. 4 + 5**.

Soil mapping and laboratory analyses of soils and sediments show that the settlemt was founded on a strongly gleyic ground. The dense structure of the periglacial slope deposits and the formation of a clay-enriched parabraunerde subsoil (Bt) made the annex a stagnic environment, prone to water-logging. This would have aided the collection of water in the basin of the 'Welschlache', a former pond in the norther corner of the annex enclosure.

Beneath the ring wall two colluvial sediments had been deposited on top of an eroded stagnic luvisol. Both the colluvia and the underlying soil relict are free of calcium carbonates and exhibit pH-values between 5 and 6.5. Grain size analyses reveal a silt maximum (silty clay to clayey silt). Similar results were found for the ditch filling between the inner and outer rampart, which is composed of water-bleached colluvisols. Sediment analyses also revealed that the darker and lighter diagonal bands of the rampart body derived from the underlying Bt-Bht periglacial clayey subsoil (III Bv, darker bands of yellow-brown silty clay) and the colluvium layers (II M, lighter bands of grey-brown clayey silt).

The formation of colluvium points to soil erosion due to human impact by forest clearance. Prior to the rampart construction colluial sedimentation seems to have occurred in two phases: The earlier phase of erosion dates at the earliest to the time of the Tumulus culture or the earlier Urnfield culture (~ 1200 BC) and at the latest to the Hallstatt/Early La Tène period (after 750 BC) (HDS-1369), and the upper one apparently corresponds to the time of the rampart construction, presumably in the La Tène period (450-120 BC) (HDS-1370, KIA26672). Both periods of activity were seemingly interrupted by a phase of geomorphological stability. This was concluded from traces of former roots only found in the lower colluvium, which point to an intermittent period of plant covering. Apparently, colluviation continued during the La Tène period after the erection of the earthwork, as indicated by colluvial deposits behind the inner rampart (KIA26674). The upper part of the ditch in front of the rampart had not been filled by colluvium until the Middle Ages (KIA26673).

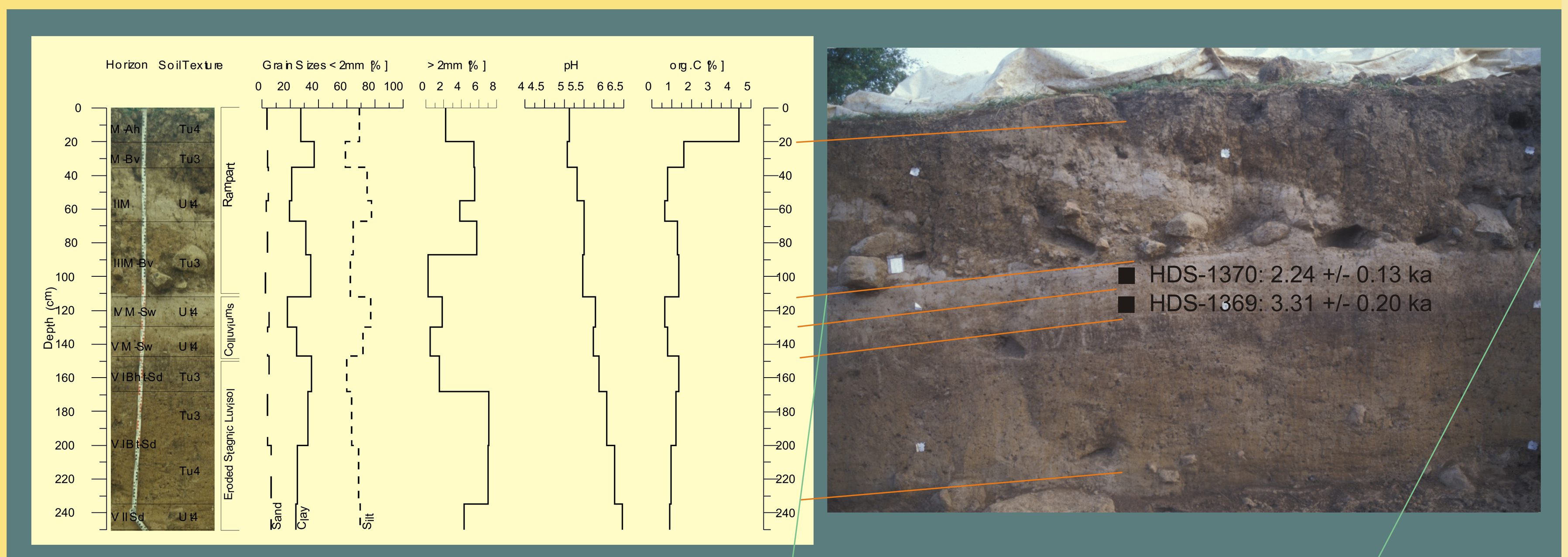

Fig. 4: Sediment analyses from a profile beneath the inner rampart of the annex.

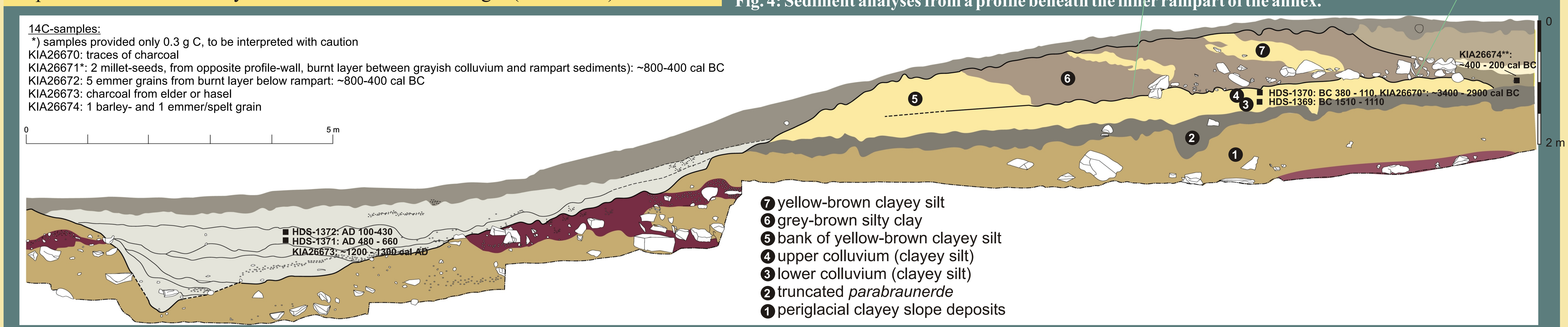

Fig. 5: Schematic profile through the inner rampart of the annex (right) and the protective ditch (left).

email-adresses:

Annette Kadereit: a.kadereit@mpi-hd.mpg.de
Ulrich Dehner: u.dehner@geo.uni-mainz.de
Leif Hansen: lhansen@uni-mainz.de
Christopher Pare: pare@uni-mainz.de
Günther A. Wagner: g.wagner@mpi-hd.mpg.de

Funding from DFG is gratefully acknowledged.