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GEOPHYSICAL PROSPECTION OF ROMAN VILLAE RUSTICAE IN THE BAVARIAN PART OF NORICUM

L. Kühne, R. Linck, J.W.E. Fassbinder

ABSTRACT

Roman *villae rusticae* in the Bavarian part of Noricum have their own tradition of architecture and house types, which show more influence from Rome than any other north-western Province. However, the present state of archaeological research made it difficult to get a coherent view of the whole countryside. Compared to other landscapes, this area is rarely used for agriculture and hence very restricted for aerial archaeology. The analysis of Airborne Laser Scanning data, combined with detailed but large-scale geophysical prospection, was applied to discover and trace new sites and enhance the archaeological knowledge in this field of archaeological research.

1. INTRODUCTION

The kingdom Noricum was in close economic and cultural contact with the Roman Empire long before it became a Roman Province. This seems to be the reason why the Roman *villae rusticae* in this area have their own tradition of architecture, showing strong Roman influences.

The precise localization of earlier excavations is sometimes a challenge for recent research. Therefore, the analysis, procession and interpretation of aerial photographs and airborne laser scanning (ALS), or LIDAR, can help. In some cases, both methods result in an increase of information, but the possibilities remain limited in this region. In comparison with other regions of Bavarian, soils in ancient Noricum are not very fertile, and the land is mainly used for stock farming. The application of aerial archaeology is hence limited. Several case studies show that large-scale magnetometer prospection and ALS makes it possible to discover and map new sites and enhance the archaeological knowledge in this field of archaeological research.

The aim of the project is to document a larger number of *villae rusticae* as comprehensively as possible. Therefore, archaeological records were examined, and places selected where excavations already took place, or where a high number of surface findings provide detailed information about the site and where a comprehensive geophysical prospection is possible. Along with these archaeological records and finds, the project sets out to show how the countryside of the Bavarian part of Noricum fits into the rest of the North-West Noricum and what the conditions were for the development of agrarian provincial architecture. These seem to be different from the rest of the North-Western Provinces.

At the current state of research, 51 Roman *villae rusticae* are known in the Bavarian part of Noricum (Figure 1). Twenty-two are fully accessible, twelve are partly overbuilt, nine totally covered and eight are located in forests. Thus, half of the sites are accessible for geophysical prospection. During the last 25 years, eight sites have already been prospected by geophysical methods through the Bavarian State Department for Monuments and Sites, and eight were prospected in 2012 for this project.

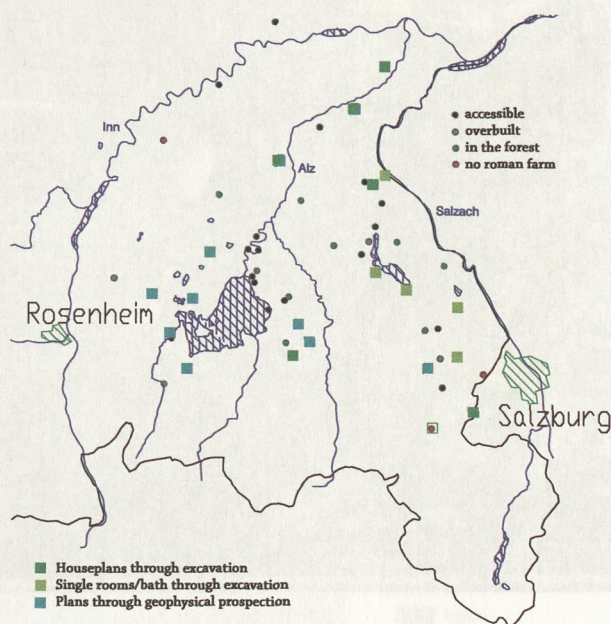


Figure 1: Map of villae rusticae in the Bavarian part of the Roman province Noricum.

2. RESULTS

2.1. Bad Endorf

One case study from the 2012 season is Bad Endorf (Lkr. Rosenheim), which is located west of the Chiemsee. In 1899, an excavation of a mural structure was made, which was recorded in a description note and an imprecise drawing of the location. From these, it was possible to narrow the area down to two large grass fields in the village of Bad Endorf. In these areas, large scale magnetometer measurements were undertaken (Figure 2). The results allowed us to locate the Roman villa rustica. However, the clear layout of the foundations was covered by the high magnetic anomalies of fireplaces and hypocausts.

Resistivity and radar prospecting were used to get more detailed information about the stone structures. The GPR depth slices (Figure 3) show the remains of the Roman *villa rustica* between 0.35 and 1.3 m depth. The huge areas of high reflection amplitude in 40 – 60 cm under the surface are due to accumulated water at the archaeological features, caused by precipitation in the weeks before the survey. Nevertheless, four buildings can be identified.

The first one depicts the smaller main building and is situated in the middle of the survey grid. In the southwest it has two corner risalits which are linked with a porticus. In the northeast of the building an annex can be detected. Several rooms, including the annex hall and the two risalits, have preserved floors at

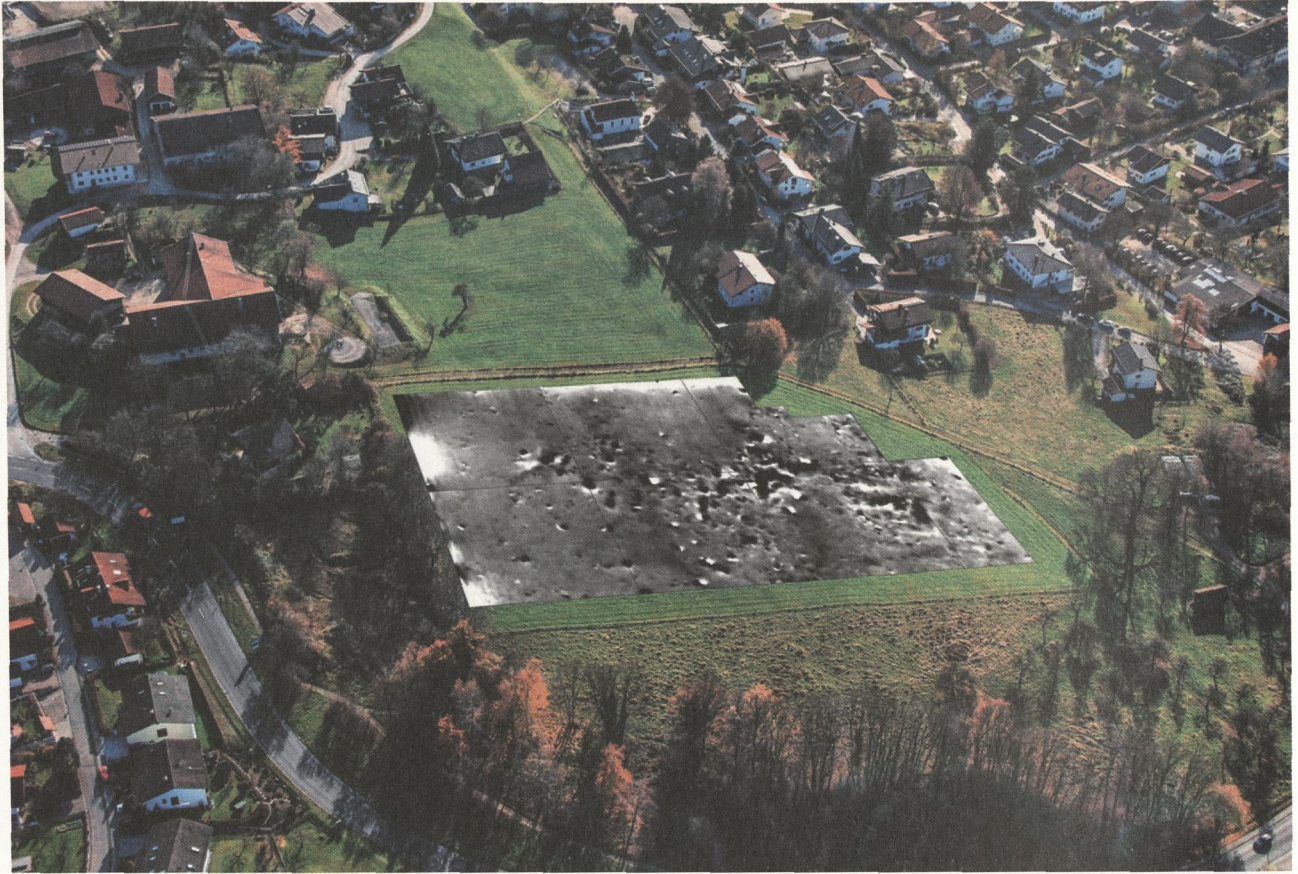


Figure 2: Bad Endorf. Magnetogram, Caesium-Magnetometer Smartmag SM4G- Special, Duo-Sensor-Configuration, Sensitivity $\pm 10\text{pT}$, Dynamics $\pm 10\text{nT}$, $0.5 \times 0.25\text{ m}$ sample spacing, interpolated to $0.25 \times 0.25\text{ m}$, 40-m-grid. Overlay with aerial photograph (Photo: K. Leidorf, Nr. L 8138/102-1 Image 5D249991).

60 – 100 cm depth, and in the case of the hall, several pillars of the hypocaust system can be identified. In the interior there is a small court surrounded by small rooms. Hence, this part could be interpreted as a residential area and the hall with floor heating was used for representative purposes. East of this building, a linear anomaly can perhaps be identified as a part of the water supply system. The enclosed area in the west of the smaller main building could probably have been a courtyard whose southern end is formed by a building of unknown function. In the interior of the court, there are lower reflection amplitudes in the radar-gram supporting this interpretation.

The second and larger main building is situated west of this court. As in the previous example, the interior layout with small rooms can be distinguished clearly. Again, several remains of the ancient paved floors were identified as high reflective regions. The western completion of the building is formed by two parallel walls that simply end. Perhaps the missing parts of the foundations have been completely destroyed over the centuries.

Southeast of the small main building is a nearly quadratric stone-outbuilding with two annexes in the north and the south. The northern annex is rectangular too, and has hypocaust pillars, whereas the southern one is semicircular. A subdivision of the interior of the house is not possible because there are no inner walls visible.

The whole complex differs from the well-known types of villae rusticae in the other Northwest-Provinces, but there

are very similar examples to this type in the Austrian part of Noricum. Like in Glas (Traxler and Kastler, 2010) we have two main houses and they seem to be connected through a courtyard. It is supposed that one of the main buildings was for the farm owners and so was part of the *pars urbana*, the living area. The other one belonged to the *pars rustica* and was owned by the administrator of the *villa rustica* (Kastler, 2010). In Erlstätt, 25 km away from Bad Endorf on the East side of the Chiemsee, there is another example with two main buildings.

2.2. Erlstätt

In the 19th century, several parts of a Roman *villa rustica* were discovered on a hill near Erlstätt (Lkr. Traunstein). In some case, seven mosaics and hypocaust systems have been uncovered. In 1980, the bigger main building showed up as a snow mark in an aerial photo because of its debris walls, which are also identifiable in a LIDAR image.

Buildings 1 and 3 were surveyed in 1997 by resistivity prospecting. The results show evidence of the internal walls of the big main building as well as the detailed layout of a nearby side building (Fassbinder and Pietsch, 2000; Pietsch, 2007). To survey the area at a larger scale, we performed magnetometer and radar prospecting in 2009 (Figure 4) (Linck and Deller, 2010).

Several interpretation problems from the first resistivity measurement were solved through the application of additional

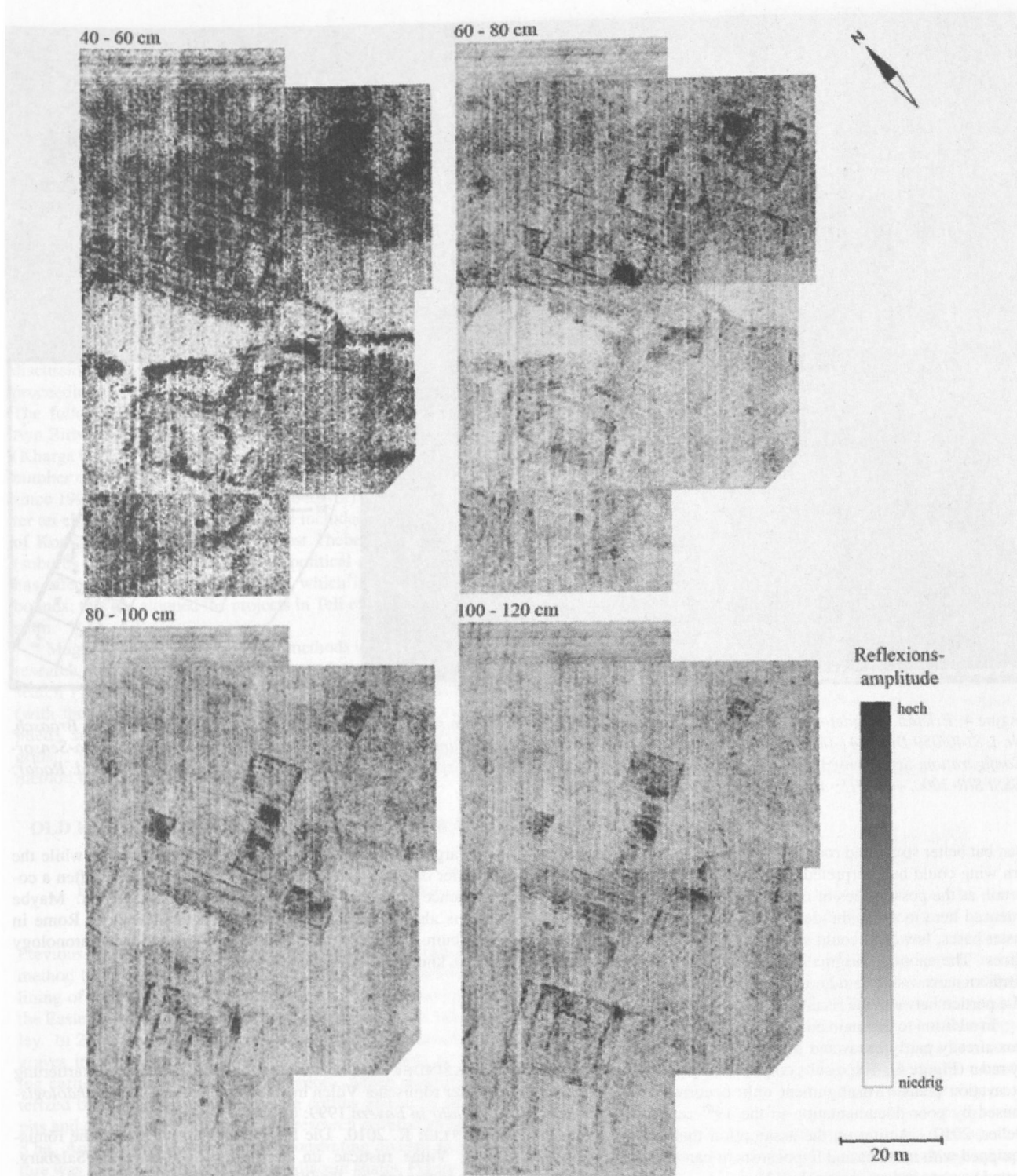


Figure 3: Bad Endorf. Radargram, GSSI SIR-3000, 400 MHz-antenna, sample interval 2×25 cm, array of depth slices of the area. Size of the grid: 68×108 m.

methods. Because the radar depth slices provide a 3D image of the buried structures, it became apparent that the remains of the large main building are covered with a thick layer of debris, which obscured the resistivity prospection quite heavily. Hence,

the toppled outer walls were interpreted as another wall, and an exterior corridor was created which had never existed. This could be corrected and clarified by the radargrams, and the new interpretation thus shows a much narrower floor plan with a sim-

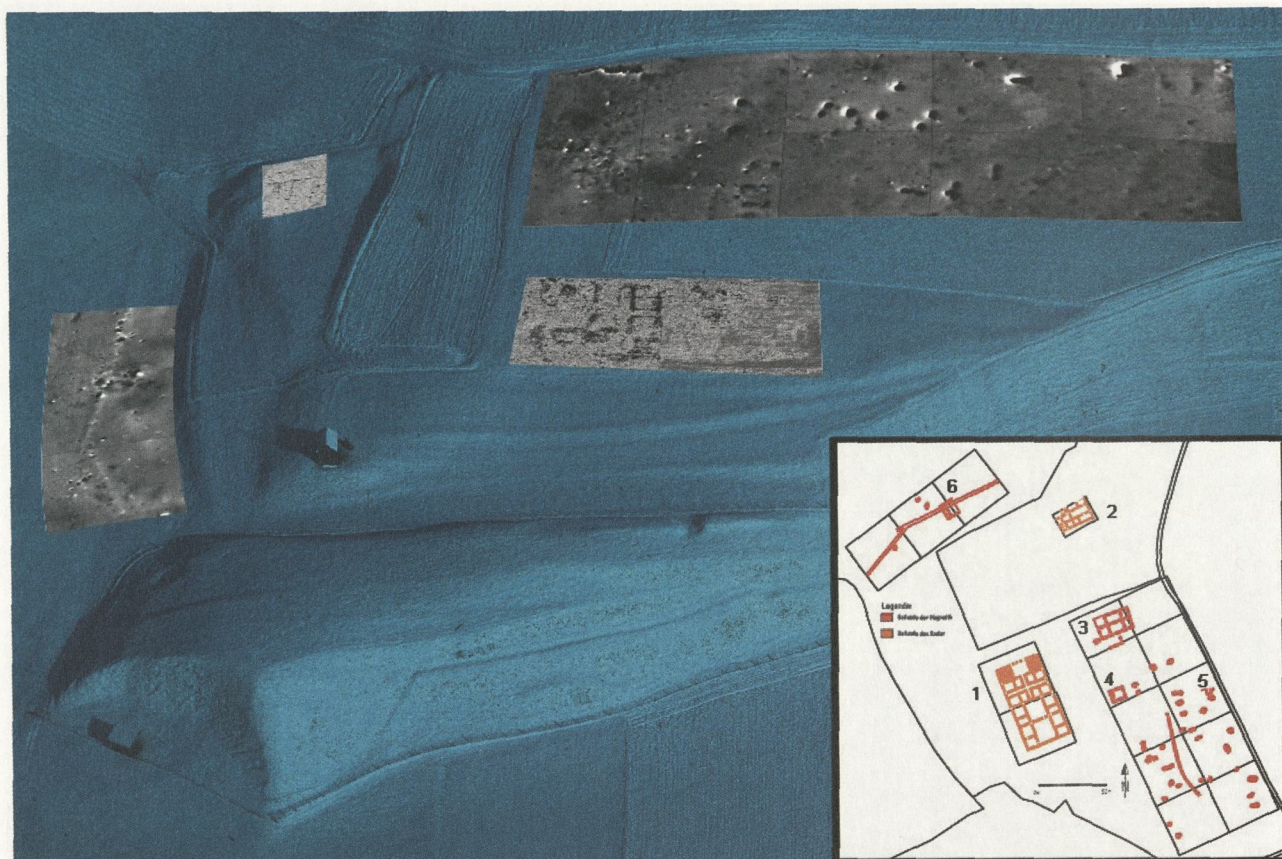


Figure 4: Erlstätt. Magnetometer- and radar prospection of the Roman villa rustica, overlay with the aerial photo (Photo: O. Braasch, Nr. L 8140/059 Dia 5741-09) and the interpretation. Magnetometer: Caesium- Magnetometer Smartmag SM4G- Special, Duo-Sensor-Configuration, Sensitivity $\pm 10\text{pT}$, Dynamics $\pm 10\text{nT}$, $0.5 \times 0.25\text{ m}$ sample spacing, interpolated to $0.25 \times 0.25\text{ m}$, 40-m-grid. Radar: GSSI SIR-3000, 400 MHz-antenna, sample interval $2 \times 25\text{ cm}$.

ilar, but better structured room division. Furthermore, the southern wing could be interpreted archaeologically in much greater detail, as the possibilities of the resistivity prospection were influenced here most by the debris. The detected column or pilaster bases, however, could not be identified in the GPR depth slices. The anomaly originally interpreted as a staircase at the northern narrow side could now be identified as toppled columns of a portico between the risalits.

In addition to the main building 1, another building 2, which was already partly excavated in the 19th century, was surveyed by radar (Figure 4). The results correlate very well with the 1890 excavation plans. Misalignment only occurred in some parts, caused by poor documentation in the 19th century (Linck and Deller, 2010). Acting on the assumption that the rooms were equipped with mosaics and hypocausts, it can be certainly interpreted as a second residential building.

3. CONCLUSION

The analytical interpretation of our geophysical data, together with the archaeological records, reveals an architectural structure that is different from the homogeneous villa-types in Rhaetia. It indicates a differentiated arrangement, and the layout of rooms and houses relating much more to each other. In addition, the complexes with two main buildings seem to be typical for North-Western Noricum. They can be arranged differently, but

the larger building always seems to be more oblong, while the smaller one mostly is quadratic. Therefore, there is often a co-existence of house types in one villa rustica complex. Maybe this is also a result of the much earlier influence of Rome in Noricum. This, however, has yet to be proved by a chronology of the known villae rusticae in Noricum.

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