The Rich and the Hard-Working: Roman Villae Near Lake Attersee, Austria

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Highlights:

- *Large-area high-resolution magnetic and GPR surveys of whole Roman villa sites in Noricum, where no such settlements have been excavated in total so far.*
- *Using image fusion to combine magnetometry and GPR data from low contrast soils to optimise data quality.*

Keywords: magnetics, GPR, low contrast soils, Roman villa, image fusion.

As part of a general interest in Roman rural settlements in north-western Noricum (Kastler *et al*., 2017), Roman villae have been in the centre of the archaeological attention (Traxler 2004). This part of Noricum stands out due to the large number of known Roman villae, single farms comprising an enclosed farmyard with several living and farm buildings without strict axial references to the layout of the enclosure. The farmed areas, like fields, meadows and forests, are situated outside of the enclosed farm.

The heritage society Attergau and the state museum of Upper Austria initiated a geophysical prospection project aiming at the survey of one known respectively two newfound but uncharted Roman villae in the area near lake Attersee, some five to ten kilometres apart from each other. Different use of the villae had become apparent: whereas the previously unexplored settlements of Königswiesen and Walchen have been used as villae rusticae, large farms that produced agricultural goods for the urban areas and the military, the long known villa of Weyregg has been the luxurious estate of a wealthy and high-ranking Roman magistrate.

As no villa rustica has been excavated in its entirety in the whole of the Roman province of Noricum, geophysical surveys are the key to a better understanding of such settlements in that area. The usual approach to an extensive geophysical survey of such villae is to first use magnetometry to cover the whole of the supposed settlement area and then to survey the actual buildings with GPR, which is more time consuming and expensive. All three sites have been surveyed using motorized multisensor magnetometer (eight Förster fluxgate sensors) and multichannel GPR systems (Sensors & Software SPIDAR with six 500 MHz antenna pairs) with 25 cm line spacing each.

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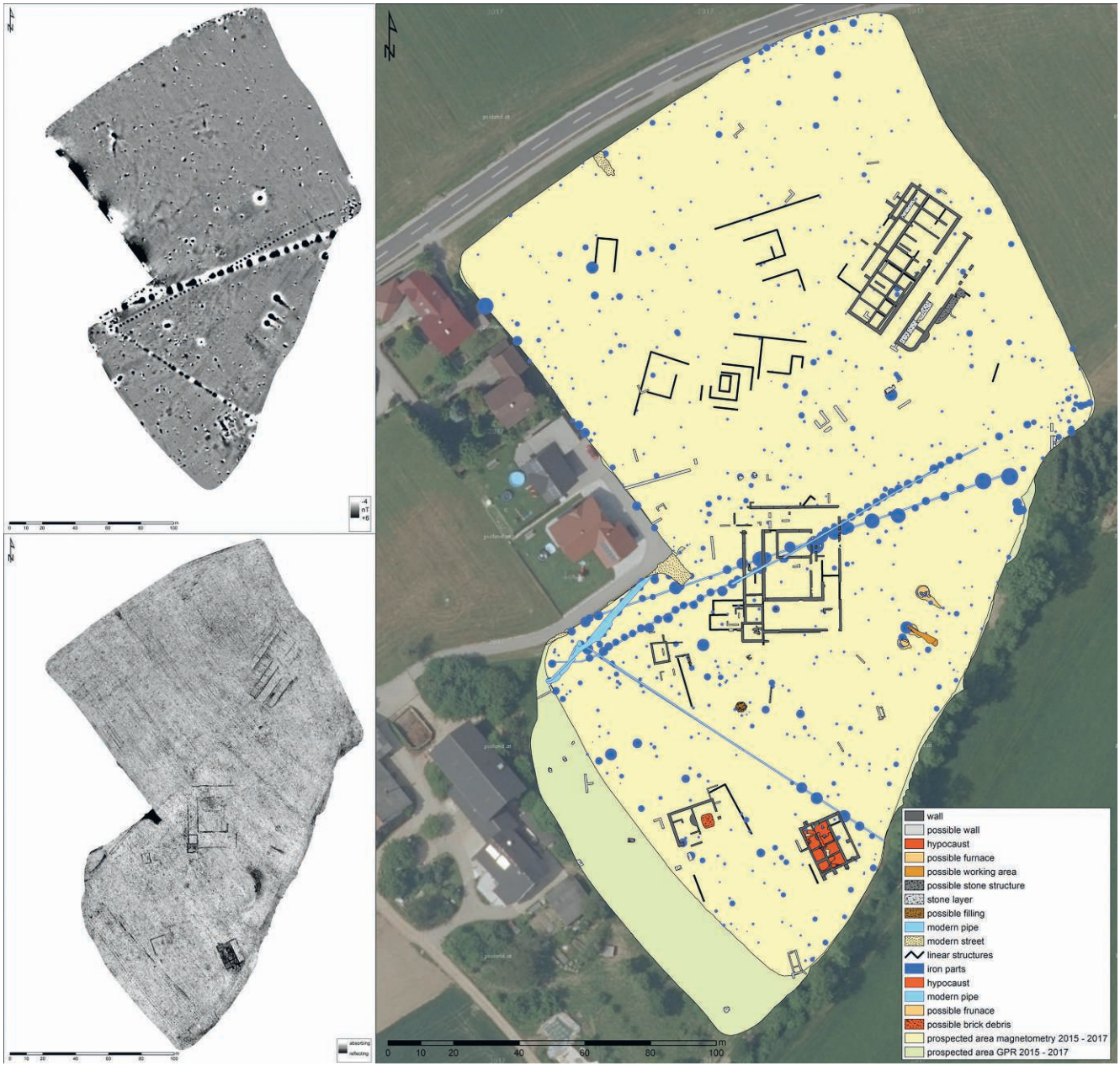

Figure 1. Villa rustica of Königswiesen. Top left: Magnetogram (-4/+6 nT), bottom left: GPR time slice (depth 0.25–1.20 m), right: archaeological interpretative map of the survey data.

In using this approach one problem emerged due to the soil conditions in the area: glacial subsoils from gravel sand below sandy, silty soils in combination with Roman walls mostly made of limestone led to very low magnetic contrasts for magnetometry surveys. Therefore it was sometimes hard to identify wall structures in the magnetograms and we had to enlarge the areas surveyed by GPR in order to be able to get a plan of the whole villa complexes. At these sites it became very clear that without a combination of large-area magnetometry (Zöllner *et al.*, 2011) and GPR (Trinks *et al.*, 2018) it would be almost impossible to get a meaningful picture of the settlement structures. This problem was especially conspicuous at the site of Walchen, where the magnetogram showed almost no visible wall structures. In order to gain the most out of the collected geophysical data we used TAIFU (Verhoeven, 2015), an image fusion toolset that has been developed by the LBI ArchPro since 2015, and were thus able to easily combine the prospection data for maximising the value of information.

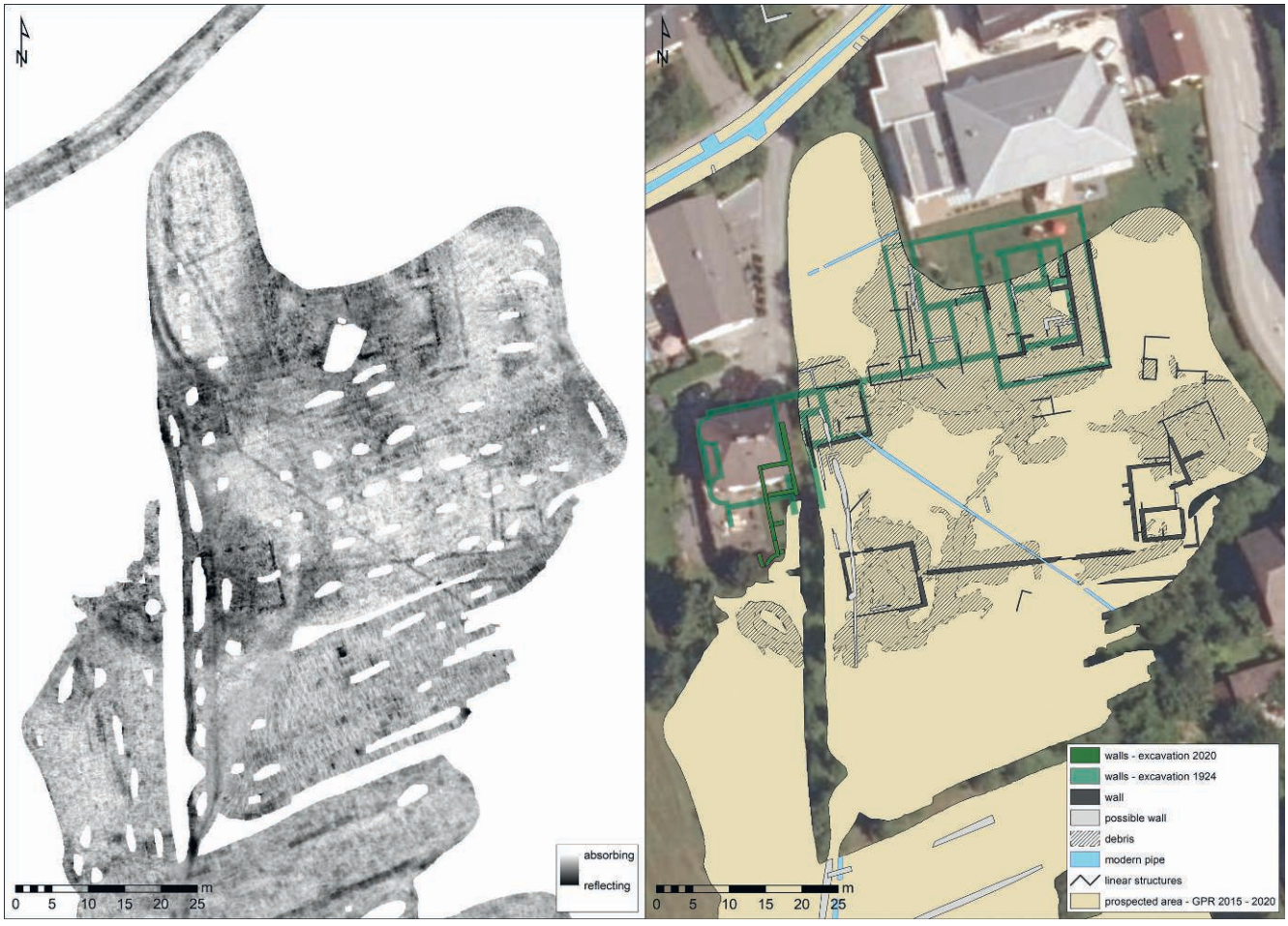

Figure 2. Roman villa of Weyregg. Left: GPR time slice (depth 0.40–1.40 m), right: archaeological interpretative map of the survey data.

The villa rustica of Königswiesen

The large farming complex of the villa rustica of Königswiesen has been discovered in the 1990s by the owning family, but no archaeological investigation has been following then. From 2015 to 2017 the site has been surveyed, covering a total area of about 3.5 hectares with both methods, magnetometry and GPR. We discovered a large main building with several adjacent buildings and a bath complex (Traxler *et al.*, 2018). A large farm building northeast of the main complex reminds of stables known from military camps and may link the villa to horse breeding.

In 2020 part of the main complex and an adjoining farm building have been excavated, showing that the site has been damaged by the plough already, but still revealing plenty of dating material, setting the villa into the 2nd and 3rd centuries.

The *villa* of Weyregg

The villa has been known for 250 years but first archaeological excavations have been taken place only in 1924 (Schmid, 1926), unearthing a large main building complex, a very luxurious adjacent building and a farm building. So far 16 mosaic floors have been documented at the site, making the villa the most luxurious Roman settlement site in the whole of Upper Austria (Traxler, 2018).

The site is situated in the small town of Weyregg, next to lake Attersee, most of its remains buried in the soil of an orchard. A total area of 1.8 hectares has been prospected between 2015 and 2020. The survey led to a new site plan, showing that the villa complex consisted of a northern wing and a western wing with a bath (which have partly been excavated in 1924) and a southern wing with a corridor connecting the main building with a possible sanctuary

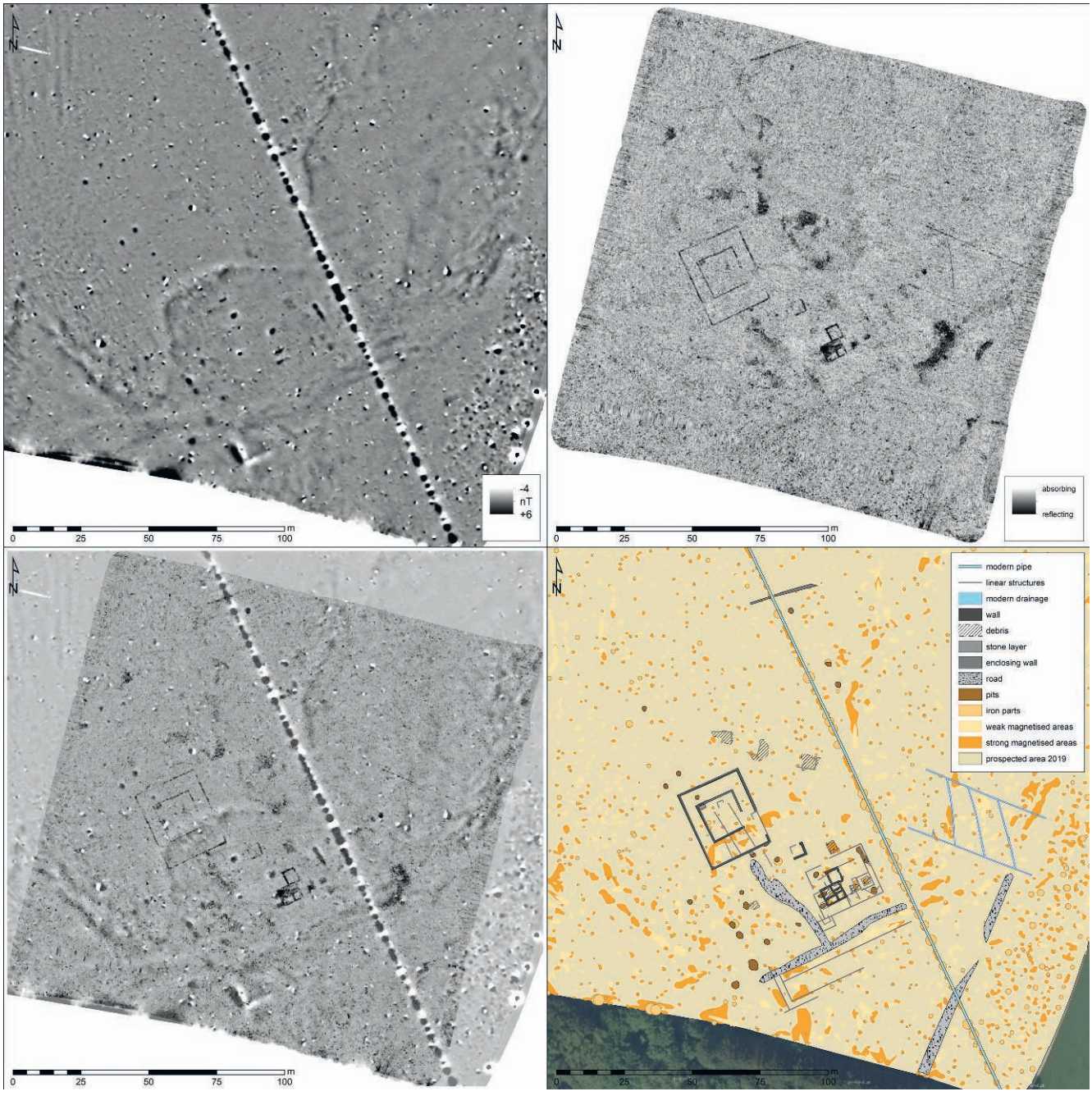

Figure 3. Villa rustica of Walchen. Top left: Magnetogram (-4/+6 nT), bottom left: fused image out of TAIFU, top right: GPR time slice (depth 0.20–0.95 m), bottom right: archaeological interpretative map of the survey data.

(Löcker *et al.*, 2018). In the north of the complex the survey led to the discovery of another farm building, some 120 m off the main building. Parts of the villa have been excavated between 2017 and 2020 (Lang *et al.*, 2020), climaxing in finding the by far largest mosaic floor in Upper Austria so far. The floor has only partly been excavated but the geophysical data show that it is 31 m long and covers about 110 m². The total information out of the excavations and the geophysical survey has been integrated into a virtual reconstruction of the site, showing its setting in the stunning Alpine lake-land.

The *villa rustica* of Walchen

The villa rustica has also been discovered by the owning family, who found brick fragments but also a complete bronze oil lamp. The geophysical survey took place in 2019 and covered some 9.2 hectares with magnetometry and about 2.7 hectares with GPR. The results of the magnetometer survey showed very poor contrast of the archaeologically relevant stone structures to the surrounding soil. Therefore the extent of the GPR survey has been enlarged in order to cover all of the visible remains of the villa complex. Most of the farming buildings have been discovered by the survey, but no definite main building could be distinguished. The largest building visible in the data could probably be the (poorly preserved) remains of the main building of the villa complex, but based on the layout rather seems to be another farm building like a horreum (granary). The main building, as well as the missing bath building, may lie hidden in the grounds of the manor house of Schloss Walchen, which is situated just south of the survey area.

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