

Klaus Freitag

The Diversity of Sites

Results of the Geophysical Prospections 2016 and 2017 in the Valleys of Pesa and Orme

The geophysical surveys conducted at the sites of Molino San Vincenzo and Podere Piano at the river Pesa as well as the sites of Il Cotone and Martignana at the river Orme have resulted in new and detailed insights into the settlement patterns of this area. The measurements at Molino San Vincenzo helped to complete the picture of the Roman rural site. In Podere Piano traces of human utilization could be documented. For more detailed statements further research is needed. Il Cotone could be defined as a Roman rural settlement in an outstanding topographic position including industrial installations. Finally, the survey at Martignana revealed traces of a probable medieval building, equally situated at a convenient higher terrace at the Orme Valley.

Keywords: *geophysics; magnetics; ground-penetrating radar; Tuscany; settlement archaeology*

1 Introduction

In the autumn of 2016 and summer of 2017 the Austrian Archaeological Institute/Austrian Academy of Sciences conducted geophysical prospections within the framework of the FWF-funded project “Val di Pesa and Val Orme as a changing rural landscape: an integrated approach”.¹ After the promising results of a first geomagnetic survey at Molino San Vincenzo in 2013, the work was extended to three more sites in the valleys of Pesa (Podere Piano) and Orme (Il Cotone, Martignana). These spots were initially identified by extensive surveys carried out by the Associazione Archeologica Volontariato Medio Valdarno as well as the Soprintendenza and were afterwards defined more precisely by G. Schörner and his team (University of Vienna). Using a Fluxgate Gradiometer (4.9 ha) and Georadar (0.4 ha) the prospections covered a total area of 5.3 ha. Their results provide new insights into the settlement patterns of the Tuscan rural landscape (Fig. 1).

¹ FWF project P 27476: Project director: G. Schörner (University of Vienna). The measurements were undertaken by K. Freitag, A. Parodi and I. Repetto under supervision of S. Groh.

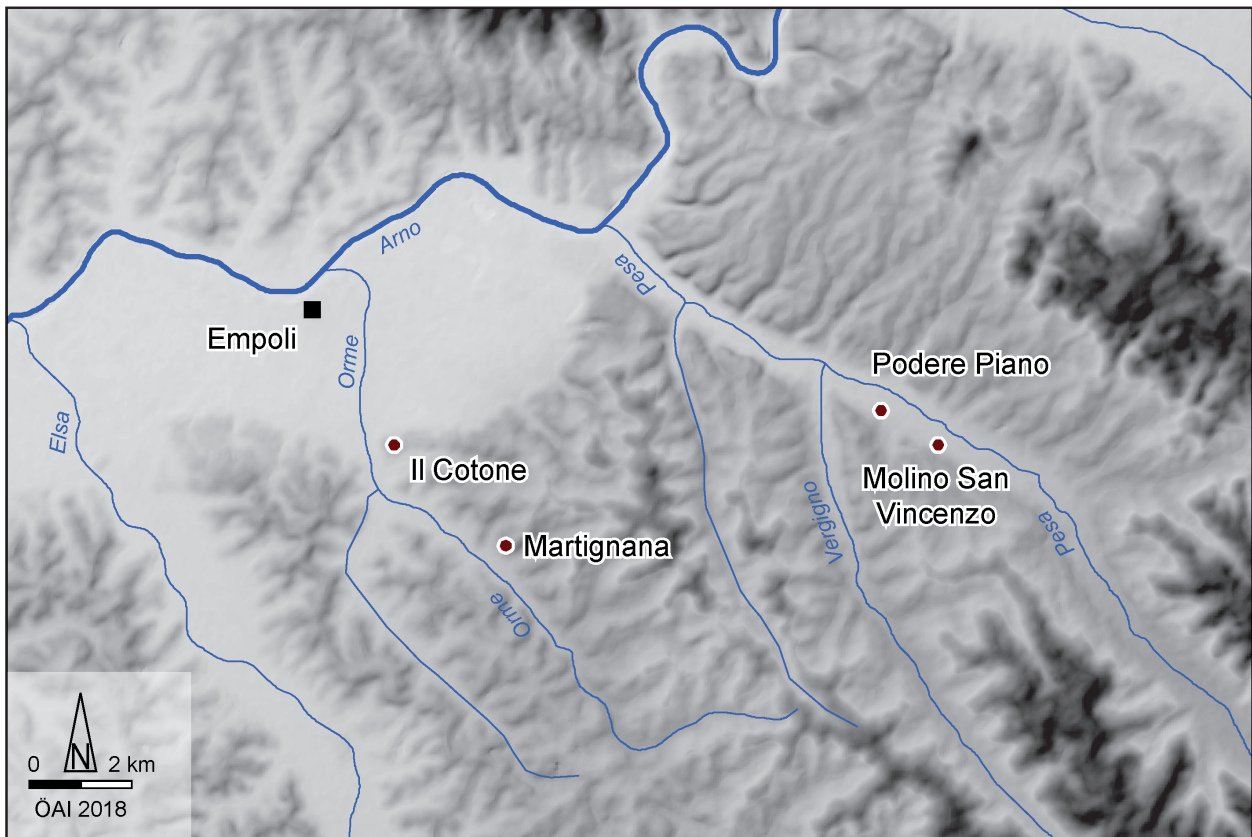


Fig. 1 Val di Pesa and Val Orme. The prospected sites (ÖAW/ÖAI. DEM: EU-DEM. Rivers: CCM-JRC)



Fig. 2 Geophysical survey using a Fluxgate-Gradiometer (left) and Georadar (right) (ÖAW/ÖAI)

2 Methodology

The geomagnetic surveys were conducted with the Geoscan Research Fluxgate-Gradiometer FM 256². This device is best suitable for a rapid detection of walls, pits, ditches as well as kilns/fireplaces. The Georadar GSSI SIR 3000 (270 MHz-antenna) instead was used for a more detailed view of stone structures documented by the magnetics (Fig. 2).³ The prospection areas were levelled with the RTK-GNSS Leica 1200 that guarantees an absolute accuracy of 1–5 cm.⁴ After the fieldwork the data were geo-rectified, stored and analysed in a GIS.⁵

3 Topography and results

All four sites are situated on flood-proof plateaus close to the rivers of Pesa and Orme which are separated from each other by a chain of hills.

Val di Pesa / Molino San Vincenzo

The site of Molino San Vincenzo is located on the left bank of the river Pesa 250 m farther from its modern course. Under the direction of G. Schörner extensive research including excavations, material surveys and geoarchaeology has been carried out since 2011. The research revealed a rural settlement dating from the 5th century BCE until the 5th century CE.⁶ After promising geomagnetic surveys conducted in the year 2013,⁷ in 2017 georadar surveys took place in the middle and eastern part of a building identified at the site, measuring 57 × 64 m. In the southwest, southeast and north of the measurement area plane reflexions suggest large layers of debris (Fig. 3, A–D). Linear feature inside layer A could be interpreted as part A of a wall (Fig. 4, A.1). In the east the georadar-surveys show additional rooms with an average width of 5 m (Fig. 4, B.1).⁸

Due to the ground conditions their eastern border could not be detected. Also the northern border of the central area, already identified by the geomagnetics, could be mapped using the georadar (Fig. 4, C.1).⁹ 13 m away from the border the southern part of the probable out-building 4 was documented (Fig. 4, D.1).¹⁰ The data reveals at least three rooms and a wider extension to the east as assumed previously. The north-south-wall D.2 could represent a link to the main building.

² FM 256 Dual, resolution 0.1 nT, grid size 20 × 40 m, traverse distance 0.5 m, sample interval 0.125 m. The data were processed using Geoplot 3.0 t and 4.0.

³ GSSI SIR 3000, 270 MHz-Antenna, 70 ns, traverse distance 0.5 m, sample interval 0.02 m. The data were processed using Radan 6.5.3.0.

⁴ Due to mistakes during walking the absolute precision of the geophysical surveys conducted in the area is less than 1 meter. Coordinate system: WGS 1984 UTM 32N (EPSG: 32632).

⁵ ArcMap 10.2.

⁶ <https://rrl.univie.ac.at/forschung/msv/> (22.11.2018); Schörner et al. 2014; Hagmann – Schreck 2016.

⁷ Schörner et al. 2014, 10; 12s. Fig. 12–13.

⁸ Block 3 after Schörner et al. 2014, 12 Fig. 13.

⁹ Block 2 after Schörner et al. 2014, 12 Fig. 13.

¹⁰ Block 4 after Schörner et al. 2014, 12 Fig. 13.

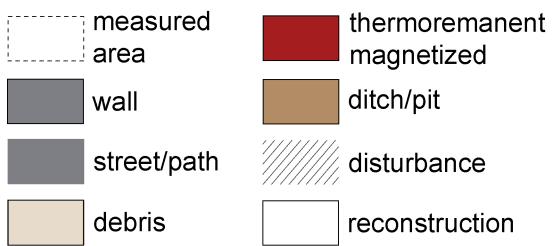
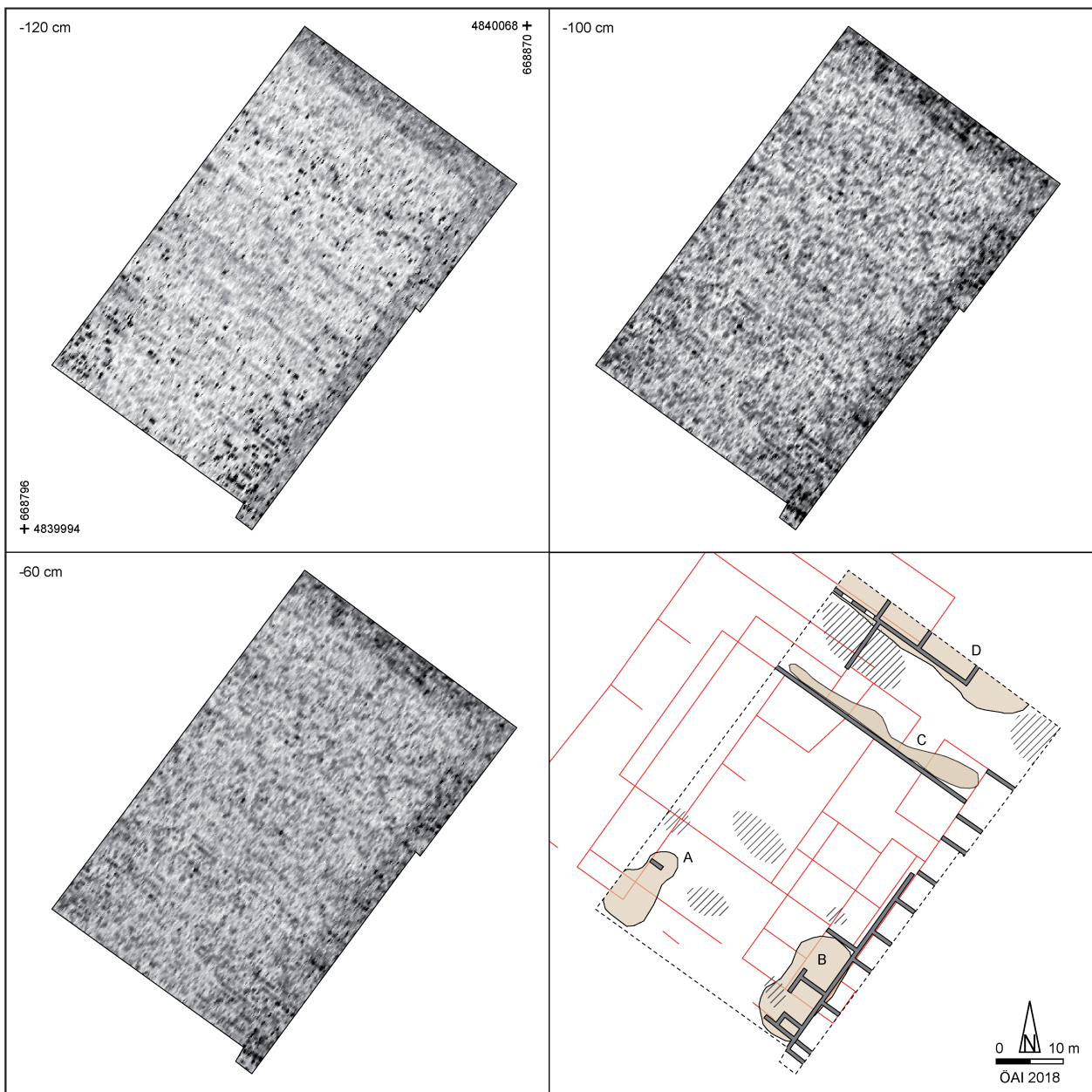


Fig. 3 Val di Pesa / Molino San Vincenzo. Radar depth slices and interpretation. Red lines: interpretation of the geomagnetic survey 2013(ÖAW/ÖAI. Interpretation of the magnetic-data: D. Hagmann [University of Vienna])

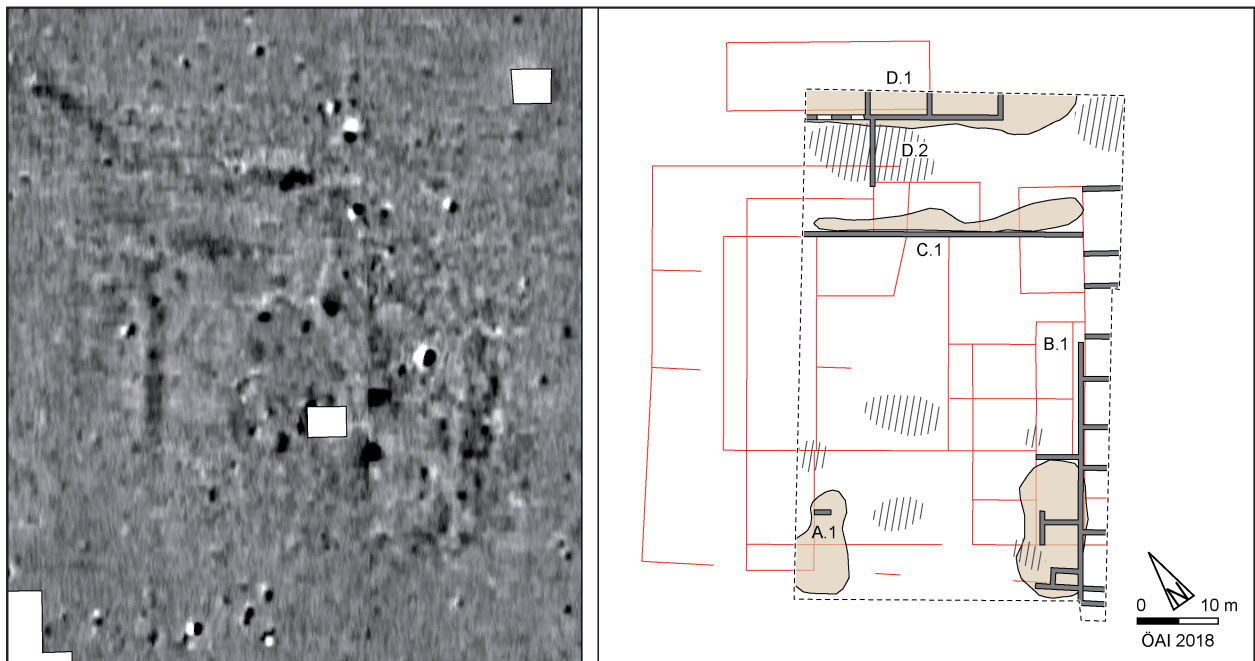


Fig. 4 Val di Pesa / Molino San Vincenzo. Magnetogram (left) and interpretation of the geomagnetic (red lines) and georadar survey (right) (ÖAW/ÖAI. Interpretation of the magnetic-data: D. Hagmann [University of Vienna])

Val di Pesa / Podere Piano

The site of Podere Piano is situated almost in the middle of the rural settlement Molino San Vincenzo and the Villa del Vergigno.¹¹ In contrast to the other sites the magnetic measurements, which were extended to an area of 2.7 ha, do not offer particularly clear results. The main reasons are the ferrous components of the soil which gravely disrupted the magnetic surveys.¹²

Features of archaeological interest are marked with the letters A and B (Fig. 5); the ditches at C most probably represent modern parcel borders. All the densely scattered structures around the Via Bartolomeo Intieri running between the measured areas can be seen as traces of the modern road construction works.

Object A is formed by highly magnetized pit-like features (-40–120 nT) that comprise an area of 12 m length and 10 m width. The high magnetization is again an indication of firing. In this case they could be interpreted as traces of a burned building; similar objects could be detected with a Fluxgate Gradiometer to the northeast of castrum of Caer Gai (Britannia).¹³ Further evidence for an interpretation as a building is provided by three regularly ordered pits with an average diameter of 0.8 m north and east of the structure, which could represent post-holes.

¹¹ Villa del Vergigno: <http://www.villadelvergigno.org> (22.11.2018).

¹² Cf. the contribution of R. B. Salisbury.

¹³ Hopewell 2005, 234 f. Fig. 4 Nr. 7.

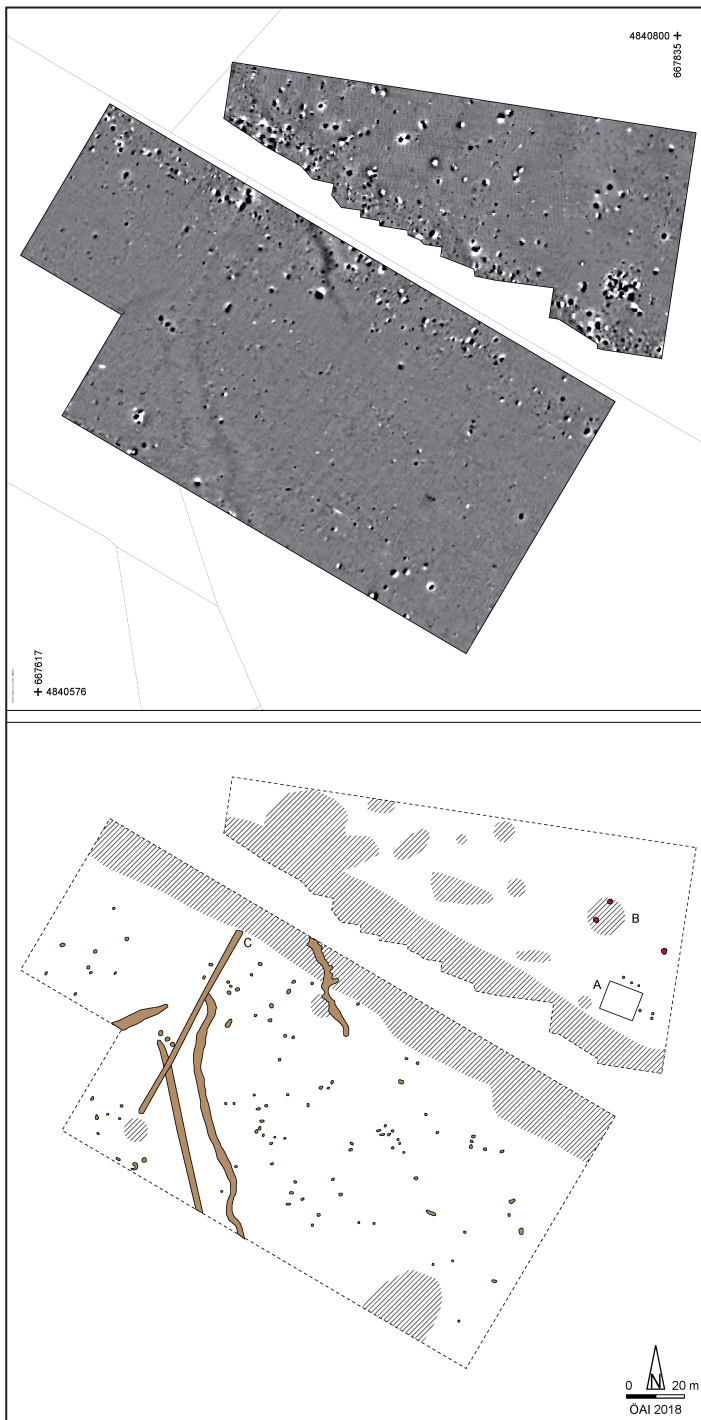


Fig. 5 Val di Pesa / Podere Piano. Magnetogram (above) and interpretation (below) (ÖAW/ÖAI. Cadaster: Regione Toscana)

The size of 12×10 m is evocative of the buildings in Il Cotone (cf. the contribution below). Another link can be seen in the three round structures measuring 1.5–2 m that again show a higher magnetization (30–80 nT). The magnetization and shape indicate an interpretation as kilns – a situation that would be directly comparable to Il Cotone.

However it has to be emphasized that the ferrous components of the soil and the large amount of disturbances visible in the magnetogram complicate the interpretation significantly. All of the results should be treated with caution.

Val Orme / Il Cotone

The site of Il Cotone is situated in a distance of 400 m to the Orme river on a higher terrace, which is situated approximately 40 m higher than the surrounding landscape. The terrace provides a good view of the Orme and Arno valley. While a larger area of 1.7 ha was investigated with the Fluxgate Gradiometer, also small-scale Georadar-surveys (0.2 ha) took place (Fig 6–7).

The geophysics revealed a high amount of archaeologically significant structures, which are mainly concentrated in the north of the measured area. Two rectangular features (Fig. 6, A and B) formed by ditches most probably represent buildings.¹⁴

Object A shows a long-rectangular shape with dimensions of 13 to 7 m,

¹⁴ Structure A could also be formed by post-holes.

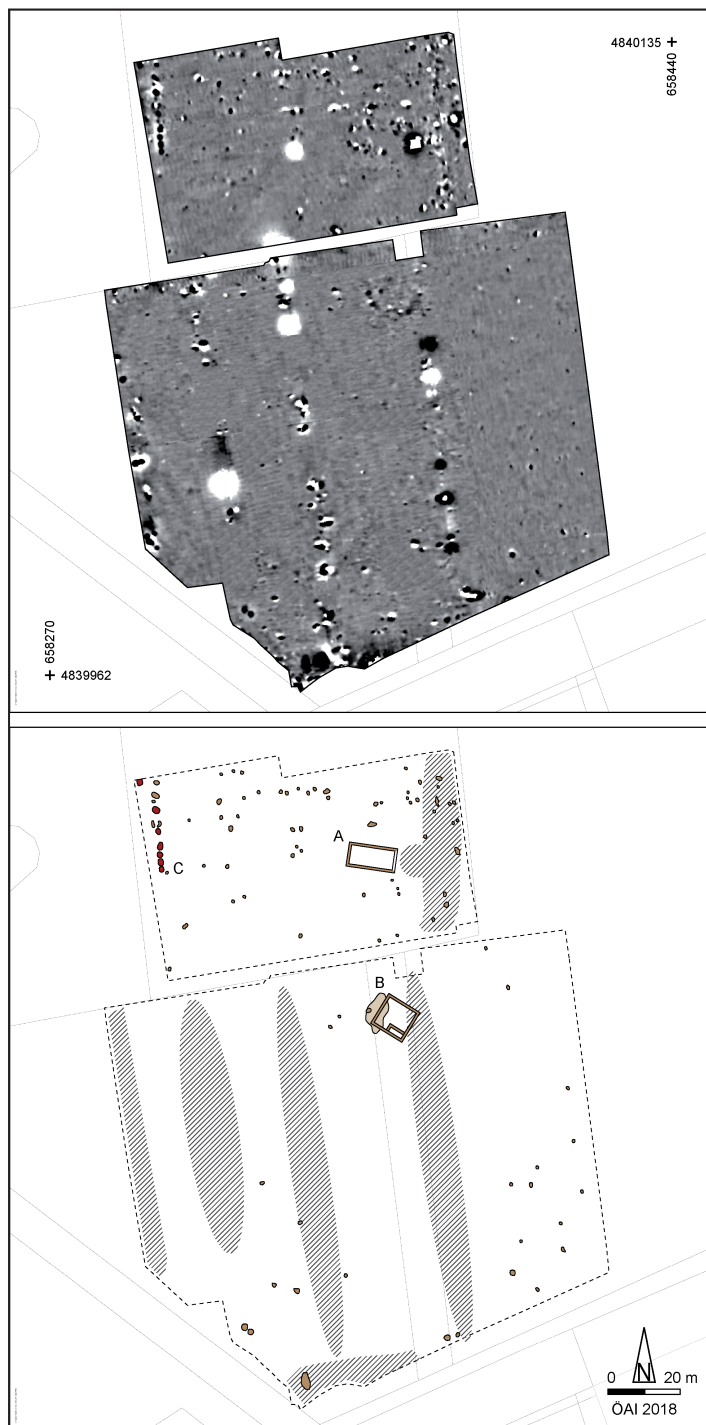


Fig. 6 Val Orme / Il Cotone. Magnetogram (above) and interpretation (below) (ÖAW/ÖAI. Cadaster: Regione Toscana)

while structure B measures 10×9.5 m. In the south-eastern corner a smaller room 4.7 m long and 2 m wide seems to have existed beside a larger main room. The interpretation is supported by an intensive material survey which revealed the highest concentration of findings around the southern feature B.¹⁵ The results of the Georadar-prospections do not indicate an existence of foundation walls,¹⁶ but show a layer of debris around feature B (Fig. 7).

The structures A and B share similar layouts with a building in San Mario in the valley of Cecina, which lies 50 km away from Il Cotone. While object A shows a connatural long-rectangular shape, the size of object B is very close to the rooms 1 and 2 of the building in San Mario (Fig. 8).¹⁷

A possible courtyard may not have been detected during the geophysical surveys. The building in San Mario was in use between the late 4th century BCE and the 5th century CE. N. Terrenato describes it as a typical rural construction in the valley of Cecina, the moderate layout of which should not be seen as a sign of poverty, but rather as a continuity of cultural attributes characteristic for northern Etruria.¹⁸ In the northwest of the magnetogram of Il Cotone nine round and rectangular features with an average diameter of 1.5

¹⁵ Cf. the contribution of H. Schörner.

¹⁶ Due to the bad operational reliability of the Georadar in the heavily ploughed field their existence cannot be ruled out.

¹⁷ Terrenato 1998, 102–105; Schörner 2013, 163 n. 45.

¹⁸ Terrenato 1998, 102–105.

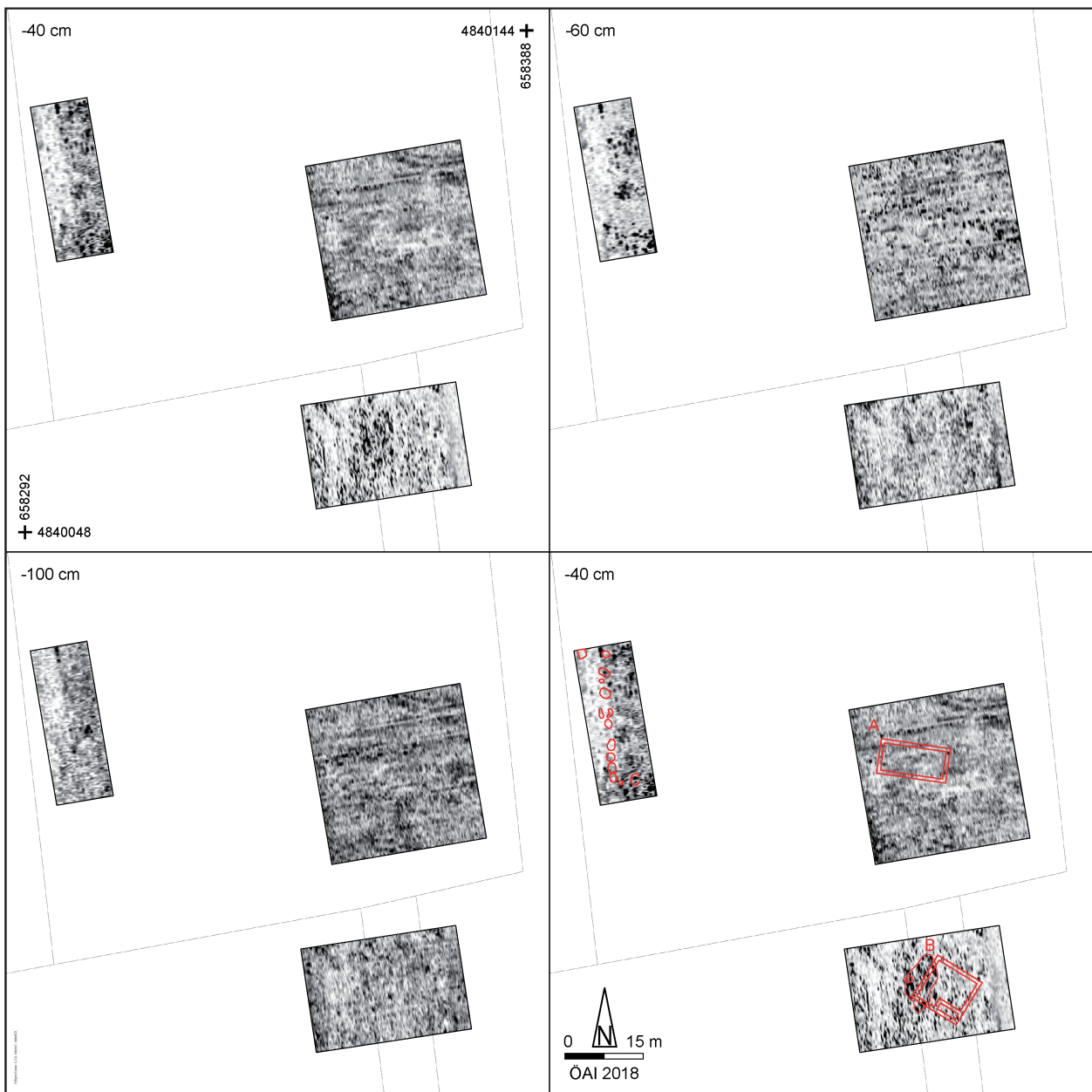


Fig. 7 Val Orme / Il Cotone. Radar depth slices superposed by the interpretation of the geomagnetic survey (ÖAW/ ÖAI. Cadaster: Regione Toscana)

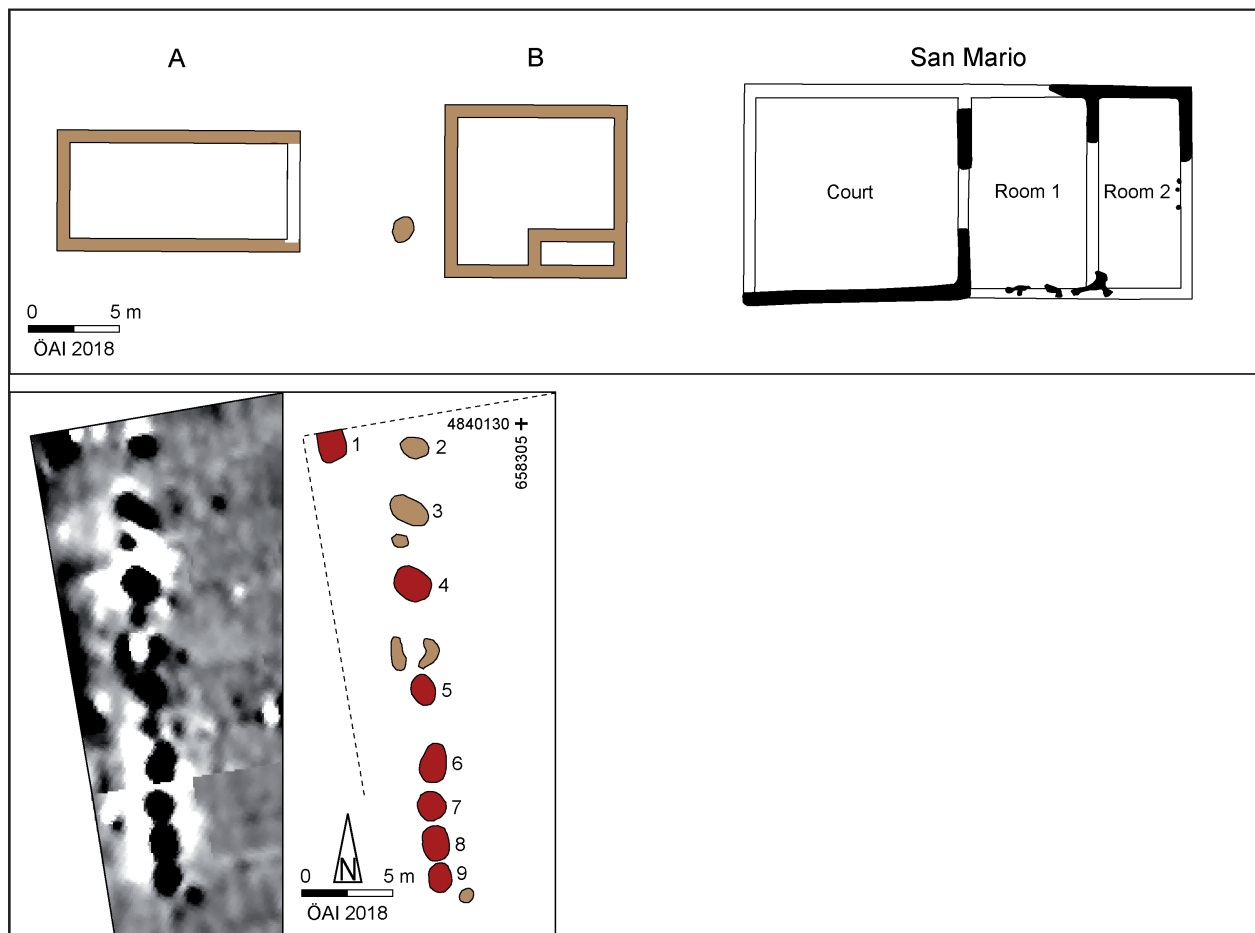


Fig. 8 Val Orme / Il Cotone. Radar depth slices superposed by the interpretation of the geomagnetic survey (ÖAW/ÖAI. Cadaster: Regione Toscana)

to 2 m are visible (Fig. 6–7, C and Fig. 8). The structures offer a higher magnetization, a clear indication for firing.¹⁹ The shape as well as the context of fire makes it possible to interpret these structures as a large kiln battery. The features 2–9 could represent kilns containing a round burning chamber; object 1 could be interpreted as a kiln with a rectangular burning chamber.²⁰ Furthermore, between the probable kiln battery C and the buildings A and B a large amount of pits refers to an intensely used anthropogenic zone (Fig. 6). Comparable structures were detected close to the mutatio/mansio of Forum Appii/Borgo Faiti (Latium): four geophysically prospected round anomalies, interpreted as kilns, are located at a distance of

¹⁹ Cf. Gaffney et al. 2000, 84. 86 tab. 1; Aspinall et al. 2009, 21 f.; the structures 1, 4–8 and 9 show a thermoremanent magnetization between 30 and 120 nT, the objects 2–3 offer only low values between 6 and 12 nT. While this circumstance makes an identification as pits more likely, it does not oppose a former thermoremanent magnetization which could not be detected due to geological phenomena.

²⁰ Comparative examples: Swan 1984, 29–42 Fig. 2–3; Cuomo di Caprio 1985, 135–143 Fig. 18–19; Groh 2006, 74–77.



Fig. 9 Val Orme / Martignana. Above: Magnetogram (left) and interpretation (right). Below: Detailed interpretation of building A. Black: exposed wall (ÖAW/ÖAI. Cadaster: Regione Toscana)

100 m to a building.²¹ Another comparison can be cited from Canovium/Caerhun (Britannia): densely arranged “small, fairly strong, round anomalies” are addressed as “hearths”.²²

Val Orme / Martignana

The site of Martignana is located 2.8 km south of Il Cotone on a comparable terrace, which again lies around 40 m higher than the direct surroundings of the Orme. The geophysical surveys were carried out using the Fluxgate Gradiometer in an area of 0.3 ha. Besides concentrations of pits in the central and southwestern zone of the measurement area (Fig. 9, B and C), a path with a junction close to B can be seen weakly in the magnetogram. The western part of the way leads to feature A, where one wall – indicated as a black line (Fig. 9, A) – is still visible nowadays. The magnetic surveys revealed further walls that can be reconstructed as belonging to a building 27 m long and 16 m wide (Fig. 9). Beside the main room measuring 17 × 16 m A.1 and the entrance corridor A.2 probably two further rooms could be documented in the north (A.3–4). Due to the weak visibility of their walls, the interpretation must be treated with caution.

The construction technique of the wall between A.1 and A.3 indicates a dating in medieval times. This statement is supported by architectural remains situated 150 m south of building A, which date back to the Romanesque period.²³ A possible interpretation as a Roman building is contradicted by its location at the terrace-border.

4 Summary

Summarizing, it can be stated that the geophysical surveys have resulted in new and detailed insights into the settlement patterns of the Valleys of Pesa and Orme. The measurements at Molino San Vincenzo helped to complete the picture of the Roman rural site. In Podere Piano possible traces of human utilization could be documented. Il Cotone could be defined as a Roman rural settlement in an outstanding topographic position including industrial installations. Finally, the survey at Martignana revealed traces of a probable medieval building.

5 Works cited

Aspinall et al. 2009

A. Aspinall – C. Gaffney – A. Schmidt, *Magnetometry for Archaeologists* (Plymouth 2009)

Cuomo di Caprio 1985

N. Cuomo di Caprio, *La ceramica in archeologia. Antiche tecniche di lavorazione e moderni metodi di indagine* (Rom 1985)

Gaffney et al. 2000

C. F. Gaffney – J. A. Gater – P. Linford – V. L. Gaffney – R. White, *Large-scale Systematic Fluxgate Gradiometry at the Roman City of Wroxeter, Archaeological Prospection* 7, 2000, 81–99

²¹ Tol et al. 2014, 118s. Fig. 3.

²² Hopewell 2005, 243s. Fig. 8–9.

²³ Notification by L. G. Terreni.

Groh 2006

S. Groh, Befunde, in: S. Groh – H. Sedlmayer, Forschungen im Vicus Ost von Mautern-Favianis. Die Grabungen der Jahre 1997–1999, Der römische Limes in Österreich 44 (Wien 2006) 21–196

Hagmann – Schreck 2016a

D. Hagmann – V. Schreck, Neue Forschungen zum ländlichen Fundplatz Molino San Vincenzo (Toskana, Italien), Forum Archaeologiae 78/III, 2016, <http://phaidra.univie.ac.at/o:460186>

Hopewell 2005

D. Hopewell, Roman Fort Environs in North-West Wales, Britannia 36, 2005, 225–269

Schörner 2013

G. Schörner, ‚Il Monte‘: Versuch einer Synthese, in: G. Schörner (ed.), Leben auf dem Lande. ‚Il Monte‘ bei San Gimignano. Ein römischer Fundplatz und sein Kontext (Vienna 2013) 131–142

Schörner et al. 2014a

G. Schörner – D. Hagmann – V. Schreck, Ausgrabung Molino San Vincenzo, 19.09.2014, <https://www.doi.org/10.13140/RG.2.1.3490.0245>

Swan 1984

V. G. Swan, The pottery kilns of Roman Britain, Royal Commission on Historical Monuments. Supplementary Series 5 (London 1984)

Terrenato 1998

N. Terrenato, Tam Firmum Municipium. The Romanization of Volaterrae and its cultural implications, Journal of Roman Studies 88, 1998, 194–114

Tol et al. 2014

G. Tol – T. de Haas – K. Armstrong – P. Attema, Minor centres in the pontine plain: The cases of Forum Appii and Ad Medias, Papers of the British School at Rome 82, 2014, 109–134



Except for the logos and icons and unless otherwise stated, this work is licensed under a Creative Commons Attribution 4.0 (CC BY 4.0) International License: <https://creativecommons.org/licenses/by/4.0/>