Volume 1

Peshdar Plain Project Publications

Exploring the Neo-Assyrian Frontier with Western Iran

The 2015 Season at Gird-i Bazar and Qalat-i Dinka

edited by

Karen Radner, F. Janoscha Kreppner and Andrea Squitieri

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Preface

Karen Radner & F. Janoscha Kreppner

To Hartmut Kühne, in gratitude

The 2015 field season at Gird-i Bazar brought together an international team of experts from Austria, Canada, France, Germany, Italy, the Kurdish Autonomous Region of Iraq, Rumania, Syria, the UK and the USA, many of whom have contributed chapters to this volume. They and the many colleagues and friends who helped make the 2015 season a success are enumerated in Chapter A1. We are very grateful to all of them. But a special debt is owed to the members of the Sulaymaniyah Directorate of Antiquities and Heritage headed by Kamal Rasheed Zewe and our cooperation partner Jessica Giraud and her team: without them, the Peshdar Plain Project would not have come together as their work formed the foundation that made our own efforts possible. We are indebted to the General Directorate of Antiquities and Heritage (Erbil) headed by Abubaker Othman Zeineddin ("Malla Awad") for facilitating fieldwork and research in the Kurdish Autonomous Region of Iraq.

We are pleased to acknowledge the funding provided by the Alexander von Humboldt Foundation and the support of LMU Munich where the Peshdar Plain Project has its home at the Alexander von Humboldt Chair of the Ancient History of the Near and Middle East. In Munich, we are very grateful to Petra Oppermann for expertly and patiently handling the project's finance and HR issues; to Stephan Kroll, Christian Piller and Michael Roaf for freely sharing their expertise on Western Iranian pottery and archaeology; and to Henry Heitmann-Gordon for help with language editing parts of this volume.

Our co-editor, the tireless and unflappable Andrea Squitieri, liaised with the authors and assembled the draft manuscript with charm, enthusiasm and technical expertise – and at lightening speed. Our thanks are due to Peter Werner who skilfully, knowledgably and patiently oversaw the production of the book at the PeWe-Verlag.

To our families – Britta Irgang, Frans and Paul van Koppen, Philipp and Johanna Kreppner – we are grateful for their constant support and patience, as ever.

We would like to dedicate this first volume in the series *Pershdar Plain Project Publications* (4P) to Hartmut Kühne (Berlin) whose exploration of the Khabur valley of northeastern Syria and in particular his interdisciplinary approach to the excavations at Tell Sheikh Hamad / Dur-Katlimmu provide the inspiration for our current work in the Peshdar Plain. Thank you, Hartmut, for all the trust and opportunities you have given us over the years!

Munich and Berlin, July 2016

A. Introducing the Peshdar Plain Project

Karen Radner

The Peshdar (also Pishdar and Pizhder) district is part of the province of Sulaymaniyah in the Kurdish Autonomous Region of Iraq (**Fig. A1.1**). In the east, it is situated directly on the border with Iran. In the west, it adjoins the administrative districts of Raniyah (also known as Raparin district; to the north of the Lesser Zab) and Dokan (to the south of the river), likewise parts of the province of Sulaymaniyah. In the north, the Peshdar district borders on the province of Erbil, specifically the districts of Rowanduz and Choman.

In the centre of the Peshdar district lies the Peshdar Plain, surrounded by the glorious mountainscape of the Zagros. It is bounded in the south by the valley of the Lesser Zab and traversed by several of its tributaries coming down from the Qandil mountain range[1] that fringes the crescent-shaped Peshdar Plain (**Fig. A1.2**). The highest peak in the Qandil range is Kuh-e Haji Ebrahim (36° 32' 52" N, 45° 0' 25" E) with an elevation of 3,587 m, which sits directly on the border with Iran and just north of the Peshdar district's boundary with the Choman district of Erbil province. To the west lies the Raniyah Plain which is separated from the Peshdar Plain very effectively by the mountains forming a wall, through which the Lesser Zab breaks in the narrow Sungasur gorge at Darband (also Darband-i Ramkan or Darband-i Raniyah; 36° 12' 53" N, 44° 59' 21" E)[2]. The regional centre of the Peshdar Plain is the town of Qaladze (also Qalat Dizeh and Qala Diza; قەڵادزێ) in the northwest of the plain, and its impressive settlement mound (36° 11' 7" N, 45° 6' 53" E; **Fig. A1.3**) demonstrates that the site has held this position since antiquity.

Fig. A1.1: Map showing the districts of the Province of Sulaymaniyah, as of 2015. Created on the basis of maps provided by the Kurdistan Region Statistics Office by PANONIAN. Deposited with a Creative Commons CC0 1.0 Universal Public Domain Dedication on Wikimedia.org.

A1. The Peshdar Plain Project in 2015

The Peshdar Plain Project was inaugurated in 2015 with the goal of investigating the region in the Neo-Assyrian period. Our work currently focuses on two sites in the small Bora Plain, a sub-unit of the Peshdar Plain: tiny Gird-i Bazar (36° 8' 18" N, 45° 8' 28" E; henceforth also Bazar), a shallow mound (altitude: 539 m) of only 0.5 ha and the more impressive Qalat-i Dinka (36° 8' 12" N, 45° 7' 57" E; altitude: 579 m; henceforth also Dinka), looming high over the Lesser Zab on the imposing terminal outcrop of a crescent-shaped mountain range along the northern river bank (**Fig. A1.4**). The results of Mark Altaweel's 2015 geoarchaeological work (Ch. B2) and the 2015 survey of the Mission *archéologique française du Gouvernorat de Soulaimaniah* (MAFGS), directed by Jes-

1 One of the tributaries coming down from the Qandil is the Chami Gafren which joins the Lesser Zab at the village of Zharawa, just west of Qaladze. It traverses the Qulqula Gorge, where geological fieldwork (36° 12' 53" N, 44° 59' 21" E) was undertaken: Karim/Koyi/Baziany 2011, 929-932. For the general geological situation see Karim/Koyi/Baziany 2011, 934 fig. 11 (7 = Qaladze).

2 On 31 August 1922, Darband (or Derbend) was the site of a battle between the British forces, including the Assyrian Levy, and insurgent Kurdish tribes, which the Kurds won: the account of Browne 1932 (chapter IV) conveys a good idea of the terrain and its strategic importance. The rock relief at the gorge (Miglus 2016) commemorates another battle at the site, fought about 4000 years earlier in the beginning of the second millennium BC.

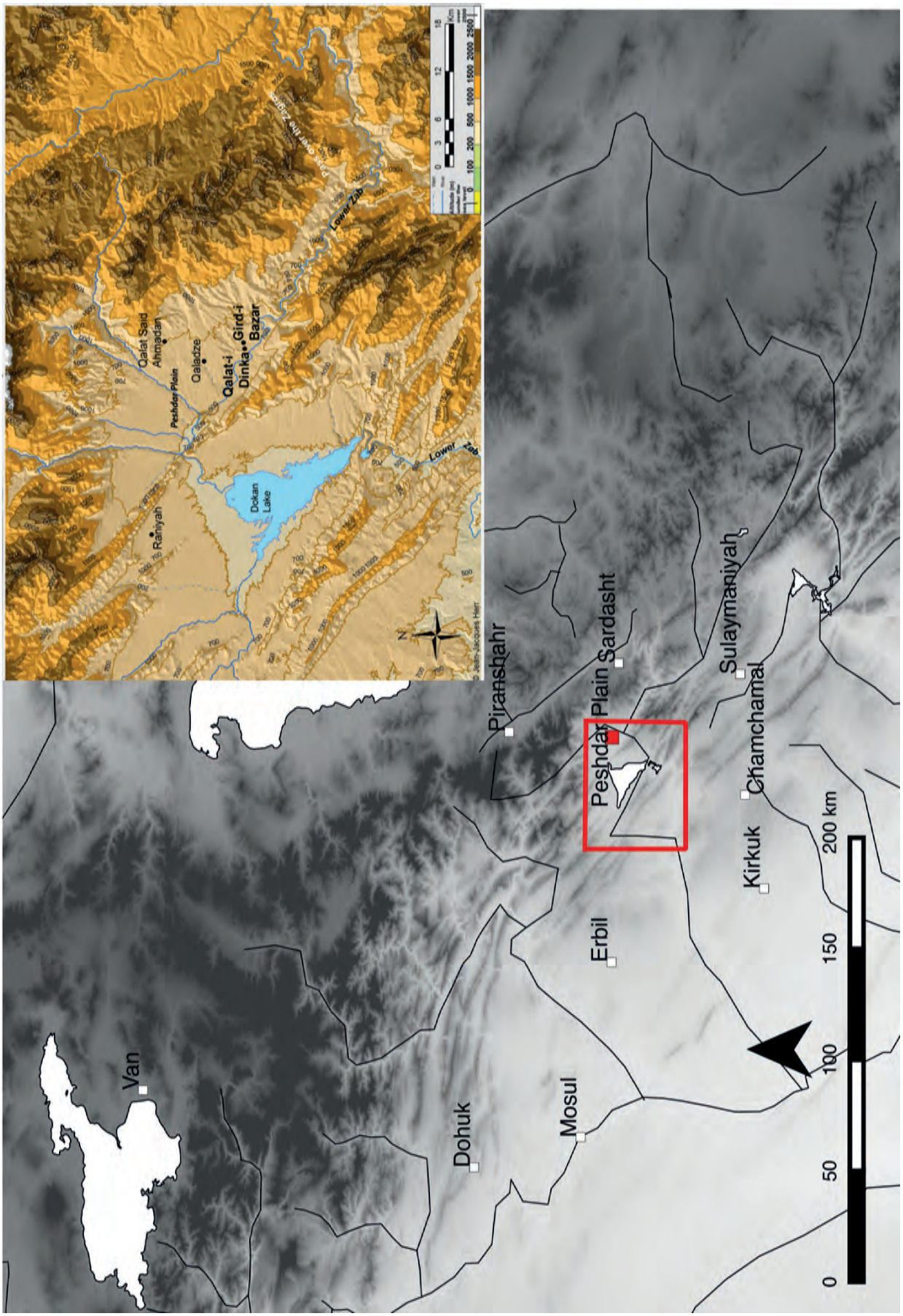

Fig. A1.2: The location of the Peshdar Plain and its key sites. Composite by Andrea Squitieri, using a map prepared by Jean-Jacques Herr.

Fig. A1.3: View of the settlement mound of Qaladze in August 2015. Photo by Janoscha Kreppner.

sica Giraud[3] (Ch. B3), indicate that the Bazar und Dinka can be seen as components of one extended site, which we may designate as the Dinka settlement complex.

During a visit to the Raniyah district on 16 February 2015, Barzan Baiz Ismail and Ismail Muhamad Ali, the local representatives of the Sulaymaniyah Directorate of Antiquities and Heritage, informed Karen Radner that in 2013 a farmer had discovered a fragmentary cuneiform tablet while preparing a field at Dinka for the cultivation of chickpea. The immediate autopsy of the tablet in Raniyah showed it to be a Neo-Assyrian legal document from the year 725 BC with an intriguing mention of a servant of the Palace Herald (Ch. B1). Prompted by this apparent clue to the Border March of the Palace Herald, Radner visited the Peshdar Plain two days later in order to see Dinka and also Bazar, following a suggestion of Jessica Giraud: at both sites, the French mission had found Neo-Assyrian pottery during the surface survey in February 2013 (Ch. B3.2).

When it emerged that an industrialised chicken farm had been erected at Bazar only a few months earlier, destroying substantial parts of the site, it was quickly decided that salvage excavations at the imperilled mound should start as soon as possible in conjunction with a wider investigation of the Peshdar Plain, including excavations at Dinka which is threatened by agriculture. The Sulaymaniyah Directorate of Antiquities and Heritage, headed by Kamal Rasheed Zewe, offered immediate administrative support and subsequently supplied invaluable personnel and logistic assistance to all aspects of the project. Funding for a first fieldwork season was readily available, as Radner had been awarded the International Award for Research in Germany ("Alexander von Humboldt Professorship") in November 2014, and F. Janoscha Kreppner quickly agreed to direct the fieldwork.

The 2015 team consisted of the following members:

- Mark Altaweel (University College London, UK): mapping and offsite archaeology
- Andrei Ašandulesei (Alexandru Ioan Cuza University of Iași, Romania): geophysics and mapping
- Barzan Baiz Ismail (Sulaymaniyah Directorate of Antiquities, Raparin district): government representative
- Peter V. Bartl (Freie Universität Berlin, Germany): supervisor of the Western Trench
- Jörg Fassbinder (Bayerisches Landesamt für Denkmalpflege, Munich, Germany): geophysics
- Christoph Forster (Fa. Datalino, Berlin, Germany): data base creation and photogrammetry
- Tina Greenfield (University of Manitoba, Winnipeg, Canada): bioarchaeology

3 Kopanias *et al.* 2015, 48.

Fig. A1.4: Satellite image of the Bora Plain (24 November 2003). Google Earth 7.1.5, 2016. The red square indicates the area shown in Fig. B2.2. Annotated by Andrea Squitieri.

Fig. A1.5: Most of the 2015 team (23 September 2015). Photo by Peter Bartl (by automatic shutter release).

- Jean-Jacques Herr (École pratique des hautes études, Paris, France): head of pottery processing
- Alice Hunt (University of Georgia, Athens, USA): material sciences
- F. Janoscha Kreppner (Ludwig-Maximilians-Universität Munich & Freie Universität Berlin, Germany): field director
- John MacGinnis (University of Cambridge, UK): supervisor of the Eastern Trench
- Ibrahim Manla Issa: cook
- Anke Marsh (University College London, UK): geoarchaeology
- Karen Radner (LMU Munich, Germany): project director and epigrapher
- Hero Salih Ahmed (Sulaymaniyah Directorate of Antiquities): pottery processing and deputy supervisor of the Eastern Trench
- Aziz Sharif (Sulaymaniyah Directorate of Antiquities): driver
- Andrea Squitieri (LMU Munich, Germany): mapping, data base management and documentation
- Adam B. Stone (University of Cambridge, UK): supervisor of the Connecting Trench
- Muhamad Kahraman Walika: pottery drawing
- Eleanor Barbanes Wilkinson (University of Durham, UK): small finds and deputy supervisor of the Western Trench
- 12 workers, mostly from the village of Nuruddin (**Fig. A1.5**).

We are very much obliged to Kamal Rasheed Zewe and especially Saber Ahmed Saber of the Sulaymaniyah Directorate of Antiquities for their invaluable assistance in matters great and small in Sulaymaniyah and in Qaladze, also during Herr's, Kreppner's and Squitieri's subsequent study of the pottery in January and March 2016; to our MAFGS project partner Jessica Giraud (Institut français du Proche-Orient, Erbil) for her dynamic support in research and logistics; to our colleagues Adelheid Otto and Simone Mühl at LMU Munich and Dorian Fuller and David Wengrow at UCL for generously letting us benefit from their equipment; and finally to Stephan Kroll (LMU Munich) for sharing his knowledge and material, especially on Mannean pottery.

A2. The scope of this volume

This inaugural volume of the *Peshdar Plain Project Publications* (4P) series presents the results of the first season of excavations at Gird-i Bazar between 1-27 September 2015; the preparatory work conducted between 20-31 August 2015, including Jörg Fassbinder's and Andrei Ašandulesei's geophysical survey at Bazar and Dinka; the geoarchaeological investigations undertaken by Mark Altaweel and Anke Marsh; and of the MAFGS surveys carried out in 2013 and 2015 by Jessica Giraud and her team. Our aim is to offer a first assessment of the Dinka settlement complex in the early first millennium BC and more generally of the significance of our work in its regional setting[4].

Our research throws light on a hitherto little known frontier region of the Assyrian Empire in the east, specifi-

4 Short reports appeared as Radner 2016 and Radner et al. 2016.

cally the Border March of the Palace Herald at the border to the kingdoms of Mannea and Ḫubuškia. Whereas the Japanese mission at Qalat Said Ahmadan (36° 13' 30" N, 45° 8' 48" E), a site in the north of the Peshdar Plain, unearthed in 2014 remains of an Iron Age building of unclear date[5], Gird-i Bazar is the first unequivocally Neo-Assyrian site to be excavated in the region. The occupation layers beginning to be uncovered there offer the rare opportunity, firstly, to explore a decidedly non-elite settlement of the Neo-Assyrian period, secondly, to further our understanding of how the Assyrian Empire organised its frontier zone and, thirdly, to synchronise the Western Iranian pottery cultures (with the key sites Hasanlu, Godin Tepe, Nush-i Jan and Baba Jan) with the Assyrian ceramic material of the 8th and 7th centuries BC[6].

After introducing the project in Section A, Karen Radner begins Section B with an analysis of the textual sources available for the Peshdar Plain in the Neo-Assyrian period, which indicate that as part of the Border March of the Palace Herald it was situated directly at the Assyrian Empire's frontier with Mannea and Ḫubuškia. The following two chapters of this section focus on the small Bora Plain, the sub-unit of the Peshdar Plain that constitutes the immediate environs of our current work at Gird-i Bazar and Qalat-i Dinka. Mark Altaweel and Anke Marsh provide a geoarchaeological assessment based on fieldwork conducted in August 2015 while Jessica Giraud presents an evaluation based on the most recent results of the MAFGS survey. Both studies strongly suggest that Gird-i Bazar and Qalat-i Dinka were part of one extended settlement that we call the "Dinka settlement complex". The section is concluded by a discussion of Jörg Fassbinder and Andrei Ašandulesei's 2015 geophysical survey at Gird-i Bazar and Qalat-i Dinka.

Section C introduces the methodology of the 2015 excavations at Gird-i Bazar, as developed by F. Janoscha Kreppner, Christoph Forster and Andrea Squitieri, before discussing the absolute chronology and the relative stratigraphy of the site. The bulk of this section presents the results of the work conducted in the eastern part of the site (by John MacGinnis and F. Janoscha Kreppner), in the Connecting Trench (by Adam B. Stone) and in the western part (by Peter V. Bartl).

Section D deals with the samples and finds recovered during the 2015 excavations at Gird-i Bazar. Tina Greenfield introduces the bioarchaeological sampling strategy. On the basis of the analysis of 666 diagnostic ceramic sherds from key find contexts and by drawing on parallels from the Assyrian heartland and western Iran, Jean-Jacques Herr presents a first assessment of the technical aspects, the fabrics and the shapes of the pottery excavated at Gird-i Bazar. The section concludes with a discussion of the small finds from the 2015 excavations by Eleanor Barbanes Wilkinson, Andrea Squitieri and Zahra Hashemi (Université Paris 1 Panthéon-Sorbonne, Paris).

Radner's and Kreppner's conclusions in Section E present a summary assessment of our work so far.

Finally, Section F is an appendix to this volume in which Jörg Fassbinder presents the results of the 2014 magnetometer survey in Mujeser in the Soran district of the province of Erbil, the possible site of the capital of the kingdom of Muṣaṣir.

This volume does not yet include results gained from analysing the palaeozoological, palaeobotanical, sediment, phytolith and archaeomagnetic samples taken during the 2015 excavations at Gird-i Bazar as well as the pottery specimens selected for laboratory analysis. The relevant material has already been exported from the Autonomous Kurdish Region of Iraq to Munich, with the kind permission and support of the Sulaymaniyah Directorate of Antiquities. Shipping these samples to the experts who will work with the material is currently underway. Tina Greenfield (University of Manitoba, Winnipeg, Canada) and Melissa Rosenzweig (Miami University, Ohio, USA) will work with the palaeozoological and palaeobotanical finds, respectively. Fatemeh Ghaheri's analytical work on the sediments and the phytoliths will commence in spring 2017 under the supervision of Arlene Rosen at the University of Texas at Austin as part of her PhD dissertation. Alexander Sammut is about to begin the analysis of 45 ceramic samples, selected by Jean-Jacques Herr, under the supervision of Patrick Quinn (University College London) as part of his MSc dissertation. Finally, Patrick Arneitz, under the supervision of Dr Roman Leonhardt at the *Zentralanstalt für Meteorologie und Geodynamik* (ZAMG), Vienna, will analyse the archaeomagnetic sample taken from the kiln.

5 Tsuneki *et al.* 2015, 31-38.

6 The synchronisation of the Western Iranian pottery cultures with Mesopotamian history and archaeology is currently fraught with problems: Danti 2013, 363-368.

B4. The magnetometer survey of Qalat-i Dinka and Gird-i Bazar, 2015

(Jörg Fassbinder and Andrei Ašandulesei)

After a first inspection of the archaeological sites Qalat-i Dinka and Gird-i Bazar and first tests with the susceptibility meter to assess the potential success of magnetometer prospection in April 2015, Jörg Fassbinder and Andrei Ašandulesei undertook a large-scale magnetometer survey and soil magnetic analysis on the sites, assisted in the field by Hero Salih Ahmed and Janoscha Kreppner from 20 to 22 August 2015.

B4.1 Methods

Among the geophysical methods the magnetometer prospection is a successful and cost-effective tool for detailed geophysical mapping of large areas in a reasonable time[51]. In order to reach the highest possible sensitivity combined with a maximum speed of prospection on topographically uneven and rough ground the so-called "duo-sensor" handheld magnetometer configuration was chosen[52]. For the purpose of getting a magnetic measurement at high sensitivity and a high spatial resolution of 25×50 cm, the reference value, e.g. the virtual gradient of the Earth's magnetic field, of the optical pumped caesium-magnetometer (Scintrex Smartmag SMG4-special) was set to infinity, so that magnetic anomalies could be measured at their full intensity. Usually more than 98% of the magnetometer data in a 40 m grid on archaeological sites vary in the range of ± 20 nT (Nanotesla) from the corrected mean value of the geomagnetic field. The stronger anomalies can typically be ascribed to burned structures, to lightning strikes or to pieces of iron containing slag or iron waste and these are easily distinguishable by the different direction of their magnetic dipole anomalies but also by their high intensities (> ± 50 nT)[53]. To cancel out the natural micro-pulsations of the Earth's magnetic field, a band pass filter in the hardware of the magnetometer processor was used.

The magnetometer probes were mounted on a wooden frame and were carried in a zigzag-pattern 30 cm above the ground. The sampling frequency of the magnetometer of 10 readings per second can provide the measurement of a 40 m profile in less than 30 seconds, maintaining the spatial resolution of approximately 10-15 cm at normal to fast walking speed. Every 5 m a marker was set by manual switch in addition to the magnetic data. This helps to perform the correct interpolation of data during subsequent laboratory processing. Additionally, the linear changes in the daily variation of the geomagnetic field are removed by a reduction filter process to the mean value of all data of the grid.

At Bazar, two adjoining areas of 25×60 m within the fenced area of the chicken farm and 40×80 m outside the fence were magnetically scanned. At Dinka, areas of a total of about 3 ha were surveyed, namely 120×120 m on the western slope of the mound and 100×60 m on the eastern plateau. The sampling density was 25×50 cm. On the read-out field unit, the data were stored as binary files. They were subsequently downloaded to a Panasonic Toughbook and unpacked to ASCII data. The software packages Geoplot (by Geoscan, UK) and Surfer (by Golden Software, USA) were used for image processing. To create discrete field values a re-sampling program designed by Fassbinder was used, which sets the data to 25×25 cm. The data was visualised as a grey scale magnetogram image, which allows even tiny anomalies of less than 0.5 nT (Nanotesla) to be traced. The advantage of the "duo-sensor" variometer configuration is that the resulting image provides more information on the site, including even the deeper parts of the archaeological structures. The instrument measures the Earth's magnetic field with a sensitivity of ±10.0 pT (Picotesla) with a sampling rate of ten measurements per second; in August 2015, the diurnal variations of the Earth's magnetic field in the Peshdar Plain varied in the range of 47.290 ±20.0 nT to 47.590, but were not affected or disturbed by magnetic storms. On the other hand, geological features and nearby technical installations, such as fences, disturb the readings to a disproportionately high degree, but in our case these disturbances were removable by a high-pass filter applied to the data. Its application however also removes the deeper and mainly geological features but provides supplemental information on the type of the anomalies. The results are then displayed in a second grey scale magnetogram image.

Accompanying measures of in situ magnetic susceptibility measurements were undertaken on rock samples and soil profiles by a handheld Kappa meter (SM-30, ZHinstruments, Brno, Czech Republic) with a sensitivity of ± 10-7 [SI] units which afforded a better understanding and interpretation of the magnetometer results (**Fig. B4.1**; **Table B4.1**).

51 e.g. Aspinal *et al.* 2008; Fassbinder *et al.* 2005; Gaffney *et al.* 2000.

52 Fassbinder/Gorka 2009

53 Fassbinder 2015.

Fig. B4.1: In situ magnetic susceptibility measurements taken for rock samples and soil profiles with a handheld Kappa meter (SM-30, ZHinstruments) with a sensitivity of ± 10-7 [SI-units]. Photos by Jörg Fassbinder.

Gravel rocks	54.4000 [10-3 SI] 2.88 [10-3 SI] 0.1370 [10-3 SI] 75.4000 [10-3 SI] 76,4000 [10-3 SI] 0.3100 [10-3 SI] 0.0857 [10-3 SI] 14.900 [10-3 SI] 11.300 [10-3 SI] 0.287 [10-3 SI] 0.0038 [10-3 SI] 14.300[10-3 SI] 0.2500 [10-3 SI] 0.3180 [10-3 SI]
Top soils	1.23 [10-3 SI] 0.842 [10-3 SI] 2.79 [10-3 SI] 1.28 [10-3 SI]
Pottery	11.000 [10-3 SI]

Table B4.1. Kappa values from Gird-i Bazar and Qalat-i Dinka. Note that the typical gravel rocks show a great variety in the content of magnetic minerals, which is measured as the volume magnetic susceptibility by the Kappa meter (SM-30, ZHinstruments).

B4.2 The magnetometer survey at Gird-i Bazar

The results of the geophysical work at Bazar were used to plan the excavation, which began immediately afterwards. They showed no further archaeological features in the area to the north of the fence surrounding the chicken farm. The northern perimeter of the ancient settlement therefore seems to correspond roughly to the modern fence. Immediately inside the fence, however, the geophysical results indicated the presence of clearly discernible rectangular building structures (**Fig. B4.2**). Consequently, an excavation area was set up here, in the western part of the ancient settlement (Ch. C5).

The measurements also revealed a high magnetic anomaly, which was interpreted as a kiln site because of the remanent thermomagnetic direction of the feature. The Connecting Trench (Ch. C4) was oriented in such a way as to allow excavation of the anomaly.

The eastern part of the survey area revealed only some indistinct and blurred features but no clear linear structures (**Fig. B4.3**). The excavation in this area (Ch. C3), however, yielded quite similar features as in the western part of the survey area. An explanation for this was provided by further analysis of the magnetic properties of the gravels and the topsoil, as *in situ* measurements of the volume magnetic susceptibility explained the discrepancy. The foundations of the buildings in the western part of the site were made using strongly magnetic gravels that were responsible for a high susceptibility and remanent magnetisation, which in turn generated a high contrast with the adjacent soil. In the eastern part, on the other hand, gravel rocks from another geological source where used for the foundations of the buildings. These gravels show almost the same kappa values as the adjacent soil and hence contrast only poorly with the soil, if at all.

Therefore, the important conclusion reached on the basis of the analysis of the magnetic properties of the foundations of the buildings at Gird-i Bazar is that the gravel rocks used originate from two separate sources.

B4.3 The magnetometer survey at Qalat-i Dinka

At Dinka, the two areas surveyed on the western slope (c. 14,500 m²) and on the eastern plateau (c. 3,200 m²) were chosen, firstly, because of ceramics surface finds and, secondly, because of topographical considerations. Both areas are being used for agricultural purposes. In August 2015, the fields cultivated in the surveyed areas had already been harvested but not yet been ploughed and were therefore relatively undisturbed. The strong magnetic enhancement of topsoil and archaeological layers compared to the weak magnetic susceptibility of bedrock and gravels is responsible for the clear signature of the ancient structures beneath the ground. As at Gird-i Bazar, however, the strong remanent magnetisation and the high magnetic susceptibility of several specific rocks and gravels dominate the magnetogram. Archaeological features built of sundried mud brick may be suppressed and therefore underrepresented in the magnetometer measurements. As a result, the signal of gravels and rocks dominates the resulting magnetogram image, whose analysis revealed clear settlement structures (**Fig. B4.4**).

On the eastern plateau (**Fig. B4.5**), the magnetometer survey revealed traces of dense settlement activity and many linear archaeological features, including foundations, pits, and very probably fortification installations.

On the western slope (**Fig. B4.6**), where the secondarily burnt clay tablet was found in 2013 (Ch. B1), a semi-circular feature of ca. 80×60 m seems to be clearly discernible. This peculiar settlement area shows a high concentration of magnetic anomalies. Additionally, there are linear features which very probably represent the remains of burnt houses or fireplaces. Pits in a large rectangular layout overlie (or possibly underlie) the semi-circular feature.

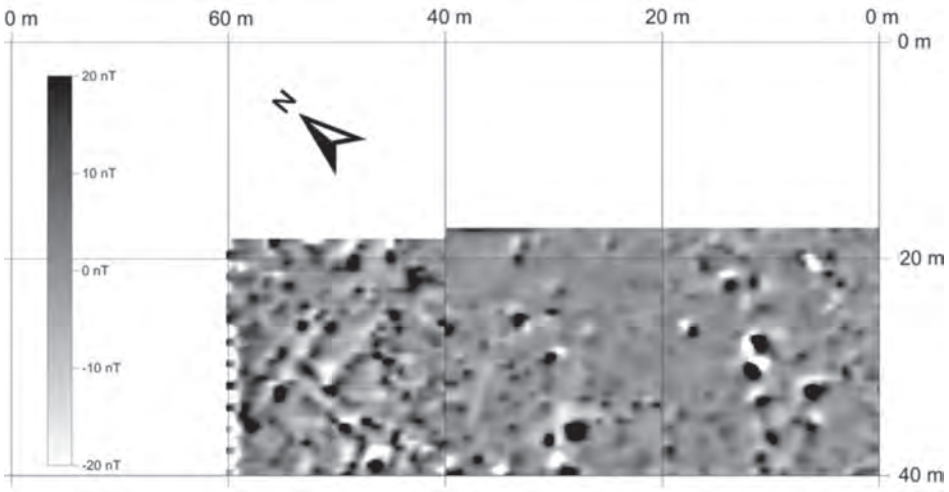

Fig. B4.2: Magnetogram of the area within the fenced area at Bazar, using a Smartmag SM4G-Special caesium magnetometer (sensitivity ±10 pT) in a variometer (duo-sensor) configuration. 40×40 m grid, spatial resolution 12.5×50 cm, interpolated to 25×25 cm. Intensity of total Earth's magnetic field at the site: 47,590 nT ±30 nT (August 2015). Prepared by Jörg Fassbinder.

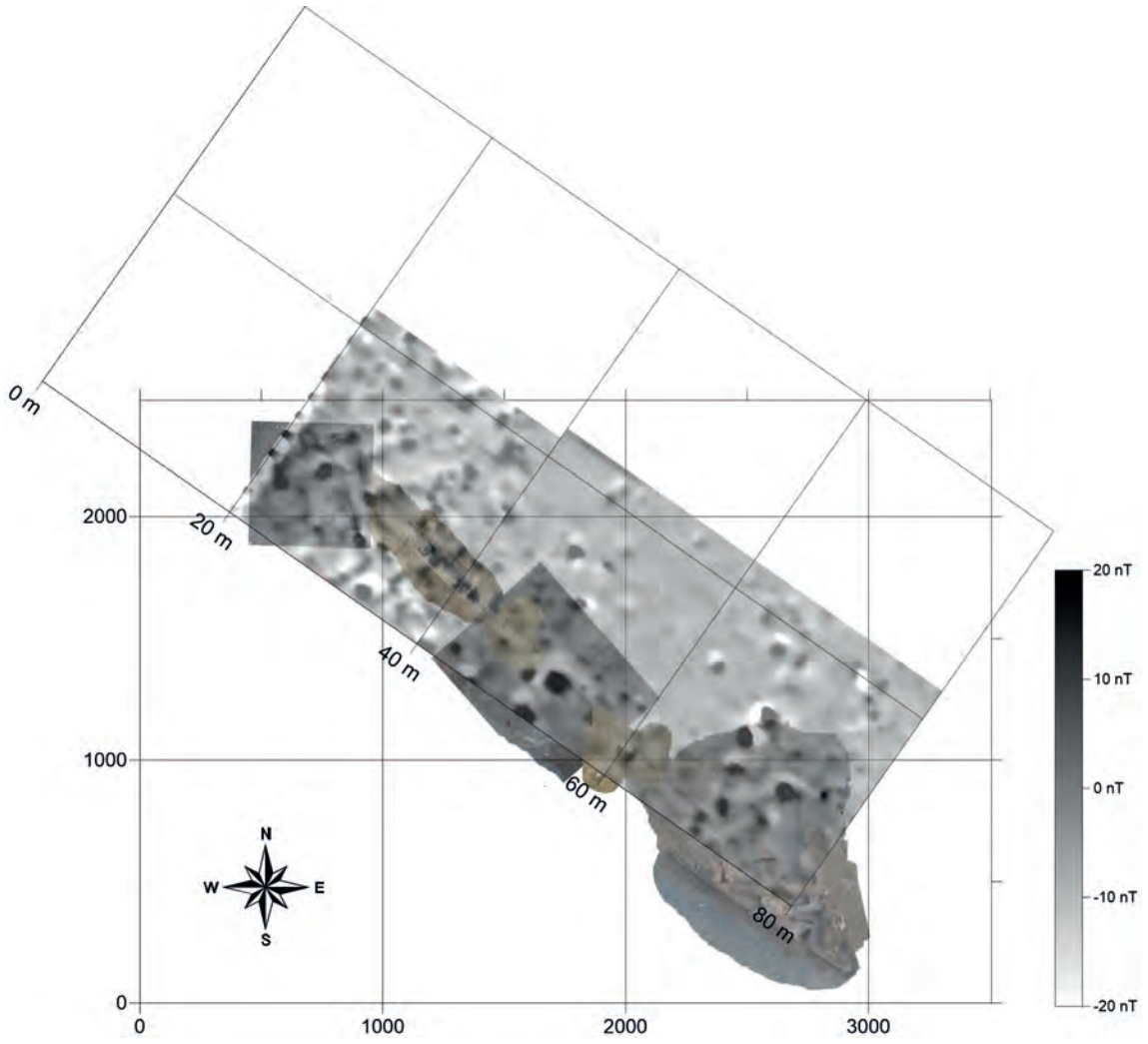

Fig. B4.3: Magnetogram superimposed on orthophotos of the excavated areas of Bazar. Magnetometer survey conducted with a Smartmag SM4G-Special caesium magnetometer (sensitivity ±10 pT) in a variometer (duo-sensor) configuration. 40×40 m grid, spatial resolution 12.5×50 cm, interpolated to 25×25 cm. Intensity of total Earth's magnetic field at the site: 47,590 nT ±30 nT (August 2015). Prepared by Jörg Fassbinder.

Fig. B4.4: Magnetograms of Dinka, superimposed on a satellite image (QuickBird Image, 24 October 2014). Magnetometer survey with a Smartmag SM4G-Special caesium magnetometer (sensitivity ±10 pT) in a variometer (duo-sensor) configuration. 40×40 m grid, spatial resolution 12.5×50 cm, interpolated to 25×25 cm. Intensity of total Earth's magnetic field at the site: 47,290 nT ±30 nT (August 2015). Prepared by Jörg Fassbinder.

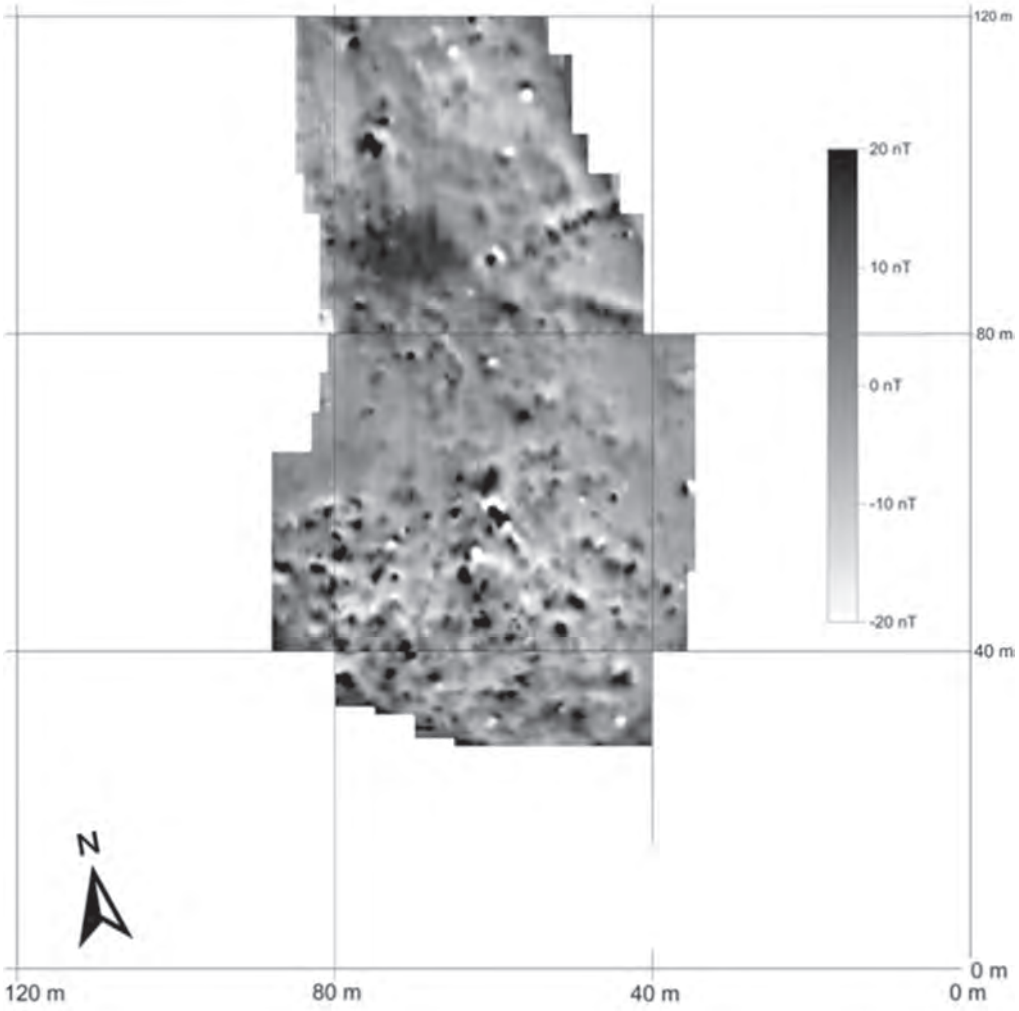

Fig. B4.5: Magnetogram of the eastern plateau of Dinka. Magnetometer survey with a Smartmag SM4G-Special caesium magnetometer (sensitivity ±10 pT) in a variometer (duo-sensor) configuration. 40×40 m grid, spatial resolution 12.5×50 cm, interpolated to 25×25 cm. Intensity of total Earth's magnetic field at the site: 47,290 nT ±30 nT (August 2015). Prepared by Jörg Fassbinder.

All archaeological structures are limited to the upper part of the western slope. Further down the slope, they are clearly enclosed by the remains of a palisade fence or fortification wall which shows up, in a fashion very similar to Gird-i Bazar, due to the remanent magnetic anomalies of the buried gravels. Near the modern metal fence, where the farmers dump stones that obstruct ploughing, we found two door socket stones with a diameter of about 1 m (**Fig. B4.7a-b**) that may originally belong to this fortification structure. Outside of the fortification, there are no more archaeological features discernible in the geophysical results.

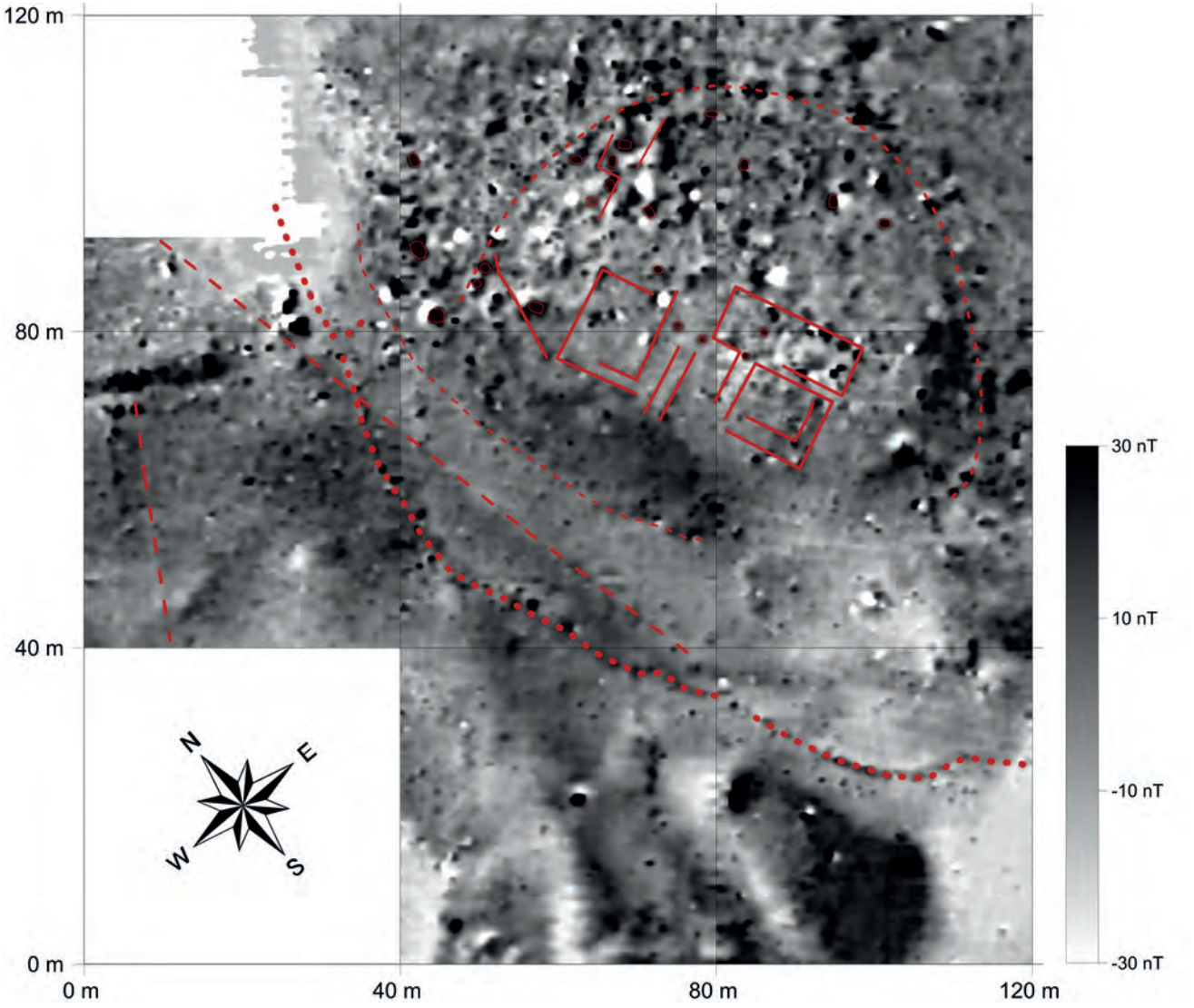

Fig. B4.6: Magnetogram of the western slope of Dinka. The red solid lines mark possible building foundations. The narrow red dashed line in the southwest marks a borderline, possibly a fortification wall. The semi-circle or horseshoe-shaped line in the northeast marks the border of the intensive settlement structures. All others dashed lines mark linear features that cannot be interpreted at present. Magnetometer survey with a Smartmag SM4G-Special caesium magnetometer (sensitivity ±10 pT) in a variometer (duo-sensor) configuration. 40×40 m grid, spatial resolution 12.5×50 cm, interpolated to 25×25 cm. Intensity of total Earth's magnetic field at the site: 47,290 nT ±30 nT (August 2015). Prepared by Jörg Fassbinder.

Fig. B4.7a

Fig. B4.7b

Fig. B4.7a-b: Two door socket stones with a diameter of c. 1 m, as currently situated near the modern metal fence at Dinka. Due to their size, these socket stones may have been part of the fortification structure surrounding Dinka. Photos by Janoscha Kreppner.

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