New Agendas in Remote Sensing and Landscape Archaeology in the Near East

Studies in Honour of Tony J. Wilkinson

edited by

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Cover illustration: Palaeochannels and archaeological sites north of Nasiriya, Iraq. A. SRTM image B. Landsat Image C. Features visible on SRTM D. Features visible on Landsat. For full explanation see Chapter 18
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The View from the Steppe: Using Remote Sensing to Investigate the Landscape of ‘Kranzhügel’ in Its Regional Context

Stefan L. Smith

Introduction

The landscapes of Northern Syria, in which Tony Wilkinson pioneered a wealth of archaeological studies, contain a significant geographical gap of little-to-no investigation. This is the large steppe landscape of the Western Jazira, a region bordered to the east by the Khabur River, to the west by the Balikh, to the south by the Euphrates, and to the north by the southeastern Taurus Mountains — roughly concordant with the Syro-Turkish border (Figure 8.1). At 19,400 km², the region encompasses an area twice the size of the Northern Jazira (east of the Khabur), an area with a well-documented wealth of archaeology (Wilkinson, Ur, and Casana 2004: 192–195). While the assumption that the greater aridity and remoteness of the Western Jazira has resulted in a lower concentration of archaeological remains is not entirely without basis, it is as inaccurate to think of its landscape as being largely devoid of sites, as it is to form conclusions of a regional scope based on the long-known corpus of ‘Kranzhügel’ sites alone (Smith and Wilkinson in press). Since surveys and excavations in the region are, in contrast to the Northern Jazira, limited, it falls to remote sensing techniques to allow the formation of a holistic view of the landscape and its context.

What follows is an overview of the geographical and archaeological landscape of the Western Jazira focusing on the crucial mid-5th to 3rd millennium BC, together with some preliminary interpretations. This period, which saw various urbanisation processes occur in many parts of the Near East (Wilkinson et al. 2014), is represented in the Western Jazira by very variable dynamics, with sedentary occupation fluctuating from near-complete abandonment, to its densest ever settlement pattern, and subsequently back to negligible levels (Hole 1997: 46–56; Pruß 2005). It also saw the unique emergence of ‘Kranzhügel’ settlements — large tell sites with concentric upper and lower towns and prominent encircling fortifications. These dynamics provide excellent data sources with which to interpret and illustrate the driving social, economic, and environmental factors faced by inhabitants of the Western Jazira.

Methodology and prior investigations

The data for this study is based on an intensive, systematic investigation of satellite imagery and digital elevation models (DEMs) carried out across the entire Western Jazira (Figure 8.2). The former largely comprises 1960s-era CORONA satellite photos, which in the nearly two decades since their declassification have been widely used in landscape studies of the Near East, owing to their demonstrated usefulness in mapping both sites and intersite features (Philip et al. 2002: 112–115). These were acquired and georeferenced by members of Durham University’s Fragile Crescent Project. The DEMs used are from the JAXA/NASA ASTER device, which is available at a resolution of 15 metres, six times that of extra-US SRTM data (Abrams 2000: 854–858). With the usefulness of DEMs for identifying tell sites in Northern Syria already well documented, potential problematic digital artifact issues pertaining to ASTER (e.g., Menze, Ur, and Sherratt 2006) were circumvented by using it as a backup to CORONA identifications only. Cartographical data, used mostly for determining toponyms, was also obtained, including maps illustrating the travels of early explorer and archaeologist Max von Oppenheim (1911, Tafel 18) and the Karte von Kleinasien (Kiepert 1910/1915).

The use of remote sensing naturally introduces a certain degree of uncertainty due to the distanced approach, yet in this instance it is backed up by robust surface control. Such a methodology mitigates issues of subjectivity, such as the visual appearance of sites on aerial imagery to a particular researcher, by introducing detailed data on material remains and morphological features collected and documented on the ground (Lawrence, Bradbury, and Dunford 2012). This stems from three excavations, at Tell Chuera (Meyer [ed.] 2010), Tell Kharab Sayyar (Meyer et al. 2005), and Tell Tawila (Becker et al. 2007),1 and two ground surveys, the Wadi Hamar Survey (Kudlek 2006; 2006).

1 A fourth site, Tell Mabtuh Sharqi (Figure 8.2), was excavated between 2001 and 2010 under the direction of Dr. Antoine Souleiman (Gernez and Souleiman 2013). Regrettably, not enough published data is available from this extensive project and thus it unfortunately cannot be used to inform this study.
Stefan L. Smith

Pruß 2005) and the Yale Khabur Survey around the Jebel Abd al-Aziz mountain (Figure 8.2; Hole 1997: 42–56; Kouchoukos 1998: 365–393). These cover both detailed archaeological knowledge (the result of over half a century of excavations) and a large geographical area — circa 6000 km² combined, or nearly a third of the entire Western Jazira. Thus data from these, obtained from numerous published sources, unpublished dissertations and databases, and personal communications, were consistently used as a foundation upon which to build remote sensing-based analyses and interpretations.

The landscape of the Western Jazira

The geography of the Western Jazira is largely uniform, the majority comprising a level semi-arid steppe rising between circa 250 and 400 metres above sea level from south to north, respectively. Most of this landscape is used for barley crop agriculture in the present day, much of it dependent on 20th century technology in the form of diesel-powered pumps to raise groundwater to the surface (Hole 1997: 44). However, photographs from the 1910s taken by von Oppenheim (in Moortgat-Correns 1972) show the pre-industrial landscape to have been a homogenous plain dotted with intermittent low-lying shrubs and grasses. This uniformity differs in the southern regions, where lower levels of precipitation form an arid steppe devoid of any vegetation. The landscape is also broken by two major uplands: the Jebel Abd al-Aziz to the east and the Tual ‘Abah to the west (Figure 8.3). The former is an elongated mountain ridge running east–west, measuring 60 km in length and 15 km across, and reaching a height of over 900 metres.
Figure 8.3. CORONA satellite image of the Western Jazira showing major geographical features and all sites of definite or likely EBA occupation, with those mentioned in text labelled. Isohyets are at 50 mm intervals, and represent average annual precipitation from 1980 to 2010 from Global Precipitation Climatology Centre (GPCC) data, processed by Louise Rayne of the University of Leicester. Numbered sites: 1 - Tell Chuera, 2 - Tell Khanzir, 3 - Tell Abu Shakhat, 4 - Tell Bogha, 5 - Tell Ghajar al-Kebir, 6 - Tell Dakhilz, 7 - Tell Glai’a, 8 - Tell Kharab ‘Arnan, 9 - Tell Mabtuh Sharqi, 10 - Tell Mabtuh Gharbi, 11 - Tell Mu’azzar, 12 - Tell Hamam Sharqi, 13 - Tell al-Magher, 14 - “Site 34”, 15 - Tell Hamam Gharbi, 16 - Tell Barud, 17 - Tell Mityaha, 18 - Khirbet Malhat, 19 - “Site 45”, 20 - Tell Zahamak, 21 - Tell Sha’ir, 22 - Tell Asamsani, 23 - Tell Mahlas, 24 - “Site 42”, 25 - Bir Sa’id
in the late 19th century (von Oppenheim 1901: 91–92). Regarding the more distant past, palaeobotanical data suggests such woodland to have covered the entire northern half of the Western Jazira until at least the mid-3rd millennium BC (Deckers and Pessin 2011).

The values of average annual rainfall in the Western Jazira vary depending on the data sources used, both for the present day and extrapolated proxies for the palaeoclimate. Some of the most accurate modern data freely available is from the Global Precipitation Climatology Centre (GPCC), of which a subset of averages of mean monthly precipitation totals from 1980 to 2010, processed by Louise Rayne of the University of Leicester, provide the best results (Rayne, pers. comm.). Meanwhile Kalayci (2013: 99–111), extrapolating the speleothem record from the Soreq Cave for Northern Mesopotamia, calculates very different values for both 2800 BC (higher than modern rainfall estimates) and 2200 BC (lower values than the present day), illustrated in Figure 8.4. Such past-present climate discrepancies are a separate discussion not entered into here, but since the GPCC isohyets form a rough average of the two extrapolated Early Bronze Age (EBA) data, and the relative correlations between each precipitation dataset and geographical locations remain similar, it was deemed that the modern values can be used to inform a discussion on the region’s past environment. Furthermore, with rainfall variations across the Syro-Jordanian steppe fluctuating by at least circa 45% from one year to the next (Sanlaville 2000: 11–12), such stark short-term variations likely had a much greater effect on the region’s prehistoric inhabitants than long-term climatic trends.

According to the GPCC data therefore, the highest levels of rainfall occur in the far northeast, which lies around the 350 mm isohyet, while at the southern end the confluence of the Euphrates and Khabur rivers receives a mere 145 mm per annum (Figure 8.3). However, even in the region’s wettest areas, high inter-annual precipitation variability causes crop failure to at best still occur one out of every three to six years, precluding the possibility of reliable perennial rain-fed agriculture (Wilkinson and Hritz 2013: 17–18). Between the 180 and 300 mm isohyets, Wilkinson (2000: 3–4) has defined a ‘zone of uncertainty’ in which agriculture is possible, but at a risk, leading to a dominance of agropastoral strategies in contrast to the mobile pastoralism of the arid south.

Rainfall is not the only water source available, however. To the north, the Wadi Hamar is the region’s only reliably seasonal watercourse, receiving a consistent springtime flow from the Taurus Mountains of Southern Anatolia (Figure 8.1; Figure 8.3; Kouchoukos 1998: 379–381). Wells for accessing groundwater also contribute to agricultural and settlement potential in the Western Jazira. Much emphasis was placed on the location of these by early explorers of the region, with Alois Musil (1927: 87–89) mentioning ones located near the EBA sites of Khirbet Malhat and Tell Zahamak in the arid south (see Figure 8.3). Both of these are located in low-lying gypsum sinks, where the groundwater table is relatively shallow and thus accessible (Kouchoukos 1998: 386–387). However, the predominant topographic elevation of the Western Jazira does not consistently allow for such easy access.

Surface runoff from the region’s two uplands is a further major contributor to water resources in the southern portion of the landscape, and has been analysed by Kouchoukos (1998: 383–386) along the southern piedmont of the Jebel Abd al-Aziz. In this area, precipitation on the flanks of the mountain collects in shallow seasonal lakes, which in turn charge seasonal wadis, of which at least seven flow southwards. Similar processes likely contribute to the five or more wadis flowing from the Jebel’s northern piedmont towards the Khabur (see Kiepert 1910/1915). Additional such watercourses can be found flowing northwards to the Wadi Hamar and southwards to the Euphrates from the Tual ‘Abah uplands (see Kouchoukos 1998: Fig. 7.10).

Despite these multiple water sources, settlement sustainability in this region remains a challenge, as all are prone to long and short-term variation. As rainfall...
values fluctuate, so does the amount of concentrated surface runoff available to charge seasonal watercourses, which can rapidly dry out completely. Meanwhile, the quality of groundwater, and hence the fertility potential of soil nutrients, is also impaired by any consecutive years of drought, severely limiting the possibilities for agriculture (Wilkinson and Hritz 2013: 14–16). Thus all sedentary populations in the Western Jazira would have faced a very uncertain survival potential, leading to erratic long-term settlement trends.

**Mid-5th to 3rd millennium BC settlement dynamics**

Owing to the remote-sensing basis of this study, all definite chronology data from the Western Jazira stems from the results of prior investigations, presented here in summary. In addition to the excavations and surveys mentioned above, surface collections by the TAVO Survey (Preuss 1989), the Sheikh Hamad Regional Analysis (Kühne and Schneider 1988), and the Khirbet Malhat Survey (Quenet and Sultan 2014) were used to supplement the fairly sparse dating information available. When drawn together, these provide sufficient data to extrapolate across the entire study region.

The Late Chalcolithic (LC) Period of the mid-5th to late 4th millennium BC saw extremely little settlement across the Western Jazira. A total of only six locations with LC occupation (all predating circa 3700 BC) have been identified, representing around 5% of all dateable sites (Figure 8.5). These have been best researched in the Wadi Hamar region, where the excavated sites of Tell Chuera and Tell Tawila contain early LC material, but show evidence of a hiatus of several centuries before their resettlement at the outset of the EBA (Babour in Hempelmann 2013: 35–36; Becker et al. 2007: 260–263). Thus despite there being some evidence for LC sites in the Western Jazira, and a potentially large settlement in the case of Tell Chuera (Helms and Tamm 2014: 287–288), the overall pattern is one of little and intermittent human occupation of the steppe. Though Hempelmann (2013: 271–272) cites palaeoclimatic proxy data (see Weiss 2003) suggesting aridification to have been responsible for the mid- to late-LC abandonment of the region, the specifics of these dynamics are unfortunately too little researched to be able to say anything more concrete on them.

The subsequent EBA could hardly provide a more radically different picture. Not only does the Western Jazira see an explosion of settlement during this period, but a plethora of site types emerge, most prominent among them the large fortified ‘Kranzhügel’ tells. To quote Hole (1997: 52), ‘even today, with industrial scale agriculture and support systems, there are no settlements comparable to those of the third millennium [BC].’ Overall, 64 sites were dated to this period, representing 58% of all sites with dateable material (Figure 8.6). Of these, 20 are large (over 10 hectares in size) and 16 are ‘Kranzhügel’ settlements, though several further examples of this site type exist that have not been dated.

Due to differing chronologies used for various projects, the data available ranges from period subdivisions of between two and six phases. At the more precise end of this spectrum is the Wadi Hamar region and its local TCH I ceramic chronology developed by Winfried Orthmann and Jan-Waalke Meyer, and later refined by a combination of calibrated radiocarbon dates and reconstructions by Hempelmann (2013: 157–161; Table 8.1). This is one of the local chronologies synthesised to form the regional ‘Early Jezirah’ (EJZ) chronology defined by Lebeau (2011; Table 8.1), part of the ARCANE regional chronology project and employed as a standard for this paper. Thus one can see that the majority of EBA sites around the Wadi Hamar emerged during EJZ 0, and although many were abandoned a mere 400 years later, Tell Chuera and other large sites like Tell Dakhilz (see Figure 8.3) continued to be occupied until EJZ 4a–5 (Figure 8.7; Hempelmann 2013: 187–193; Kudlek 2006).²

² The latest EBA radiocarbon date obtained from the Wadi Hamar region is 2465 ±20 cal. BC, corresponding to the start of TCH ID, the penultimate TCH I period (Table 8.1). Thus the dating of the most recent EBA phases is uncertain, leading to a wide range of possible corresponding regional periods (Hempelmann 2013: 184–185).
The Yale Khabur Survey uses a less precise definition of only two periods: phases I–II and IIIa–IIIb of the first incarnation of the ‘Frühgazira’ (EJ) chronology developed by Pfälzner (1997). Both this and the EJ chronology have been correlated with the stratigraphic levels of Tells Leilan, Bderi, and Raqa’i (by Pfälzner 1997 and Quenet 2011, respectively), and by comparing these correlations the EJ sequence can be transposed to the EJZ, providing comparable results (Table 8.2). Thus it can be seen that settlement in the Jebel Abd al-Aziz region commenced a few centuries later than around the Wadi Hamar, during EJZ 1 (Figure 8.7). However, despite being numerous, sites remained small in size until EJZ 3a, when large urban centres emerged (often directly out of the earlier settlements) and remained occupied until the region’s near-complete abandonment at the end of EJZ 3b (Kouchoukos 1998: 373).

‘Kranzhügel’ morphologies

The ‘Kranzhügel’ variety-of-tell settlement has been documented since von Oppenheim (1901: 86–92) first explored this region in 1899. Although mainly associated with the Western Jazira, this site type exists to the east and west of this region also (Smith and Wilkinson in press). Von Oppenheim defined these as more-or-less circular or polygonal sites with large, low mounds. Furthermore, he emphasised that they are comprised of an inner mound (which he called a ‘Burg’ or ‘Zitadelle’) enclosed by bastions or an inner wall, and a lower-level terrace that encircles the former, itself

**Table 8.1.** Table of dates for the EJZ and TCH chronologies, adapted from Lebeau 2011: 379 and Hempelmann 2013: 161, respectively.

<table>
<thead>
<tr>
<th>Early Jezirah chronology with approximate dates</th>
<th>Tell Chuera chronology with absolute dates for the start of each period</th>
</tr>
</thead>
<tbody>
<tr>
<td>EJZ 0</td>
<td>TCH IA</td>
</tr>
<tr>
<td>EJZ 1</td>
<td>TCH IA/IB</td>
</tr>
<tr>
<td>EJZ 2</td>
<td>TCH IB</td>
</tr>
<tr>
<td>EJZ 3a</td>
<td>TCH IC</td>
</tr>
<tr>
<td>EJZ 3b</td>
<td>TCH ID</td>
</tr>
<tr>
<td>EJZ 4a</td>
<td>TCH IE</td>
</tr>
<tr>
<td>EJZ 4b</td>
<td></td>
</tr>
<tr>
<td>EJZ 4c</td>
<td></td>
</tr>
<tr>
<td>EJZ 5</td>
<td></td>
</tr>
</tbody>
</table>

**Table 8.2.** Table of the EJ chronology of Pfälzner (1997: 240) transposed to the EJZ chronology of Lebeau (2011: 379).

<table>
<thead>
<tr>
<th>Frühgazira EJ chronology (1997 version)</th>
<th>ARCANE EJZ chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>EJ I</td>
<td>EJZ 0</td>
</tr>
<tr>
<td>EJ II</td>
<td>EJZ 1</td>
</tr>
<tr>
<td>EJ IIIa</td>
<td>EJZ 2</td>
</tr>
<tr>
<td>EJ IV</td>
<td>Final EJZ 2</td>
</tr>
<tr>
<td>EJ IIIb</td>
<td>EJZ 3a</td>
</tr>
<tr>
<td>EJ IIIc</td>
<td>EJZ 3b</td>
</tr>
<tr>
<td></td>
<td>EJZ 4a</td>
</tr>
<tr>
<td></td>
<td>EJZ 4b</td>
</tr>
<tr>
<td></td>
<td>EJZ 4c</td>
</tr>
<tr>
<td></td>
<td>EJZ 5</td>
</tr>
</tbody>
</table>
The first problem is the concept that the two concentric walls visible at many of these settlements were in use simultaneously during their entire period of occupation. This is not always explicitly stated but is consistently implied by the widespread use of the term ‘double-walled’ to describe them. While it is certainly possible that some ‘Kranzhügel’ sites may have featured a double-walled system from the outset, excavations at the only well-documented example in the Western Jazira, Tell Chuera, showed that this was in fact a gradual process. At the outset of its occupation, this tell was comprised solely of the later ‘upper town’ and its one encircling wall. Only around four centuries later did the site expand into its lower town and see the construction of the second encircling wall, while the (now) inner wall was refortified, at which point Chuera became truly ‘double walled’ (Helms 2018).
Secondly, even if the concept of the ‘double-walled Kranzhügel’ is used purely as a description for the visual appearance of these sites’ archaeological footprints, it is inaccurate to homogenously apply it to all large fortified tells in the region. Settlements that have been called ‘Kranzhügel’ include such diverse sites as Tell Chuera, Khirbet Malhat (Quenet and Sultan 2014), Tell Beydar (Lebeau 1990), Tell al-Rawda (Casana and Herrmann 2010: 74), and Mari (Meyer 2010a). As noted by Creekmore (2008: 342–343), the morphologies of, for example, Tells Chuera and Beydar ‘have little in common, and certainly are not more similar to each other than they are to non-Kranzhügel sites.’ Evidently, there is a need for clarification and greater precision of the term here.

At least three separate types of ‘Kranzhügel’ are identifiable in the Western Jazira based on their visual footprints on satellite imagery. Two of these I have previously defined as ‘true Kranzhügel’ and ‘ringwall settlements’ (Smith, Wilkinson, and Lawrence 2014: 164–165). The former type resembles Tell Chuera; a circular upper mound with a central depression and a surrounding wall, around which lies a concentric circular lower town on a terrace with its own surrounding wall. Meanwhile ringwall settlements are characterised by a flat-topped circular or polygonal inner mound and barely visible (often seemingly nonexistent) surrounding wall, around which a ‘lower town’ with hardly any visible structural remains situated on an extremely low (if any) terrace is enclosed by a very clear polygonal outer wall (Figure 8.8). Since defining these classifications, however, it has become clear that further varieties of sites exist that have been indiscriminately labeled ‘Kranzhügel.’ A third major type I have termed the ‘Dakhliz variety’ after the eponymous tell site (see Figure 8.3). This is distinguished by an upper town and inner ramparts almost indistinguishable from that of the true Kranzhügel, but a flat concentric lower town with no outer enclosing wall (Figure 8.9).

While the discrepancies between true Kranzhügel and ringwall settlements can be put down to different underlying reasons for their establishment and economic practices of their inhabitants (see discussion below), the Dakhliz variety are perhaps best explained as ‘unfinished’ true Kranzhügel (Kudlek, pers. comm.). That is to say they each probably underwent the same initial establishment of a simple tell with enclosing ramparts as did Tell Chuera, before expanding similarly also. However, such an expansion was most likely short-lived, or involved activities that were not deemed to require fortification, since it never saw the construction of a further wall enclosing the entire settlement.

Results of the remote sensing survey

As the survey carried out covered the entire region of the Western Jazira (see Figure 8.2), it encompasses both areas incorporated into prior investigations and areas hitherto unstudied. Thus presented here is an overview of the major sites (all marked on Figure 8.3) and offsite features recorded by both others and me from the LC to EBA Periods. These have either been dated on the ground, or have been deemed to very likely date to these periods based on their morphology as seen on remote sensing. Where data on LC–EBA occupation periods is available, this has been listed in brackets; where none exists, the acronym ‘ND’ (no date) has been used. Also included are the size of each site as measured on satellite imagery, and its ID number from this study’s database.

Sites — Wadi Hamar region

This northern region sees a concentration of numerous prominent EBA settlements, many of them belonging to the ‘Kranzhügel’ variety. The most notable of these is Tell Chuera (Site 22; 68 ha; LC, EJZ 0–4c/5), not only the best-investigated and published site in the Western Jazira, but also its largest EBA settlement. This tell, which defines the true Kranzhügel type, consists of a flat circular central mound with a clear large central depression, while its inner surrounding wall is only faintly visible (see Figure 8.8). Around this extends Tell Chuera’s lower town, which is surrounded by a largely circular outer wall that is very clearly visible on all satellite imagery and interspersed by a large number of gaps, some confirmed to be city gates. Several of these appear to align with features in the upper town, indicating the radial street network confirmed by excavations and geomagnetic prospection (Meyer 2010b).

Several other tells in the Wadi Hamar region display a very similar morphology; in order of size, these true
The View from the Steppe

Kranzhügel are Tells Khanzir (Site 27; 40 ha; at least EJZ 3b–5), Abu Shakhat (Site 24; 31 ha; at least EJZ 2–3b), Bogha (Site 25; 22 ha; ND) and Ghajar Al-Kebir (Site 21; 20 ha; 'EBA'). Naturally not all these settlements are identical in form; the outer wall of Tell Khanzir, for example, features a protruding angular outcrop on its northwestern side (Figure 8.10). However, they all contain enough similarities in terms of morphology, form, and location to categorise them together.

Two further fortified tells in the Wadi Hamar region have a distinctly different morphology. These are the Dakhliz variety sites of Tell Dakhliz (Site 72; 23 ha; EJZ 0–4a) and Tell Glai'a (Site 116; 18 ha; ND). The former (Figure 8.9) consists of an oval 10-hectare truncated conical tell at its centre, with a flat (not depressed) middle. Its perimeter features a distinct encircling wall, gaps in which could indicate gates. This is surrounded by a clear ‘halo’ of undulating surface on CORONA imagery, indicating intensive human activity; i.e., a lower town without an enclosing wall. Tell Glai’a is very similar, though more regularly circular and with fewer gaps in its wall. One final large site, Tell Kharaib ‘Arnan (Site 28; 9 ha; ND) features no visible integral ramparts; though as it is partially covered by a more recent settlement likely dating to the Late Antiquity and surrounded by a clear wall of presumably this period also, the presence of EBA fortifications cannot be categorically discounted.

Sites — Jebel Abd al-Aziz region

The regions north and south of this mountain range also contain a great number of significant settlements. The largest are two true Kranzhügel very similar to those discussed above, located within five kilometres of the northern flanks of the jebel; Tells Mabtuh Sharqi (Site 36; 44 ha; EJZ 2–5) and Mabtuh Gharbi (Site 39; 28 ha; EJZ 1–3b). Apart from these, most major settlements in this area are of the ringwall settlement type, the clearest example being Tell Mu’azzar (Site 41; 14 ha; EJZ 1–3b/5), three kilometres south of the mountain’s southern piedmont. This site has a circular central mound that is flat on top with a very slight depression, around which a wall featuring several gaps is vaguely noticeable (see Figure 8.8). The surrounding ‘lower town’ area appears largely empty, with only a slightly undulating surface noticeable on the western side on CORONA imagery. Beyond this, the clarity of the rounded pentagonal outer wall is particularly striking, as are five gaps in it, two of which align with those on the central mound to form a rough northwest–southeast axis.

Three other prominent sites in the area north of the jebel exhibit very similar features: Tell Hamam Sharqi (Site 35; 16 ha; EJZ 3a–3b), Tell Al-Magher (Site 38; 13 ha; EJZ 1–3b), and Site 34 (4.5 ha; EJZ 3a–3b). A fourth large site, Tell Hamam Gharbi (Site 474; 10 ha; EJZ 1–3b), is a prominent circular tell with a clear central depression, but shows no obvious signs of ‘Kranzhügel’-like ramparts. Finally, some small fortified tells such as Barud (Site 481; 2.9 ha; EJZ 3a–3b) and Mityaha (Site 487; 2.5 ha; EJZ 1–3b) are located south and east of the jebel; however, these cannot be categorised by the same site typology as the large settlements.

Sites — southern region

The arid steppe south of the Western Jazira’s two uplands features a few further major sites, some of which could be called ‘Kranzhügel.’ These include Khirbet Malhat (Site 46; 33 ha; EJZ 1–3b), situated 40 kilometres south of the Jebel Abd al-Aziz in the most arid location for any large site in the region. The appearance of this clear rounded hexagonal ringwall settlement in a landscape which today receives only 200 mm of rainfall per year (and even at times of increased precipitation in the past likely received less than 250 mm; see Figure 8.4) has long been regarded as an anomaly. However, this study has shown it to be the easternmost settlement on an alignment of sites that stretches between the Khabur and Balikh rivers, skirting the southern limit of accessible water sources. The other major sites along this line, from east to west, are Site 45 (8.6 ha; ND), Tell Zahamak (Site 44; 10 ha, possibly up to 50 ha; 'EBA'), and Tell Sha’ir (Site 43; 21 ha; ND). These appear most similar to the Dakhliyah-variety tells, but with enough variations in terms of form and morphology to render them unique (Figure 8.11). They furthermore align with the large potential river-fording sites of Tell Asamsani (Site 1232; 10 ha; ‘3rd millennium BC’) on the Khabur, and Tell Mahlas (Site 16; 6.2 ha; ‘early–late EBA’) on the Balikh, a site with mid–late EBA fortifications (Curvers 1991: 183–184). Other minor tells ranging from 0.4 to 1.6 ha also lie along this line.
Two further features of note exist in this region, both in the vicinity of the Tu‘al ‘Abah mountains. One is the isolated ringwall settlement Site 42 (6 ha; ND), a clear example of this site type with the form of a rounded square. The other is an interesting feature next to the modern village of Bir Sa‘id (Site 1065; 1.5 ha; ND). This site appears as a dark-shaded area that is clearly much visited, as evidenced by the straight pathways emanating outwards, crossing its centre like the spokes of a wheel (Figure 8.12). This, together with the location’s toponym ‘bir’, indicates the presence of a significant well. From its location, it appears likely that this was also a water source in antiquity (see below).

**Offsite features — hollow ways**

While nowhere near as prevalent as in the Khabur basin (see Ur 2003), several major sites in the Western Jazira exhibit ‘hollow ways’ (Figure 8.13); heavily-used routeways for accessing agricultural and pastureland in antiquity that manifest as incised lines in the present-day landscape (Ur 2003: 102–104). The sites that clearly exhibit these emanating in all directions are Tells Mabtuh Sharqi, al-Magher, Bogha, Khanzir, Kharab ‘Arnan, and Mu‘azzar. Some examples also exist around Tells Chuera, Mabtuh Gharbi, Hamam Sharqi, and Hamam Gharbi, though these are fainter and mostly concentrated on a single side of each site. None appear to go very far (circa 10 km maximum), and there are no clear examples of the long intersite hollow ways that exist in the Khabur basin (see Ur 2003: 111–112).

Significantly, none exist around the two Dakhlo-tells, despite these being located in areas where other contemporary tells do exhibit hollow ways. This further supports the hypothesis of a short and uneven occupation of these sites, at least as large settlements. Meanwhile, the consistency of the absence of hollow
ways of any kind in the entire southern half of the Western Jazira, despite the existence of several large tells of a variety of types, is probably better explained by the taphonomic processes of an arid, dusty environment obscuring any traces of ancient paths, as well as the lack of necessity of following the same route for each journey in an area of sparse land control.

Discussion of EBA settlement dynamics

The prevalence of large, well-fortified sites in the semi-arid steppe of the Western Jazira during the EBA naturally poses the question of how and why societies and economies operated in the region, sustaining themselves for the better part of a millennium. Several potential coping strategies that could have been employed to minimise risk have been postulated in recent publications, including agro-pastoralism (Smith, Wilkinson, and Lawrence 2014: 154–159), agricultural extensification (Wilkinson et al. 2013: 185–189), support of large sites by satellite settlements (Kalayci 2013: 237–243), and trade (Wilkinson 2000: 13–14). The EBA populations of the different regions of the Western Jazira likely employed a variety and combination of such resilience methods for survival, tailored to the specific environmental and social needs of each area. However, the different timings of settlement trajectories and the heterogeneous fortified settlement morphologies suggest that the origins of urbanism in the region were equally varied.

Specifically, two distinct zones of trajectories to urbanism can be defined in the Western Jazira. The northern settlement zone (Figure 8.3) sees true Kranzhügel and Dakhlez-variety tells established from EJZ 0 onwards. The general pattern across Northern Mesopotamia at this time is one of previous indigenous centres vanishing in favour of dispersed small settlements and a reduction in social complexity following the collapse of the Uruk expansion until the mid-EBA (circa 3000–2600 BC; Ur 2010: 401–404). By contrast, this zone sees rapid urban growth with the establishment of numerous large fortified centres. This has led Hempelmann (2013: 272) to argue that initial settlement trajectories around the Wadi Hamar were not linked to developments in its vicinity, and based on ceramic similarities (such as cyma-recta bowls, Karababa ware, and metallic ware) suggests it to be the product of migration from the Upper Euphrates region (see Figure 8.1). Inhabitants of large sites in that area were not only less affected by the collapse of the Uruk network, with evidence of continuous LC to EBA occupation at many sites, but were also familiar with aspects of urban planning (Hempelmann 2013). This would explain the existence of the central administrative axis and planned street network of Tell Chuera (and presumably other large sites around the Wadi Hamar); indicators of societies with highly organised hierarchical structures

Figure 8.13. Map of the Western Jazira showing the locations of all hollow ways identified by the remote sensing survey, and the main sites these emanate from. Some of the hollow ways depicted in the northeast have previously been mapped by Jason Ur of Harvard University.
This northern zone was likely colonised as it is a prime location for agro-pastoralist strategies to prevail. Assuming climatic conditions not too dissimilar to the present day,3 this area would have allowed for sufficient agriculture to produce the amounts of fodder crops necessary to support large sheep herds. These, in turn, would have had ample space for pasture in areas away from wadi courses, along which the majority of EBA settlements were clustered. This would additionally have provided space for the implementation of extensification during dry years (Smith and Wilkinson in press). Together, these practices would also account for the relative prevalence of hollow ways in the area.

The southern settlement trajectory zone (Figure 8.3), by contrast, follows the general EBA settlement pattern of Northern Mesopotamia, with large urban centres not emerging until the mid-3rd millennium BC (Ur 2010: 404–412). Though this area saw a similar influx of population and probable use of agro-pastoralism as the Wadi Hamar region around 500 years earlier, the reasons behind these processes were likely very different. Since high numbers of sheep holdings are known from textual sources to have been required by major polities by this time (see e.g. Milano 1995), these would have been in the best position to exploit both the empty space and potential for limited agriculture of the southern Western Jazira when conditions were favourable (Smith et al. 2014: 161–163, 166–168). This would explain the influx of people and thus rapid settlement increase primarily during the mid–late EBA, presumably originating from newly urbanised centres on the nearby Middle Khabur (Kouchoukos 1998: 421–423). However, this likely occurred in combination with local exchange with mobile pastoralists, or a fluctuating relationship between these two strategies over time. Kouchoukos (1998: 410–412) argues that the commodification of pastoral produce, a result of the growing value of textiles (and hence the wool needed to produce them) following the late 4th millennium BC Uruk expansion (McCorriston 1997), would have made local trade between mobile pastoralists and sedentary farmers a lucrative business around the Jebel Abd al-Aziz.

Regionwide trade doubtless also played a major role in the colonisation of the southern settlement zone. This is especially true south of the 250 mm isohyet, where despite the existence of accessible groundwater sources sufficient for direct human consumption, the low precipitation levels preclude the use of even the most flexible agro-pastoralist strategies, making it ‘doubtful that agriculture was the dominant means of subsistence’ (Kouchoukos 1998: 387). As the numbers of local mobile pastoralists in such arid regions are also likely to have been low, long-distance trade would appear to have been the primary source of income, and indeed raison d’être, of large sites. This hypothesis is given greater credence by the identification of the alignment of four large tells described above (Figure 8.11), but also likely applies to other sites in the area. The probable well of Bir Sa‘id, for example, is directly located on a route between Nineveh on the Tigris and Tell el-Sweyhat on the Upper Euphrates (and west thereof) proposed by Wilkinson (2004: 186–187).

It is furthermore possible that the locations of the southern zone’s prevalent ringwall settlements on trade routes account for their morphology. As has been proposed for Tell Beydar, the inner and outer walls of which were constructed and initially used simultaneously, ‘traders were [very likely] allowed to spend the night between the [two] walls, safe from highway robbers but not themselves posing a danger to the sleeping citizens of [the city]’ (Bretschner 2005: 55). This would explain the very prominent outer walls of ringwall settlements, as well as the empty look of their ‘lower towns’ on satellite imagery, as these areas might primarily have been the locations of temporary traders’ camps rather than permanent structures.

To conclude, the settlement trajectories recorded in the Western Jazira make it clear that there was no single path to urbanism in Northern Mesopotamia, supporting the conclusions of Wilkinson et al. (2014). While the general pattern of dispersed small rural settlements during the early EBA giving way to increased numbers of large urbanised centres in the mid–late EBA is not in dispute, geographical pockets of alternative patterns appear likely. In the case of the northern Western Jazira, this is accounted for by a probable long-distance migration from the Upper Euphrates region, establishing a separate developmental enclave within Northern Mesopotamia. More broadly, the complex and dense EBA settlement structures observed make it evident that the overall exploitation of the Western Jazira (incorporating various subsistence strategies in abundance and to great effect) was a major component of the regional and inter-regional economy to an extent not previously realised. Thus this area is not a ‘marginal’ region, as it has long been considered, but is instead as integral to the study of Northern Mesopotamia as its well-researched fertile regions. While the Western

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1 Estimates by Kalayci (2013: 99–111) suggest that if anything, conditions in the early 3rd millennium BC would have been slightly wetter than in the present day (see Figure 8.4).
Jazira certainly merits further investigations, especially on the ground, this remote sensing-based survey goes some way to filling in a significant knowledge gap of EBA Northern Syria, illustrating how this methodology can contribute results with widespread ramifications to the known archaeological landscape.

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