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This study analyses the relationship between Aleppo and settlements in the city's hinterland based on spatial statistics. A theoretical extension of the term central place is used in reconstructing Aleppo's central character. Locally the city served as a centre for trade, exchange, and cult activity. In a regional and supra-regional context, advantages deriving from the topographic location led trade, exchange, and craft to take on different functions. This study demonstrates that, in constrast to other important cities in the ancient Middle East, Aleppo could maintain its long-lasting significance as a central place due to the combination of different functions.

Central Place; Central Functions; Spatial Scales; Environmental Determinism; Middle East.

Die Studie analysiert anhand räumlicher Statistik das Verhältnis zwischen Aleppo und den die Stadt umgebenden Siedlungen. Auf Basis einer theoretischen Erweiterung des Begriffs 'Zentraler Ort' ist es möglich, Aleppos zentralen Charakter darzustellen. Die Stadt diente als lokales Zentrum für Austausch und Kult. Im regionalen und überregionalen Kontext profitierte die Stadt von ihrer topographischen Lage, die Funktionen des Handels und Handwerks konzentrierte. Die Kombination der zentralen Funktionen Aleppos auf verschiedenen Skalen kann als Grund für die diachrone Bedeutung des Ortes, im Vergleich zu anderen Städten des mittleren Ostens, verstanden werden. Die Studie zeigt, dass diese Kombination aus Funktionen der Grund dafür war, dass Aleppo, anders als vergleichbar wichtige Städte im Mittleren Orient, seine zentrale Bedeutung langfristig sichern konnte.

Zentraler Ort; Zentrale Funktionen; Raumskalen; Naturdeterminismus; Mittlerer Osten.

1 Introduction

This study investigates the centrality of the city of Aleppo in the context of its environs. Recent investigations by the research group "Central Places and their Environment" of the Excellence Cluster Topoi showed the need for an integrated, diachronic determination of a site's social, cultural and natural circumstances.[1] Thus, questions concerning centrality may focus not only on the interaction within or between cultures but also on the interaction between nature and culture.

In the 19th century, Kohl published a book concerning the location of settlements based on the character of the earth's surface.[2] The teleological character of Ritter's geo-

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1 Schütt and Meyer 2011, 24–25.
2 Kohl 1841.

graphy derived from a unified view of humanity and nature.[3] Marsh showed the destructive influence of man on the environment.[4] Ratzel alleges that not only human decisions, but also environmental factors lead human settlement to assume a heterogeneous pattern.[5] Many other authors went on to write about this topic, covering questions concerning the dependency of cultural development on nature.[6] But the approaches of this natural deterministic school of thought were too general and simplistic to gain insights into the dynamic relationship of human to environment. Nevertheless, these studies try to present a unified view of humanity and nature and their complex interaction.[7] In the Excellence Cluster Topoi, researchers in the fields of geography and archaeology work together on different case studies to obtain new insights into these questions on a site specific level. It is the aim of this paper to indicate the first few steps that need to be taken in order to build a theoretical framework that is able to synthesize these different case studies. To build a base for these first steps the centrality of a place with aspects of the local and regional human-environmental relationship is investigated. In contrast to the oft-mentioned assumption of homogeneity[8] in Walter Christaller's central place theory of 1968[9], this study focuses on the particularities of a location, in the context of its natural and socio-economic environment. Centrality is therefore understood as a relative concentration of interaction. These theoretical considerations are then applied to the case of Aleppo and its environs in northwest Syria.

Centrality is the relative concentration of interaction. The places involved in an interaction are called interaction nodes. A central place is a location having a high density of interaction nodes.[10] In this study, centrality is assessed using a conception of different central functions and facilities, such as trade, justice or culture, a conception first advanced by Denecke.[11] Denecke defines ten functions that can be ranked in order of importance.[12] This conception focuses on historical epochs and demands different kinds of direct and indirect sources. In order to make this model applicable to epochs for which little cultural or human material has survived, Gringmuth-Dallmer generalizes it by decreasing the number of central functions from ten to five.[13] From prehistory to the Middle Ages these functions are: reign, protection, trade, resources exploitation and craft, as well as cult.[14] The more functions a location provides, the greater its complexity. The hierarchy that results from this classification consists of four stages of centrality:[15]

1. the lowest rank are the autarchic, agricultural settlements

2. the next rank is comprised of craft and commerce settlements that produce seasonal goods and depend mostly on their surroundings for supplies

3 Ritter 1852.
4 Ritter 1852.
5 Ratzel 1891.
6 E. g. Semple 1911; Huntington 1915.
7 The fact that only environmental determinism is mentioned here is not meant to rule out the other schools of thought, like possibilism, cultural relativism, the landscape school, cultural perception and the ecological approach (for further information see, e. g. Jeans 1974; Norton 2000). The general character of all these approaches is important for the present study since their objective is always the human/environment relationship. The wealth of approaches shows the complexity of this connection.
8 See Heinritz 1979, 23.
9 Christaller 1968.
10 Nakoinz 2012, 218–221.
11 Denecke 1972.
12 Denecke 1972, 46.
13 For an overview of the development of the central place concept in archaeology see e. g. Nakoinz 2009.
14 Gringmuth-Dallmer 1996, 8.
15 After Gringmuth-Dallmer 1996, 8.

3. the third rank consists of settlements that create dependency in the surrounding settlements by offering at least one central function, i.e. a function with regional significance or importance, such as authority or cult

4. the highest rank is accorded to complex centres that offer all or nearly all central functions, making them of the highest importance to the wider surroundings or region

The investigation of interaction is related to the different scales of the sphere of influence. As the parallel space concept of Nakoinz shows,[16] the socio-economic and environmental dynamics differ with regard to scale. Accordingly, an investigation of the location's centrality needs to use different spatial and temporal scales.

The case study focuses on Aleppo, its development through time and the central functions it came to assume on different spatial scales. Aleppo is one of the oldest known cities, having been occupied at least since the Early Bronze Age, around 2500 BC.[17] The city underwent many pronounced changes in political, religious, and socio-economic circumstances.[18] Despite these changes Aleppo never vanished, unlike other important sites such as Ebla (modern Tell Mardikh), Chalkis (modern Qinnasrin) and Antioch on the Orontes (modern Antakya). As is shown in the following, this remarkable continuity can be evaluated as resulting from a complex relationship between the natural and socio-economic circumstances.

1.1 Study site

The research area is located in modern-day Syria between the Euphrates in the East and the coastal mountain range in the West. It is a slightly rolling sedimentary plain, intercalated by mesas of carbonaceous rocks and tectonic domes composed of magmatic rocks (Fig. 1).[19]

The climate of Aleppo and its northern and western environs is warm-temperate with a dry and hot summer. It corresponds to a Csa climate (after Köppen-Geiger's classification) with an annual mean temperature of 17.3°C and an annual mean precipitation of 340.8 mm at Aleppo.[20] To the East and South a narrow, undulating band of arid steppe climate (BSh climate after Köppen-Geiger classification) occurs, and is adjoined by a hot, arid desert climate (BWh climate after Köppen-Geiger classification).[21] An agriculturally important isohyet with 200 mm of precipitation crosses the study area during dry years in the south and west, leading to problems in rainfed agriculture (Fig. 2).[22]

Due to the geology and corresponding relief character there are no navigable streams connecting the west and the east.[23] The only perennial stream in the research area is the Nahr al-Quwayq (Qoueiq). From its sources in the mountains north of Aleppo, it crosses the city and drains into the steppe-swamp of al-Maṭāḥ. Besides precipitation and the Qoueiq, the groundwater resources are very important sources for regional water supply.

16 Nakoinz 2013.
17 Klengel 1992; Del Fabbro 2012. – Two sites outside of the medieval city but within modern Aleppo date back to the Neolithic and Chalcolithic periods: 'Ain at-Tall and Tall as-Sawdā' (see Gonnella, Khayyata, and Kohlmeyer 2005, 11); For a detailed description regarding the early history and further sources see Del Fabbro 2012.
18 Del Fabbro 2012; Klengel 1992; Wirth 1966; Wirth 1971.
19 Wirth 1971, 378.
20 Rösner 1995, 25.
21 Kottek et al. 2006.
22 Wirth 1971.
23 Ruppin 1920, 7–8.

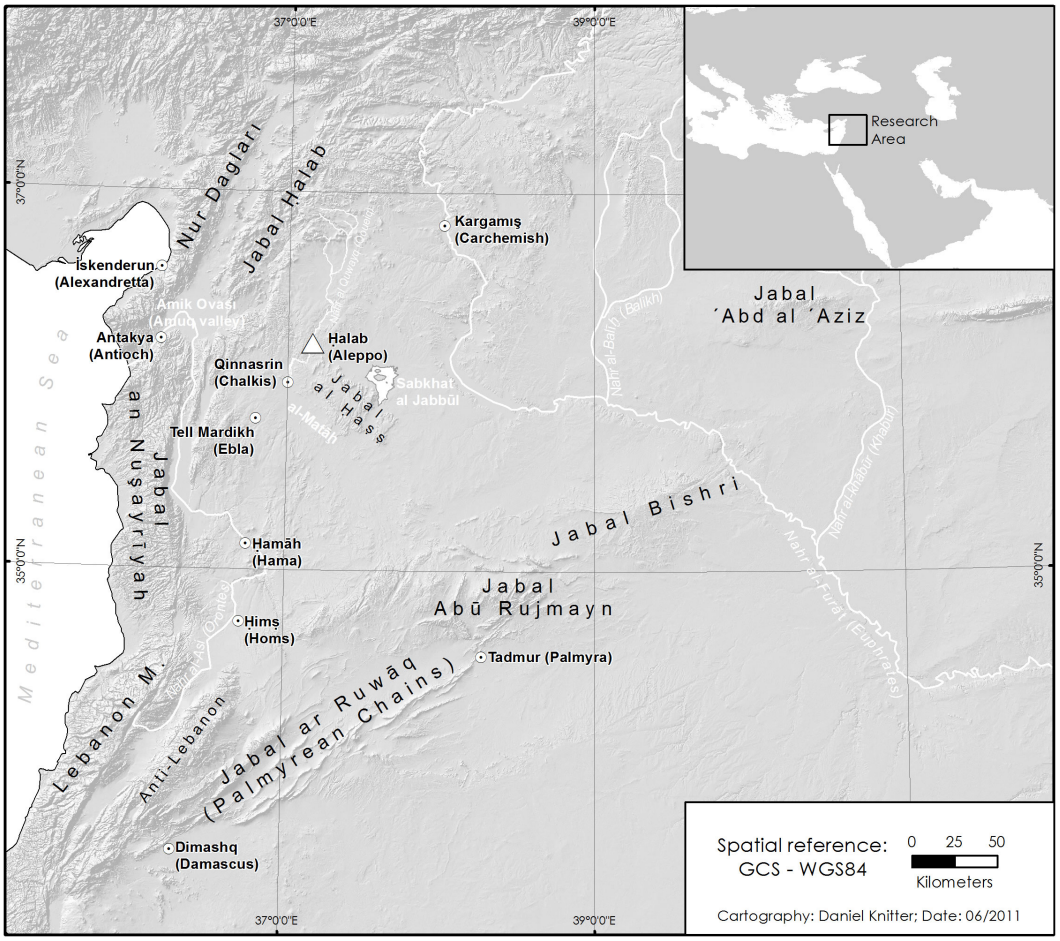


Fig. 1 | Topography of the research area with important sites.

Easily exploitable groundwater with low salt content is only present around the Nahr al-Quwayq as well as in the eastern and western environs of Aleppo.[24]

The soils in the study area are clayey, rich to medium deep developed, calcareous Grumusols[25] with a thick dark-red to dark-brown humic horizon.[26] These are the most fertile soils in present day Syria, covering the environs of Ḥimṣ (Homs) and Ḥamāh, (Hama) as well as the plains around Aleppo.[27] General suitability for agricultural production can be assessed based on climate, relief, groundwater resources and soil type.[28] This assessment shows that only the direct environs of the rivers Nahr al-Furāt (Euphrates) and Nahr al-Asi (Orontes), the Amik Ovası (Amuq valley) as well as the plains and lowlands around Aleppo are highly favourable areas for agriculture (Fig. 3).

1.2 Methods

The centrality of a location needs to be investigated in a way that integrates information about its complementary region.[29] Accordingly, besides the city of Aleppo, 293 settlement

24 Wolfart 1966, 11–15; Wolfart 1967, 247.
25 Vertic Inceptisols (Rösner 1995, 23).
26 Strebel 1967, 273.
27 Liere 1963, 116; Wirth 1971, 171.
28 Wirth 1971, 116.
29 Christaller 1968, 27; Carr 1993, 40.

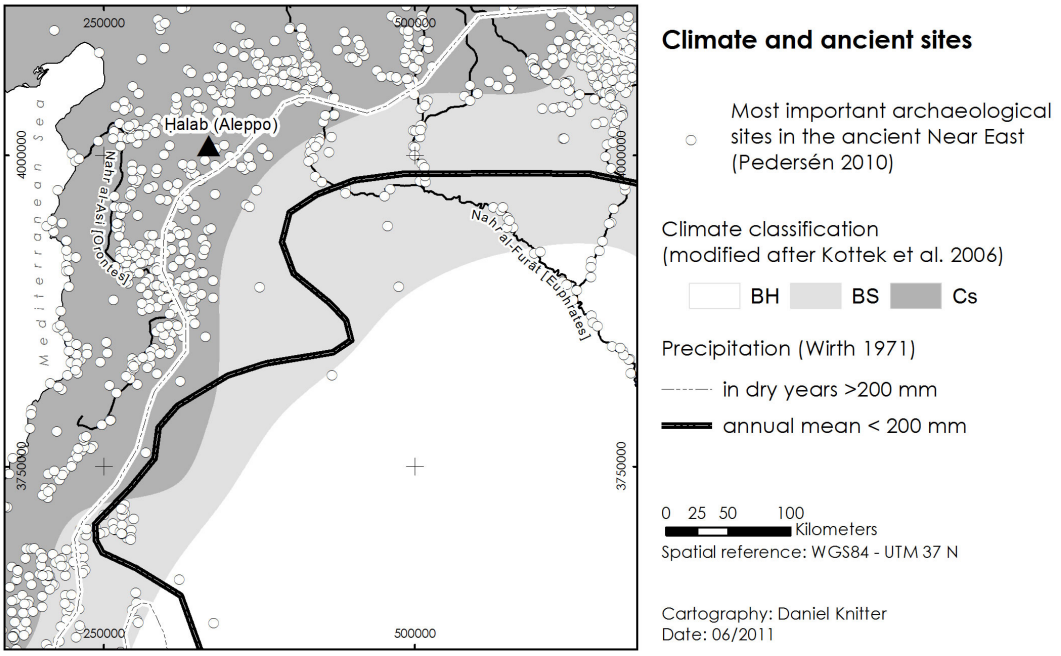


Fig. 2 | Climatic characteristics and thresholds of precipitation in the research area; note the climate related regional settlement pattern of the dataset compiled by Pedersén 2010.

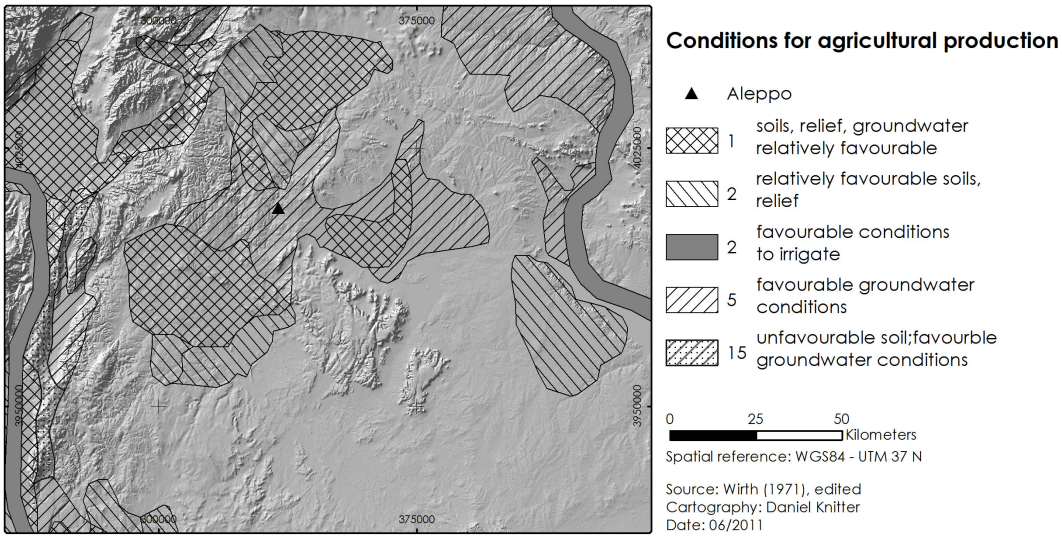


Fig. 3 | Areas with suitable conditions for agricultural production. These assessments are based on a combination of factors: soil type, relief, groundwater and irrigation capabilities (edited after Wirth 1971).

locations documented by tells[30] were integrated into this study (Fig. 4).[31] The tells belong to the Bronze Age period and a majority of them remained settled until Byzantine times;

30 *Tell* is an arabic term and can be traced back to *tilu*, the Akkadian word for mound. It is used to describe stratified mounds of archaeological deposits. Tell sites grow vertically as a result of a long continuation of settling activities and an accumulation of sediments due to repeated demolition and re-levelling of mud-brick houses (Shaw and Jameson 1999 566–567).

31 The tell database was created by Roswitha Del Fabbro as part of the Topoi project "The Aleppo Hinterland" (A-I-6). For further information see Del Fabbro 2012.

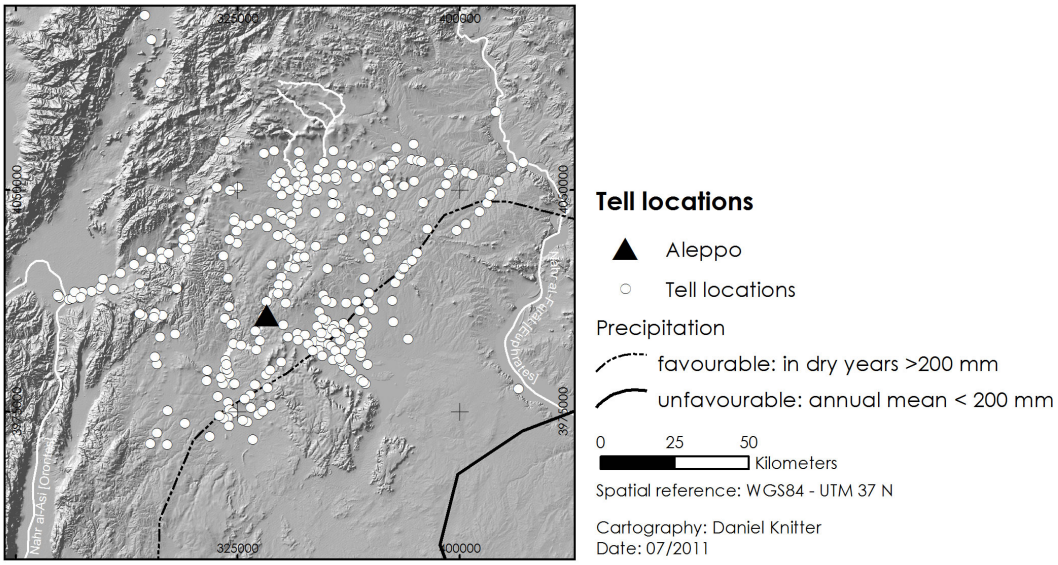


Fig. 4 | Settlement locations as documented by tells around Aleppo (data kindly provided by Roswitha del Fabbro and Topoi Project A-I-6).

some are still settled today. The large tell database allows for meaningful application of statistical approaches in delineating the general pattern of settlement locations.

To identify potential patterns in the spatial distribution of the tells objectively, spatial statistics are applied. The method used in this study is the point process statistic. It aims to describe the short-range interaction among points that explains their common location.[32] To achieve this, tests of Complete Spatial Randomness (CSR) are applied. In the case of CSR, the points are randomly distributed and independent throughout the research area.[33] A large and still growing number of tests have been conducted of the CSR hypothesis. Each test is only capable of assessing particular aspects of CSR behaviour. Accordingly, it is not possible to derive the best performing test from only a single criterion.[34] Therefore, this analysis uses different standard test approaches to identify the structure inherent in the data. With regard to Illian et al. the CSR hypothesis could ultimately be disproved if any of the standard tests were to reject the CSR hypothesis.[35]

The first approach to be utilized is the G-function, based on the nearest neighbour distances (Fig. 5a). It compares the cumulative frequency distribution of the empirical nearest neighbour distances with measurements of the distribution of the distances from an arbitrary point to its nearest neighbour.[36] The second approach, the F-function (Fig. 5b), measures the distribution of all distances from an arbitrary *non-point* within the research area to its nearest neighbour. This function is occasionally called the *empty space function* because it is a measure of the average space left between points.[37] In order to perform the F-function and to avoid arbitrary empty space, the research area is defined by a convex hull surrounding all sites.[38] While G- and F-functions are based on the nearest neighbour for each event, the third test approach, the K-function (Fig. 5c), uses distances between all events in the study area.[39] It takes a range of distances within the area and compares

32 Illian et al. 2008, 3.
33 Bivand, Pebesma, and Gómez-Rubio 2008, 160.
34 Illian et al. 2008, 83.
35 Illian et al. 2008.
36 Bivand, Pebesma, and Gómez-Rubio 2008, 162.
37 Bivand, Pebesma, and Gómez-Rubio 2008, 162–163.
38 Schabenberger and Gotway 2005, 89.
39 Lloyd 2011, 251.

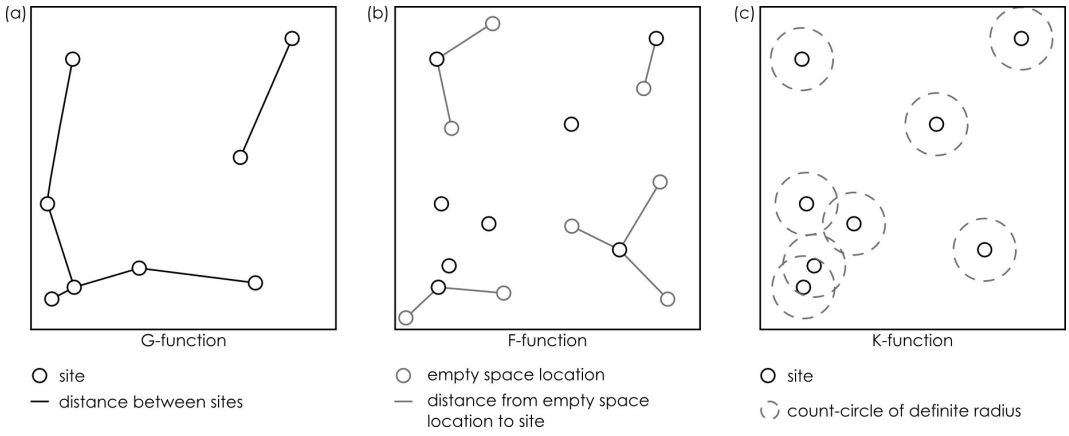


Fig. 5 | Sketches of the different CSR test principles.

the calculated number of points within the range with that of the observed number of points.[40]

These methods describe the *general distribution* of the ancient settlements documented by the tells. To receive information concerning the *spatial density*, hence the spatial distribution of tells, a simple Gaussian kernel density estimation (KDE) is conducted. A KDE calculates a two-dimensional kernel estimate of the intensity function.[41] Accordingly, a continuous surface is produced that allows researchers to distinguish high and low density areas of tell locations.[42] Methods for calculating the bandwidth can be found in Duller,[43] though there is no general rule for selecting the optimal value of the bandwidth. "It seems reasonable to use several values depending on the process under consideration, and to choose a value that seems plausible."[44] In this regard, the kernel bandwidth is chosen based on expert knowledge, using two times the mean nearest neighbour distance.

1.3 Results

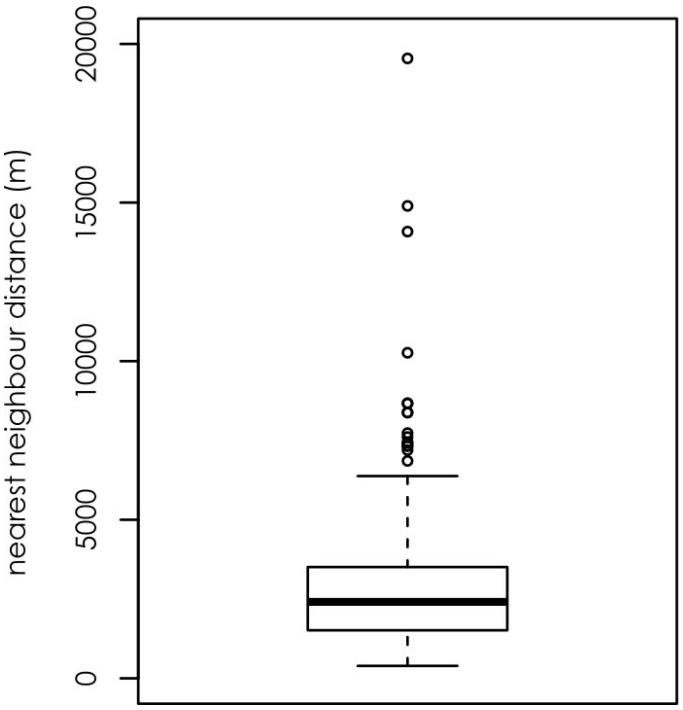
The general characteristics of the nearest neighbour distances show that besides a scattering of the data, the majority of tells are less than four kilometres apart from their nearest neighbour (Fig. 6).

The tests for CSR reveal that the tells are not randomly distributed (Fig. 7a–c). The cumulative empirical nearest neighbour distances are larger than the theoretical ones. Thus, the distances to the nearest events are smaller than under random conditions (Fig. 7a). The F-function results in larger theoretical than empirical distances. The empirical curve shows fewer short-distance nearest neighbours than the theoretical curve, hence the distances are larger than expected (Fig. 7b). The K-function results in tells at shorter distances than expected (Fig. 7c). All test approaches rejected the CSR-hypotheses. Besides this, the resulting graphs assume clustered distribution of the tells.

The KDE revealed high density areas of tells north, southwest and east of Aleppo. The city itself is not in an area of high settlement activity (Fig. 7d).

The intersection of the most favourable areas for agricultural purposes and the tell locations reveals a strong relationship (Fig. 8a). The majority of the tells (Fig. 8b) and

40 Crawley 2007, 754; the applied K-function assumes that the point process is stationary (spatially homogeneous) Baddeley 1998.
41 Duller 2008, 278–285.
42 Bivand, Pebesma, and Gómez-Rubio 2008, 165–169.
43 Duller 2008, 287–289.
44 Bivand, Pebesma, and Gómez-Rubio 2008, 166.



Min.	392.2 m
1st Qu.	1506.0 m
Median	2341.0 m
Mean	2908.0 m
3rd Qu.	3472.0 m
Max.	40970.0 m

Fig. 6 | Descriptive statistics of the nearest neighbour distance calculation. The data is concentrated between 1.5 and 3.5 km (1st and 3rd quartile). Due to outliers (see max. distance of 40 km; omitted in boxplot) the data is skewed to the right, weakening the mean. Hence, the median is taken into account as well.

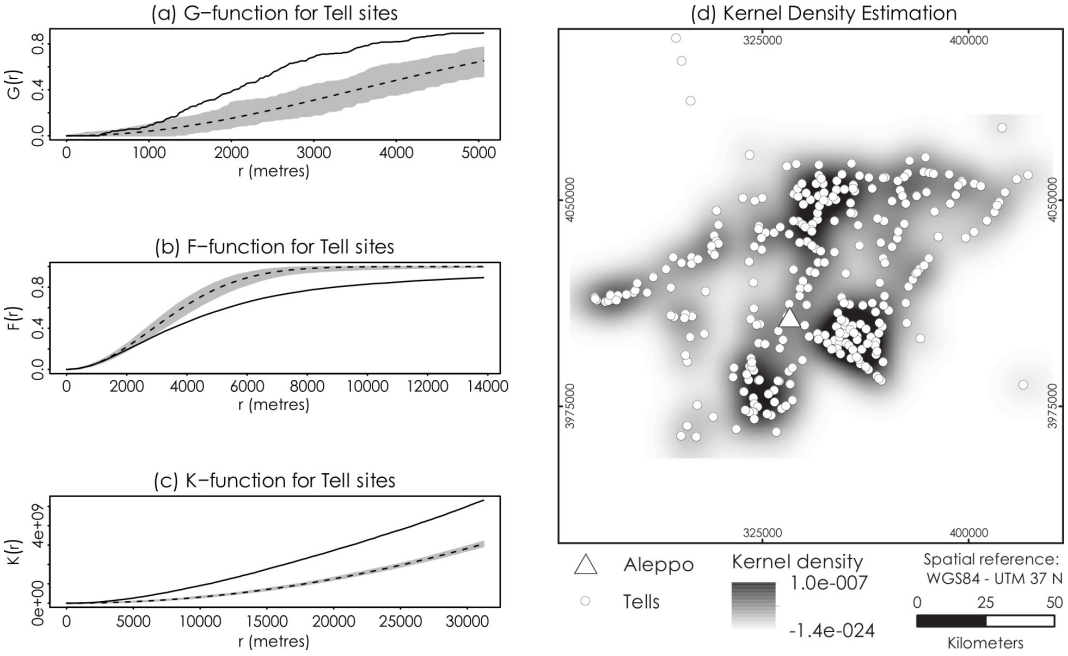


Fig. 7 | Results of the CSR test (a-c); the solid lines represent the cumulative empirical distribution, while the dotted lines correspond to the theoretical. The grey area around the dotted graphs shows the uncertainty based on Monte Carlo experiments. For the G- and F-function, 999 experiments were conducted, as compared to 99 for the K-function. (d) shows the result of the KDE.

nearly the whole area of the tells' high density clusters (Fig. 8c) focus on areas with the most favourable agricultural conditions.

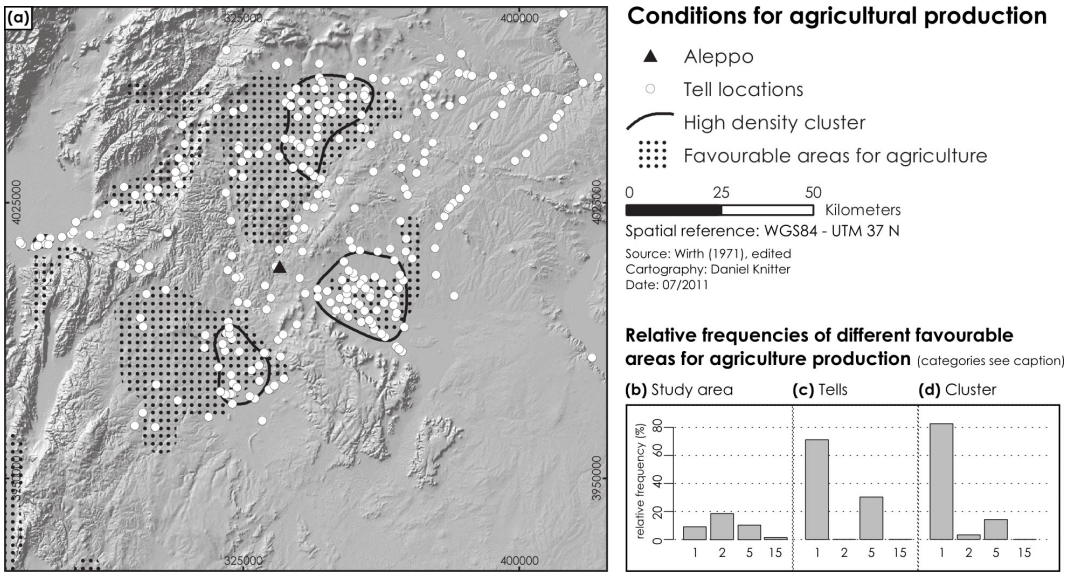


Fig. 8 | Comparison of the areas with the most favourable conditions for agricultural production, tell locations, and high density tell clusters (a). The relative frequency of the different categories shows a strong concentration of class 1 at tell locations and within tell clusters. Category numbers correspond to (see also Fig. 3): 1 – soil, relief and groundwater are relatively favourable; 2 – soil and relief are relatively favourable; 5 – groundwater is relatively favourable; 15 – unfavourable soil and favourable groundwater conditions (based on Wirth 1971).

1.4 Discussion

The nearest neighbour distances of the tells involved in the study are comparable to those of settlements with a subsistence agricultural economy.[45] Chisholm points out that in subsistence economies, independently of the region, cultivated land is located less than two kilometres from the farmstead.[46] Accordingly, settlements reliant on subsistence agriculture should be located in distances of two to four kilometres apart. This holds true for the nearest neighbour distances of the tells in question. Thus, the tells around Aleppo conform to the model of rural, subsistence based settlements. Research by Wilkinson et al. on Bronze Age tells in Upper Mesopotamia corroborates this observation.[47] Notwithstanding, the dating of tells to cultural periods instead of definite times might conceal periods of lower settlement density, and hence larger distances between tells and different specific functions. Nevertheless, the tendency of tells to be located in areas with the most favourable agricultural conditions underlines the general character of a subsistence based economy at least during the Bronze Age throughout the research area. For further interpretations, a temporal, spatial, or even functional separation of the tell dataset is required.

Aleppo is neither part of the high density tell clusters nor is it located on the most favourable soils: it is not integrated into the local networks of tells according to natural favourable positions. However, Aleppo is centrally located with regard to different clusters of tells (see below). For Gradmann the main function and activity of a city is to serve as a

45 Chisholm 2007, 125.
46 Chisholm 2007, 148. – These empirical results conform to the theoretical model of Chisholm 2007 that defines the location of a settlement in relation to its local resources (water, arable land, grazing land, fuel, building material) based on the cost-distance relationships investigated by von Thünen 1910. Hence, by assigning different weights to elementary resources, the settlement's location can be explained – though this holds true only from a simple environmental deterministic viewpoint.
47 Wilkinson et al. 1994, 492.

central location, connecting the local traffic of its rural hinterland with the *outside world*.[48] In this regard Aleppo offers the central functions of trade and craft to the rural settlements in its hinterland.[49]

The advantage of this central position is also illustrated by the fact that the centre of worship of the storm god[50] was located in Aleppo. The need for sufficient precipitation for rainfed agriculture in an area of high variability in annual precipitation forms the basis of the cult.[51] With respect to the subsistence based economy throughout the hinterland of Aleppo, the storm god's blessing was important for survival; the people lived on faith. Accordingly, Aleppo offered the central function of a cult, due to its being located between different tell clusters in the subsistence-based hinterland. Furthermore, administrative functions seem to have been important since the Bronze Age, based on van Liere's statement that Aleppo was not a major centre of population, but one of the most important citadels of the region.[52]

There seems to be a strong connection between the settlement structure of Aleppo and its hinterland to Christaller's central place concept because a central place serves as a supply centre for its complementary region.[53] However, Christaller defined centrality not in the context of settlement clusters and centred city. The results do not show that the tells were centralized around Aleppo. Therefore, Aleppo does not exhibit centrality as defined by Christaller but rather a network centrality. Nevertheless, extending the definition of centrality makes it possible to assess the advantages of Aleppo's central position. In this regard the city is similar to an interaction node, whose degree of interaction is assessed by the identified central functions.

1.5 Synthesis – The centrality of Aleppo

During the Bronze Age Aleppo was the centre of cult, local trade and administrative functions for a subsistence based hinterland. Politically, the city was important only during the Middle Bronze Age as the capital of the kingdom of Yamhad.[54] After this period it lost its political significance until the Hellenistic era but remained an important cult centre.[55] Moreover, there are no remarkable quantities of exploitable resources[56] in the environs of Aleppo. The continuing importance of the city in a regional and supra-regional context must therefore be attributed to its spatial location.

The fact that Aleppo is advantageously positioned on a local scale between fertile agricultural plains has already been mentioned. From a more regional perspective climate-induced environmental differences became important. Due to the lack of perennial streams and decent groundwater, the isohyet having 200 mm of precipitation is not just a physical but also a cultural boundary, marking the fringe between areas where rainfed agriculture is possible and where agriculture is only possible by irrigation. In areas where

48 Gradmann 1916, 427.
49 Ruppin 1920, 28; David 2008, 329.
50 First venerated as Hadda, later as Addu, Teššub, Tarhunta, and Hadad, see Schwemer 2001; Schwemer 2008; Kohlmeyer 2000; Kohlmeyer 2009.
51 Klengel 1965, 92; Bunnens 2004.
52 Liere 1963, 116.
53 Beavon 1977, 18; Christaller 1968, 63; Heinritz 1979, 26–28.
54 Klengel 1992, 52, 197; Kohlmeyer 2000, 5–10. – The question of the relation between Aleppo and Ebla (modern Tell Mardikh) with its important remains from the Middle Bronze II period has still to be solved.
55 Klengel 1992, 197; Bryce 2009, 28.
56 Gypsum is present in the El Bab (north-east of Aleppo) and the Jabboul basin. Large amounts of evaporative salt are present at the Sabkha Jabboul (Wolfart 1967, 253–254). Today, a larger source of limonitic iron in the Kurd-Dagh mountains is known; it contains approximately 12–16 million tons of iron (Wolfart 1967, 249–250).

the precipitation is sufficient for rainfed agriculture, resident farmers dominate even in dry years. In the intermediate zone, where rainfall variability leads to frequent crop failures, they are mixed with semi-nomads and nomads. The sphere of influence or, to use Sachau's terminology,[57] *the realm* of the nomads (Bedouin) begins south of Jabal al Ḥaṣṣ,[58] where rainfed agriculture is mostly impracticable. Aleppo benefits from this location at a cultural frontier. North and west of the city, cotton, wheat, almonds, watermelons, figs and wine are cultivated. South and east of the city, wheat, barley, and millet are cultivated over large areas that extend to the Euphrates. Aleppo is the most important marketplace for the exchange of goods from these different areas of cultivation.[59] This exchange also facilitated the establishment of a local craft industry.[60] Thus, on a regional scale Aleppo offers the central functions of craft and trade as well. The city serves a gateway function[61] that connects different cultural spaces and increases its importance. This is based on a strong relationship between environmental conditions and various human adaptations to it.[62] On a supra-regional scale, Aleppo's geographical location is *excellent*.[63] It is advantageously located at the intersection of transcontinental trading routes between Europe, Asia and Africa, and has been since these emerged.[64] Aleppo's location at the point of contact between maritime traffic heading west towards Europe and caravan commerce heading east is especially important[65] because the shortest caravan route from the Mediterranean to Mesopotamia crossed the city, underlining its function as a trade centre.[66] This favourable location, connecting trade on the Mediterranean Sea and Mesopotamia is for Banse the reason why Aleppo developed into the greatest commercial centre of the southern Middle East.[67] Raymond seconds this evaluation.[68] For him, the dimension and number of khans in the city[69] reflect the city's scope, importance and role as a commercial centre. From cities of the Ottoman period, the most monumental and most finely decorated khans are those found in Aleppo.[70] Furthermore, their number exceeds that of the most prominent cities of the time and is topped only by Cairo.[71]

On this small scale it is clear that Aleppo is not the only city of supra-regional importance. The most prominent example is Antioch (modern Antakya), a metropolis during the Hellenistic and Roman periods (Fig. 1). During that time Aleppo prospered[72]

57 Sachau 1883, 112.
58 Djebel ElḤaṣṣ (Sachau 1883, 112); Jebel Hass (Wirth 1971, 390).
59 Wirth 1966, 106–108.
60 Wirth 1971, 389.
61 Nakoinz 2013.
62 Nevertheless, changes in the location of the frontier between nomads and farmers over the last six thousand years correspond to socioeconomic changes and are not naturally determined Rösner 1995, 52.
63 Banse 1919, 331; Wirth 1966, 105. – „Die geographische Lage (…) ist für einen Handels- und Verkehrsknotenpunkt schlechthin hervorragend; das gilt sowohl für die Lagegunst innerhalb der Region Nordsyrien als auch für die im Rahmen der Großregion Vorderasien, und schließlich nicht zuletzt für die Lage zwischen den großen Kontinenten und Kulturerdteilen der Alten Welt" (Gaube and Wirth 1994, 10).
64 Sherrat 2010.
65 Raymond 2008, 736.
66 Beek 1962.
67 Banse 1919, 326.
68 Raymond 2008.
69 Also known as caravanserais; supported the flow of commerce, information, and people across trade routes.
70 Raymond 2008, 738.
71 Raymond 2008, 739; Number of khans in cities of the Ottoman period; sorted in ascending order (after Raymond 2008, 739): Algiers (34), Mosul (35), Baghdad (44), Damascus (57), Aleppo (around 100), Cairo (360).
72 Gaube and Wirth 1994, 76; Bryce 2009, 28.

but remained, as mentioned by Strabo, just a small city east of the metropolis of Antioch.[73] The importance of Antioch was based on the Roman world economy and supra-regional trade.[74] Because it was located outside the Amik Ovası (Fig. 2), it had no local subsistence base. The founding of Antioch southwest of the Amik Ovası was not arbitrary. Since the Neolithic there was a shift of major settlements first southwards and in the end entirely out of the plain of the Amik Ovası onto nodal points in the route network.[75] This suggests that trade and exchange came to play an increasingly significant role in the development of important settlements. With respect to the abovementioned, Antioch lost important central functions on a local and regional scale. Due to earthquakes,[76] wars[77] and the demise of the ancient world Antioch lost and never regained its former importance. Aleppo experienced the same catastrophes, but endured. Thus, while Antioch vanished, Aleppo flourished because it was able to benefit from its locational advantages on a local, regional and supra-regional scale.

2 Conclusion and Outlook

This case study of Aleppo's location shows the strength of an interaction-based approach to centrality. The determination and integration of different spatial and temporal scales allows important natural and social parameters to be distinguished and described. On this basis, parameters are assessed that furthered or undermined the importance of a city. This is a holistic approach that benefits from archaeological, geoarchaeological, and geographical research concerning the relationship between human beings and their environment. Defining centrality in terms of interaction makes it possible to synthesize the specific results of different case studies and to combine them on the meta-layer of centrality. Further research regarding *interaction* in other case studies throughout the Mediterranean and Near East as well as in Europe will provide new, important insights into the old question of the relationship between humans and their environment in different epochs.

73 "To the east of Antioch are the Euphrates, Bambyce, Berœa, and Heracleia, small towns formerly under the government of Dionysius, the son of Heracleon", see Hamilton and Falconer 1857, 3:163).
74 Yener et al. 2000, 192.
75 Yener et al. 2000, 191; The most important routes cross the plain of the Amik Ovası in the south, connecting the Mediterranean in the west with Aleppo in the east as well as the Orontes in the south (Yener et al. 2000, 189, 191).
76 Sbeinati, Darawcheh, and Mouty 2009, 355–359.
77 Holmes 1988; Greatrex and Lieu 2005.

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