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Reconstruction of the Black Sea Map in the Geographical Work of Abū al-Fidā'¹

Keywords: Arab geography, Abū al-Fidā', Black Sea, geographical description, mental map, coordinate data.

Summary: Abū al-Fidā's geographic work is a descriptive world geography that does not contain any maps, but it is equipped with coordinate data borrowed from the Arabic translations of Ptolemy which makes it possible to give cartographic reconstruction of Abū al-Fidā's picture of the world. This paper investigates the information of Abū al-Fidā' about the Black Sea. In his coordinate data, four groups are detected in which the points are represented in a general coordinate system that distinguishes them from other groups. Further study of Abū al-Fidā's geographic data is supposed to be carried out separately for each of the groups.

Introduction

Maps, according to the geographer and cartography historian J.B. Harley, serve as “mediators between an inner mental world and an outer physical world” (Harley 1987: 1). This figurative phrase precisely determines the place of the map — as a materialized form of spatial thinking — in the general block of human representations of space. The medieval maps that came down to us were based on a huge amount of information that was in various forms — in the form of oral information, notes of travelers, scholarly works, administrative and political documents, literary works, etc., — among which the actual cartographic images were only a small part. This broad information context, multiplied by the peculiarities of spatial thinking in various cultural traditions, is often underestimated when analyzing maps and their history. Meanwhile, the mental maps and geographic images underlying the geographical descriptions are no less important part of the cartographic heritage than cartographic drawings and the maps themselves, and therefore the study of geographical narratives can greatly contribute to a deeper understanding of the practice of mapping.

This applies to medieval Islamic geography and cartography, perhaps to a greater extent than to other traditions. Recent studies in the field of medieval Islamic cartography show that maps of Islamic geographers hardly existed as independent works: almost all of them came to us as part of narrative works and were an integral part of the latter (Karamustafa 1992: 4–6). It is with the illustrative role of Islamic maps that the historians of cartography link the fact that in Arabic for a long time there was no exact term for the geographical map as such. The words used for this purpose were suitable for referring to any visual objects: *ṣūra* (“drawing, representation, image, picture”), *rasm* (“picture, drawing, plan, figure, image”), *naqsh* (“painting, drawing, decoration”). The term *kharīṭa* (“geographical map”) in Arabic is a late borrowing from the French (Maqbul 1997: 1077–1078).

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Abū al-Fidā's geographic work is a descriptive world geography that does not contain any maps, but it is equipped with coordinate data borrowed from the Arabic translations of Ptolemy, as well as from al-Bīrūnī and Ibn Sa'īd, which makes it possible to give cartographic reconstruction of Abū al-Fidā's picture of the world. The coordinate data from Abū al-Fidā's work have never been studied in this respect, but such investigation is facilitated by significant progress in research on the geographic and cartographic data of Ptolemy, including the mathematical basis of his calculations using GIS technologies (Livieratos 2008; Tsorlini 2011; et al.). This paper investigates the information of Abū al-Fidā' about the Black Sea.

Abū al-Fidā' and his geographic treatise

Abū al-Fidā' Ismā'īl ibn 'Alī — an Ayyubid amir, historian and geographer — was born in 1273 in Damascus, where his father, the emir of the city of Hama (located 213 km north of Damascus on the banks of the Orontes River), fled from the Mongols. In his young years Abū al-Fidā' took part in campaigns against the Crusaders; later, he participated in military expeditions under the leadership of the Mamluk sultans who seized Hama in 1299. Thanks to his diplomatic abilities, Abū al-Fidā' managed to preserve and expand his father's possessions. Having achieved the favor of the Mamluk Sultan al-Nasīr Muḥammad (1293 –1341, with interruptions), Abū al-Fidā' maintained close ties with him: he frequently appeared in Cairo, where he was honored to be present at the reception of foreign ambassadors, repeatedly accompanied the sultan on his trips, and also on pilgrimages to Mecca. Abū al-Fidā' died in 1331 at his residence in Hama. Abū al-Fidā' is the author of two extensive compilations — a universal history from the pre-Islamic period to his own times, “The Concise History of Humanity” (*Kitāb al-mukhtaṣar fī akhbār al-bashar*) and a geographic treatise entitled “Survey of countries” (*Taqwīm al-buldān*, 1321), which describes the Earth and its inhabitants (Gibb 1960).

The geographic work of Abū al-Fidā' has been preserved in three manuscripts from Paris (Bibliothèque Nationale, Ancien fonds arabe 578), Leiden (Univ. Or. 57) and St. Petersburg (Institute of Oriental Manuscripts at the Russian Academy of Sciences 594 / C 592); the Leiden manuscript was reviewed by the author. The differences between the manuscripts suggest that, after finishing “Survey of Countries” in 1321, Abū al-Fidā' returned to work on his treatise until his death (Reinaud, Slane 1840: XXXV–XXXVI, XLI–XLVII). The full Arabic text (based on manuscripts from Paris and Leiden) and part of the French translation of “Survey of Countries” were published by J.T. Reinaud and W. Mac Guckin de Slane in the middle of the 19th century (Reinaud, Slane 1840; Reinaud 1848); 35 years later the translation was completed by S. Guyard (Guyard 1883).

“Survey of Countries” consists of two different parts. The first one is a vast introduction containing a short review of the sources of the work, general information about the Earth, the equator, the seven climates, the inhabited world, the extent of the earth and the seven climates, the general characteristic of the five great seas — the Encircling Sea (*al-Baḥr al-Muḥīṭ*), the Sea of China (*Baḥr al-Šīn*), the Mediterranean Sea (*Baḥr al-Rūm*), the Black Sea (*Baḥr Niṭāsh*) and the Caspian Sea (*Baḥr al-Khazar*) (Reinaud, Slane 1840: 1–19). Then comes the detailed description of the seas (the abovementioned and others), lakes, rivers, mountains, and finally — the plan of the treatise and its structural principles (Reinaud, Slane 1840: 19–75). In particular, Abū al-Fidā' distinguishes between two types of “climates” — the so-called “conventional climate” (i.e. country or some historical and geographical area) and “true climate” as an astronomical concept (Reinaud, Slane 1840: 72). He was aware that very often the borders of a

country or a historical and geographical region did not coincide with the boundaries of a particular “climate” in the astronomical sense. Therefore, Abū al-Fidā’ decided to systematize the material according to geographic rather than astronomical “climates”.

The second part of the treatise, larger in volume, consists of twenty-eight sections devoted to the description of various geographical areas (Reinaud, Slane 1840: 77–505). They are characterized in the following order: Arabia, Egypt, Maghrib, Sudan, al-Andalus, the islands of the Mediterranean and the Atlantic, northern lands (the land of Franks and Turks, which includes the description of Eastern Europe), Syria, al-Jazirah (Upper Mesopotamia), Arabic Iraq, Khuzistan (al-Aḥwāz), Fars, Kirman, Sijistan, Sind (Punjab), India, China, the East Sea Islands, al-Rūm (Asia Minor) with surrounding areas, Armenia (with Arran and Azerbaijan), Persian Iraq, Daylam (and Gilan), Tabaristan (with Mazandaran), Khurasan, Zabulistan (and Gur), Tokharistan, Khwarezm, Transoxiana.

Each section is divided into two parts: descriptive and tabular. The descriptive part contains information on the boundaries of a particular region, its political structure, the ethnic composition of the population, its customs and beliefs, and its main cities and monuments; route data is sometimes also given. The information on the cities of various regions is also presented in the form of tables resembling the tables of al-Khwārazmī (9th century) and al-Battānī (the beginning of the 10th century). Abū al-Fidā’ himself, however, says that he borrowed the system of tables from an Arab physician of the late 11th – early 12th century Ibn Jazlah, who in his work “Survey of Bodies with Regard to Their Constitutions” (*Taqwīm al-Abdan fī Tadbīr al-Insān*), systematized data on various diseases in the form of tables, taking astronomical tables as a model (Reinaud, Slane 1840: 3). The very title of the treatise of Abū al-Fidā’ — *Taqwīm al-buldān* — was chosen in imitation of the work of Ibn Jazlah.

Tables from the work of Abū al-Fidā’ contain the following columns: 1) ordinal number; 2) the name of the city; 3) an indication of the source from which the information about the city was borrowed; 4–5) geographical longitude of the city in degrees and minutes; 6–7) geographical latitude of the city in degrees and minutes; 8) an indication of the “true climate” to which the city belongs; 9) an indication of the “conditional climate” (i.e., the region, country) to which the city belongs; 10) transliteration of the name of the city; 11) the characteristic of the city.

One of the main sources for Abū al-Fidā’ was the work of the Spanish-Arabic geographer of the second half of the 13th century, Ibn Sa‘īd al-Maghribī, “Exposition of the earth in length and breadth” (*Kitāb baṣṭa l-arḍ fī ḫūliḥā wa-al-‘arḍ*), numerous and sometimes lengthy quotations from which are found in almost all sections of “Survey of countries” (Reinaud, Slane 1840: 64, 202, 203, 214–215, 220–223). The description of the Earth in the treatise of Ibn Sa‘īd is based on astronomical climates, in which he describes countries and peoples, often giving the geographical coordinates of various objects (Ibn Sa‘īd al-Magribī 1958).

Along with the writings of authors who worked in the genre of descriptive geography or compilers of encyclopaedias, dictionaries and historical works — Ibn Khurrahādhbih (9th century), Ibn Ḥawqal (10th century), al-Idrīsī (12th century), al-Sam‘ānī (12th century), Yāqūt (13th century), Ibn al-Athīr (13th century) — Abū al-Fidā’ names a number of representatives of astronomical geography. In particular, he points to al-Bīrūnī (11th century) and his famous work *Kitāb al-qānūn al-Mas‘ūdī fī al-hay’ah wa-al-nujūm* (“The Mas‘udic canon on astronomy and stars”), and to Naṣīr al-Dīn al-Ṭūsī (13th century) and his student and follower Quṭb al-Dīn al-Shīrāzī (the beginning of the 14th century). Besides them, Abū al-Fidā’ names a number of anonymous sources, which either did not reach us, or are only known from quotations from other authors — some astronomical tables (*zīj*s), “books of longitudes and latitudes”, probably based on

the writings of Ptolemy (such as *Rasm al-Ma'mūr* of the Arab scholar of the 9th century al-Kindī and *Kitāb al-aṭ wāl*), “Book of routes and realms” (known by the abbreviated name *al-'Azīzī*) of the Egyptian geographer of the second half of the 10th century al-Muhallabī, and some “old books” (Reinaud, Slane 1840: 1–3, 34, 35, 71, 203, 207, 218–219).

It is difficult to evaluate Abū al-Fidā's own contribution to the determination of the coordinates of geographical objects that he mentions. Abū al-Fidā' himself was not an astronomer or geodesist, therefore he borrowed information about the geographical coordinates from the works of other scholars. Very often he points to the source of this information, and sometimes for one object he gives several variants of coordinates taken from different sources, without any own comments. Abū al-Fidā' was aware that there were different approaches to determining the prime meridian, and in the introduction to his work he states that all the longitudes given in his book are counted from the most westerly point of Africa, i.e. approximately ten degrees to the east of Ptolemy's prime meridian of the Fortunate Isles (*Jazā'ir al-Khālīdāt*) (Reinaud, Slane 1840: 73). For several places whose coordinates were unknown from the books or inaccurate, Abū al-Fidā' determined them by parity of reasoning (*qiyās*) — by means of recalculating in degrees the distances expressed in units of length, at a rate of 22,2 or 18 ⁸/₉ farsakhs in one degree (Reinaud, Slane 1840: 73–74).

Description of the Black Sea in the work of Abū al-Fidā'

Due to the complex structure of the treatise of Abū al-Fidā', information about the Black Sea (with the Sea of Azov) is placed in various parts of his work. Abū al-Fidā' knows the Black Sea under several names: “Pontus” (Old Greek Πόντος, transmitted in Arabic with distortion as *Nīṭash*), “The Crimean Sea” (*Baḥr al-Qirim*), “The Black Sea” (*al-Baḥr al-Aswad*), “The Khazar Sea” (*Baḥr al-Khazar*), “The Armenian Sea” (*Baḥr al-Arminī*), “The Sea of Sinop” (*Baḥr Sīnūb*). According to Abū al-Fidā', “The Crimean Sea” and “The Black Sea” were the modern names of the sea, while the name “Pontus” became known to him from some “old books” (Reinaud, Slane 1840: 34). As for the Sea of Azov, Abū al-Fidā' was aware of its book name “Maeotis” (Old Greek Μαῶτις, transmitted in Arabic with distortion as *Mānīṭash*), and also of its modern name “The Sea of Azov” (*Baḥr al-Azaq*) associated with the city of Azov located on its shore (Reinaud, Slane 1840: 31, 64).

There are four information blocks in the work of Abū al-Fidā' that contain data about the Black Sea — “The Story about the Black Sea” in the introduction; description of rivers also in the introduction; description of the Southern and Eastern shores of the Black Sea in the section devoted to Armenia, Arran and Azerbaijan; description of some of the Black Sea cities in the description of the Northern part of the world. The main body of data on the Black Sea is placed in the introduction to “Survey of Countries”, in the section devoted to the description of the seas.

“Story about the *Nīṭash* Sea. The *Mānīṭash* Lake is connected to the *Nīṭash* Sea and is known in our time as the Sea of al-Azaq, by the name of the city, which stands on its northern shore and is a trading harbor. The *Nīṭash* Sea is known in our days as the Sea of al-Qirim and as the Black Sea. Its waters flow to [the city] al-Qusṭ anṭīniyya, bypass it, and, forming a channel, pour into the Sea of al-Rūm, and therefore ships heading from [the city] al-Qirim to the Sea of al-Rūm are running quickly, and those arriving from al-Iskandariyya at al-Qirim are sailing slowly because of the oncoming water.

The Sea of al-Qirim is connected [with the Sea of al-Rūm] south of the [city] al-Qusṭanṭ īniyya via the Channel of al-Qusṭanṭ īniyya . This channel although it represents the extremity of the Sea of al-Qirim, is the most famous part of it. Therefore, we begin [our story about the sea] with a description of its eastern coast lying opposite [the city] al-Qusṭanṭ īniyya . We will tell you what is on the east coast, then turn to the northern shore, then — to the west, until we reach [al-Qusṭanṭ īniyya] again.

The [city] al-Qusṭanṭ īniyya, or Iṣṭ anḅūl, stands on the west coast of the famous channel. Opposite it on the other, eastern shore, lies a fortress in ruins, called al-Jarūn. The distance between it and Iṣṭ anḅūl is equal to the width of the channel, and this is such a [small] distance that, being on one shore, one can see the person standing on the opposite side. The latitude of al-Jarūn and al-Qusṭanṭ īniyya is one and the same, and the longitude of al-Jarūn is somewhat greater [than the longitude of al-Qusṭanṭ īniyya]. The latitude of al-Jarūn is 45 degrees, like the latitude of al-Qusṭanṭ īniyya, and the longitude is 50 degrees, which is 10 degrees greater than the longitude of al-Qusṭanṭ īniyya .

From al-Jarūn the aforementioned Channel of al-Qusṭanṭ īniyya extends to the north with a slight deviation to the east to the city called Karbī, from the region of Iṣṭ anḅūl. Karbī lies on the north side of the entrance to the said channel. From Karbī, the sea extends to the city called Bantariqlī. Then it goes to the northeast to the city called Kitrū, the last of the towns of Qusṭanṭ īniyya, [located] on this coast. Further the sea extends from Kitrū to the city, called Kinulī, and continues to the northwest. In the east [in the course of the movement] the land penetrates into the sea with a slant to the west. On the edge of this promontory there is the port of Sinūb, located at 57 degrees longitude and 46 degrees 40 minutes latitude. On the opposite shore, to the west, there is also a land protrusion lying opposite the said promontory. At the edge of it lies Ṣārūkarmān, it is opposite Sinūb, located on the eastern shore.

Then the sea extends from Sinūb to the east and continues to Sāmsūn, located at 59 degrees 20 minutes longitude and 46 degrees 40 minutes latitude, which is equal to the latitude of Sinūb. The sea goes further also to the east to Aṭrābzūn, a port belonging to [the country] al-Rūm and located at 64 degrees 30 minutes longitude and 46 degrees 50 minutes latitude, almost at the latitude of Sāmsūn. Then the sea continues from Aṭrābzūn to the north with a slight inclination to the west to the city of al-Kurj, called Sukhūm. Then the sea narrows [towards] the west; also, it narrows from the opposite, western shore until both coasts converge and between them there is a water strip in the form of a strait connecting the Sea of al-Azaq with the Sea of al-Qirim. On the east coast of this strait there is a city called al-Ṭāmān. It is a border point of the Golden Horde (mamlakat Barka). The current ruler of this state is called Uzbek, his ambassadors often visit Egypte (Miṣr).

Then this strait turns from the mentioned city al-Ṭāmān [first] to the east, [and then to the] north and west and becomes like a round pond. At the end of the eastern bank of the pond there is a city called al-Shaqrāq. From al-Shaqrāq [the pond] no longer extends to the east, but turns north and continues in this direction to the city of al-Azaq, which is the aim of the merchants from [different] countries. Near it lies the mouth of the Tān River. If then turn from al-Azaq, [you can sail further until] you find yourself on the western shore of this Sea of al-Azaq. Then you pass the strait, which is between the aforementioned Sea of al-Azaq and the Sea of al-Qirim, [and head towards] the city

lying at the entrance to this strait on the western shore and called al-Karsh. This city lies opposite [the city] al-Ṭāmān, located on the other side of [the strait] mentioned above. The strait goes south until it flows into the Sea of al-Qirim.

After that the sea turns south-west toward [city] al-Kafā. This is the port on the west coast, lying opposite Arābzūn, mentioned above. Then the sea extends also to the south-west to Ṣūdāq, located at 56 degrees longitude and 51 degrees latitude, turns from Ṣūdāq to the south and deviates to the east until it reaches the land stretching out to the sea, where Ṣārūkarmān is located, lying opposite the abovementioned Sinūb. Further from Ṣārūkarmān the sea turns to the west with inclination to the south. It also extends to a city called Aqjākarmān. Then the sea turns south to a city called Ṣaqjī. There is the mouth of Ṭunā, the great and famous river. After the sea passes Ṣaqjī, it begins to narrow and turns to the southeast until it reaches the entrance to the Channel of al-Qusṭanṭ īniyya .

Then the sea turns to the south, and both its shores approach each other. Thus the sea extends to [the place] opposite the abovementioned Karbī. Further, the sea flows into the Channel of al-Qusṭanṭ īniyya , while [its] current intensifies so that it makes it difficult for ships to pass through the channel if the favorable wind does not blow. The channel extends as far as [the city] al-Qusṭanṭ īniyya , located at 49 degrees 50 minutes longitude and 45 degrees latitude. Near al-Qusṭanṭ īniyya and below it [downstream] the channel narrows so that one person sees the other from the opposite shore. The channel also flows to the south, until it joins the Sea of al-Rūm to the west of the city, which lies at the entrance [to the channel] and is called Abzū. The longitude of this city is equal to the longitude of al-Qusṭanṭ īniyya — 49 degrees 50 minutes, and its latitude is less than the latitude of al-Qusṭanṭ īniyya , since it lies to the south of it.

We are already finishing the description of the mentioned Nīṭash Sea, having reached the place where we started. Nīṭash is the name of this sea in old books; it is also called the Sea of al-Armanī, [however] Allah knows best.

According to travelers, the entrance to the Channel of al-Qusṭanṭ īniyya from the Sea of al-Rūm is so narrow that the travelers can see there both banks, eastern and western. When travelers enter the Channel of al-Qusṭanṭ īniyya , it expands and becomes like a round pond. There is the Marmarā Island, on which there is a marble quarry. Hence the island got its name Marble, in Greek — Marmarā. It is said that between the entrance to the channel from the Sea of al-Rūm and between the entrance [from the channel] in the Sea of al-Qirim is 70 miles. This is the length of the Channel of al-Qusṭanṭ īniyya from south to north with a slight deviation to the east.

The sea of al-Qirim is now called the Black Sea. It is said that between [the city] Qusṭanṭ īniyya and the entrance to the channel from the Black Sea is 16 miles” (Reinaud, Slane 1840: 31–34).

This is the only coherent generalized description of the Black Sea in Abū al-Fidā’s book — all other information about the sea appears in connection with the story of various settlements or estuaries of rivers. In contrast to reports of the Black Sea in other parts of the book, this description does not contain any references to written sources of author’s information. The only exception is the mention of some “old books”, from which the author became aware of one of the names of the Black Sea. Therefore, the chapter devoted to the description of the Black Sea was compiled by Abū al-Fidā’ most likely independently. The absence of quotations from the writings

of earlier authors suggests the predominantly oral sources of information available to Abū al-Fidā’.

By its form the description of the Black Sea resembles sailing directions: the story of the sea is a description of the voyage from Istanbul along the southern, eastern, northern and western coasts of the sea with a return to the starting point; there is information about the features of the shoreline and sea currents; there are no references to any land routes leading from coastal cities to the interior of the continent; localization of cities is given through their mutual position. At the same time, for some cities their geographical coordinates are additionally given, and for Istanbul two variants of its longitude are pointed out (as well as two variants of city’s name), which indicates the use of several sources for the description of the sea. The fact that Abū al-Fidā’ had a number of sources at his disposal is also indicated by varying degrees of detail in describing the southern and northern coasts, on the one hand, and the eastern and western, on the other: nine cities are mentioned on the southern coast, eight cities — on the northern, only one city — on the north-western and one on the eastern shore.

In another section of the introduction to the treatise of Abū al-Fidā’ there is also a fragmentary information about the Black Sea, which is part of the story of some rivers of its basin — the Danube, the Dnieper, the Sakarya, and the Kızılırmak (Reinaud, Slane 1840: 50–51, 63–64). This information refers to the cities in the estuaries of these rivers and sometimes contains their coordinates (Table 1).

Name in the source	Modern name	Longitude		Latitude		Remarks of Abū al-Fidā’
		Deg.	Min.	Deg.	Min.	
Azaq	Azov					The Tān River (= Don) flows into the <i>Mānīfash</i> Lake, known in our time as the Sea of Azaq, being named after the port on its shore, which is the aim of the merchants. The Tān River flows into the above sea near the city of Azaq, to the west of it.
Şūdāq	Sudak	56		51		This is what Ibn Sa‘īd says in the fourth section of his description of countries lying outside the seventh climate.
Şārūkarmān	Chersonese	much smaller than 56		about 51		The Azzū River (= Dnieper) flows into the bay of the Sea of Azaq between Şārūkarmān and Aqjākarmān, two cities located on the coast of this sea. The latitude of these cities is approximately the same as the latitude of Şūdāq, and their longitude is much smaller, since they are located far to the west of Şūdāq.
Aqjākarmān	Belgorod-Dnestrovsky (Akkerman)	much smaller than 56		about 51		
Şaqjī	Isaccea			about 50		It is located north-north-west of al-Quştaṅṅ İniyya and to the south of the Ṭunā’s (= Danube) mouth. The latitude of Şaqjī is greater than the latitude of al-Quştaṅṅ İniyya : while the latter is 45 degrees, the latitude of Şaqjī is about 50 degrees, a littel more or less.
The estuary of the Anqura	The mouth of the Sakarya River	54		49		<i>Rasm al-Ma‘mūr</i>
The estuary of the river of Harqala	The mouth of the Kızılırmak River at Cape Bafra	57		46		Ibn Sa‘īd

Table 1: Toponyms of the Black Sea in the description of rivers.

The information of this table confirms our abovementioned observation, that Abū al-Fidā' knew the northern (including northwestern) and southern Black Sea coasts better than the eastern and western. As can be seen, when pointing the coordinates, the geographer refers to his sources — Ibn Sa'īd and *Rasm al-Ma'mūr*, and the coordinates of Chersonese, Akkerman and Isaccea determines himself, in analogy with the coordinates of Sudak and Istanbul.

In the second part of the treatise, some material about the Black Sea appears in connection with the description (in narrative and tabular form) of a number of cities on its coast; the coordinates of a number of cities are indicated.

First, information about the Black Sea cities is available in the section devoted to the description of Armenia, Arran and Azerbaijan (Reinaud, Slane 1840: 388–389, 393–393). Abū al-Fidā' points out nine cities of the southern Black Sea coast, two cities — of the eastern, and one — of the north-eastern. For four cities (Sinop, Samsun, Trabzon, and non-localized *al-Anjāz*) coordinates are given (for Trabzon in three variants), always with references to sources — Ibn Sa'īd, *Kitāb al-aṭwāl*, and al-Bīrūnī's *Kitāb al-qānūn al-Mas'ūdī*.

Secondly, information about the Black Sea cities can be found in the description of the northern regions of the earth (Reinaud, Slane 1840: 201, 203–204, 212–217, 222–223). Abū al-Fidā' mentions seven cities of the northern Black Sea coast, five cities — of the eastern, one city — of the north-western, and one city — of the southern. Coordinates are given for all cities, and the source of these data is almost always indicated. In seven cases, Abū al-Fidā' used the information of Ibn Sa'īd, in two cases — *Kitāb al-aṭwāl*, once referred to the data of *Kitāb al-qānūn al-Mas'ūdī* and *Rasm al-Ma'mūr*, and the coordinates of six cities he determined by analogy (*qiyās*).

Abū al-Fidā's map of the Black Sea and its sources

Judging by the fact that information about the Black Sea is placed in different parts of Abū al-Fidā's work, the geographer used a number of sources to describe the Black Sea. Along with the aforementioned written sources, Abū al-Fidā' also used information received from contemporary informants who visited the Black Sea region (Reinaud, Slane 1840: 393). Due to his high position Abū al-Fidā' had access to contemporary information related to the diplomatic, economic and religious contacts of Mamluk Egypt and the Golden Horde. For example, Abū al-Fidā' refers to reports of some persons who traveled from Egypt to the Crimea and back, including the ambassadors of the Golden Horde Khan Uzbek to Egypt, and to the stories of travelers and merchants who sailed the Black Sea and visited the Golden Horde (Reinaud, Slane 1840: 32–34, 63). Among the informants of the geographer were inhabitants of Isaccea — the Golden Horde town in the Lower Danube region (Reinaud, Slane 1840: 212).

Some data of Abū al-Fidā' about the Black Sea cities have signs of cartographic orientation, that is, they suggest that while drawing up the description of the Black Sea, Abū al-Fidā' could rely on a certain map. In four cases, far-away cities are referred to as lying “opposite” from each other — and this despite the fact that sailing the Black Sea is always described as coastwise traffic. Thus, Abū al-Fidā' claims that the cities of Sinop and Chersonese, Kafa and Trabzon, Sudak and Samsun, and *al-Anjāz* (non-localized city somewhere on the eastern coast of the Black Sea) and Kafa, lie opposite each other (Reinaud, Slane 1840: 32, 33, 214–215, 388). It is clear that such an observation could not be done *de visu*; in order to do this, one need a map.

Information about the Black Sea, placed in various parts of the work of Abū al-Fidā', is partly repeated, but at the same time it has differences and peculiarities caused by the use of various sources. All the Black Sea coordinates given by Abū al-Fidā' are summarized on maps below

according to their sources. On maps, the affiliation of the item to the certain information block is indicated by the corresponding figure: 1 — toponyms in the “Story about the Black Sea” in the Introduction to “Survey of countries”; 2 — toponyms in the description of rivers; 3 — toponyms in the description of the Southern and Eastern shores of the Black Sea in the section devoted to Armenia, Arran and Azerbaijan; 4 — toponyms in the description of the Northern part of the world. Non-localized toponyms and toponyms whose coordinates are not indicated (Reinaud, Slane 1840: 32–33, 203, 389) are summarized in a separate table at the end of this chapter (Table 2).

An important source of information about the Black Sea for Abū al-Fidā’ was the work of Ibn Sa’īd, in which the coordinates of most of the points (with the exception of Makhā’s longitude)-do not contradict each other (Fig. 1). It is noteworthy that in these cases the correlation coefficient with Ptolemy’s coordinates is high (for longitude its value is 0.99, for latitude — 0.95). The longitude of Ibn Sa’īd is less than the Ptolemaic one by about six degrees, and the latitude is greater by about three degrees (the standard deviation of the values is 37 and 38 minutes respectively, that is, it can be explained by rounding to one degree).

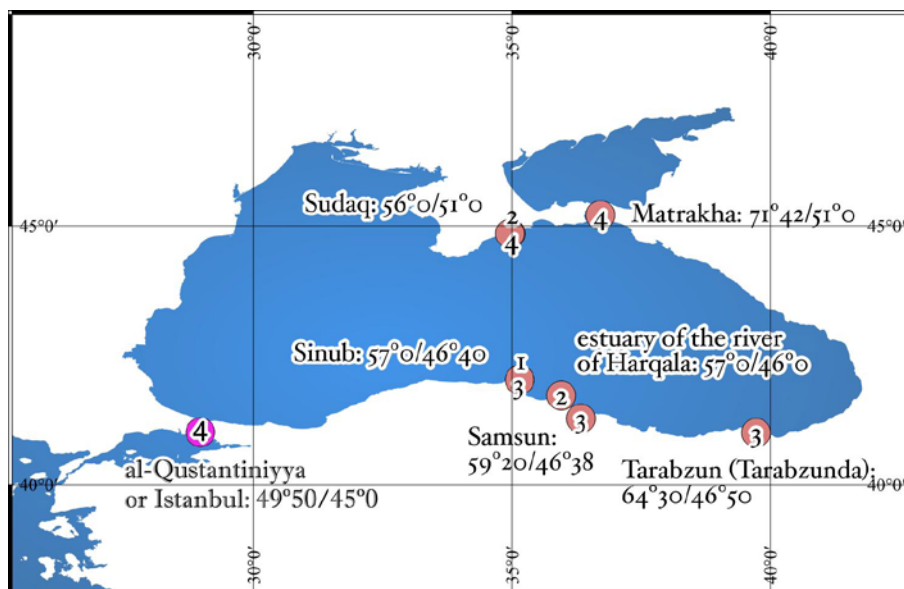


Figure 1: Cities, information about which is taken from Ibn Sa’īd

It is noteworthy that the figures obtained by the analogy method (*qiyās*) are in good agreement with each other in longitude, but are inconsistent in latitude (for example, Kerch and Azov are located at a latitude more southern than other cities) (Fig. 2). This agrees well with Abū al-Fidā’s remark on the computation of coordinates on the basis of distances: the summation of the distances from one point to the other along the seacoast in the Northern Black Sea region always coincided with the increase in longitude, while the latitude could both increase and decrease, and without special observations, it was easy to fall into error. The calculation of the longitude based on the lengths of the segments at an angle to the parallel explains the much smaller size of Abū al-Fidā’s longitude, calculated by the *qiyās* method, relative to the degree of the modern grid. But in addition, an estimate of the length of the cabotage route between six points allows us to conclude that one farsakh of Abū al-Fidā’ actually corresponds to a 2700–4000 m section (if one degree corresponds to 22.2 farsakhs) or 3200–4700 m (if one degree corresponded to 18.88 farsakhs), that is, 1,5–2 times less than the Persian farsakh.

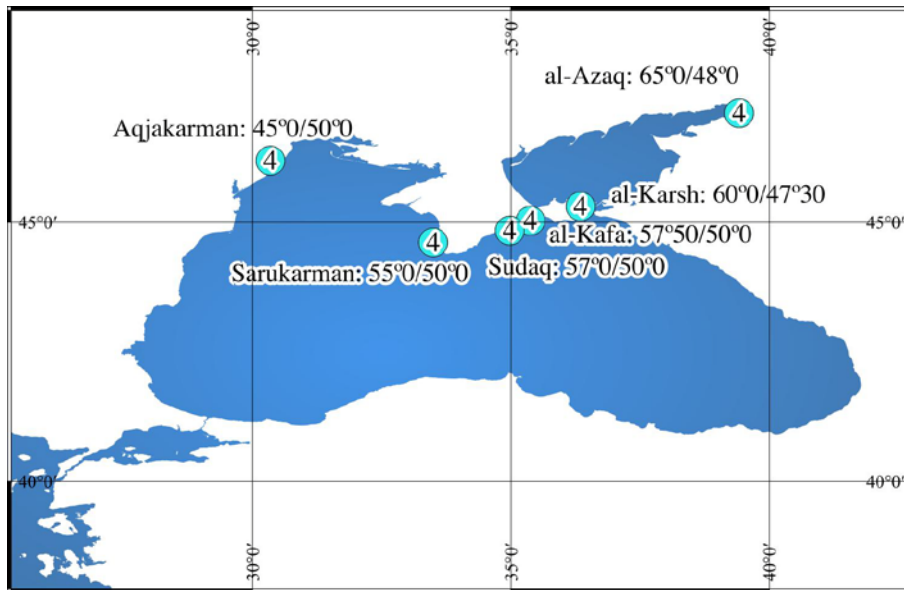


Figure 2: Cities, information about which is calculated with the help of *qiyās*.

Cities with coordinates for which the source of information is not specified, hardly belong to the same group as cities, information about which is calculated with the help of *qiyās*, because they do not agree with its coordinates (Fig. 3). At the same time, they almost always coincide exactly with the data of Ibn Sa‘īd (Sudak, Trabzon, one of the variants of the coordinates of Constantinople). The coordinates of Samsun differ only by two minutes. The coordinates of Chersonese differ from the Ptolemaic ones by the same values as those taken by Abū al-Fidā’ from Ibn Sa‘īd.

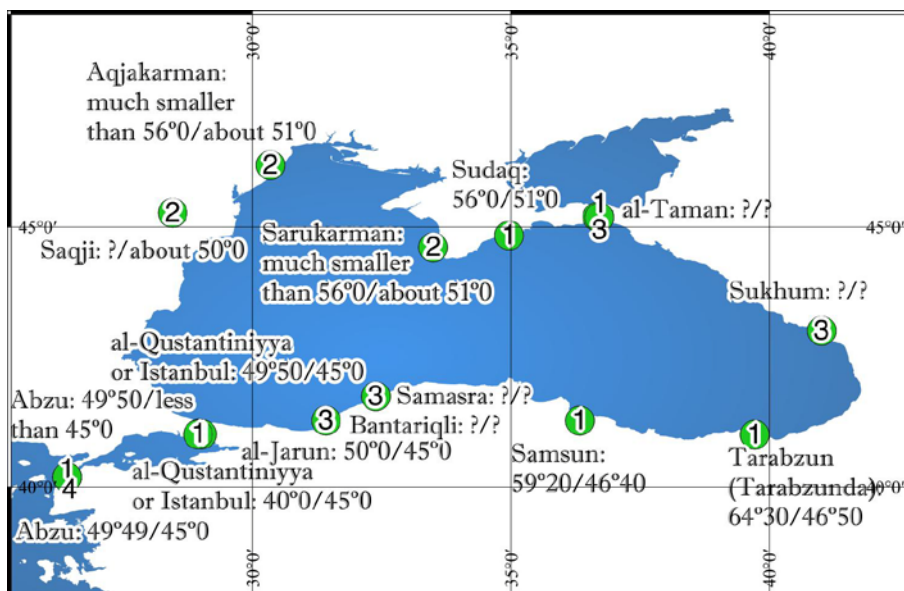


Figure 3: Cities, whose source of information is not indicated.

Abū al-Fidā’s references to other authors are too few to judge the characteristics of their coordinate systems without widening the field of research geographically (Fig. 4). The specification of the principles for calculating coordinates of different cities in the treatise of Abū al-Fidā’ will make it possible in the future to propose the identification of points that have not yet been localized but are provided with coordinates in the source.

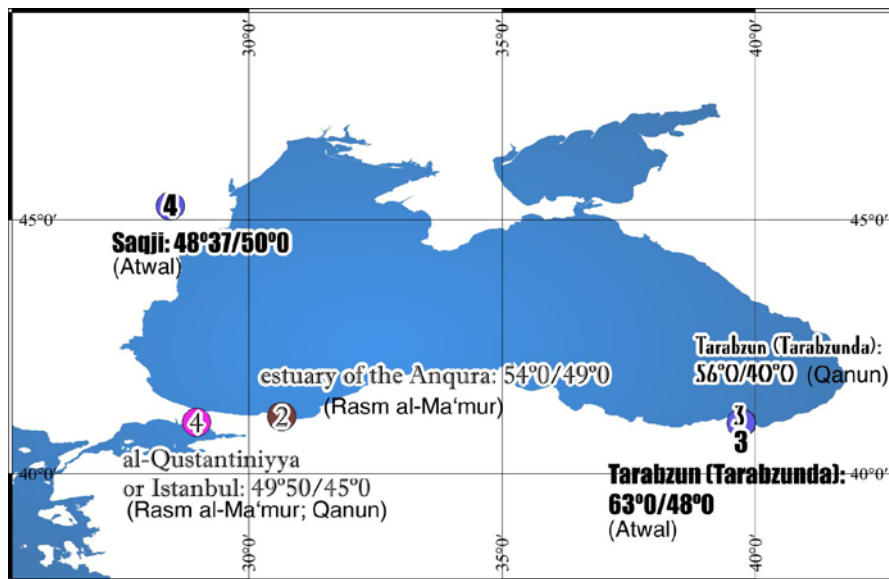


Figure 4: Cities, information about which is taken from other sources.

Name in the source	Modern name	Longitude		Latitude		Remarks of Abū al-Fidā'
		Deg.	Min.	Deg.	Min.	
Karbī	ancient Calpe					lies to the north with a slight deviation to the east of Istanbul
Bantariqlī	Karadeniz Ereğli					
Kitrū	ancient Kithoros in Paphlagonia					lies to the north-west of Ereğli
Kinulī	?					
Sukhūm	Sukhumi					lies to the north with a slight deviation to the west of Trabzon
al-Anjāz	?	68	30	46		lies on the sea shore to the east of Arkashiyya; according to al- 'Azīzī, the main city of al-Anjāz is called Arṭanūj
al-Kasā	?	66		46	53	Ibn Sa'īd; lies on the sea shore to the east of Trabzon and to the west of Arkashiyya
Arkashiyya	?	67	13	46	40	Ibn Sa'īd; lies on the sea shore
'Allāniyya	?	69		46		Ibn Sa'īd; lies on the sea shore to the east of al-Anjāz
Khazariyya	?	71		45	30	Ibn Sa'īd; stands on a river flowing from the north into the sea; lies in the bay on the edge of the sea to the east of 'Allāniyya
al-Shaqrāq	?					lies at the eastern shore of the Sea of Azov

Table 2: Toponyms without coordinates or non-localized.

Concluding remarks

Analysis of the geographic coordinates given for the Black Sea cities leads to preliminary conclusions about geographer's sources and the specifics of his coordinate information of the Black Sea basin. Since there is no reason to believe that all the coordinates given by Abū al-Fidā' were obtained as a result of measurements using the same technique with the same accuracy, it seems reasonable to consider his data for a number of separate information blocks where spatial relationships of the positioned objects allowed him to at least in general control the correctness of the coordinate data.

Abū al-Fidā' to a great extent preserved the data on the Black Sea basin coordinates that he found in his sources, the most important of which was the work of Ibn Sa'īd. At present, the question of the origin of the coordinate data of Ibn Sa'īd remains unexplored, but almost all of his coordinates ascend — probably indirectly — to the Ptolemaic ones, differing from them in longitude (minus six degrees in comparison with the figures of Ptolemy) and latitude (plus three degrees). The position of some of points mentioned by Abū al-Fidā' without a reference, correspond to the same pattern, so information on them can also be traced to Ibn Sa'īd or to its source. A supporting role in the work of Abū al-Fidā' played some other sources, coordinate data of which may also be related in the future to a particular geographical tradition. It can also be traced that Abū al-Fidā' supplemented the information he had taken from his predecessors — with the help of an independent calculation of geographical coordinates based on the distance between cities. Some details of the description in his treatise suggest that in addition to the descriptive and mathematical data, he could also use some cartographic image.

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