

Better Directions at Sea: The Pîrî Reis Innovation

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BETTER DIRECTIONS AT SEA: THE PÎRÎ REIS INNOVATION*

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Our lives are filled with directions of all sorts, including how to write this paper and both where and when to submit it. Directions are generally very useful. Among the most common visual directions nowadays are those we see as we speed along the highways. They tell us how fast or slowly to go, which side of the road to drive on, and how to get to where we want to go. On land, it used to be that we went slowly enough to ask directions. We could even stop to ask someone for help or visit a house to seek help. Nowadays life and directions are more complex, so we need more help. In order to reach a particular place I find that I want both written directions and a map. They complement each other.

In the open sea, on the other hand, it is more difficult to see signposts like those on the road or to ask directions even when sailing slowly, even when becalmed. At sea we need something else. The development of useful help took a long time and is still improving with newer technology such as Global Positioning System (GPS). Up until about 1300 CE and the early Renaissance, sea captains relied largely on memory, perhaps some personal notes, and practiced skill to get to where they wanted to go.¹ About that time the knowledge that was accumulated began to be written down in portolans, that is, books of instructions on how to get from one port to another port. Also at this time, almost miraculously, a new style of chart or map appeared based on the use of the compass. The map might accompany a portolan, though visually not, and has come to be called a "portolan chart."² These maps became ever more detailed and accurate, giving additional information as it was reported to the mapmaker. The maps improved much more after the development of printing as corrections were easier to make without adding copiers' errors.

In 1584 Lucas Janszoon Waghenaer published *Die Spiegel der Zeevaeri* in the Netherlands. It included not only detailed instructions but also many coastal maps. This book is considered "the first to contain charts and

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¹ For an example of a pilot's practice still in the 19th century and on a river, read chapter 10 of Samuel Clemens (Mark Twain), *Life on the Mississippi*.

² The development of the early charts has been explored extensively, though not conclusively. For the most recent extensive study, see Campbell, Tony. "Portolan Charts from the Late Thirteenth Century to 1500," in *The History of Cartography*, volume one, *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, edited by J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987) pp. 371-463. Other studies with some beautiful plates and bibliography are: Mollat Du Jourdin, Michel, and Monique de La Ronciere. *Sea Charts of the Early Explorers: 13th to 17th Century*. Translated by L. Le R. Dethan (New York: Thames and Hudson, 1984); and Whitfield, Peter. *The Charting of the Oceans: Ten Centuries of Maritime Maps* (Rohnert Park: Pomegranate Art books, 1996).

sailing directions in one book.³ It was soon available in English and other languages. It was very popular, often republished, and used a great deal for a long time.

In the 1520s, more than half a century before Waghenauer, however, another mapmaker did the same thing, if not in so detailed a fashion. It is that earlier book of the 1520s that I would like to examine and, in doing so; add one more leaf to the laurel wreath of fame on the brow of the already famous Ottoman cartographer, Piri Reis.

Piri Reis has become well known for his two world maps and for his portolan, the *Kitab-i Bahriye*⁴. There is, however, an innovation of his within the *Kitab-i Bahriye* that to my knowledge no one has ever fully explored for its useful creativity.⁵ The large-scale coastal maps of Piri Reis illustrate what he says in his text, and his maps add additional information to the text. The two elements go together.⁶ Waghenauer may have done a much more thorough work and added aspects such as coastal profiles, but no cartographer before Piri Reis had developed quite such a close interrelationship between the two elements of text and maps.

In the cartographic work of Piri Reis we already recognize five not merely special but unique aspects:⁷

First: In his time he was successful in drawing two quite different types of maps:

(A) world maps in loxodromic form: that is, the two incomplete maritime maps of the world of 923/1513 and 935/1528 with all their rhumb lines and scales of measurement, and

³ Phillip Allen, *Mapmaker's Art: Five Centuries of Charting the World* (2000), p. 58. Copies of a map by Lucas Janszoon Waghenauer are in many histories of map making.

⁴ Svat Soucek has written the best introductions to the *Kitab-i Bahriye*, both in "Islamic Charting in the Mediterranean," *Cartography in the Traditional Islamic and South Asian Societies, History of Cartography* 11/i, edited by J. B. Harley and David Woodward (Chicago: University of Chicago, 1987), 279-84, and in his *Piri Reis & Turkish Mapmaking after Columbus* (London: Nour Foundation, 1992), 84-101.

For the purposes of this article, unless otherwise indicated, all references to the *Kitab-i Bahriye* are to the colour facsimile of the manuscript of the second version, Ayasofya 2612: Piri Reis, *Kitab-i Bahriye*. Edited by Ertugrul Zekai Okte, translators: Vahit Cabuk, Tulay Duran, and Robert Bragner, The Historical Research Foundation - Istanbul Research Centre (Ankara: Ministry of Culture and Tourism of the Turkish Republic, 1988), 4 volumes. (As much as possible, use the facsimile itself. One must treat the English carefully, since it is the result of three removes from the text.) This publication is the third facsimile edition of the same manuscript, the first in colour, and the only facsimile of any manuscript text. The most complete published listing of extant manuscripts and some lovely maps in colour from other manuscripts are in M. E. Ozen, *Piri Reis and His Charts* (Istanbul, 1998), 20-22; almost as complete with additional information is in *Cartography in the Traditional Islamic and South Asian Societies*, pp. 290-292.

There have been studies of many sections of the *Kitab-i Bahriye*, but the only thorough study of a section of both versions of the text was that prepared over a quarter century ago by Svat Soucek, "Tunisia in the *Kitab-i Bahriye* by Piri Reis," *Archivum Ottomanicum* 5 (1973 [1976]), 129-296. He transliterated and translated both versions of the book and has extensive studies of every issue that came up. He also compared a short part of the text with four other earlier portolans, concluding: "[In] the description of the coast of Tunisia, the *Kitab-i Bahriye* is based on the original experience and notes of the author to the point of making any discussion of foreign models specious. In the thoroughness and organization of his description, Piri Reis was ahead of his time by perhaps two centuries" p. 294.

A careful study of one large section that includes an examination of the place names on the maps is Dimitris Loupis, *Piri Reis: Ottoman Cartography and the Aegean Lake* (in Greek), (2000).

⁵ Without quite realizing the innovative aspect Svat Soucek has explained how Piri Reis has used the words with the maps: "Kitab-i Bahriye," *Piri Reis & Turkish Mapmaking*, 86-88; "Islamic Charting in the Mediterranean," *op. cit.* p.277.

⁶ For an explanation of why the book was written and why it is basically a written set of directions with maps as supplements, read what Piri Reis writes in *Kitab-i Bahriye*, 41-42, or f. 2b-3a.

⁷ For the maps in the *Kitab-i Bahriye* see the chapter in the *History of Cartography* 11/1, by J. M. Rogers, "Itineraries and Town Views in Ottoman Histories," 228-256, especially 231-35; and Svat Soucek, "A propos du livre destructions nautiques de Piri Reis," *Revue des Etudes Islamiques* 41 (1973), 241-255.

(B) The hundreds of detailed coastal maps in his portolan, the *Kitab-i Bahriye*, each with its north-pointing arrow but without a scale of measurement, since the text gives the necessary distances between points.⁸

Second: unlike anyone else in his time or before, as he writes on his world map of 1513, he utilized at least twenty maps not only from the Christian European world but also from the Islamic world and from the ancient period, or as he put it "the time of Alexander" (*Iskender Zulkarneyn' zamaninda*).⁹

Third: he included in the world map of 1513 information based upon the map of Christopher Columbus resulting from his second voyage.¹⁰

Fourth: he initiated the representation of towns and cities in Ottoman illustrations.¹¹

Fifth: he wrote the most complete portolan of the Mediterranean and Aegean seas, the *Kitab-i Bahriye*,¹² a few passages of which we are going to look at more carefully.

These accomplishments make him one of the world's outstanding cartographers. It is time to recognize yet another cartographic achievement of Piri Reis.

In the second version of 1526 his great *Kitab-i Bahriye* (*A Book on Maritime Matters*), there are more than two hundred large-scale maps. To help get the attention of his sultan, Suleyman the Magnificent (ruled 1520-66), Piri Reis made the maps beautiful.¹³ More importantly for us today, he included information about historical and personal events. Most importantly and the main purpose of the book, however, was the large number of directions he wrote about safely getting around the Aegean, Adriatic, and Mediterranean seas. The text is as practical and rooted in reality as possible. The details are emphasized. During the previous two centuries maps or "portolan charts," had been made to help sailors cross the open seas of the Mediterranean, Aegean, Black seas, and even to navigate the east coast of the Atlantic. Most sailors, however, continued to use the safer routes along coasts and around islands. Piri Reis wrote to help those sailors, both naval and

⁸ In the Ptolemaic terms given by Lloyd A. Brown, Piri Reis was a geographer, a cartographer, and a chorographer. "Chorography does not require mathematics, according to Ptolemy... but it does need an artist." *The Story of Maps* (Boston, 1950), 61.

⁹ Specifically, twenty maps and world maps - "[the latter] are maps made at the time of *Iskender Zulkarneyn* [probably Alexander the Great, though there is also a supposed Muslim prophet with that name]; they show the inhabited part of the world, and the Arabs call them *ca'fariyes*, -eight such *ca'fariyes*, one Arab map of India, four maps recently made by the Portuguese that show Pakistan, India, and China drawn by means of mathematical projection, as well as a map of the Western Parts drawn by Columbus." Translation by Soucek, "Islamic Cartography," *op. cit.*, p. 270.

It is not clear whether Piri Reis meant a total of twenty maps or twenty maps plus world maps.

Gregory C. McIntosh indicates that Piri Reis believed that Iskender Zulkarneyn (Dhu'l Karneyn) was Ptolemy. *The Piri Reis Map 0/1513* (Athens, Georgia: University of Georgia Press, 2000), p. 17. In his *Kitab-i Bahriye*, f. 136b, p. 593, Piri Reis mentions the name writing about the island of Istindin (Tenos) and more clearly is referring to a time long past, possibly even before the time of Alexander the Great. *Kitab-i Bahriye*, f. 136b, p. 593

¹⁰ Gregory C. McIntosh, "A Tale of Two Admirals: Columbus and the Piri Reis Map of 1513," *Mercator's World*, vol. 5 #3, 18-23; and *The Piri Reis Map 0/1513*, *op. cit.*, which has a large bibliography.

¹¹ J. M. Rogers, *op. cit.*, p. 231.

¹² "[U]ntil the *Kitab* came on the scene no marine document described the entire range of coast, ports, and islands of the Mediterranean in such detail." Michelle Mollat du Jourdin and Monique de La Ronciere, etc., *op. cit.*, p. 223.

¹³ Later copies emphasize this to the extent that they are no longer guides so much as miniatures in which the colour is magnificent but details are left out. They would in any case be too expensive to take out to sea. Examples are the seventeenth-century copies in the University of Istanbul, the Ataturk Library in Istanbul, the Naval Museum in Istanbul, the Bibliotheque Nationale in Paris, and the Walters Art Gallery in Baltimore.

commercial.¹⁴ In the *Kitab-i Bahriye* he did not explain how to navigate the open seas across the Mediterranean or even from island to island, nor did he consider the Black Sea, a sea that he did not know.¹⁵ He tried to help the sailors in what they actually did in the Mediterranean and the Aegean, that is, sailing short distances around an island or a few miles along the coast, surviving the difficulties of winds, currents, soundings, climate, and finding water to drink.¹⁶ As he explained in his introduction, maps of large areas (by which he meant here the portolan charts) cannot provide the details that are necessary near the coasts.¹⁷ Only through his extensive text, with supplementary information on the detail maps, was this possible. In his efforts to assist the sailor by providing even more information he developed his innovation of linking the maps directly to the text.

While today we are captured by the maps, both by their beauty and because they are easier to comprehend than the Ottoman text, they are actually both an aid to understanding the text and a supplement to the text, the result being something no one had done before.¹⁸

My first example is from the very first section of directions and its accompanying map, the one dealing with the area of Canakkale, where the Dardanelles enters the Aegean.¹⁹

Piri Reis writes:²⁰

It is not possible for large merchantmen [*bargas*]²¹ to drop anchor on the European side (Rumeli) because of its currents and because it is deep. It is only for small boats. But on the Asian (Anadolu) side are wide harbours near the fort.

On the map he indicated where to moor on both the European side and the Asian side, illustrating with drawings where the smaller and the larger ships moor. He then added to the map among other things an indication of where to get water (an extraordinarily vital aspect of sailing up until recently), by showing the streams and by writing the word "*Cesme*," that is, "a source of water."

To the south, to the Aegean island of Chios (Sakiz) near Izmir, Piri Reis wrote:²² (Figure1).

¹⁴ There is a study in Greek that argues that Piri Reis prepared the *Kitab-i Bahriye* as a manual for Ottoman naval invasions. It stimulated the four-volume publication on the *Kitab-i Bahriye*. Maria Pharantou, *Kataktetike nausiploia sto Aigaiο* (Athens, c. 1990). Most of his ship terminology is commercial rather than military, though the corsairs in their galleys would have found the work useful. One value of her book is the great deal of material about the culture on the Aegean islands during the sixteenth to eighteenth centuries.

¹⁵ In some manuscript copies of the *Kitab-i Bahriye* there are small-scale maps of the Aegean, Mediterranean, and Black seas, and also of the world. In a few cases there are a number of segmental maps of the Black Sea coast. Piri Reis did not make any of these. They were added to the manuscripts after his death. See my "Supplemental Maps in the *Kitab-i Bahriye* of Piri Reis," *Archivum Ottomanicum* 13 (1993-94), 117-142.

¹⁶ An excellent short book that considers these nautical problems and more is John H. Pryor, *Geography, Technology, and War* (Cambridge: Cambridge University Press, 1988).

¹⁷ *Kitab-i Bahriye*, 2b, p. 41.

¹⁸ It is possible that Piri Reis learned the idea from a Portuguese rutter, but no such evidence exists.

¹⁹ See Figure 2. The examples that I use all come from a manuscript produced almost thirty years after Piri Reis completed the revised book, with the likelihood of some copiers' errors: Ayasofya 2612 (982/1574). The map is on f. 47a, p. 218.

²⁰ *Kitab-i Bahriye*, f. 43b, p. 205.

²¹ See the essay by Svat Soucek, "Galleys and Galleons," *Piri Reis & Turkish Mapmaking after Columbus*, *op. cit.*, 13-20; or his "Certain Types of Ships in Ottoman-Turkish Terminology," *Turcica* 7 (1975), 233-49.

²² *Kitab-i Bahriye*, f.86a, p. 370.

Before the fort or town is an artificial harbour...to permit very large carracks [*karakalar*] to moor, they sank a cofferdam (or caisson)... Ships entering this harbour do so from the north.... A creek flows here ...among the pine trees and on southerly days it is possible to take on water.

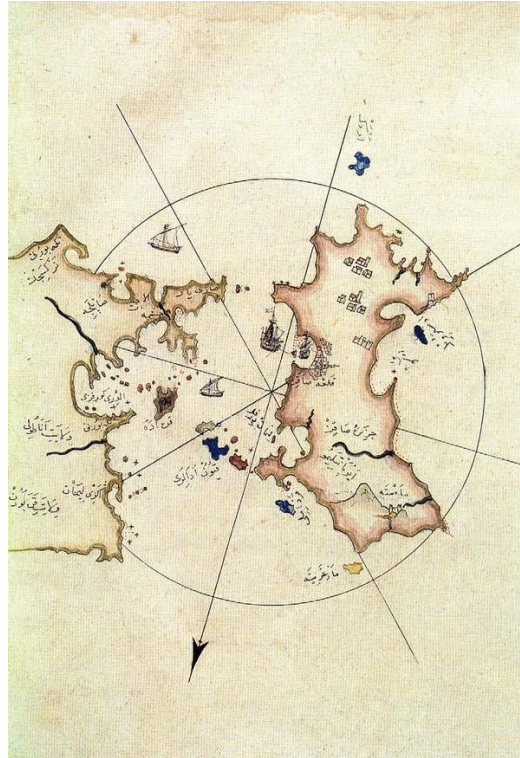


Figure 1. Chios (Sakiz) island map, *Kitab-i Bahriye*, Suleymaniye Library, Ayasofya, 2612.

Depicted on the accompanying map²³ is the harbour with a breakwater forming the artificial harbour and a large ship moored to the caisson, plus some other details not mentioned in the text I do not believe such a wedding of detailed text and map exists in any previous writings or until publication of L. J. Waghenaer's book fifty years later.²⁴ The map clearly indicates details of his verbal directions and also adds additional information of place-names and watering spots.

To show a passage that adds some personal and historical elements, here is a passage dealing with a small aspect of the Gulf of Corinth or Inebaht.²⁵

There is a harbour in this gulf called Asipre (Ispitiye) This harbor is where we [emphasis added; notice the first person] wintered **our** warships.... This is a fine haven, safe against all winds. During the conquest of the Gulf of Corinth (Inebaht) **our** victorious troops dug wells for their drinking water.... Of all these wells, the water of the one dug by the late Kemal Reis [uncle of Piri Reis] is the sweetest.

²³ See Figure 3. *Kitab-i Bahriye*, f. 83a, p. 359.

²⁴ A topic for investigation would be whether anyone produced a marriage of text and map after the *Kitab-i Bahriye* and before Waghenaer's book.

²⁵ *Kitab-i Bahriye*, f. 185b. p. 788.

On the map the harbour of Aspire is indicated along with the spot of the well dug by Kemal Reis.²⁶

We could slowly go from map to map, but I encourage you to look at the facsimile edition of 1988 for yourselves to see what Piri Reis achieved in so many ways in over two hundred chapters and maps. There is much yet to be learned both from and about the *Kitab-i Bahriye*.

It is possible, of course, that Piri Reis wrote only in the introduction how important the maps are as additions to the text, but did not actually directly link the maps and the text. But there are passages when his intension is clear. Here is a brief passage, for example, about a small island, the island of Kerpe, off the southern coast of Asia Minor.²⁷

If desired, places to get water on the island that is drawn are marked. They are marked on the supplemental [map]. (*Murad olicak cezire-i mezburun seklinde ol kazilan yirlerun alamenti kayd olunmusdur. Seklinde malum olunur.*)

Another example is in the Adriatic Sea near the island of Corfu:²⁸

In short, across from Corfu on the shore of Rumeli there are all sorts of harbors. Whoever wishes, let him look at the maps, where each one is drawn. (*Velhasil Korfuz Adasinun karsusunda, yani Rumeli kenarinda enva' durlu liman cokdur. Her birini murad olacak eskaline nazar oluna, ki her birini mesturdur.*)

So far I have found ten examples of Piri Reis telling the reader to look at the accompanying map, sometimes to see what he has written and at times to see additional information. Piri Reis meant for his text and his maps to go together:

The poetic introduction to the *Kitab-i Bahriye*, probably by Muradi, has three sections that considers maps, their creation, and their uses. In these passages the word for maps is "harita."²⁹ In the main body of the book the word is "sekil," its plural "eskal," and "resim," with the single exception found on folio 339b, where it is once again "harita."

1 *Zira bu zikr olan kaziyyeler harta icinde kayd olunmaga kabil ve muyesser deguldur.*

(The matters mentioned here cannot be explained by what is on a map.) (f. 2/b; p. 41)

2 *Amma bu fakir bir tarik uzerine asan eyledum ki bu fennun ehli olan kimesnelerden mezbur yirleri gormedin ve bilmedin bu kitabda yazilanin amele geturmegile be- inayetullah her isleri asan olup kilavuza ihtiyaclan kalmaz.*

(But this unworthy one has made it easy this way so that those who know this skill by using what is in this book, with the grace of God, without seeing or knowing the places mentioned, will have no need of guides, i.e., pilots.) (f. 3a-3/b; pp. 43-45-)

²⁶ *Kitab-i Bahriye*, f. 186b, p. 792.

²⁷ *Kitab-i Bahriye*, f. 98a, p. 418; the accompanying map is on f. 98b, p. 420.

²⁸ *Kitab-i Bahriye*, f. 169a, p. 722.

²⁹ *Kitab-i Bahriye*, ff. 12/a - 15/b, pp. 79-93.

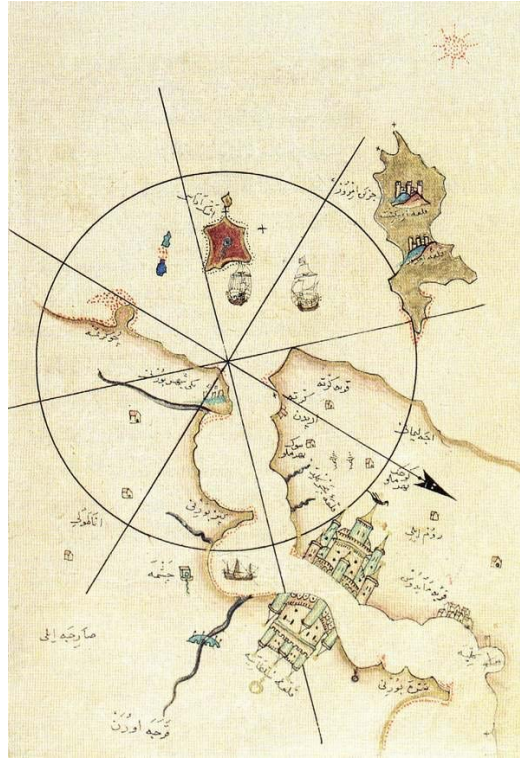


Figure 2. Canakkale area map, *Ayasofya Kitab-i Bahriye*, Suleymaniye Library, Ayasofya, 2612.

3 *Ve eger mezkur adalarda icmege su murad olunursa, her birinde bulunur. Hin-i amelde eskaline nazar oluna.*

(And if one desires water to drink on these islands, it exists on each of them. Just look at the maps where they are marked.) (f. 80b; p. 349)

4 *Hin-i amelde eskale nazr oluna kim, her husunu ma' lum ola.*

(When doing so look at the maps so that the matter may be known.) (f. 8ib; p. 353)

5 *Murad olucak seklime nazar oluna....(When necessary look at the map.)* (f. 100a; p. 427)

6 *Bu zikr olan limandan ma'da mezkur korfezde cok liman var. Amma murad olicak eskaline nazar oluna.*

(Besides the mentioned harbor there are many harbors in the gulf. But let those who wish look at the maps.) (f. 114b; p. 507)

7 *Velhasil Korfuz Adasinun karsusunda, yani Rumeli kenarinda enva durlu liman cokdur. Her birini murad olicak eskaline nazar oluna, ki her birini masturdur.*

(In short, across from Corfu on the Rumelian shore there are all sorts of harbors. Whoever wants can look at the map, where each one is written.) (f. 168b; p. 721)

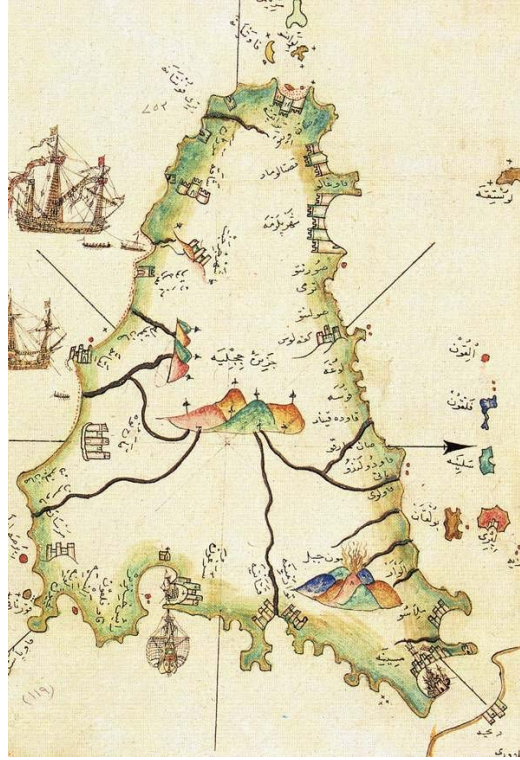


Figure 3. Sicily Island, Kitab-i Bahriye, Suleymaniye Library, Ayasofya, 2612.

8 *İmdi mezkur Cicilye Adası bir büyük adadır. Ol adanın cem'i alâyyimin kenâr be-kenâr resm idecek olursuz, mezkur ada degme kâğıdlar sigmaz.*

(Now the said island of Sicily is a big island. If we were to map all the landmarks along its coast, there would not be enough paper to depict the island.) (f. 244a; p. 1043) (Figure 3).

9 *Ol sebedendur ki, hartalarda Mutu-Barka cânibinde bir nev'a alem yazduklar...beyan eyleduk.*

(For that reason we have noted on the maps that in the area of Mutu-Barka they make a sort of signal.) (f. 339b; p. 1441)³⁰

10 *İmdi mezkur Nil ırmagın Misr'a giderken, pulula ile, makam ber-makam yazardım. İsbu eskâl hâsil oldu.*

(Thus, while going to Egypt [Cairo] on the River Nile I took compass readings stage by stage. The maps resulted.) (f. 355b; p. 1503) (Figure 4).

Piri Reis did not create the perspective or form for either of the world maps or the method for the detailed maps for the *Kitab-i Bahriye*, nor did he create all the information in the book from his own experiences. The forms he had learned from portolan charts such as those he used for his map of 1513, probably Portuguese, and for the *Kitab-i Bahriye* from the *isolarios* developed by the Italians, and possibly from a rutter or two, also probably Portuguese.³¹ What he did in compiling the *Kitab-i Bahriye* was to put his own extensive personal knowledge to use and expand upon the portolans, the *isolarios*, and the rutters. His portolan goes all around the Aegean, the Adriatic, and the Mediterranean and, in the second version, up the Nile to Cairo. (To go inland in a portolan at all was itself a novelty.³²) In addition to the extensive text his maps give a great deal of information not only depicting what the text indicates but also adding to it. While the maps such as the island of Andire (Andros, Kastro) and of others in the Aegean Sea clearly are copies of the earlier maps by Bartolemeo da li Sonetti,³³ Piri Reis gave a great deal more information in his text and on his maps as well.

I have tried to find examples of texts and maps earlier than 1520 that do what Piri Reis did and have been unsuccessful.³⁴ Besides the library searches of studies of old maps and examples of old maps and portolans I have asked experts in the field and posed the question on the web site that deals with old maps — MAPHIST, which goes to hundreds of people interested in old maps. No one has yet suggested maps or cartographers that either indicated so much information on a map for sailors or that so wedded the text and the maps together.

My final example is a passage that once again deals with an area south of Izmir, in this case, on the bay and mainland east of Chios.³⁵

³⁰ This explanation for the appearance of tents in this area is a contrast to the decorations of tents on the portolan chart called the "Catalan World Map" of about 1450 and the later (1563) map by G. de Maggiolo.

³¹ Svat Soucek, "Piri Reis basically contented himself with following the general pattern of Portolan charts of the time, his main contribution being to enlarge them so as to give a better visualization of the broad features of what he was describing in the text," "Tunisia in the *Kitab-i Bahriye* by Piri Reis," *op. cit.*, p. 138.

On *isolarios* see P. D. A Harvey, "Local and Regional Cartography in Medieval Europe," *History of Cartography I*, pp. 482-484; F-X Leduc, "Les insulaires [*isolari*]," *Couleurs de la Terre*, edited by Monique Pelletier (Paris: Bibliotheque nationale de France, 1998), 56-61.

Books of sailing directions had existed for over a century, whether the *portolano* (Italian), *roteiro* (Portuguese), *leeskaart* (Dutch), *derrota* (Spanish), *Seebuch* (German), *routier* (French), or *rutter* (English). It is possible that Piri Reis had seen one of these books, such as that by Pierre Garcie, and extended the ideas in the book in the *Kitab-i Bahriye*. (See D. W. Waters, *The Rutters of the Sea: the sailing directions of Pierre Garcie*, 1967. The materials used by Waters are now at Yale University.)

³² Soucek has an essay on the map of Cairo in his in *Piri Reis and Turkish Mapmaking after Columbus*, pp. 149-159.

³³ The maps of Almagro and others by Piri Reis are clearly derived from the printed book by Bartolomeo da li Sonetti (also Bartolemeo Turco), *Isolario* (1485). In her article on his predecessor, Christopher Buondelmonte, Hilary Louise Turner writes on page 17: "The maps therefore ... do not present information contained in the text, either by the common device of written explanation or in symbols, of which very sparing use is made." "Christopher Buondelmonte and the *Isolario*," *Terrae Incognitas*, 19 (1987), pp. 11-28.

An interesting map that was clearly copied from the *Isolario* of 1485 for the first version of the *Kitab-i Bahriye* is that of Istanbuliye or Caloiero. Both the text and the map were removed for the second version. See Soucek, *Piri Reis*, 122-23 and W. Sydney Allen, "Kaloyeros: * an Atlantis in microcosm," *Imago Mundi*, 29 (1977), 55-71. A colored copy of the Bartolomeo map is in the * chapter by Leduc, "Les insulaires (isolari)," *op. cit.* p. 14. A reproduction of the map in the late 16th-century copy of the first version is given in Claus-Peter Haase, "An early version of Piri Reis' naval charts," *Scribes et manuscrits du Moyen Orient* (1997), 272.

³⁴ Works that I checked for examples: Herbert Ewe, *Schone Schiffe auf dem alten Karten*, Leipzig: Delius, Klasing & Co., 1978; Arvid Gottlicher, *Die Schiffe im Alten Testament* (Berlin, 1992); Michael Leek, *The Art of Nautical Illustration*, London: Studio Vista, 1991; John Goss, *Mapmakers' Art*, London: Studio Editions, 1993; Gendre, F., "A propos des portulans: L'Art dans la Cartographie," *Societe de Geographic du Maroc* 3 (1937), 195-203.

³⁵ See Figure 1. *Kitab-i Bahriye*, f. 82a, p. 354.

If there is a desire for drinking water on these islands, it is found on all of them ... look at the map, [emphasis added] for the wells are marked on them.... Kara Ada is an uninhabited and ruined place...On the southern side; however, there is a cove.... Should one need drinking water, there is a fig tree at this cove and at its base there is a large well.... In sailing from Kara Ada to Toprak Adasi it is a mistake to sail directly because of a large rock in the way.... You should place this rock to your east. Proceed south on the western side of this rock. Cesme Harbor is a fine shelter for every type of ship.... A mile out to sea there are two lines of shoals. Attention must be paid to the map. [Emphasis added.]

Piri Reis was an extraordinarily able cartographer, somehow absorbing two types of mapmaking created in the western Mediterranean and making them his own to the extent that he was able to improve upon them. It would be nice to say that he began a school of Ottoman cartography, but I do not know anyone anywhere who followed his path. His world maps were buried in the palace, and the portolan that he made for mariners, even though copied many times, like Gilbert and Sullivan admirals, seems never to have gone to sea.³⁶ It was not revised with the knowledge that later sailors acquired either in his text or in his maps.³⁷ This lack of change in Ottoman mapmaking has a significance that we cannot explore here.³⁸ In general historians do not function well in the absence of evidence. One reason for this absence may be that Piri was an Ottoman who as a cartographer was thoroughly westernized, and his maps were too different from the cartography of the Ottoman and Islamic World, therefore difficult to understand. The Western cartographers, on the other hand, never saw his work and so did not learn from his innovative coupling of text and maps.



Figure 4. Cairo map, *Kitab-i Bahriye*, Istanbul University Library, T 6605.

³⁶ The book may have been not only too expensive but also simply too large. Other portolans and rutters are much smaller. The one exception is the Kiel manuscript, which seems to have gone to sea in some capacity, as there are notes and a little water damage. See Haase, *op. cit.*, 266-79.

³⁷ Some additional maps, often outdated, were added to some copies. See my "Supplemental Maps," *op. cit.* The Kiel manuscript has some notes that may be corrections. I have not seen this recently identified manuscript.

³⁸ For two of many ideas about the issue see: Svat Soucek, "Piri Reis and Ottoman Discovery of the Great Discoveries," *Studia Islamica* 79

Now in the 21st century, almost five hundred years after Piri Reis completed his magnum opus; we can recognize the novelty of what Piri Reis created in the *Kitab-i Bahriye*. By merging text and maps into one he tried to help sailors get where they want to go safely; he improved maritime directions. The Ottoman Turk Piri Reis is truly a great figure in the history of cartography.

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