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A Comparative Analysis of the 16th Century Ottoman Mapping of the Croatian Coast and Islands

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Abstract: *The paper is an analysis and comparison of maps of Piri Reis in six different copies of Kitab-i Bahriye. The study is only concerned with the Croatian part of the eastern Adriatic Sea from Dubrovnik to Umag on the Istrian peninsula. Methods of general and special visual comparison were used. Different copies of Kitab-i Bahriye show no significant further development of cartographic content. The later copies were improved in artistic value and decorative impression, especially the manuscripts from Bologna and Berlin.*

Key words: *Ottoman Cartography, the 16th Century, Kitab-i Bahriye, Piri Reis, Adriatic Sea, Croatian Coast and Islands*

1. Introduction

The primary aim of the research is the comparative study of six different versions of *Kitab-i Bahriye* by Piri Reis, from 1521 and 1526 to the beginning of the 17th century (Ari, 2002; Goodrich, 2004; Ökte, 1988; Özen, 1999). The reason for such a procedure is the evaluation of the development of scientific methodology and knowledge of geography and cartography of Croatia described by the Ottoman admiral and cartographer Piri Reis in his manuscript atlas *Kitab-i Bahriye (Book of Navigation)* (Tooley, 1979; Soucek, 1992).

The particular attention is paid to the description of the Croatian part of the eastern coast of Adriatic Sea, as well defined geographical region. Until now different countries, regions and coastlines described by Piri Reis are analysed in several publications (Goodrich, 2004a; 2004b; Loupis, 1999; 2004; Özen, 1999; Soucek, 1973; 1992).

Croatian islands, harbours and cities shown in the *Kitab-i Bahriye* are for the first time analysed in detail by the authors of the paper (Novak, Mlinarić, Lapaine, 2004; Novak, Mlinarić, 2005).

Isolarii of Venetian cartographers (Camocio 1571, Pinargenti 1573, Rosaccio 1606) are very well known and widely published. In general, these isolarii were classified as the first accurate descriptions of Adriatic islands. On the other hand, the descriptions of the East Adriatic coast and islands by Piri Reis in his chapter *Dalmaçya Kiyilary* of his manuscript atlas *Kitab-i Bahriye* were less known and popular. They were not, according to Goodrich, till now analysed and described in literature (Table 1, Goodrich, 2004).

It should be stressed that Piri Reis's maps of Croatian coastline and islands were made half a century before the "*Isolaria*" of Camocio, Rosaccio and Pinargenti (Novak, Mlinarić, Lapaine, 2004). *Kitab-i Bahriye* is not just an atlas with a collection of maps. The maps are followed by detailed instructions for navigation. The combination of maps and instructions characterizes *Kitab-i Bahriye* as a unique and practical book of navigation.

2. The Purpose and Goals

1. A comparative study of selected maps in six different copies of *Kitab-i Bahriye*. The study focuses only on the Croatian part of the eastern Adriatic Sea, i.e. from Dubrovnik to Umag on the Istrian peninsula.
2. A detailed analysis of a chapter from *Kitab-i Bahriye* titled *Dalmaçya kiyilari*.
3. Special attention was paid to the maps of Dubrovnik, Zadar, Mljet, Kvarner, Poreč, Novigrad and Brač with Hvar, Korčula and Pelješac.

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Sažetak: Rad je usporedbena analiza karata Piri Reisa iz šest različitih kopija *Kitab-i Bahriye*. U studiji se analizira isključivo hrvatski dio istočne obale Jadrana od Dubrovnika do Umaga na istarskom poluotoku. Korištene su metode opće i posebne vizualne usporedbe karata. Uočeno je da različite kopije *Kitab-i Bahriye* ne predstavljaju daljnji razvitak u poznavanju kartografskog sadržaja. Kasnije kopije predstavljaju napredak u umjetničkom smislu i impresivnije su zbog svoje dekorativnosti, a to se posebno odnosi na rukopisne primjerke iz Bolonje i Berlina.

Ključne riječi: osmanska kartografija, 16. stoljeće, *Kitab-i Bahriye*, Piri Reis, Jadransko more, hrvatska obala i otoci

1. Uvod

Primarni je cilj ovog usporedbenog istraživanja bilo istražiti šest različitih kopija *Kitab-i Bahriye* Pirijsa Reisa nastalih između 1521. odnosno 1526. do početka 17. stoljeća (Ari, 2002; Goodrich, 2004; Ökte, 1988; Özen, 1999). Na taj smo način nastojali vrednovati razvoj znanstvene metodologije i kumuliranog znanja na području geografije i kartografije, koja su na primjeru Hrvatske vidljiva u radovima osmanskog admirala i kartografa Pirijsa Reisa u manuskriptnom atlasu *Kitab-i Bahriye* (*Priručnik o plovidbi*) (Tooley, 1979; Soucek, 1992).

Posebna je pozornost usmjerena na prikaze hrvatskoga dijela istočne obale Jadrana, koji je posebno definirana geografska regija. Do sada se u različitim publikacijama već mogu naći rezultati istraživanja o različitim zemljama i obalnim regijama iz prikaza Pirijsa Reisa (Goodrich, 2004a; 2004b; Loupis, 1999; 2004; Özen, 1999; Soucek, 1973; 1992).

Kartografske je prikaze hrvatskih otoka, gradova i luka iz *Kitab-i Bahriye* prvi puta detaljnije istražio ovaj isti istraživački tim (Novak, Mlinarić, Lapaine, 2004; Novak, Mlinarić, 2005).

Izolari mletačkih kartografa (Camocio 1571, Pinargenti 1573, Rosaccio 1606) poznati su širokom čitateljstvu i često su objavljivani i istraživani. Općenito su smatrani prvima i do tada najboljim kartografskim prikazima jadranskih otoka. S druge su strane karte istočne jadranske obale i otoka Pirijsa Reisa iz poglavlja *Dalmaçya Kiyilari* rukopisnog atlasa *Kitab-i Bahriye* ostale daleko manje poznate široj javnosti. One čak niti nisu, barem prema Goodrichu, do sada proučavane, analizirane i opisane u dostupnoj literaturi, vidi tablicu 1 (Goodrich, 2004).

Stoga valja naglasiti da su karte hrvatskih obala i otoka Pirijsa Reisa nastale pola stoljeća prije od Camociovih, Rosacciovih i Pinargentijevih „Isolaria“ (Novak, Mlinarić, Lapaine, 2004). *Kitab-i Bahriye* pored toga nije samo atlas kao zbirka karata, već su te karte popraćene detaljnim uputstvima za plovidbu. Upravo takva kombinacija karata i plovidbenih savjeta učinila je *Kitab-i Bahriye* jedinstvenim praktičnim priručnikom o plovidbi.

2. Namjera i svrha istraživanja

1. Usporedbena studija izabranih karata iz šest različitih kopija *Kitab-i Bahriye* usmjerena je isključivo na hrvatski dio istočne obale Jadrana, odnosno prostor od Dubrovnika do Umaga u Istri.
2. Detaljna analiza poglavlja *Dalmaçya kiyilari* iz *Kitab-i Bahriye*.
3. Posebna je pozornost usmjerena na karte Dubrovnika, Zadra, Mljeta, Kvarnera, Poreča, Novigrada i Brača s Hvarom, Korčulom i Pelješcem.

In the chapter of *Kitab-i Bahriye* called *Dalmaçya kıyilari* relatively higher number of places are described as in others comparable regions. The following reasons could be assumed:

1. The Adriatic Sea was the most important and the only possible seaway for the Serenissima Republica di Venezia, the main rival of the Ottoman Empire, in the control of the Mediterranean (Inalcik, 1994; Karamustafa, 1997a; 1997b).
2. Exact information about the Adriatic Sea, islands and harbours was strategically important in sea and continental wars. The mainland Bosnia and Herzegovina was since beginning of sixteenth century in Ottoman hands.
3. The islands and the coast of the eastern Adriatic Sea were known to Piri Reis from his own experience.

Contrary to the coastline and islands of Spain, France, Italy, Slovenia, Greece, Tunisia, Egypt, Algeria and Palestine (Table 1), that have already been researched and studied, the coasts and islands of present-day Croatia (sections 62-86 of *Kitab-i Bahriye*) were only preliminary studied and published by the authors of the paper (Novak, Mlinarić, Lapaine, 2004; Novak, Mlinarić, 2005). This paper is an extended study in detail and a first systematic comparison of maps of Croatia from six versions of *Kitab-i Bahriye*. Because of the fact that *Kitab-i Bahriye* was written in old Turkish language and in Arabic script, it was difficult for us to study the original manuscripts that were kept in numerous Turkish and some European libraries. The situation changed when H. J. Kissling published the Bologna manuscript (MS 3609) in 1966 with his comments in German. The first facsimile edition (Ökte, 1988) and the second facsimile edition (Ari, 2002) of *Kitab-i Bahriye* allowed us to study it in a systematic way.

Table 1. Sections of *Kitab-i Bahriye* that have been studied according to Goodrich (2004)

Tablica 1. Dijelovi *Kitab-i Bahriye* koji su prema Goodrichu (2004) već istraženi

Section / Dio	Author / Autor	Title / Naslov
1-59, Sultaniye to Korfuz	Dimitris Loupis	Piri Reis, Ottoman Cartography and the Aegean Lake, 2000.
??, Istria	Joachim Kissling	Die istrische Kueste in See-Atlas des Piri Reis, 1969.
89-100, Moya-Venice-Padazino	Allesandro Bausani	L'Italia nel Kitab-i Bahriye di Piri Reis, 1990.
104, Teremiti Islands	Allesandro Bausani	L'Italia nel Kitab-i Bahriye di Piri Reis, 1990.
106, Mafurduyna	Allesandro Bausani	L'Italia nel Kitab-i Bahriye di Piri Reis, 1990.
111-118, Brindizi-Calabria	Allesandro Bausani	L'Italia nel Kitab-i Bahriye di Piri Reis, 1990.
120, Sicily	E. Sachau	Sicilien nach dem tuerkischer Geographen Piri Reis, 1910.
122-124, Sardinia	Bacqué-Grammont, Jean-Louis, Mathilde Pinon	La Premiere description des côtes de Sardaigne dans des instructions nautiques ottomanes (1521-1526)
122-124, Sardinia	Allesandro Bausani	L'Italia nel Kitab-i Bahriye di Piri Reis, 1990,
125, Corsica	Bacqué-Grammont, Jean-Louis, Mathilde Pinon	La Premiere description des côtes de la Corse dans des instructions nautiques ottomanes (1521-1526)
129-133, Pola-Kastiru-Genoa	Allesandro Bausani	L'Italia nel Kitab-i Bahriye di Piri Reis, 1990.
138-141, Andalusia	Robert Mantran	La description des côtes de l'Andlouise dans le Kitab-i Bahriye Piri Reis, 1986.
136, France	Joachim Kissling	Zur Betrachtung des Rhône Deltas in der Bahriye des Piri Re'is, 1973.
147-152, Algeria	Emel Esin	La description des côtes de l'algériennes de Piri Ra'is, 1986.
151-158, Tunisia	Svat Soucek	Tunisia in the Kitab-i Bahriye by Piri Reis, 1973, 1976.
151-158, Tunisia	Robert Mantran	La description des côtes de Tunisie dans le Kitab-i Bahriye de Piri Reis, 1977.
164-176, Egypt	Robert Mantran	La description des côtes de l'Egypte dans le Kitab-i Bahriye de Piri Reis, 1981.
177-178, Palestine	Uriel Heyd	A Turkish Description of the Coast of Palestine in the Sixteenth Century, 1956.
198, Meis	Dimitris Loupis	Piri Reis, Ottoman Cartography and the Aegean Lake, 2000.
204-219, Kerpe-Magariz	Dimitris Loupis	Piri Reis, Ottoman Cartography and the Aegean Lake, 2000.

U poglavlju *Dalmaçya kıyilari* iz *Kitab-i Bahriye* kartografiran je i opisan relativno veći broj luka u usporedbi s drugim regijama. Razlozi za to su sljedeći:

1. Jadransko more bilo je najvažniji i jedini mogući pomorski put Mletačke Republike, koja je u to vrijeme bila glavni suparnik Osmanskoga Carstva u borbi za dominaciju na Sredozemnom moru (Inalcik, 1994; Karamustafa, 1997a; 1997b).
2. Precizne informacije o Jadranskom moru, otocima i lukama bile su strateški vrlo važne u vođenju rata na moru i na kopnu. Područja Bosne i Hercegovine su početkom 16. stoljeća bile pod osmanskom vlašću.
3. Piri Reis je na osnovi vlastitoga plovidbenog iskustva poznao istočnu obalu i otoke Jadranskoga mora.

Obale i otoci Španjolske, Francuske, Italije, Slovenije, Grčke, Tunisa, Egipta, Alžira i Palestine su do sada dobro istraženi i o njima je dosta pisano (tablica 1). S druge strane, o obali i otocima današnje Hrvatske (dijelovi 62-86 iz *Kitab-i Bahriye*) preliminarna su istraživanja proveli i pisali autori ovoga rada (Novak, Mlinarić, Lapaine, 2004; Novak, Mlinarić, 2005). Ovaj je rad daljnja detaljna proširena studija i prva sustavna usporedba karata Hrvatske iz šest različitih prijepisa *Kitab-i Bahriye*. Proučavanje izvornih rukopisnih primjeraka *Kitab-i Bahriye*, koje se čuvaju u brojnim turskim i nekim europskim knjižnicama, u početku je bilo otežano jer su popratni tekstovi i upute o plovidbi pisani na staroturskom jeziku arapskim pismom. Situacija je donekle promijenjena kad je 1966. god. H. J. Kissling objavio rukopisni primjerak koji se čuva u Bolonji (MS 3609) s komentarom na njemačkom jeziku. Tek su prvi službeni pretisak (Ökte, 1988), a potom i drugi (Ari, 2002) *Kitab-i Bahriye* omogućili sustavno i usporedbeno istraživanje.

3. Kartografski izvori i metodologija

Piri Reis je kartografski prikazao 23 luke i otoka s prostora današnje Republike Hrvatske. Reprezentativni izbor najznačajnijih karata, koje su detaljno istražene i predočene ilustracijama, prikazuju tablica 2 i slike 1-7.

Za sustavnu vizualnu usporedbu karata istočne obale Jadrana iz šest prijepisa *Kitab-i Bahriye* Pirijsa Reisa korišteni su sljedeći elementi: orijentacija, smještaj otoka, oblik otoka, izgled obalne linije, zaljevi i rtovi, luke, gradovi, sela, utvrde, istaknute zgrade, crkve, ceste i putevi, arheološka nalazišta, ruševine, akvadukti, planine, jezera, rijeke, polja, vinogradi, maslinici, granice, oznake teritorijalnih podjela, toponimi i ukupni dojam.

4. Opća vizualna usporedba šest različitih prijepisa

1. Usporedba verzije 1 (1521): MS 3612 (Bologna) i H.O. 192 (Wien) s verzijom 2 (1526) *Kitab-i Bahriye*: MS 2612 (Ayasofya, Istanbul), H642 (Topkapi, Istanbul), MS 3609 (Bologna) i Diez A. Foliant 57 (Berlin)

Usporedbom su utvrđene značajne razlike u kartografskom pristupu. Na kartama iz prve verzije prikazane su veće regionalne cjeline s dužom obalnom crtom i više otoka, luka i gradova, pa one predstavljaju pregledne regionalne karte. (Slika 6a) U primjercima druge verzije *Kitab-i Bahriye* nalaze se detaljni kartografski prikazi. Kartografska metodologija se mijenja. Prikazuju se pojedini otoci (Slika 3a, 3b) ili luke s detaljnijim kartografskim sadržajem (Slika 1a-1d, 2a-2d).

2. Usporedba verzije 2 (1526) *Kitab-i Bahriye*: MS 2612 (Istanbul, Ayasofya), MS H 642 (Istanbul, Topkapi), MS 2609 (Bologna) i MS Diez A. Foliant 57 (Berlin)

Table 2. Croatian islands, harbours and towns described in the chapter of Kitab-i Bahriye entitled Dalmaçya kıyilari by Piri Reis. Source: Istanbul, Süleymaniye Library, Ayasofya MS 2612, Facsimile Edition 1988 (Ökte, 1988)

Tablica 2. Hrvatski otoci, gradovi i luke iz poglavlja Dalmaçya kıyilari u Kitab-i Bahriye Pirijsa Reisa. Izvor: Istanbul, Süleymaniye Library, Ayasofya MS 2612, Facsimile Edition 1988 (Ökte, 1988)

Map no. / Karta br.	Contemporary name / Suvremeno ime	Name in <i>Kitab-i Bahriye</i> / Ime u <i>Kitab-i Bahriye</i>
1	Dubrovnik / Cavtat	RAGUZA NOVA, RAGUZA VANE, DUBREVONIK / ESKI RAGUZA
2	Mljet	MELIDE ADASI
3	Korčula	KORSILE ADASI
4	Vis	LÎSE ADASI
5	Otok Hvar / grad Hvar / Starigrad	LEZÎNE ADASI / YENI LEZINE / ESKI LEZINE
6	Šibenik	ŞİBENIK
7	Zadar / Biograd	CARA, YENI CARA, ZADIRE / ESKI CARA
8	Molat	ÇAM PONTAL
9	Škadra	SAM PARU DAMANU
10	Rab	EZNI ADASI
11	Premuda	PÎREMUDE ADASI
12	Pag	PAGU ADASI
13	Krk	VAGE ADASI
14	Cres / Lošinj	KARSU ADASI / LUŞIN ADASI
15	Unije	UNÎYE KALESÎ
16	Medulin	MEDELUN
17	Veruda	ULAMUSALU
18	Pula	TARA POLA
19	Rovinj	ROVÎNE
20	Poreč / Vrsar	PIRANSE / ORSARA
21	Novigrad / Poreč	SÎTE-NOVA / PIRANSE
22	Umag / Novigrad	UMAGU / SÎTE-NOVA
23	Umag	UMAGU

3. Cartographic Sources and Methodology

Concerning the eastern Adriatic coast, Piri Reis mapped 23 ports and islands, located in today's Republic of Croatia. The selection of the most representative maps from those 23 maps is analysed in details and shown (Table 2 and Fig. 1-7).

This systematic visual comparison of maps of the Eastern Adriatic coast in six copies of *Kitab-i Bahriye* by Piri Reis is made using the following elements: orientation of the map, position of islands, form of islands, contour of the coastline, gulfs and promontories, harbours, cities, villages, fortresses, prominent buildings, churches, roads, ways, archaeological sites, ruins, aqueducts, mountains, lakes, rivers, fields, vineyards, olive grows, local borders, signs of territorial division, toponymic descriptions and general impression.

4. General Visual Comparison of Six Different Copies

1. Comparison of version 1 (1521): MS 3612 (Bologna) and H.O. 192 (Vienna) versus version 2 (1526) of *Kitab-i Bahriye*: MS 2612 (Ayasofya, Istanbul), H642 (Topkapi, Istanbul), MS 3609 (Bologna) and MS Diez A. Foliant 57 (Berlin)

The comparison reveals significant differences in the cartographic approach. Maps of the first version show broader regions with longer coastline with several islands, harbours and cities, giving a more general overview of the region (Fig. 6a). In the second version of *Kitab-i Bahriye*, a detailed cartographic description is found. The methodology of description was changed to island by island (Fig. 3a, 3b) or harbour by harbour demonstration with richer cartographic content (Fig. 1a-1d, 2a-2d).

2. Comparison of version 2 (1526) of *Kitab-i Bahriye*: MS 2612 (Istanbul, Ayasofya), MS H 642 (Istanbul, Topkapi), MS 2609 (Bologna) and MS Diez A. Foliant 57 (Berlin)

The comparison indicates the same or very similar coastline and contours of the islands. The content of the hinterland is slightly different, with variations in number and form of the fortresses, buildings, houses and villages. The inner urbanistic architecture of Dubrovnik, Cavtat, Zadar, Poreč and Novigrad are illustrated in a similar schematic way (Fig. 1c, 1d, 2c, 2d, 4a, 4b, 5a, 5b).

3. Comparison of version 2 (1526) of *Kitab-i Bahriye* MS 2609 (Bologna) versus MS Diez A. Foliant 57 (Berlin)

All the analysed maps have the same or very similar coastline and contours of the islands, but different and more detailed architecture and urbanistic feature of cities and harbours compared to the MS 2612 (Istanbul, Ayasofya) and MS H642 (Istanbul, Topkapi) manuscripts. Cities and harbours are depicted differently, with prominent architectural features (city walls, fortresses, churches). Local and specific structures are drawn individually (e.g. Dubrovnik, Zadar). Inner city architecture

(i.e. houses) is mostly schematically represented (Fig. 1c, 1d, 2c, 2d, 4a, 4b, 5a, 5b).

4. Comparison of *Kitab-i Bahriye* version 1, MS H.O. 192 (Vienna) and version 2, MS Diez A. Foliant 57 (Berlin) versus modern maps

a) In order to evaluate the accuracy of Piri Reis' maps versus modern maps, we compared the contours of the coastline from Split to Dubrovnik and islands Brač, Hvar, Korčula and peninsula Pelješac from *Kitab-i Bahriye*, Version 1 from Oesterreichische Nationalbibliothek, Vienna, Cod. H.O. 192. with the corresponding modern map (Fig. 6a, 6b). The relations of big islands and the position of the Pelješac peninsula are almost exact, while the coastline and the island contours are schematic and simplified. Not only bigger islands (e. g. Brač, Hvar, Korčula, Mljet), but also smaller islands (Vis, Šolta, Lastovo) and islets (Sušac) are drawn. Vienna map also represents the cities of Split, Makarska and Dubrovnik (Fig. 6a).

b) Further comparison was made between the map of the Kvarner area with the island of Cres from *Kitab-i Bahriye*, Version 2, Deutsche Staatsbibliothek, Berlin, MS Diez A. Foliant 57 and an adequate modern map (Fig. 7a, 7b). The form and the coastline of the Kvarner and contours of islands Cres and Lošinj on the Berlin map show clear differences compared to the modern map. But the position of islands and distances between the coast and the islands do not show great deviations. The bridge between Cres and Lošinj is shown and it still exists. Towns and villages on the coast are numerous and correspond with a modern map.

5. Special Comparison of Four Different Copies Concerning Cities of Dubrovnik, Zadar and the Island of Mljet

Dubrovnik

1a (Ayasofya, Istanbul), 1b (Topkapi, Istanbul), 1c (Bologna), 1d (Berlin)

1. All four maps have simple compass roses with the orientation north-south (north up)
2. Positions of the city and the harbour of Dubrovnik and Cavtat are the same on all four maps
3. Elafit islands are similarly drawn
4. Contours of the coastline are simply drawn in Fig. 1a and 1b, while in the Fig. 1c and 1d they are described in detail
5. Promontories are presented in more details on Fig. 1c and 1d
6. Walls and fortresses are dominant features of Dubrovnik. The harbour is shown in semi-circular form. The harbour is closed with a harbour chain and walls and moles

Table 3. Manuscripts of Kitab-i Bahriye concerning the Croatian Adriatic coast

Tablica 3. Rukopisi Kitab-i Bahriye prema kojima je analizirana hrvatska obala Jadrana

Version 1 / Verzija 1 (927/1521)	Location / Knjižnica	Signature / Signatura	Number of maps of Croatia / Broj karata Hrvatske
1	BOLOGNA, Biblioteca Universitaria di Bologna,	MS 3612	3
2	WIEN, Österreichische Nationalbibliothek	H.O. 192 (Historia Otomanica)	3
Version 2 / Verzija 2 (932/1526)			
3	ISTANBUL, Süleymaniye Library, Ayasofya	MS 2612, 982/1574, (Facsimile Edition 1988)	23
4	ISTANBUL, Topkapi Palace Museum, Library	H. 642, (Facsimile Edition 2002)	23
5	BOLOGNA, Biblioteca Universitaria di Bologna	MS 3609, „Seyyid Nuh“ (Seyel Noe)	25
6	BERLIN, Deutsche Staatsbibliothek,	Diez A. Foliant 57	17

Usporedba ukazuje na isti ili vrlo sličan izgled obalne crte i obrisa otoka. Kartografski sadržaj kopnene unutrašnjosti se donekle razlikuje brojem i oblikom utvrda, zgrada, kuća i sela. Na sličan shematiziran način je prikazan sadržaj unutar gradskih zidina Dubrovnika, Cavtata, Zadra, Poreča i Novigrada (slike 1c, 1d, 2c, 2d, 4a, 4b, 5a, 5b).

3. Usporedba verzije 2 (1526) *Kitab-i Bahriye* MS 2609 (Bologna) sa MS Diez A. Foliant 57 (Berlin).

Sve uspoređene karte prikazuju istu ili vrlo sličnu obalnu crtu i obrise otoka. U odnosu na rukopis MS 2612 (Istanbul, Ayasofya) i MS H642 (Istanbul, Topkapi) razlikuju se u detaljnije prikazanoj arhitekturi i istaknutijim urbanističkim značajkama gradova i luka. Gradovi i luke su drugačije prikazani, s istaknutijim arhitektonskim značajkama (gradske zidine, utvrde, crkve). Individualizirane su specifične lokalne urbanističke strukture (npr. Dubrovnik, Zadar). Unutargradska arhitektura (kuće) je većinom prikazana shematski (slika 1c, 1d, 2c, 2d, 4a, 4b, 5a, 5b).

4. Usporedba verzije 1, MS H.O. 192 (Wien) i verzije 2, MS Diez A. Foliant 57 (Berlin) sa suvremenim kartama.

a) S ciljem vrednovanja preciznosti karata Pirija Reisa u odnosu na suvremene karte uspoređeni su obrisi obale od Splita do Dubrovnika i otoka Braća, Hvara, Korčule i poluotoka Pelješca iz *Kitab-i Bahriye*, verzija 1 iz Österreichische Nationalbibliothek, Wien, Cod. H.O.192. s odgovarajućom suvremenom kartom (slika 6a, 6b). Međusobni odnosi velikih otoka i položaj poluotoka Pelješca su prilično vjerni stvarnosti, ali su obalne crte i obrisi otoka shematizirani i pojednostavljeni. U crtani su ne samo veliki (npr. Brač, Hvar, Korčula, Mljet), nego i manji otoci (Vis, Šolta, Lastovo) i otočići (Sušac). Karta iz manuskripta koji se čuva u Beču prikazuje također i gradove Split, Makarsku i Dubrovnik (slika 6a).

b) Uspoređena je također karta Kvarnera s Cresom iz *Kitab-i Bahriye*, verzija 2, iz Deutsche Staatsbibliothek u Berlinu, MS Diez A. Foliant 57 s odgovarajućom suvremenom kartom (slika 7a, 7b). Oblik i crta obale Kvarnera kao i obrisi otoka Cresa i Lošinja na karti iz Berlina znatno se razlikuju od suvremene karte. U prikazu položaja otoka i udaljenosti između obale i otoka također ima velikih razlika. Prikazan je most između Cresa i Lošinja, koji i danas postoji. U crtani su brojni gradovi i sela na obali što odgovara današnjim kartama.

5. Posebna usporedba četiri različita prijepisa karata gradova Dubrovnika, Zadra i otoka Mljeta

Dubrovnik

1a (Ayasofya, Istanbul), 1b (Topkapi, Istanbul), 1c (Bologna), 1d (Berlin)

1. Sve četiri karte imaju jednostavnu kompasnu ružu. Orijentacija karte je sjever-jug (sjever gore)
2. Smještaj gradova i luka Dubrovnika i Cavtata jednak je na sve četiri karte
3. Elafitsko otočje je nacrtano na sličan način
4. Obalne crte su jednostavno prikazane na sl. 1a i 1b, dok su detaljno ucrtane na sl. 1c i 1d
5. Rtovi su detaljno prikazani na sl. 1c i 1d
6. Najistaknutije karakteristike Dubrovnika su gradske zidine i utvrde. Luka ima polukružni oblik, a zatvorena je lancem i molom.

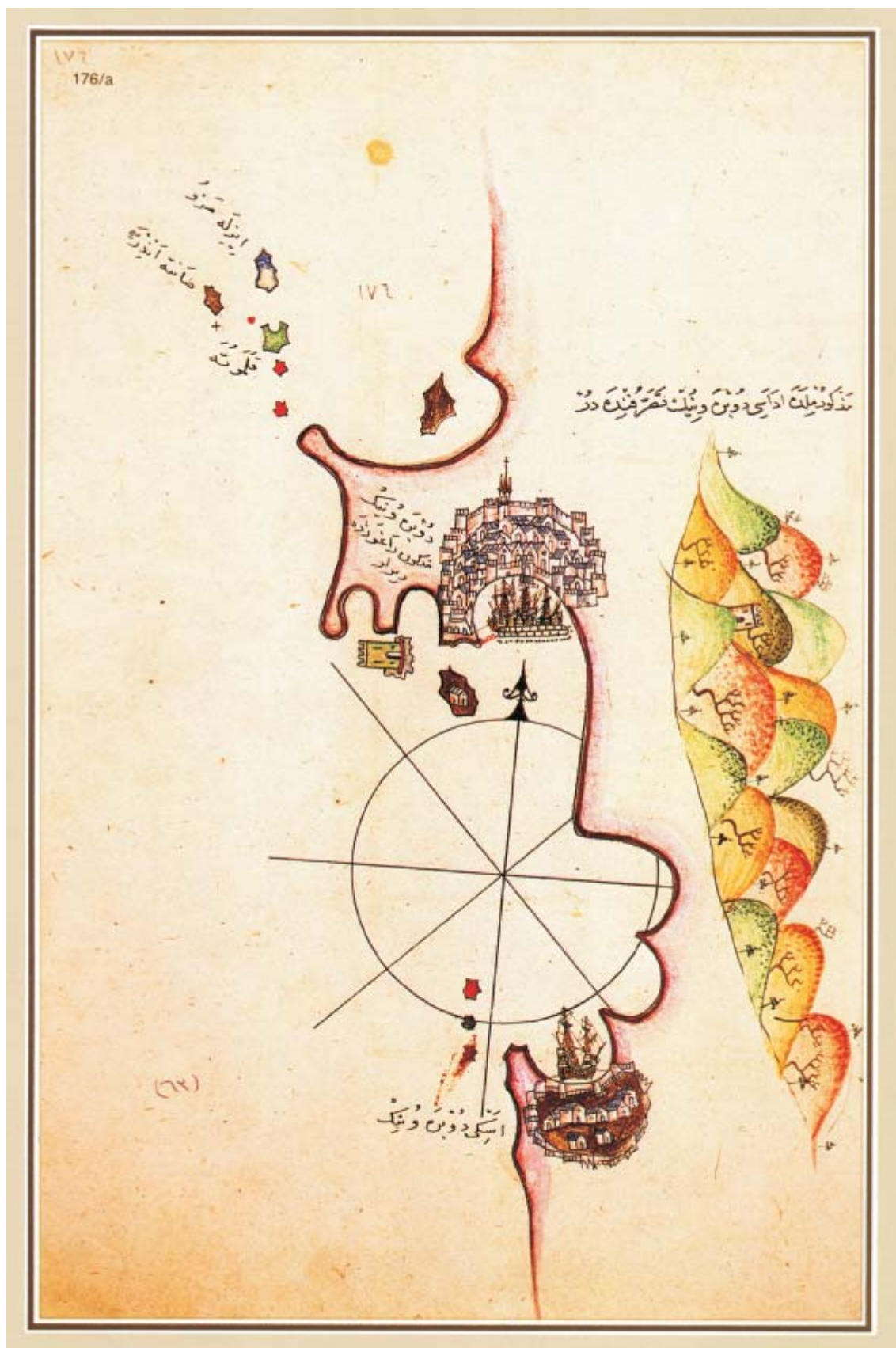


Fig. 1a. Dubrovnik and Cavtat from Kitab-i Bahriye, Istanbul, MS 2612

Slika 1a. Dubrovnik i Cavtat iz Kitab-i Bahriye, Istanbul, MS 2612

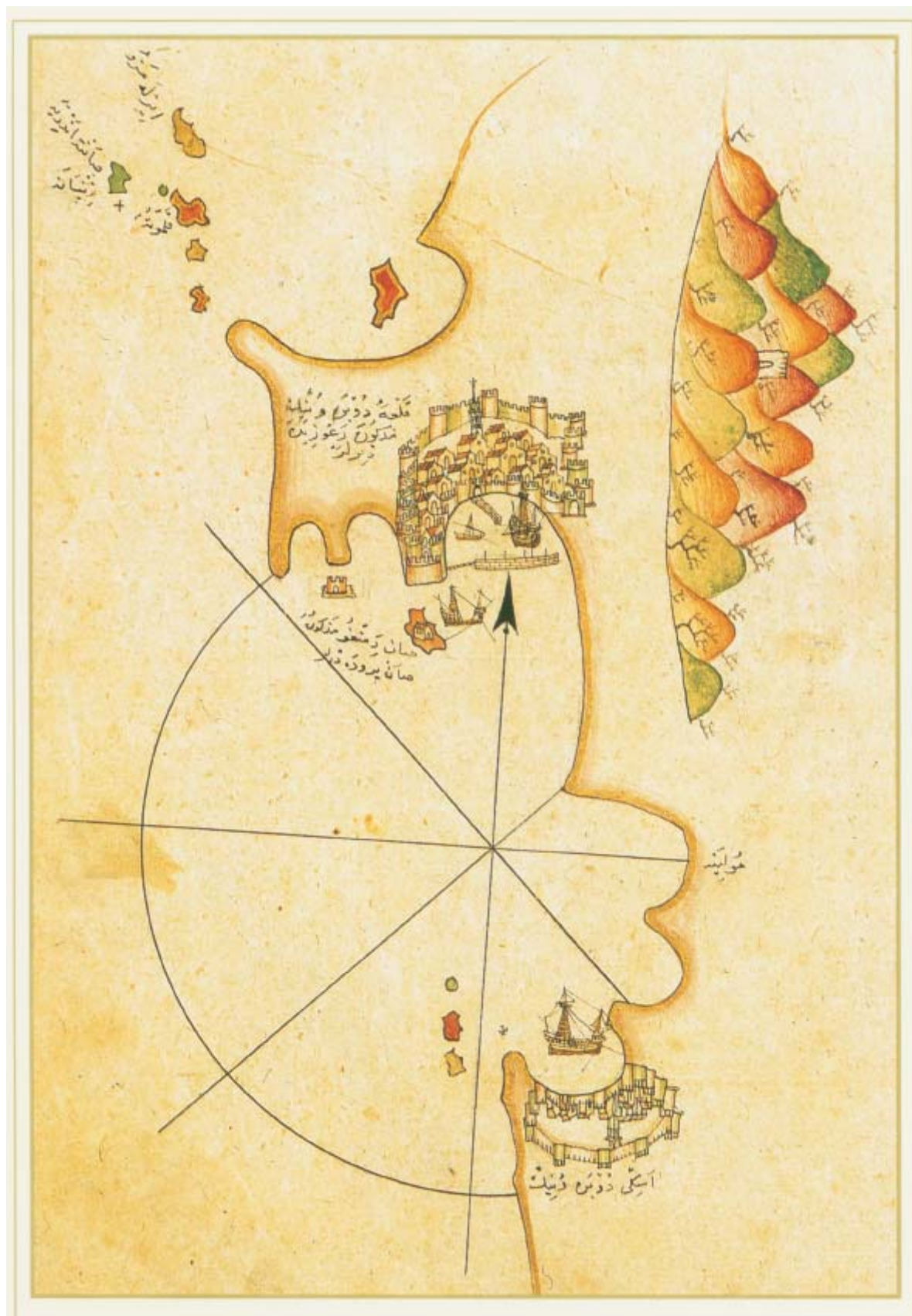


Fig. 1b. Dubrovnik and Cavtat from Kitab-i Bahriye, Istanbul, MSH 642

Slika 1b. Dubrovnik i Cavtat iz Kitab-i Bahriye, Istanbul, MSH 642

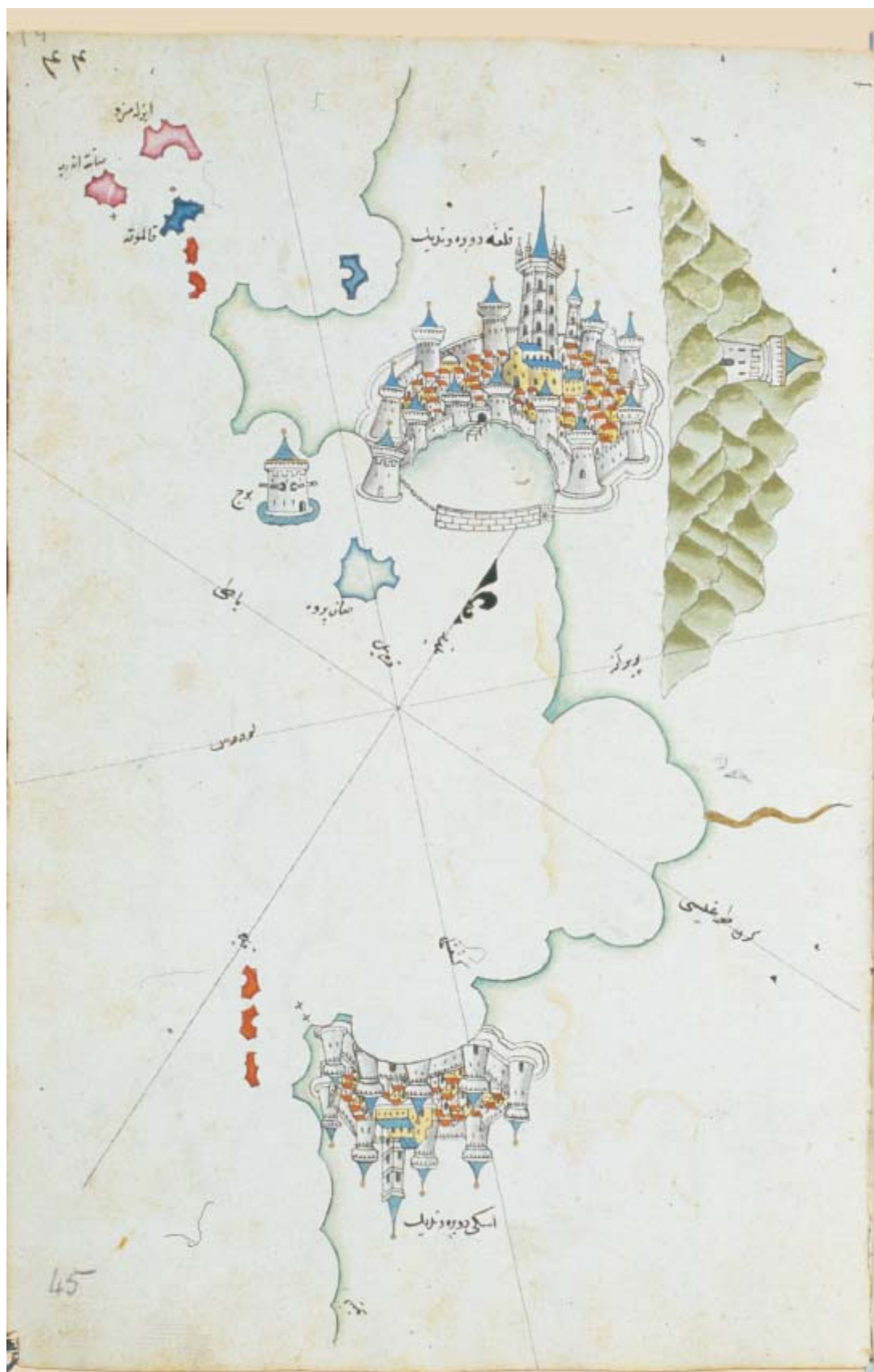


Fig. 1c. Dubrovnik and Cavtat from Kitab-i Bahriye, Bologna, MS 3609

Slika 1c. Dubrovnik i Cavtat iz Kitab-i Bahriye, Bologna, MS 3609



Fig. 1d. Dubrovnik and Cavtat from Kitab-i Bahriye, Berlin, Diez A. Foliant 57

Slika 1d. Dubrovnik i Cavtat iz Kitab-i Bahriye, Berlin, Diez A. Foliant 57

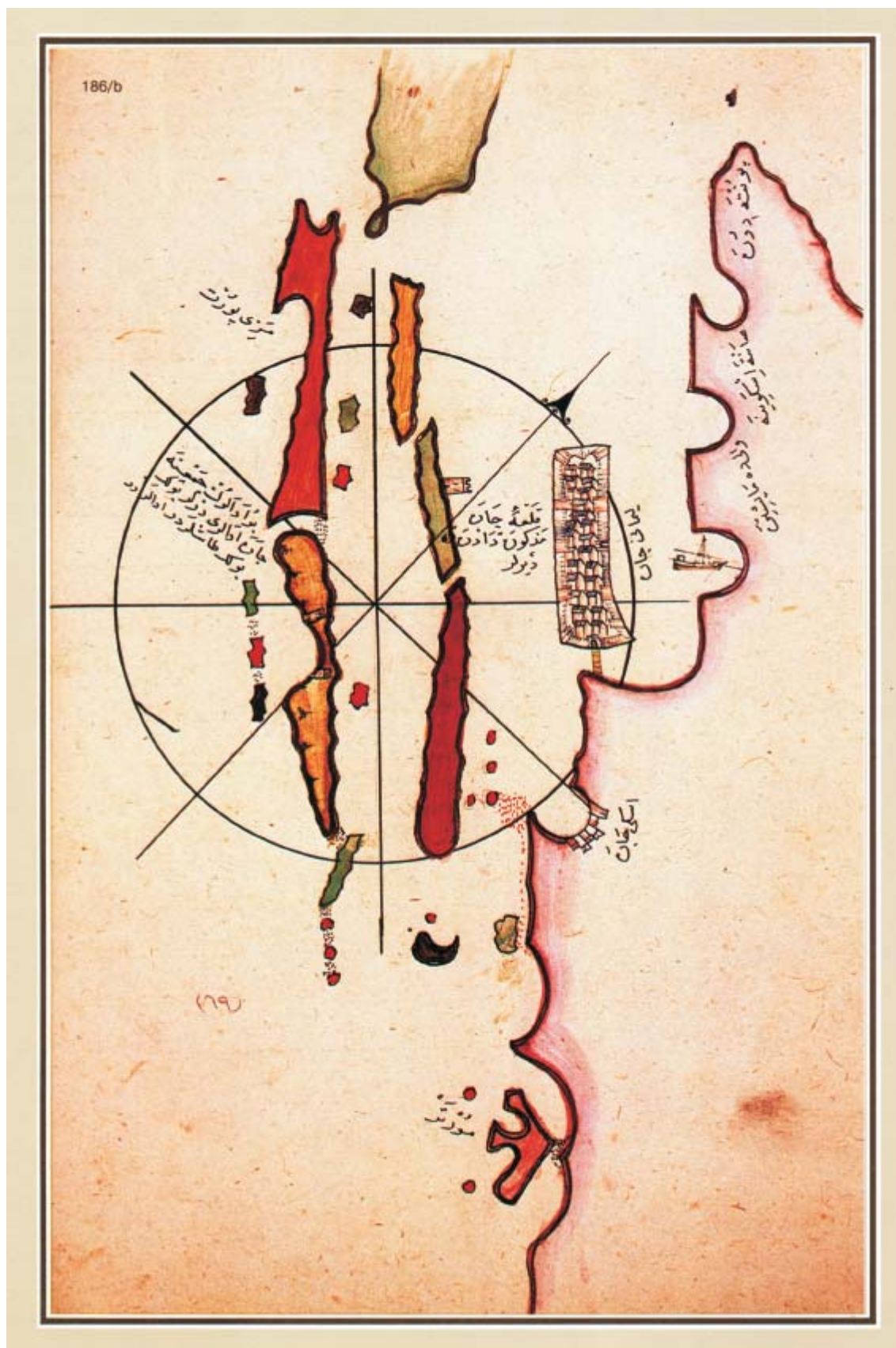


Fig. 2a. Zadar from Kitab-i Bahriye, Istanbul, MS 2612
Slika 2a. Zadar iz Kitab-i Bahriye, Istanbul, MS 2612

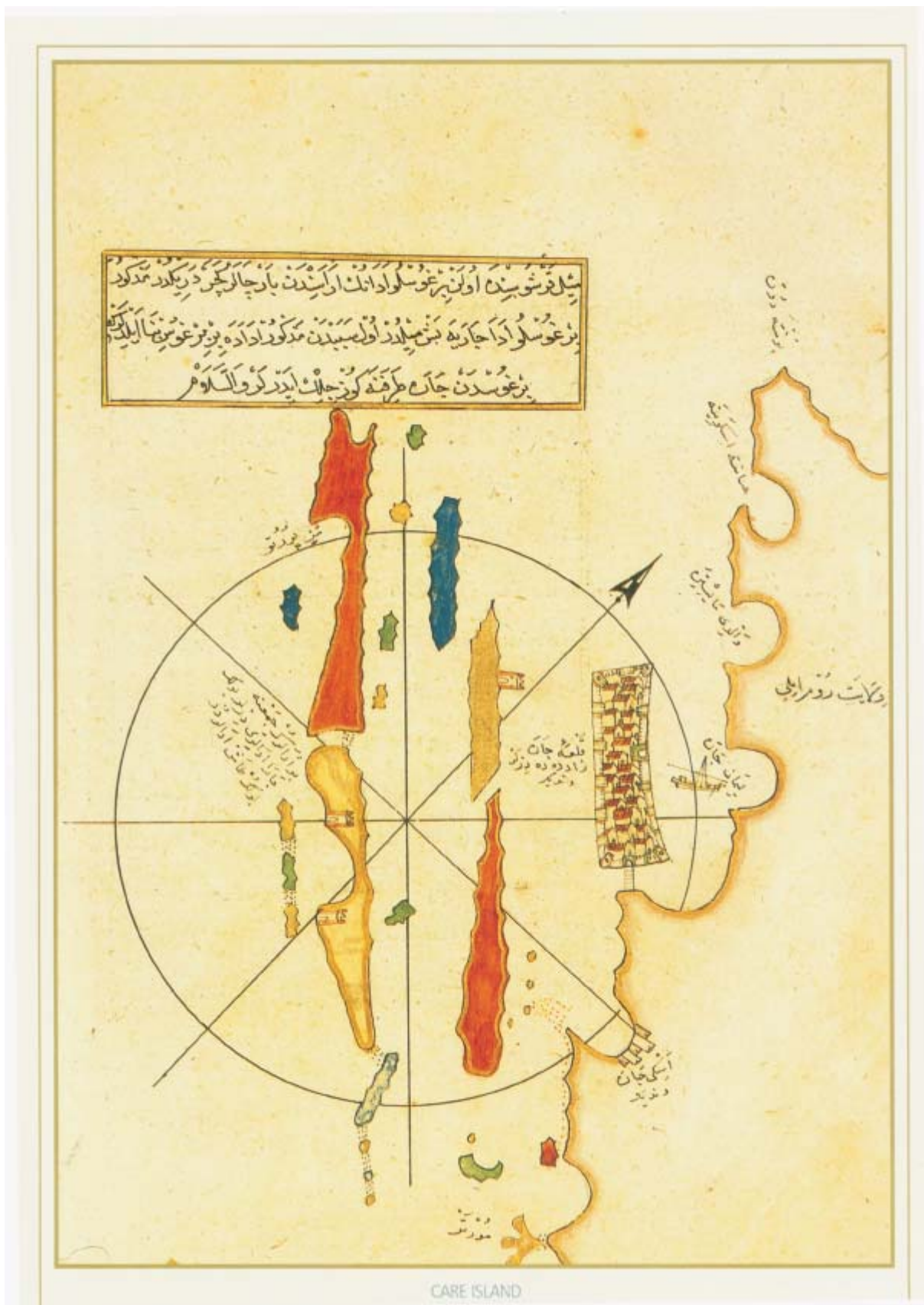


Fig. 2b. Zadar from Kitab-i Bahriye, Istanbul, MSH 642
 Slika 2b. Zadar iz Kitab-i Bahriye, Istanbul, MSH 642

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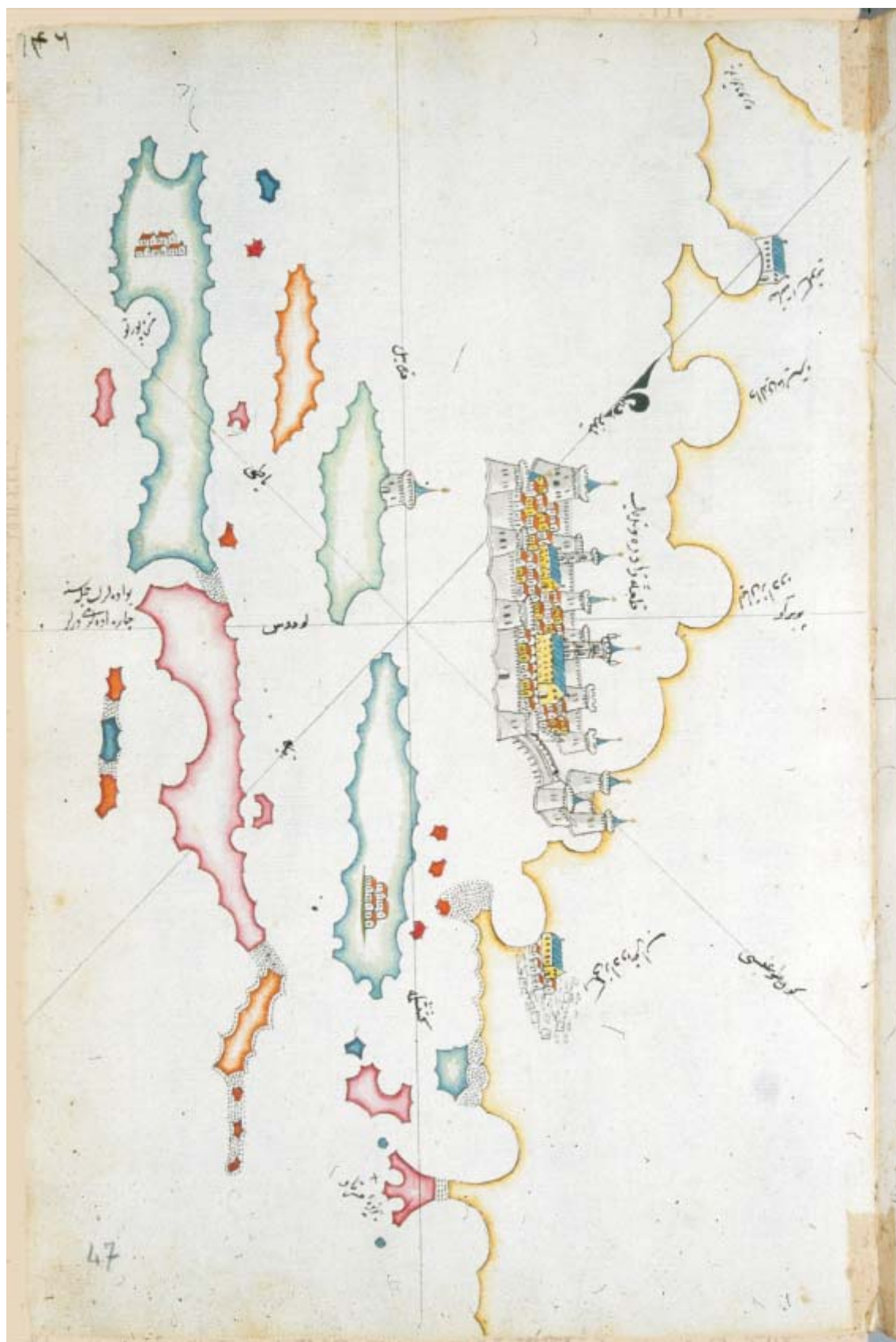


Fig. 2c. Zadar from Kitab-i Bahriye, Bologna, MS 3609

Slika 2c. Zadar iz Kitab-i Bahriye, Bologna, MS 3609



Fig. 2d. Zadar from Kitab-i Bahriye, Berlin, Diez A. Foliant 57

Slika 2d. Zadar iz Kitab-i Bahriye, Berlin, Diez A. Foliant 57

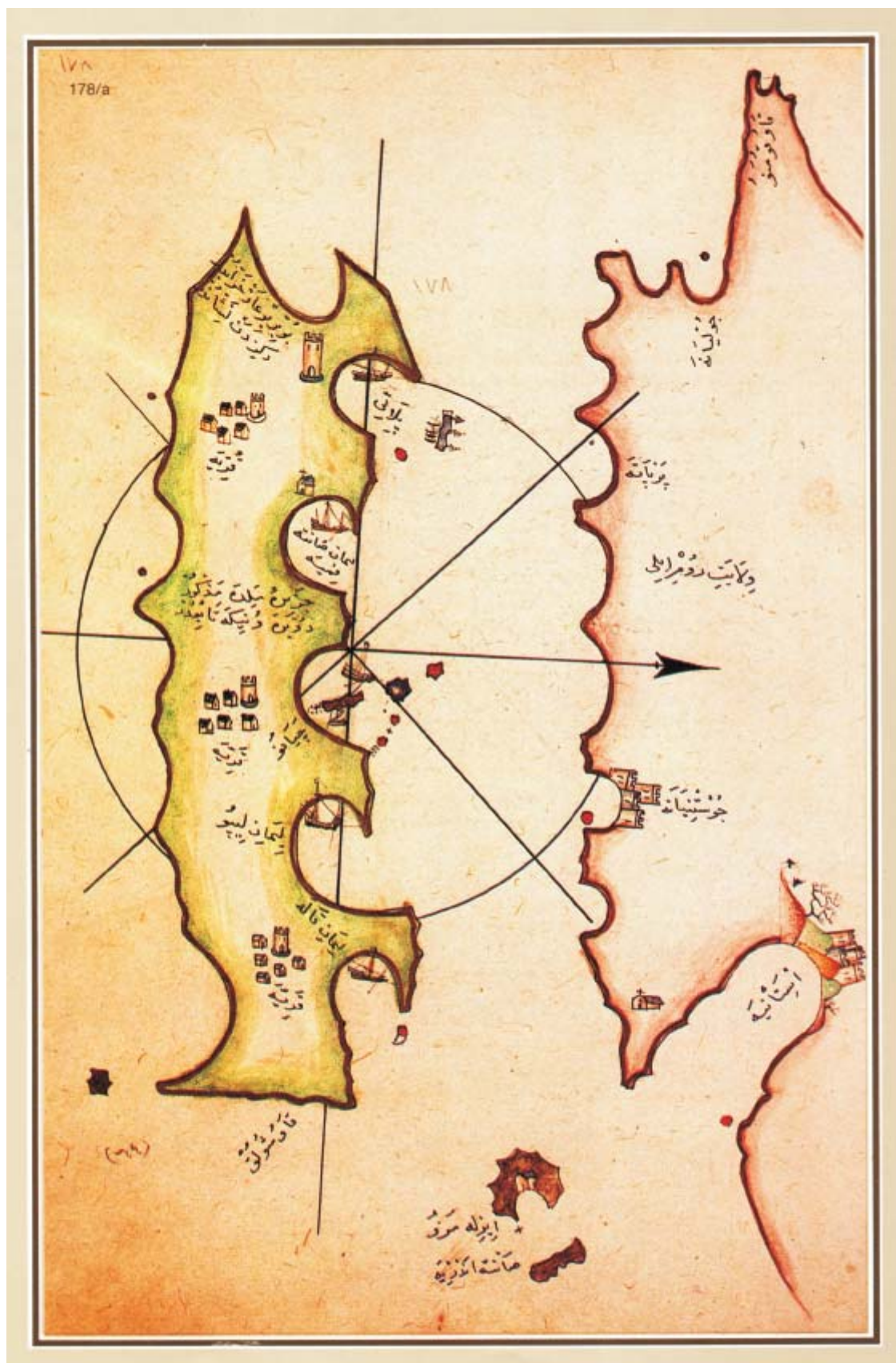


Fig. 3a. Mljet from Kitab-i Bahriye, Istanbul, MS 2612
 Slika 3a. Mljet iz Kitab-i Bahriye, Istanbul, MS 2612

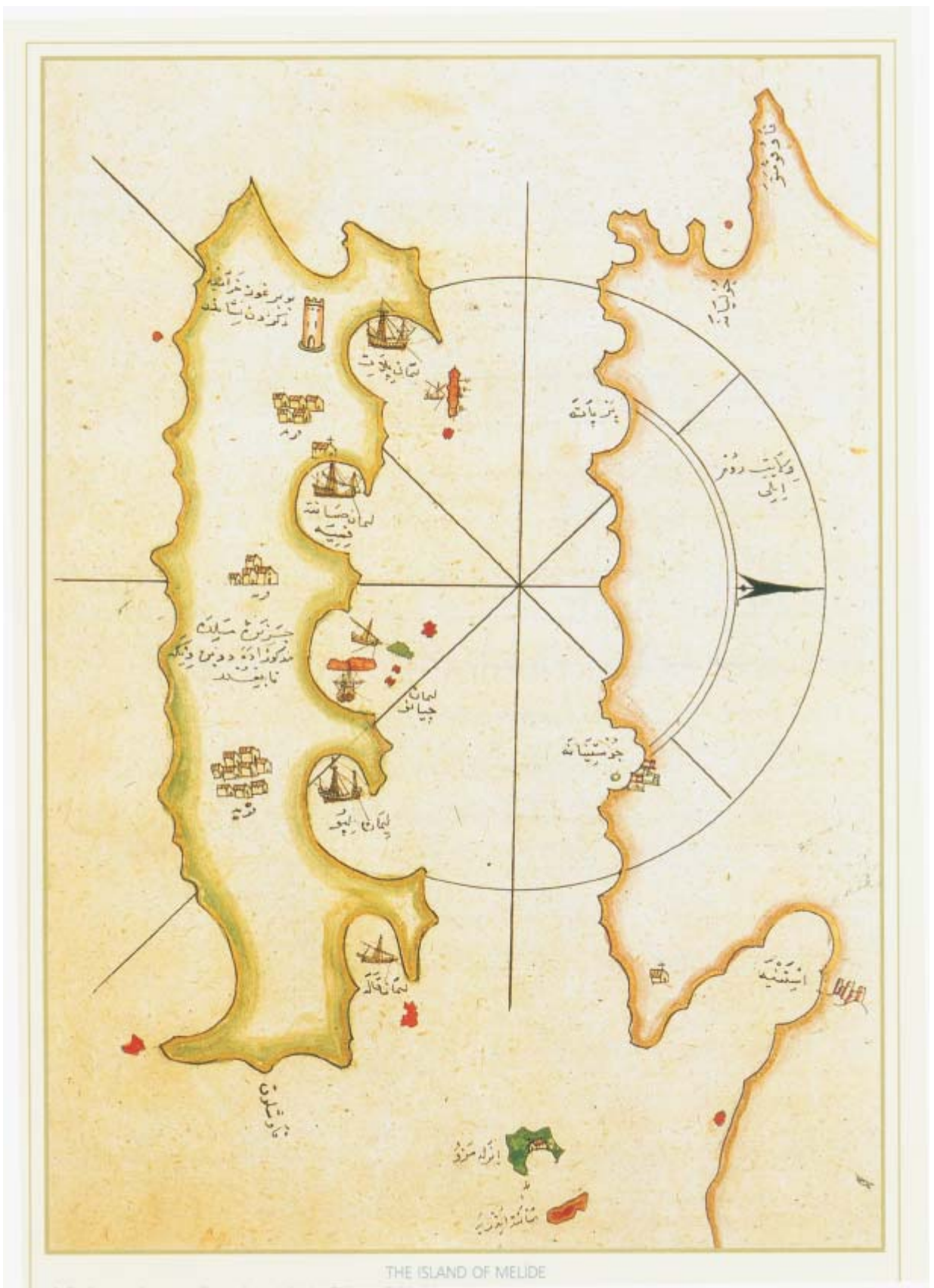


Fig. 3b. Mljet from Kitab-i Bahriye, Istanbul, MSH 642
 Slika 3b. Mljet iz Kitab-i Bahriye, Istanbul, MSH 642

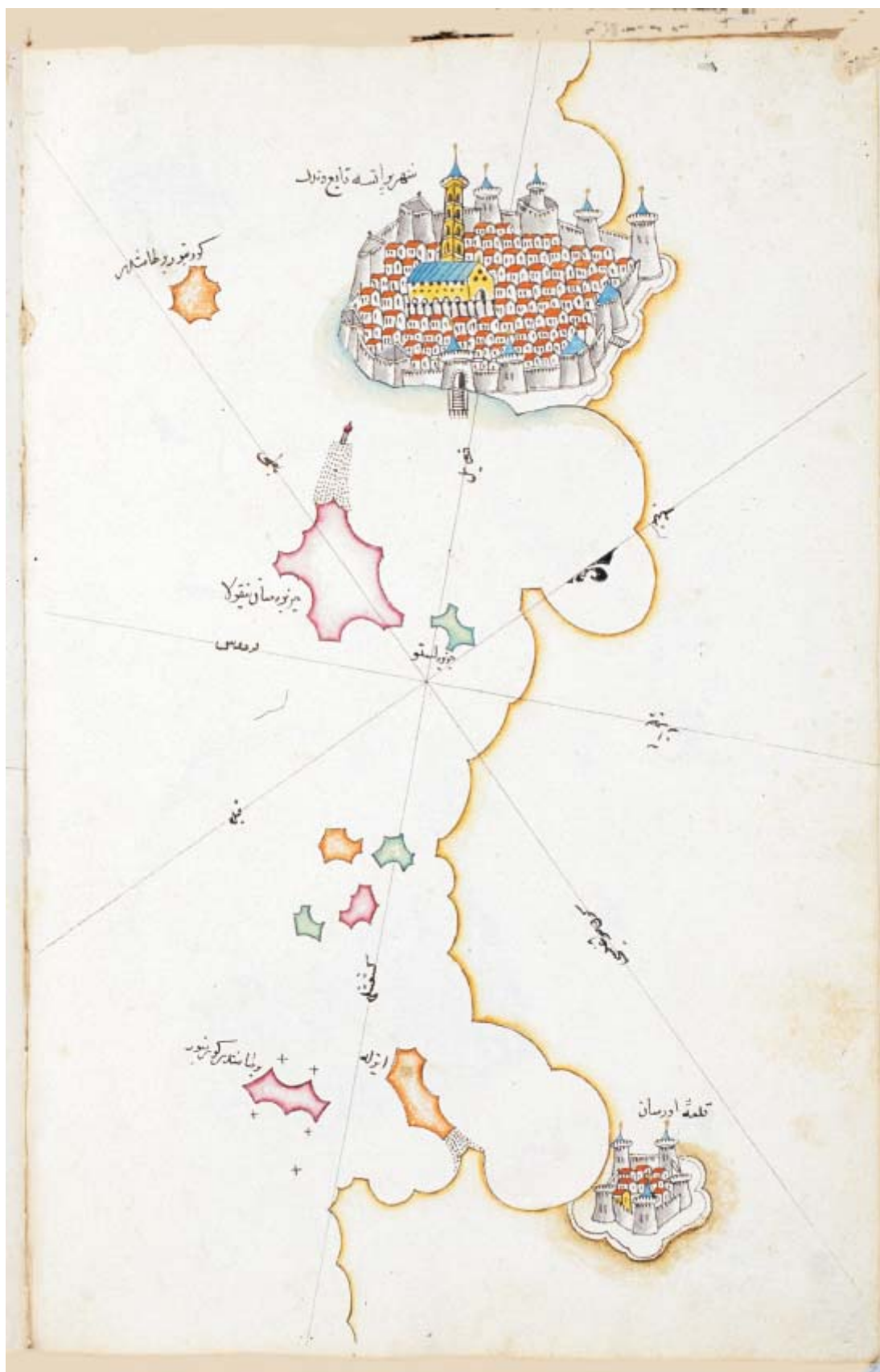


Fig. 4a. Poreč from Kitab-i Bahriye, Bologna, MS 3609

Slika 4a. Poreč iz Kitab-i Bahriye, Bologna, MS 3609



Fig. 4b. Poreč from Kitab-i Bahriye, Berlin, Diez A. Foliant 57
Slika 4b. Poreč iz Kitab-i Bahriye, Berlin, Diez A. Foliant 57

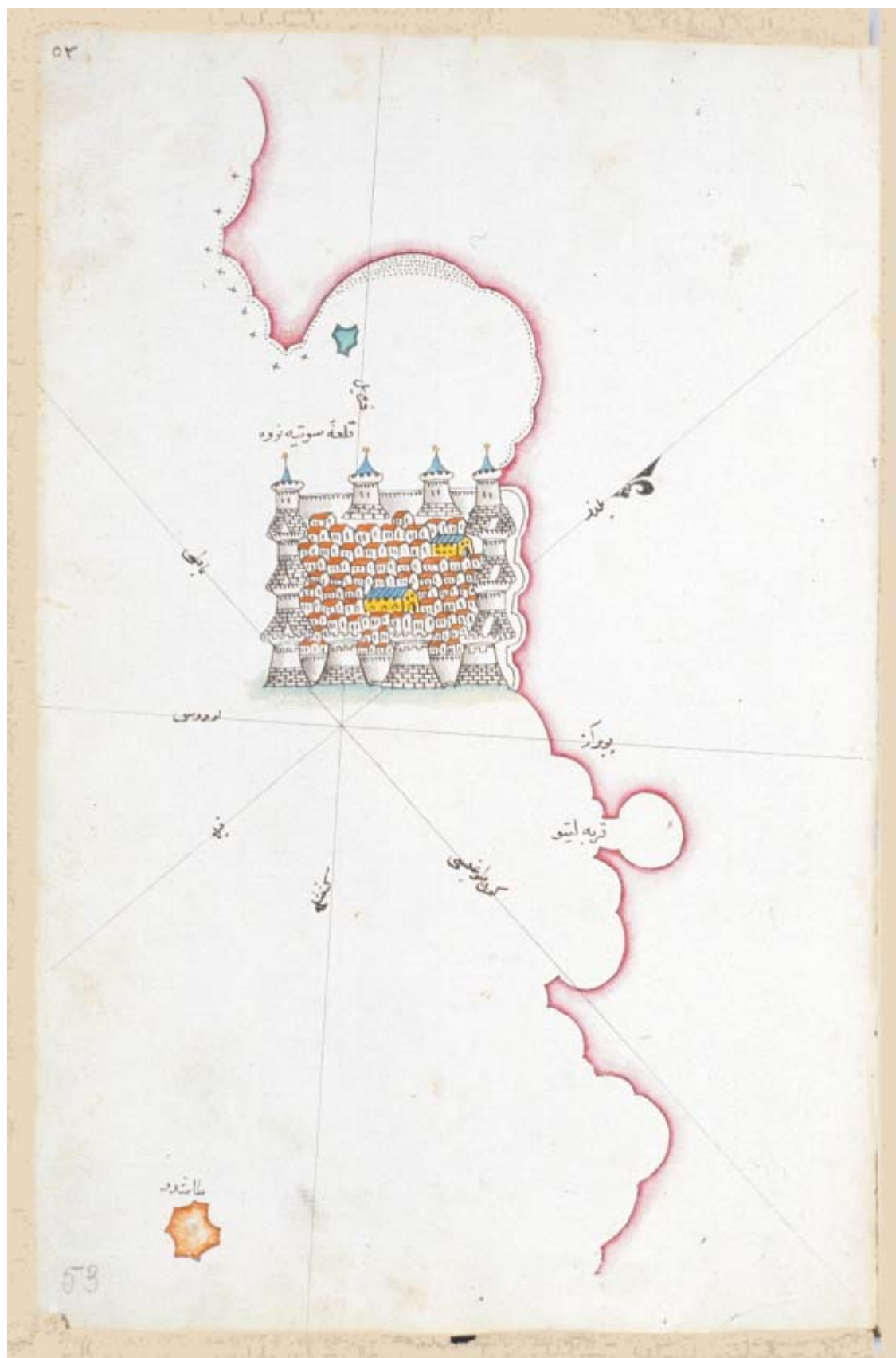


Fig. 5a. Novigrad from Kitab-i Bahriye, Bologna, MS 3609
Slika 5a. Novigrad iz Kitab-i Bahriye, Bologna, MS 3609

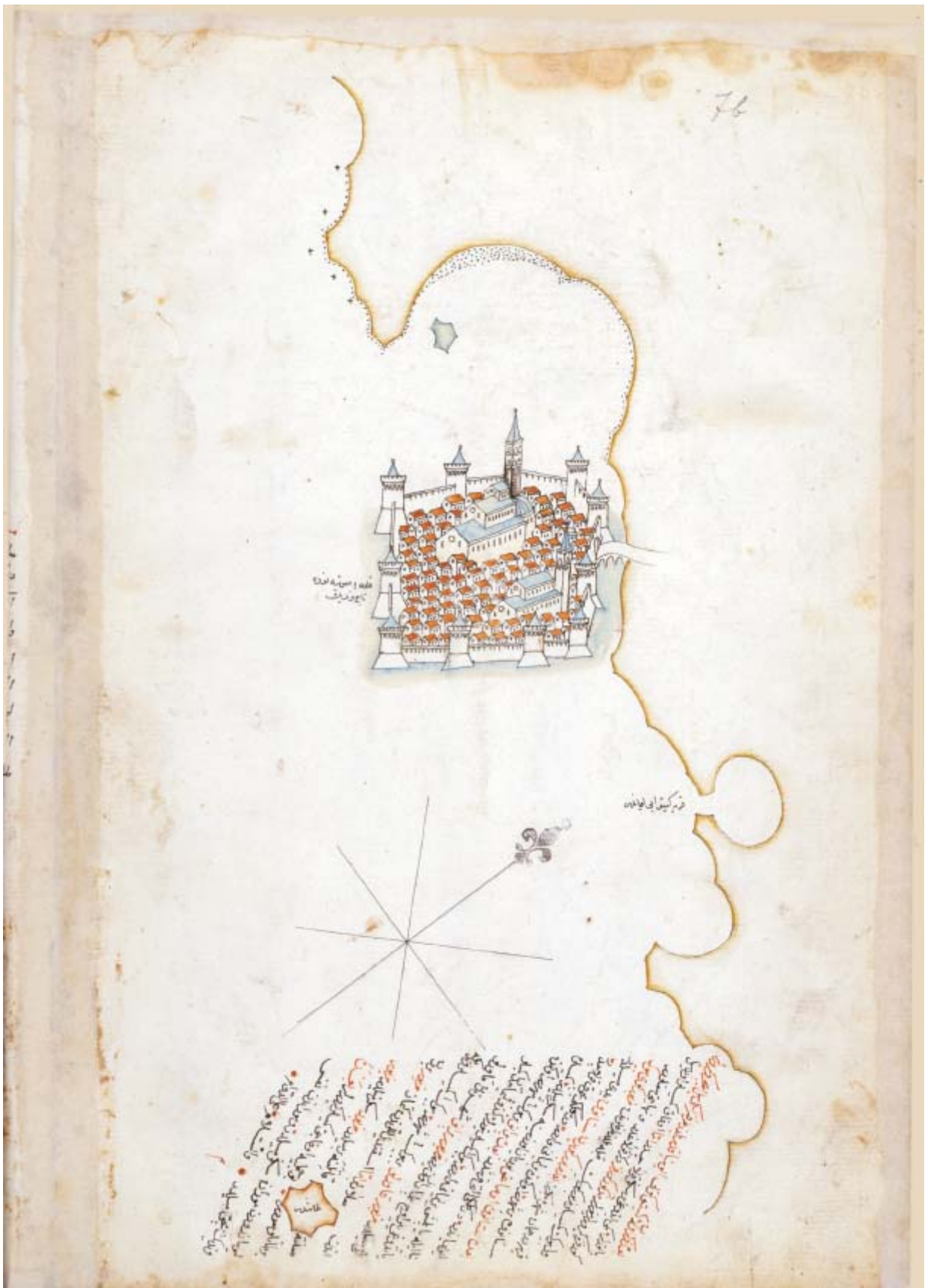


Fig. 5b. Novigrad from Kitab-i Bahriye, Berlin, Diez A. Foliant 57
Slika 5b. Novigrad iz Kitab-i Bahriye, Berlin, Diez A. Foliant 57

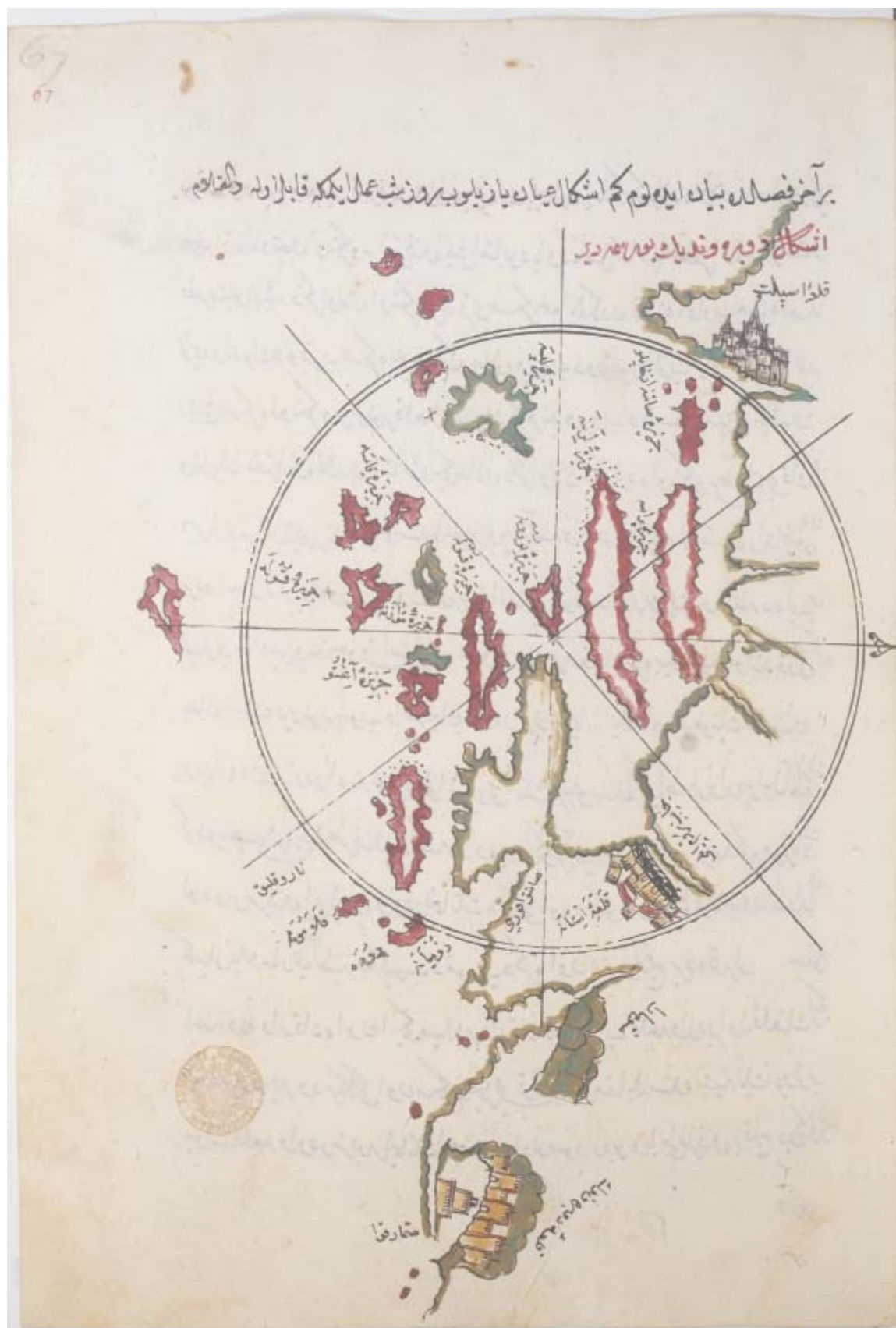
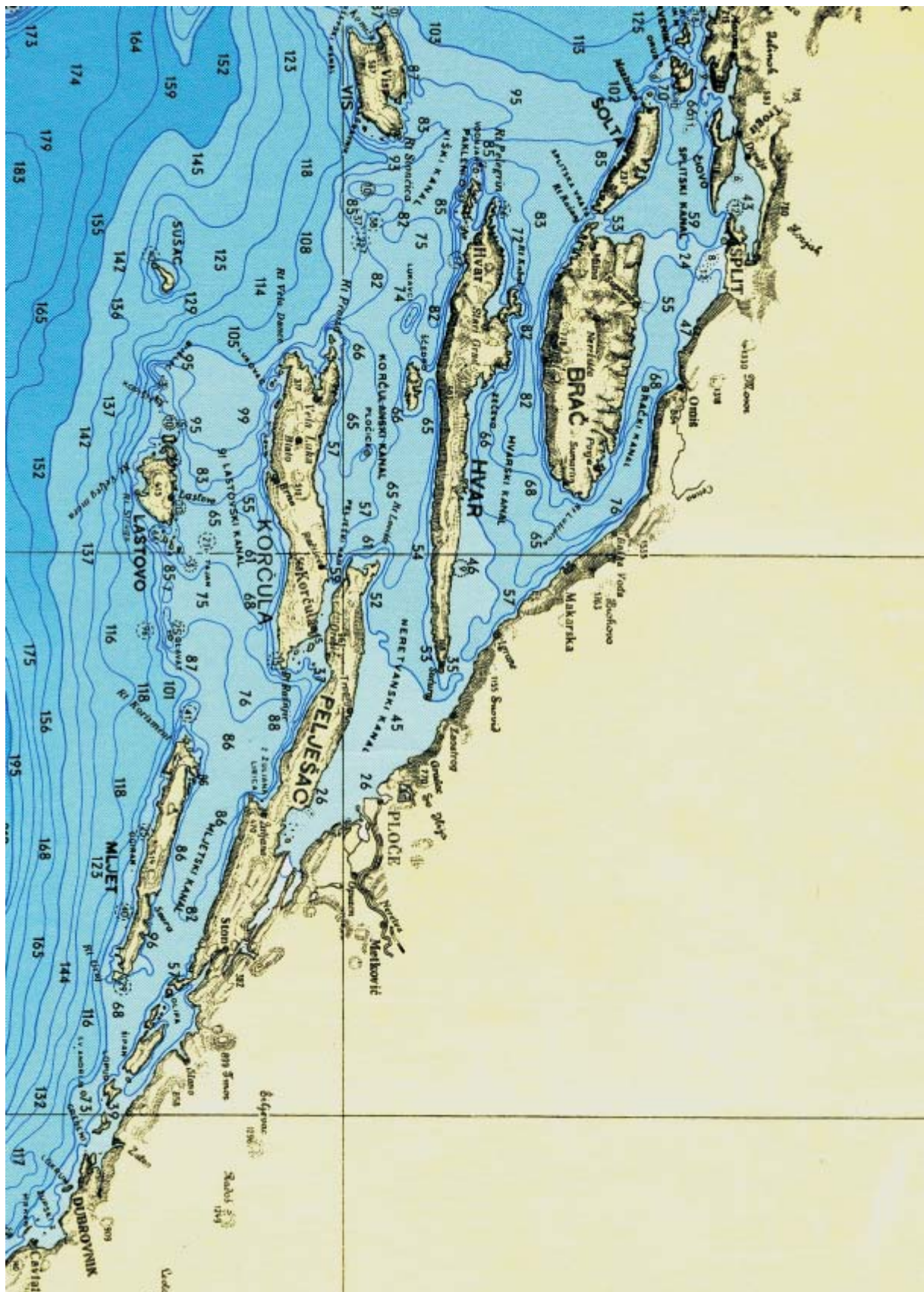


Fig. 6a. Coastline and islands Brač, Hvar, Korčula and peninsula Pelješac from *Kitab-i Bahriye*, Version I, Vienna, COD HO 192

Slika 6a. Obala i otoci Brač, Hvar, Korčula i poluotok Pelješac iz *Kitab-i Bahriye*, verzija I, Beč, COD HO 192



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Fig. 6b. Coastline and islands Brač, Hvar, Korčula and peninsula Pelješac, detail of bathymetric chart of the Adriatic sea, Republički hidrografski institut, 1992.

Slika 6b. Obala i otoci Brač, Hvar, Korčula i poluotok Pelješac, isječak batimetrijske karte Jadranskog mora, Republički hidrografski institut, 1992.



Fig. 7a. Gulf and islands of Kvarner from Kitab-i Bahriye, Version II, Berlin, Diez A. Foliant 57
 Slika 7a. Kvarnerski zaljev s otocima iz Kitab-i Bahriye, verzija II, Berlin, Diez A. Foliant 57

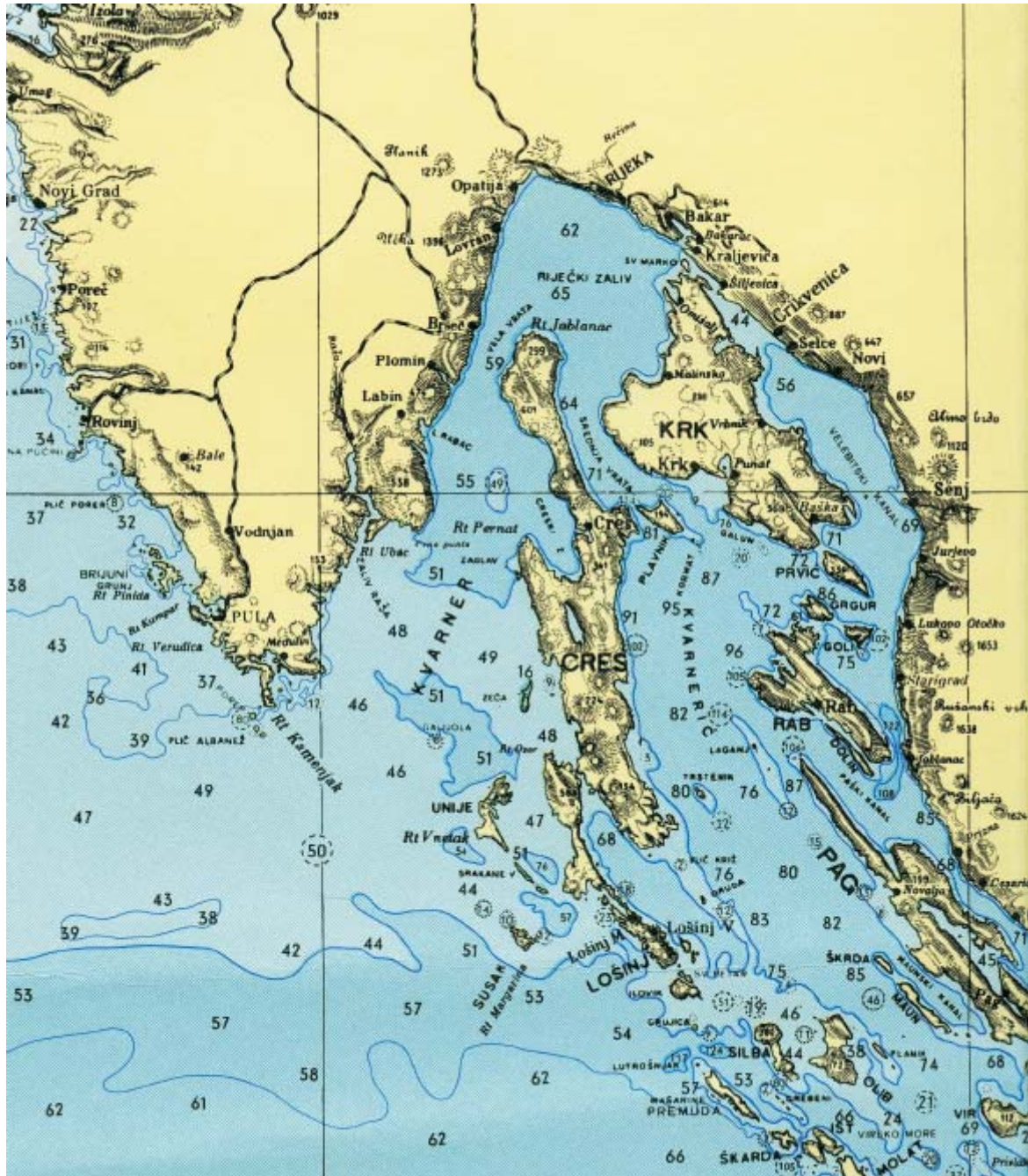


Fig. 7b. Gulf and islands of Kvarner, detail of bathymetric chart of the Adriatic sea, Republički hidrografski institut, 1992.

Slika 7b. Kvarnerski zaljev s otocima, isječak batimetrijske karte Jadranskog mora, Republički hidrografski institut, 1992.

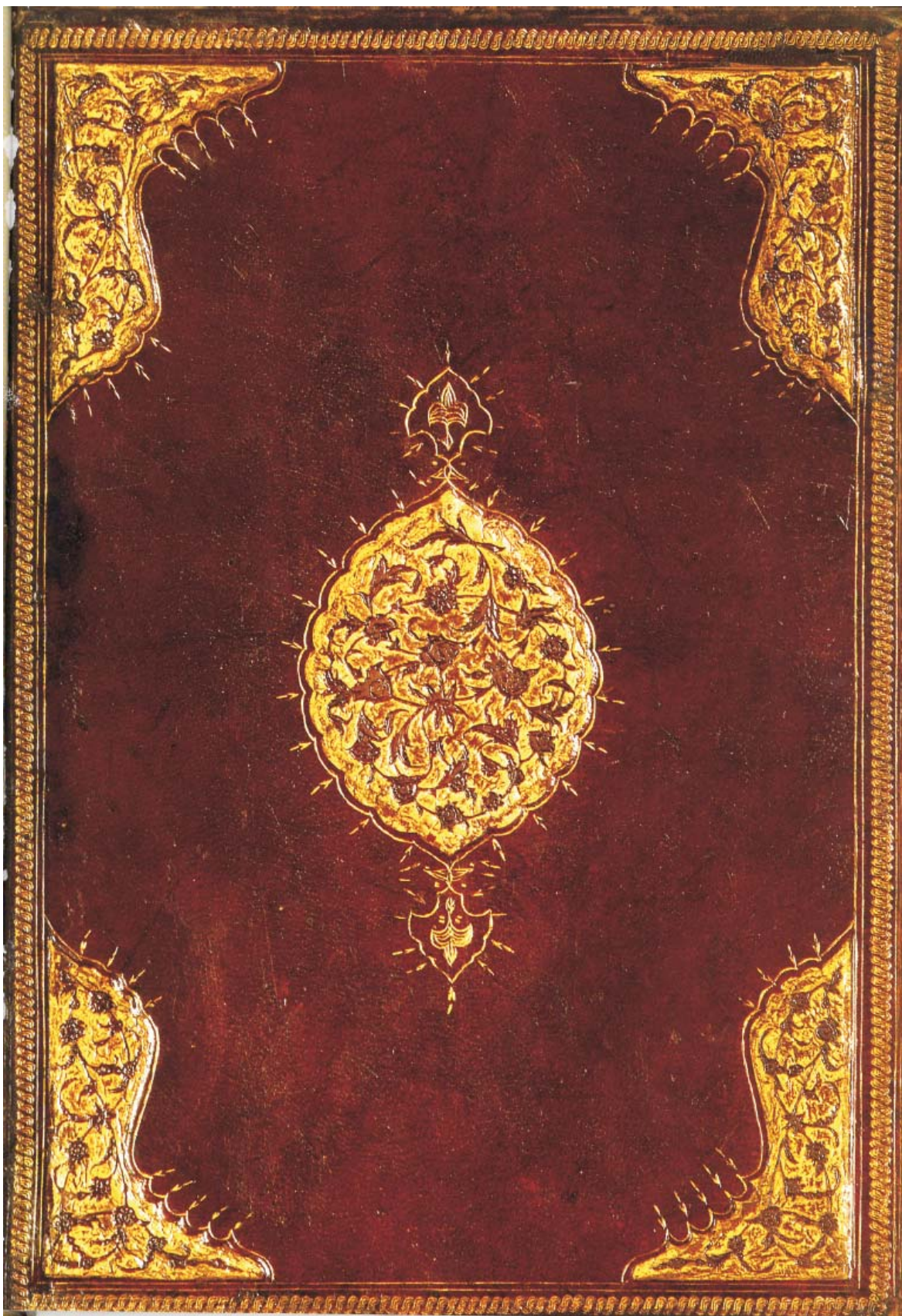


Fig. 8a. An example of the Ottoman book binding of Kitab-i Bahriye, MSH 642 from Topkapi Library, Istanbul

Slika 8a. Primjer osmanskog uveza knjige Kitab-i Bahriye, MSH 642 iz Knjižnice Topkapi u Istanbulu

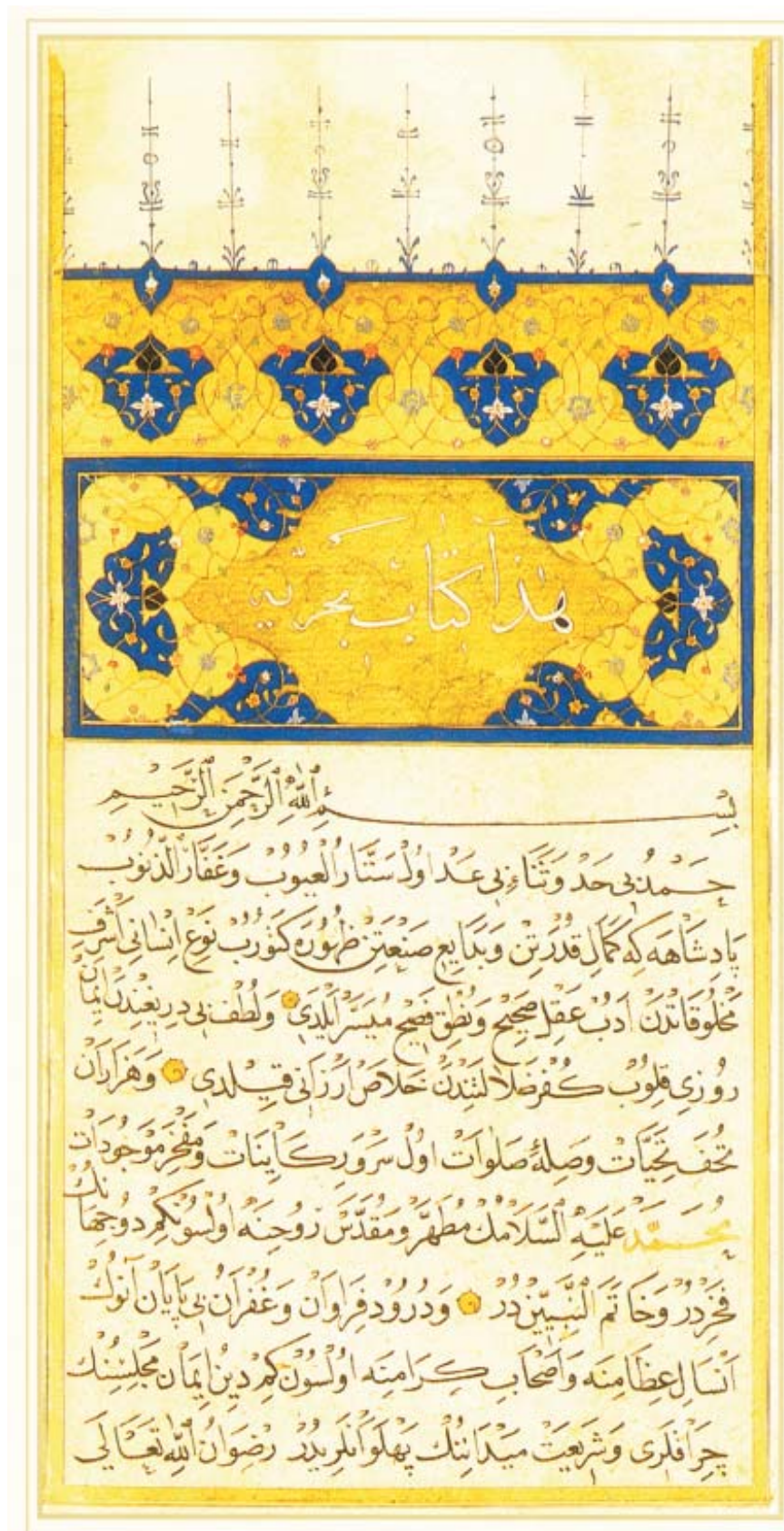


Fig. 8b. A typical page with information about navigation from Kitab-i Bahriye, MSH 642, Topkapi Library, Istanbul

Slika 8b. Tipična stranica s uputama o plovidbi iz Kitab-i Bahriye, MSH 642 iz Knjižnice Topkapi u Istanbulu

7. The city of Cavtat is located South of Dubrovnik, also surrounded by walls and fortresses. The only difference is the position of walls, houses and churches showing conical roofs in opposite (south) direction in Fig. 1b and 1c
8. Urbanistic structures (houses) within the city of Dubrovnik are demonstrated schematically. The most prominent is the church tower in the northern part of the city. The fortress on the island of Lokrum shows different architecture in Fig. 1a and 1b. The architecture of city walls and fortresses and church tower in Fig. 1c and 1d is different. The fortresses and church tower are conically shaped in Fig. 1c and more rectangular in copy in Fig. 1d. Churches of Dubrovnik and Cavtat are depicted in detail. Both cities are connected to the surrounding area with a bridge and a road (Fig. 1d). The same appearance shows the fortress on the Srđ mountain, dominating over city and harbour. The fortress with cannons on the island of Lokrum is shown.
9. Only in the Fig. 1c and 1d the road around the city walls of Dubrovnik and Cavtat is depicted.
10. The mountains in Fig. 1b and 1c are northern than in Fig. 1a. The mountain chain is much longer along the coastline in Fig. 1d.
11. The mouth of a short river is shown in the gulf between Dubrovnik and Cavtat in Fig. 1c and 1d.
12. Woods are symbolized by single trees on hills.
13. Toponyms are as usually on the coast and islands.

GENERAL IMPRESSION: The four different transcriptions of the coast and island, as well as those of cities and harbours of Dubrovnik and Cavtat are different. The most striking changes are in the depiction of architecture, shown in Fig. 1c and 1d. There is no significant cartographic difference in the coastline and the position of harbours. The attractiveness and artistical value changed in many details in versions 1c and 1d. The most striking feature of Fig. 1d is the extensive textual comment.

As an example of Piri Reis' narrative descriptions, a part of the chapter about Dubrovnik is cited as follows:

„THIS CHAPTER DESCRIBES THE ENVIRONS OF DUBREVONIK

The cities are called *Raguza Nova* and *Raguza Vane*. Let us first describe *Eski Raguza* however so as to keep things in order.

This *Eski Raguza* is a castle and its ships sail under their own flag. This city is ruled by the lord of Dubrovnik. The new city of Dubrovnik today, is twelve miles from this one. On the way is a small inlet called *Muline* [Mlini], which is shelter. *Dubrevonik* [Dubrovnik], itself is a large fortress situated on the sea facing south. Before this fortress, they have sunk caissons into seven fathoms [1 fathom = 6 feet = 1,829 m] of water and by these means have they created a harbour. Big barges may enter and depart. The entrance is on the western side of this mole, between the caissons

and the fortress and it is here that big ships may enter. There is also an entrance on the eastern side, but it is smaller and only boats may enter and depart through it. They have made it this way so as to create a current and prevent the harbour from silting up“. (Ökte, 1988)

Zadar

2a (*Ayasofya, Istanbul*), 2b (*Topkapi, Istanbul*), 2c (*Bologna*), 2d (*Berlin*)

1. All four maps have simple compass roses with the orientation north-west-south-east (north-west up)
2. Islands of the Zadar archipelago (Ugljan, Pašman, Dugi otok, Kornat) are represented in the same way. There are no significant cartographic changes between all four copies. The position of the city and harbour of Zadar is same on all four maps. The city is located on a peninsula, connected with the mainland with a bridge
3. Form of the city of Zadar is almost identical in all four versions
4. Contours of the coastline are almost identical in all four versions
5. Promontories are presented in identical way, with no significant differences
6. Dominant feature of Zadar is its rectangular form with walls and fortresses.
7. Houses are drawn schematically. The city is connected with mainland with a bridge. On the opposite side of the bridge, there is a fortress with towers defending the city gate. In Fig. 2c and 2d, there is a church with a tower. South of Zadar is a gulf with several houses in a village.
8. Toponyms are as usually on the coast and islands.
9. Rectangular framed cartouche with description can be found in Fig. 2 b

GENERAL IMPRESSION: All four copies show very similar, mostly identical cartographic content. The most striking difference is the architecture of the city of Zadar. There are significant differences in the version in Fig. 2c and 2d versus Fig. 2a and 2b. Also, the decorative value of maps is accentuated in Fig. 2c and 2d.

The Island of Mljet

3a (*Ayasofya, Istanbul*), 3b (*Topkapi, Istanbul*)

1. Both maps have simple compass roses with the orientation west-east (west up)
2. The island of Mljet is represented in a very similar way, there are no significant cartographic changes between the copies
3. The form is almost identical in both versions
4. Contours of the coastline are almost identical
5. Promontories and gulfs are presented in identical way, with no significant differences

7. Južno od Dubrovnika smješten je grad Cavtat, također okružen gradskim zidinama i utverdama. Jedina razlika je položaj zidina, kuća i crkvi, koje imaju stožaste krovove i nacrtane su u suprotnom tj. južnom smjeru na sl. 1b i 1c
8. Urbanistička struktura (kuće) unutar zidina Dubrovnika je shematski nacrtana. Najistaknutija točka je crkveni toranj u sjevernom dijelu grada. Razlikuje se arhitektura utvrde na otoku Lokrumu na sl. 1a i 1b. Izgled gradskih zidina, utvrda i crkvenih tornjeva je različit na sl. 1c i 1d. Utvrde i crkveni toranj su stožastog oblika na sl. 1c, a četverouglastog na primjerku na sl. 1d. Crkve Dubrovnika i Cavtata prikazane su vrlo detaljno. Oba grada povezana su s okolinom mostom i cestom (sl. 1d). Utvrda na Srđu dominira nad gradom i lukom. Prikazana je utvrda s topovima na otoku Lokrumu.
9. Samo sl. 1c i 1d prikazuju cestu koja vodi izvan gradskih zidina Dubrovnika i Cavtata.
10. Položaj planina na sl. 1b i 1c je nešto sjeverniji nego na sl. 1a. Planinski lanac uzduž obalne crte je mnogo duži na sl. 1d.
11. Ušće jedne rijeke kratkog toka nalazi se u zaljevu između Dubrovnika i Cavtata na sl. 1c i 1d.
12. Šume su prikazane simbolima pojedinačnog drveća na brežuljcima.
13. Uobičajeni su toponimi upisani na priobalju i otocima.

UKUPNI DOJAM: Sva četiri prijepisa karata priobalja, otoka, gradova i luka Dubrovnika i Cavtata međusobno se razlikuju. Najznačajnije su razlike u prikazu arhitekture, što je vidljivo na sl. 1c i 1d. Nema značajnijih kartografskih razlika u obliku obalne crte i smještaju luka. Privlačnost i umjetnička vrijednost razlikuje se u mnogo detalja u verzijama na sl. 1c i 1d. Najupadljivija karakteristika karte na sl. 1d je opširno tekstualno objašnjenje.

Kao primjer narativnog opisa karakterističnog za Piri Reisa slijedi citat iz poglavlja o Dubrovniku:

“OVO POGLAVLJE OPISUJE OKOLINU DUBROVNIKA

Gradovi se zovu **Raguza Nova** i **Raguza Vane**. Opišimo najprije **Eski Raguza** držeći se redosljeda.

*Taj grad **Eski Raguza** je utvrda, a njegovi brodovi jedre pod vlastitom zastavom. Tim gradom vlada dubrovački knez. Današnji novi grad Dubrovnik udaljen je dvanaest milja od staroga. Između ta dva grada nalazi se otočić **Muline** [Mlini], koji je pogodno sklonište. **Dubrovnik** [Dubrovnik] je velika utvrda okrenuta jugu. Ispred utvrđenog grada stvorena je luka pomoću potopljenih kesona do dubine od sedam hvati. [1 hvat = 6 stopa = 1,829 m]. Velike tovarne barke mogu u luku ući i iz nje izaći. Ulazi se sa zapadne strane mola, između kesona i utvrde a ovuda mogu ući i veliki brodovi. Postoji i ulaz s istočne strane, ali je taj manji pa kroz njega mogu ući i proći samo mali brodići. Luka je izgrađena tako da nastaje strujanje koje sprečava zamuljivanje luke.“ (Ökte, 1988)*

Zadar

2a (Ayasofya, Istanbul), 2b (Topkapi, Istanbul), 2c (Bologna), 2d (Berlin)

1. Sve četiri karte imaju jednostavnu kompasnu ružu. Orijentacija karte je sjeverozapad-jugoistok (sjeverozapad gore)
2. Otoci zadarskog arhipelaga (Ugljan, Pašman, Dugi otok, Kornat) prikazani su na isti način. Sva četiri prijepisa ne pokazuju značajnije kartografske razlike. Smještaj grada i luke prikazan je na isti način na svim kartama. Grad se nalazi na poluotoku i mostom je povezan s kopnom.
3. Oblik grada Zadra gotovo je identičan na kartama iz sva četiri prijepisa.
4. Obalne crte su identične.
5. Rtovi su ucrtani bez značajnih razlika.
6. Najistaknutija karakteristika Zadra je njegov pravokutni oblik unutar zidina i utvrda.
7. Prikaz kuća je shematiziran. Most povezuje grad s kopnom. Na kopnenoj strani mosta utvrda s tornjevima brani gradska vrata. Na sl. 2c i 2d prikazana je crkva s tornjem. Južno od Zadra je ucrtan zaljev s nekoliko kuća.
8. Toponimi upisani na obali i na otocima.
9. Četverokutno uokvirena kartuša sadrži tekstualni opis (sl. 2b).

UKUPNI DOJAM: Sve četiri kopije karata su slične, s gotovo istim kartografskim sadržajem. Najupadljivija razlika je arhitektura grada Zadra. Značajne razlike vidljive su na prijepisu prikazanom na sl. 2c i 2d u usporedbi s prijepisima na sl. 2a i 2b. Dekorativna vrijednost karata je posebno istaknuta na sl. 2c i 2d.

Otok Mljet

3a (Ayasofya, Istanbul), 3b (Topkapi, Istanbul)

1. Obje karte imaju jednostavnu kompasnu ružu. Orijentacija karte je zapad-istok (zapad gore)
2. Otok Mljet prikazan je vrlo slično, bez većih kartografskih promjena.
3. Forma je gotovo ista na oba prijepisa i prerisa.
4. Obrisi obalne crte gotovo su identični.
5. Rtovi i zaljevi su ucrtani na isti način.
6. U unutrašnjosti otoka su sela i tornjevi označeni shematskim simbolima. Kuće su shematski prikazane.
7. Crkve su ucrtane na osamljenim lokacijama.
8. Planine su shematizirane, sa simbolima drveća na vrhu.
9. Toponime nalazimo na obali i na otoku.

6. In the inland of the island, the villages and towers are depicted with schematic symbols. Houses are drawn schematically.
7. The churches are drawn on isolated locations.
8. Mountains are schematic, with symbols of trees on top.
9. Toponyms are as usually on the coast and island.

GENERAL IMPRESSION: Both copies show very similar, mostly identical description of Mljet. There are no significant changes in cartographic content and also in decorative impression.

6. Special Comparison of Two Different Copies Concerning the Cities of Poreč and Novigrad

Poreč

4a (Bologna), 4b (Berlin)

1. These two maps have simple compass roses with the orientation north west-south east (north-west up)
2. Contours of the coastline and small islands are almost identical
3. Promontories and gulfs are presented in identical way, with no significant differences
4. The city and the harbour of Poreč are in the north part. In the south, there is a city of Vrsar that is depicted as a small city with city walls, towers and houses with clearly different architecture. The border of the city and city walls are identical. The architecture of walls and towers is different in two versions. The houses are depicted schematically. Fig. 4a shows one church with a church tower, while Fig. 4b shows two larger churches. Seaside gates and entrances to the city, as well as inland gates with beginning of the ways are drawn in both maps.
5. There is an extensive comment in the west part of the map in Fig. 4b.

GENERAL IMPRESSION: No cartographic changes on the coastline and islands, the form of city borders and city walls were practically the same. Different urbanistic structure inside the city walls. Fig. 4b shows very carefully depicted churches and towers. Both maps expressed important position of shallow waters and reefs in front of harbours of Poreč and Vrsar.

Novigrad

5a (Bologna), 5b (Berlin)

1. Two maps have simple compass roses with the orientation north west-south east (north-west upper)
2. Contours of the coastline are described in almost identical way
3. Promontories and gulfs are presented with no

significant differences

4. Novigrad is demonstrated as a quadrilateral and fortified city, equipped with bastions. City walls, towers and houses are depicted differently in those two copies. Houses are schematic. Fig. 5a has a small church, while Fig. 5b has two larger churches with prominent towers.
5. On the east side of the city, there are gates with a bridge and road (Fig. 5b).
6. There is an extensive comment in the lower part of the map in Fig. 5b.

GENERAL IMPRESSION: No cartographic changes in the coastline and city of Novigrad in these two copies, practically the same form of city borders and city walls. Clearly different urbanistic structures inside the city walls. Fig 5b shows very carefully depicted churches and towers.

7. Special Comparison of the Vienna Manuscript with a Modern Map

Coast from Split to Dubrovnik with the islands of Brač, Hvar, Korčula, and the Pelješac peninsula

6a (Vienna), 6b (modern map, Haiman, 1996)

This Piri Reis' map from 1521 is actually a general map of a larger region of middle and southern Dalmatia. It shows a broader coastal region from Split to Dubrovnik with the islands of Brač, Hvar, Korčula, Mljet and the Pelješac peninsula. City views of Split and Dubrovnik are drawn.

GENERAL IMPRESSION: The map is a representative example for the Kitab-i Bahriye version I (1521). The comparison of Piri Reis' map to modern map reveals that he was well informed about the Croatian coast of the Adriatic Sea.

8. Special Comparison of the Berlin Manuscript with a Modern Map

The Gulf of Kvarner with the islands of Cres and Lošinj

7a (Berlin), 7b (modern map, Haiman, 1996)

The map is an example of the combination of an isolario, demonstrating two islands, Cres and Lošinj and a longer part of the coastland from Labin on the Istrian peninsula to the fortress and the gulf of Bakar. On the coast there are many harbours and cities, such as Bakar, Rijeka, Opatija, Lovran and Labin. The islands of Cres and Lošinj are connected by a bridge. The largest city and harbour Cres is located in the north of island, while the city of Osor is in the south. The interpretation of the island of Cres is not quite clear because the island of Krk is not drawn on this map at all.

UKUPNI DOJAM: Oba prijepisa karata su vrlo slična, s gotovo identičnim prikazom otoka Mljeta. Nema značajnih promjena kartografskog sadržaja niti dekorativnih elemenata.

6. Posebna usporedba dva različita prijepisa karata gradova Poreča i Novigrada

Poreč

4a (Bologna), 4b (Berlin)

1. Obje karte imaju jednostavnu kompasnu ružu. Orijehtacija karte je sjeverozapad-jugoistok (sjeverozapad gore)
2. Konture obale i otoka su gotovo iste.
3. Nema značajnijih razlika u prikazu rtova i zaljeva.
4. Na sjevernom dijelu je grad i luka Poreč, a na jugu mali gradić Vrsar, koji je prikazan s gradskim zidinama, tornjevima i kućama jasno diferencirane arhitekture. Granice grada i gradskih zidina su identične. Arhitektura zidova i tornjeva se razlikuje u oba prijepisa. Prikaz kuća je shematiziran. Slika 4a prikazuje jednu crkvu s tornjem, a slika 4b dvije velike crkve. Na obje karte su ucrtana gradska vrata s morske strane kao i kopnena gradska vrata s početkom ceste prema unutrašnjosti.
5. Na zapadnom dijelu karte na slici 4b nalazi se opširno pojašnjenje.

UKUPNI DOJAM: Nema kartografskih razlika u prikazu obalne crte i otoka. Oblik gradova i gradskih zidina gotovo je identičan. Postoji razlika urbanističkih struktura unutar gradskih zidina. Slika 4b prikazuje minuciozno ucrtane crkve i tornjeve. Obje karte prikazuju položaj plićaka i podvodnog stijenja ispred luka Poreča i Vrsara.

Novigrad

5a (Bologna), 5b (Berlin)

1. Obje karte imaju jednostavnu kompasnu ružu. Orijehtacija karte je sjeverozapad-jugoistok (sjeverozapad gore)
2. Obalne crte su gotovo identične.
3. U prikazu rtova i zaljeva nema razlika.
4. Novigrad je prikazan kao pravokutni, bastionima utvrđeni grad. Gradske zidine, tornjevi i kuće su nacrtane različito, a kuće su shematizirano prikazane. Slika 5a prikazuje kartu s malom crkvicom, dok su na slici 5b dvije velike crkve istaknutih tornjeva.
5. Gradska vrata s mostom i izlaznom cestom nalaze se s istočne strane grada (sl. 5b).
6. Na donjem dijelu karte (sl. 5b) nalazi se opširan komentar.

UKUPNI DOJAM: Na ove dvije karte nema kartografskih razlika u prikazu obalne crte i samog Novigrada. Oblik grada i gradskih zidina gotovo je identičan. Postoji jasna razlika urbanističkih struktura unutar gradskih zidina. Slika 5b prikazuje kartu s precizno ucrtanim crkvama i tornjevima.

7. Posebna usporedba rukopisa iz Beča sa suvremenom kartom

Obala od Splita do Dubrovnika s otocima Bračom, Hvarom, Korčulom i poluotokom Pelješcem

6a (Wien), 6b (suvremena karta, Haiman, 1996)

Ova Piri Reisova karta iz 1521. je zapravo pregledna karta veće regije srednje i južne Dalmacije. Prikazuje širu obalnu regiju od Splita do Dubrovnika s otocima Bračom, Hvarom, Korčulom, Mletom i poluotokom Pelješcem. Ucrtane su vedute gradova Splita i Dubrovnika.

UKUPNI DOJAM: Ova karta je reprezentativni primjer karata iz Kitab-i Bahriye verzija I (1521). Usporedba karte Pirija Reisa sa suvremenom kartom pokazuje jasne razlike, ali i dobro poznavanje hrvatske obale.

8. Posebna usporedba rukopisa iz Berlina sa suvremenom kartom

Kvarnerski zaljev s otocima Cresom i Lošinjem

7a (Berlin), 7b (suvremena karta, Haiman, 1996)

Karta je primjer kombinacije izolara, s prikazom dva otoka, Cresa i Lošinja, i većeg dijela priobalja od Labina u Istri do utvrde u Bakarskom zaljevu. Duž priobalja je ucrtano mnogo luka i malih gradova, poput Bakra, Rijeke, Opatije, Lovrana i Labina. Otoci Cres i Lošinj povezani su mostom. Veći grad i luka Cres nalazi se na sjeveru otoka, a grad Osor na jugu. Prikaz i lokacija otoka Cresa nije sasvim jasna budući da otok Krk na ovoj karti nije uopće prikazan.

Kao primjer preciznosti opisa Pirija Reisa citiramo njegov sljedeći zapis:

„Najpoznatija luka je na južnoj strani otoka. To je odlična prirodna luka. U luci je i utvrda Karcu. Nešto jugoistočnije od te luke nalazi se utvrda na samoj obali, okrenuta prema jugozapadu. Tu utvrdu nazivaju Orsaro, a nasuprot nje leži veliki otok. Između ta dva otoka postoji most.“ (Ökte, 1988)

9. Značajke Piri Reisova kartografskog prikazivanja hrvatske obale i otoka

Najznačajnija karakteristika poglavlja *Dalmaçya kıyilari* iz *Kitab-i Bahriye* je detaljni i opsežni opis hrvatske obale, otoka i luka. *Kitab-i Bahriye* ima i sljedeće značajke:

As an example of the precision of the description of Piri Reis the following text is quoted:

„The best-known harbour is on the southern side of the island. This is an excellent, natural harbour. The castle of Karcu lies within the harbour. A bit southeast of this harbour, there is a castle on the seashore facing southwest. They call this castle Orsaro and opposite it lies a big island. Between the two islands is a bridge.“ (Ökte, 1988)

9. Characteristics of Piri Reis' Mapping of the Croatian Coastland and Islands

The most interesting aspect of the chapter *Dalmaçya kıyilari* of *Kitab-i Bahriye* was a detailed and extensive description of the Croatian coast, islands and harbours.

The other characteristics of a *Kitab-i Bahriye* are:

- a) The version 1 shows a more general overview. A detailed cartographic description is found in the version 2.
- b) The comparison of version 2 (MS 2612 versus MS H642) shows very similar coastline and contours of the islands.
- c) More detailed descriptions are found in the comparison of the version 2 (MS 2609 versus Diez A. Foliant 57). Local and specific structures and prominent architectural features of the cities are drawn.
- d) The comparison of *Kitab-i Bahriye* version 1 and version 2 with modern maps shows schematic and simplified coastline and the island contours, but the position of islands is almost exact.

10. Discussion

While discussing the terminology, it could be said that the word *isolario* was widely used in the work of the Venetian cartographers, as well as that of Piri Reis. This terminology is not quite adequate. *Kitab-i Bahriye* is a collection of:

1. Descriptions of single islands, corresponding to classical *isolarii* (Fig. 3a, 3b).
2. Descriptions of wider segments of the coast with islands or archipelagos (Fig. 6a).
3. City views with descriptions of harbours and partly schematic partly detailed depictions of city walls, fortresses and houses (Fig. 1a-1d, 2a-2d, 4a, 4b, 5a, 5b).
4. The primary purpose was to create charts for navigation and usually simple compass roses were drawn (all figures).

The most striking feature of the comparison between the two versions (1521 and 1526) of *Kitab-i Bahriye* is

the difference in the cartographic approach. In the first version (1521, Wien, MS HO 192), most general maps show broader regions with several islands, harbours and cities. The first impression of those maps is that they were drawn by an experienced sailor who described the coastline of the mainland, islands and cities as an overview.

Quite opposite, the second version of *Kitab-i Bahriye* (1526) is the further development of the detailed cartographic description, demonstrating island by island as it was usually found in the *isolarii* of Christoforo Buondelmonti and Bartolomeo dalli Sonetti (Novak, Mlinarić, Miletić-Drder, 2004; Novak, Mlinarić, Lapaine, 2004).

Full attention was paid to the MS 3609 manuscript from Biblioteca Universitaria di Bologna and the MS Diez A. Foliant 57 manuscript from Deutsche Staatsbibliothek zu Berlin showing artistically unique descriptions of Dubrovnik, Zadar, Kvarner, Poreč and Novigrad.

The importance of the Berlin copy of *Kitab-i Bahriye* that was supposedly destroyed in the World War II was stressed (Soucek, 1992). The evaluation showed that the artistic value reached its peak in different later transcriptions of *Kitab-i Bahriye* (e.g. manuscript from Bologna and Berlin). The Berlin manuscript was copied in the beginning of seventeenth century. The study also reveals the improvement of cartographical approach, with a significant change and progress in aesthetic value and the quantity of the cartographic information represented. This development to a more advanced stage of cartography is especially evident by evaluation and comparison of the later transcriptions of *Kitab-i Bahriye*.

In 1966 the *Kitab-i Bahriye* manuscript from Bologna (MS 3609) was published under title „Der See-Atlas des Sejjid Nuh“. Kissling attributed this atlas to Sejjid Nuh (Kissling, 1966; Soucek, 1969). It is a collection of maps without instructions for navigation, as Kissling himself was also said in the comments. Goodrich (2004) states that coasts and islands of Croatia (maps number 62-86) in *Kitab-i Bahriye* have not been studied at all. The first research of the Croatian islands and the Adriatic coast was made by the authors of this paper. The total number of maps of Croatian islands and coastline from all six copies of *Kitab-i Bahriye* studied by our team is 94 (Table 3, Goodrich, 2004).

Piri Reis was especially precise and detailed in his descriptions useful for the navigation. The obvious advance in quality of mapping and descriptions is explained by his huge life experience as a navigator. Reis was providing sailors with useful information concerning winds, anchorages, dangerous shallow waters and submarine reefs. He gave a warning about sources of drinking water, ruins and/or shelters. He also quoted the capacities of certain harbours to protect and hide the ships, short ways and channels, and other signs on the coastland useful for terrestrial navigation. *Kitab-i Bahriye* represents a real *Book of Navigation* of the Adriatic Sea.

- a) Verzija 1 sadrži generalne karte većih područja. Karte iz verzije 2 su detaljniji kartografski prikazi.
- b) Usporedba verzije 2 (MS 2612 nasuprot MSH 642) ukazuje na slične obalne crte i konture otoka.
- c) Rukopisi verzije 2 (MS 2609 nasuprot Diez A. Foliant 57) prikazuju detaljnije opise lokalne specifične strukture i istaknutih arhitektonskih značajki gradova.
- d) Usporedbom *Kitab-i Bahriye*, verzije 1 i verzije 2 sa suvremenim kartama proizišlo je da su obalne crte i konture otoka pojednostavljene, ali je njihov položaj prilično točan.

10. Rasprava

U odnosu na uobičajenu terminologiju valja reći da su radovi mletačkih kartografa kao i karte Pirija Reisa uobičajeno nazivane izolirima. Taj naziv nije potpuno primjeren. *Kitab-i Bahriye* predstavlja zbirku koja sadrži:

1. Opise pojedinačnih otoka, koji odgovaraju klasičnim izolirima (sl. 3a, 3b)
2. Opise većih obalnih cjelina s otocima (sl. 6a)
3. Vedute gradova s opisima luka i djelomično she-matskim, a djelomično detaljnim prikazima gradskih zidina, utvrda i kuća (sl. 1a-1d, 2a-2d, 4a, 4b, 5a, 5b)
4. Karte za navigaciju s kompasnim ružama (sl. 1-7)

Najznačajnija odrednica usporedbe dviju verzija *Kitab-i Bahriye* (1521 i 1526) je razlika u kartografskom pristupu. U prvoj verziji (1521, Beč, MS HO 192) nalaze se većinom karte koje prikazuju veće geografske cjeline s pripadajućim otocima, lukama i gradovima. Te karte ukazuju na to da ih je izradio iskusni moreplovac, koji je pregledno prikazao priobalje s otocima.

Suprotno tome, u drugoj verziji (1526) vidljiv je daljni razvitak s detaljnim kartografskim prikazima pojedinih otoka, kao što to uobičajeno nalazimo na izolirima Christofora Buondelmontija i Bartolomea dalli Sonettija (Novak, Mlinarić, Miletić-Drder, 2004; Novak, Mlinarić, Lapaine, 2004).

Posebna je pozornost usmjerena na rukopisni prijepis karata iz MS 3609 iz Biblioteca Universitaria di Bologna i prijepisu MS Diez A. Foliant 57 iz Deutsche Staatsbibliothek zu Berlin koje prikazuju umjetnički jedinstvene opise Dubrovnika, Zadra, Kvarnera, Poreča i Novigrada. Naglašena je i važnost berlinskog primjerka *Kitab-i Bahriye*, za kojeg se smatralo da je uništen u Drugom svjetskom ratu (Soucek, 1992). Valoriziran je umjetnički značaj, koji je dostigao svoj vrhunac u kasnijim prijepisima *Kitab-i Bahriye* (npr. u prijepisu iz Bolonje i prijepisu iz Berlina). Berlinski prijepis nastao je početkom 17. stoljeća. Ova studija otkriva i napredak u kartografskom pristupu kao i promjenu i progres u količini prikazanih kartografskih informacija i umjetničkoj vrijednosti. Taj iskorak na višu kartografsku razinu

posebno je vidljiv vrednovanjem i usporedbom kasnijih prijepisa *Kitab-i Bahriye*.

Godine 1966. objavljen je prijepis *Kitab-i Bahriye* (MS 3609) iz Bolonje pod nazivom *Der See-Atlas des Sejjid Nuh*. Kissling je pripisao autorstvo tog prijepisa Sejjidu Nuhu (Kissling, 1966; Soucek, 1969). Taj atlas ima samo karte, ali nema popratne instrukcije za navigaciju. To u svom uvodu i komentaru naglašava i sam Kissling. I Goodrich (2004) konstatira da obala i otoci Hrvatske (na kartama 62-86) iz *Kitab-i Bahriye* do sada nisu uopće istraživani. Prvo istraživanje Piri Reisoa kartografiranja jadranske obale i otoka proveo je tek naš tim. Ukupno su analizirane 94 karte hrvatske obale i otoka iz šest prijepisa *Kitab-i Bahriye* (tablica 3, Goodrich, 2004).

Piri Reis bio je posebno precizan i detaljan u svojim savjetima za plovidbu. Značajan napredak u kvaliteti kartografskog prikaza i opisa omogućilo je njegovo veliko životno i plovidbeno iskustvo. Opskrbljivao je moreplovce s korisnim informacijama o vjetrovima, sidrištima, opasnim plićinama i podvodnim grebenima. Upozoravao je na korisne podatke kao što su izvori pitke vode i ruševine, odnosno dobra skloništa. Navodio je veličinu pojedinih luka, njihovu mogućnost za sidrenje brodova, ukazivao na prečace i kanale, kao i na obalne oznake korisne za terestričku navigaciju. *Kitab-i Bahriye* je pravi *Plovidbeni priručnik* Jadranskoga mora.

Kasniji prijepisi *Kitab-i Bahriye* vrlo vjerojatno više nisu služili u navigaciji nego su predstavljali prigodne darove za osmansku elitu. Ti umjetnički jedinstveni atlas bez tekstualnih savjeta za plovidbu (npr. rukopis iz Bolonje) postali su svojevrsni "coffee table books".

11. Zaključak

Karte Pirija Reisa su najstariji poznati kartografski dokumenti osmanske proizvodnje koji prikazuju hrvatsku obalu i otoke. Iako je Piri Reis najvjerojatnije koristio i druge kartografske izvore i informacije, on je očigledno sakupio mnogo izvornih podataka na osnovu vlastitog iskustva. Zahvaljujući tome, u svom je radu obraćao pozornost na detalje i postigao visoki stupanj kvalitete u kartografskoj produkciji.

Rani prijepisi verzije 1 (1521) i verzije 2 (1526) dokumentiraju značajni napredak u pomorskoj kartografiji, posebno u usporedbi s njegovim prethodnicima, npr. Christoforom Buondelmontijem i Bartolomeom dalli Sonettijem. Stoga je napredak kartografskog znanja i kartografiranja hrvatske obale i otoka u njegovom radu očigledan.

Osamnijske su vlasti u vrijeme intenzivnih vojno-političkih operacija i kroz kartografska djela iskazivale pojačani interes za hrvatsku obalu i otoke - karte su im zapravo omogućavale detaljan uvid u krajeve koje su namjeravali osvojiti. Neobično je da Venecija, odnosno mletački kartografi, ne posjeduju tako detaljnu sliku hrvatskoga primorskog prostora kojega su vojno i politički najvećim dijelom kontrolirali.

The later copies of *Kitab-i Bahriye* were very probably not used for navigation anymore, but as presents for members of the Ottoman elite. These artistically unique map atlases without textual instructions for navigation (e.g. Bologna manuscript) became a sort of „coffee table books“.

11. Conclusion

Piri Reis's maps are the oldest cartographic documents of Ottoman production that represent the Croatian coastland and islands. Although Piri Reis probably also used other cartographic sources and information, he has evidently acquired many original information according to his own experience. Due to these

facts, his work shows many details and high quality of map production.

The early copies of version I (1521) and version II (1526) are documents of significant progress in maritime cartography, as compared with forerunners, e.g. Cristoforo Buondelmonti and Bartolomeo dalli Sonetti. So, the progress in the cartographic knowledge in mapping of the Croatian coastland and islands is evident.

In the time of intense military-political operations and through cartographic work, Ottoman authorities became increasingly interested in Croatian coast and islands - their maps enabled them to see areas they intended to conquer. It is unusual that Venice, i.e. Venetian cartographers did not possess such a detailed image of the Croatian maritime area, most of which they controlled in politics and military.

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