

200 Years of Hydrography of Adriatic

An important anniversary to be celebrated this year is the 200th anniversary of hydrography or, to be more precise, 200 years since the beginning of the depth survey and chart plotting of the eastern Adriatic coast.

Hydrography is one of the oldest sciences dealing with the research of the sea and the seabed. It may be defined as a branch of applied science dealing with measurements and descriptions of physical features of the navigable portion of the Earth's surface and adjoining coastal areas, with special reference to their use for the purpose of navigation, to ensure safety at sea, safeguard of marine environment, and establish boundaries at sea. Hydrography includes hydrographic survey or marine geodesy, oceanographic measurements and nautical cartography. Hydrographic activities in the Croatian part of the Eastern Adriatic are carried out by the Hydrographic Institute of the Republic of Croatia.

In Europe, hydrographic activities started around the middle of the 16th century in major maritime countries of that time – France, Holland and Great Britain. Great maritime powers laid foundations for depth survey and the production of “modern” charts. Their next step was the use of hydrography for colonisation of overseas territories. As historical attainments of hydrography cannot belong only to one man or one nation, the first French surveys of the eastern Adriatic coast are considered to be the beginnings of hydrography in the Adriatic.

After Napoleon's victory at Austerlitz and the Peace of Pressburg, Venetian



Charles François Beautemps-Beaupré (1766-1854)

Dalmatia fell to France. The French took over Istria and Dalmatia, dissolved the Dubrovnik Republic, and established their military and civil power there, with the centre in Zadar. The military power over Dalmatia was taken over by General Auguste Frédéric Louis Viesse de Marmont, and the civil authority by the Venetian Vincenzo Dandolo. In a relatively brief period under French occupation, there were significant breakthroughs, not only in the advancement of economy, transport and education, but also in the first hydrographic surveys.

In the early 19th century, in 1806, the French engineer, hydrographer and cartographer Charles François Beautemps-Beaupré arrived on the coasts of the Eastern Adriatic (or the Gulf of Venice as car-

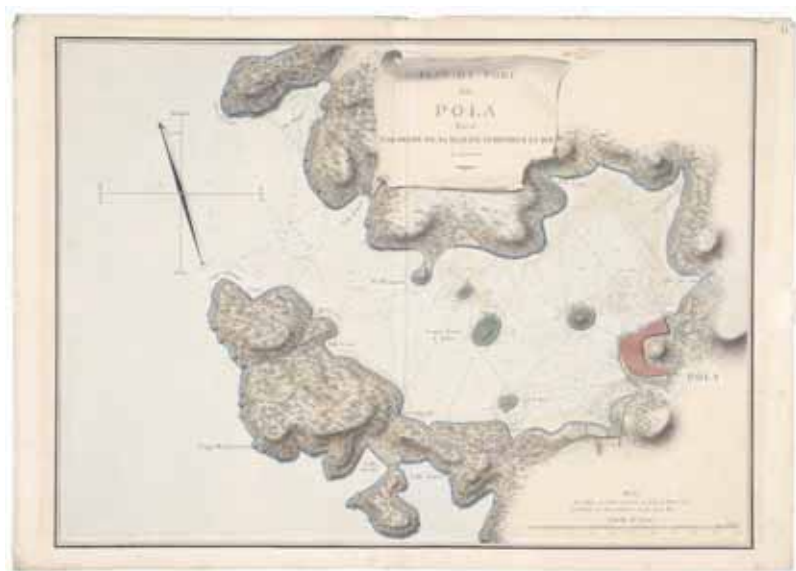
tographers of that time called it) to carry out the first hydrographic survey, i.e. to measure the depths of major Croatian ports. Throughout his sixty-year long and productive work, that French hydrographer and scientist surveyed the coasts of the Atlantic Ocean, the North Sea and the Adriatic Sea, and the coasts of Australia. He was chief engineer and deputy director of the Hydrographic Institute of the French Navy and member of the French Academy of Sciences and Arts.

In his campaigns, Beautemps-Beaupré applied new methods of the hydrographic survey, and besides geodetic and hydrographic measurements he also employed astronomic and geomagnetic measurements. His campaign, which lasted for three years with some interruptions (1806-1809), yielded 15 charts of Adriatic ports from Piran to Split and 2 sheets of panoramic views bound in a manuscript atlas titled *Reconnaissance hydrographique des ports du Royaume d'Italie situés sur les côtes du Golphe de Venise* – Hydrographic survey of ports of the Italian Kingdom situated along the coasts of the Gulf of Venice, and report on the campaign with descriptions of the surveyed areas.

Today, the manuscript atlas and report are kept in the cartographic collection of the National and University Library in Zagreb. The Atlas was discovered in 1972 in a second-hand bookshop in London by an antiquarian T. Radman, who advised the Croatian authorities to buy it. The Atlas has an exceptional scientific and artistic value. All charts and panoramic views, drawn in ink on an aquarelle paper and subsequently coloured by water-colour technique, were made in different sizes ranging from 28 × 39 cm to 169 × 158 cm, at approximate scale of 1:7200.

The result of the hydrographic survey under the guidance of Beautemps-Beaupré was a series of topographic maps featuring the area of Dalmatia, *La Carte de la Dalmatie a l'Echelle du 500 000 du Terrain*, today known as *Napoleon's map of Dalmatia*, which consists of 13 sheets and one overview sheet published in Paris in 1807. The chart was intended for Napoleon's conquests of Dalmatia, and nowadays it is kept in the *Archives des cartes Ministère de la guerre, Dépôt de la guerre*.

During his campaign, Beautemps-Beaupré used the resources of the Military Geographic Office in Milan. He trained the qualified personnel that carried out a systematic survey of entire Adri-



200 godina hidrografije Jadrana

Godine 2006. obilježava se 200. obljetnica hidrografije ili 200 godina od početka mjerenja dubina i njihova ucrtavanja na pomorskim kartama istočne obale Jadrana.

Hidrografija je jedna od najstarijih znanosti koja se bavi istraživanjem mora i podmorja. Može se definirati kao dio primijenjene znanosti koji se bavi mjerenjima i opisivanjima fizikalnih svojstava plovnih područja Zemljine površine i pripadajućega kopnenoga priobalnog područja, s posebnim naglaskom na njihovoj primjeni za potrebe plovidbe radi uspostave sigurne plovidbe, očuvanja pomorskog okoliša te uspostave granica na moru. Obuhvaća hidrografsku izmjeru ili marinsku geodeziju, oceanološka mjerenja i pomorsku kartografiju. Institucija koja obnaša hidrografsku djelatnost na hrvatskom dijelu istočne obale Jadrana je Hrvatski hidrografski institut.

Hidrografska se djelatnost u Europi razvija sredinom 16. stoljeća u Francuskoj, Nizozemskoj i Velikoj Britaniji, tada najrazvijenijim pomorskim državama. Pomorske velesile tada utemeljuju radove na mjerenju dubina i izradi „modernih“ pomorskih karta. Sljedeći je korak primjena hidrografije za potrebe koloniziranja prekomorskih teritorija. Povijesni dosezi hidrografije ne pripadaju samo jednom narodu ili naciji, stoga prva francuska mjerenja istočne obale Jadrana smatramo početkom hidrografije na Jadranu.

Mletačka Dalmacija pripala je Francuskoj nakon Napoleonove pobjede kod Austerlitz i Požunskoga mira 1805. godine. Francuzi preuzimaju vlast nad Istrom i Dalmacijom i dokidaju slobodnu Dubrovačku Republiku, te formiraju vojnu i civilnu vlast sa sjedištem u Zadru. Vojnu vlast nad Dalmacijom preuzima general Auguste Frédéric Louis Viesse de Marmont, a civilnu vlast Venecijanac Vincenzo Dandolo. U relativno kratkom vremenu francuske okupacije dogodilo se na prostorima Dalmacije nekoliko pozitivnih pomaka unapređivanjem privrede, prometa i školstva, ali i prvih hidrografskih mjerenja.

Godine 1806. francuski inženjer, hidrograf i kartograf Charles François Beautemps-Beaupré stigao je na obale istočnoga Jadrana (ili Mletačkoga zaljeva, kako su ga kartografi tada zvali), gdje je obavio prvu hidrografsku izmjeru, odnosno izmjerio je dubine najvažnijih hrvatskih luka. Taj francuski znanstvenik tijekom šezdesetogodišnjeg plodonosnog



rada mjerio je obale Atlantskog oceana, Sjevernog i Jadranskog mora, ali i obala Australije. Bio je glavni inženjer i zamjenik direktora Hidrografskog instituta francuske mornarice te član Francuske akademije znanosti i umjetnosti.

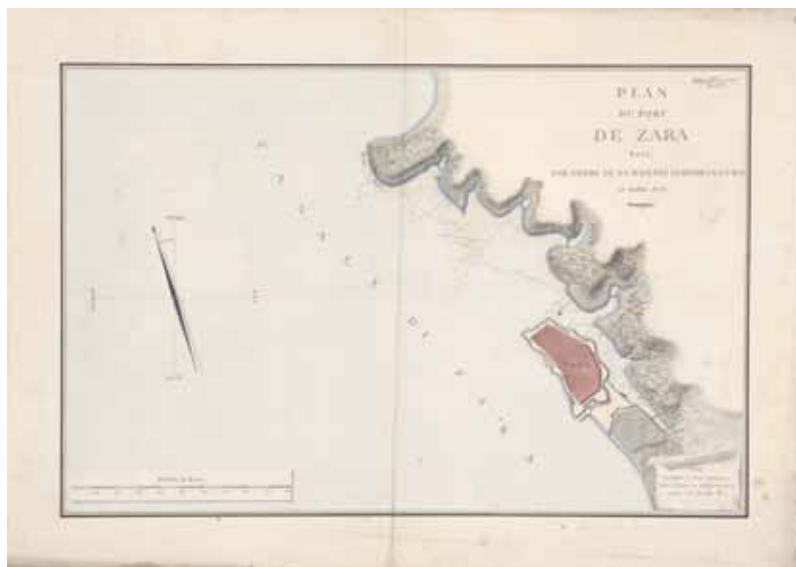
Beautemps-Beaupré se tijekom svojih kampanja koristio novim metodama hidrografske izmjere, a osim geodetskih i hidrografskih mjerenja primjenjivao je astronomska i geomagnetska mjerenja. Rezultat njegove kampanje, koja je s prekidima trajala tri godine, od 1806. do 1809., bio je 15 pomorskih karata luka na Jadranu od Pirana do Splita i 2 lista s panoramama, sve uvezano u rukopisni atlas *Reconnaissance hydrographique des ports du Royaume d'Italie situés sur les côtes du Golphe de Venise commencé*

– Hidrografski prikaz luka kraljevine Italije smještenih uzduž obale Mletačkoga zaljeva, te izvješće o tijeku kampanje s opisima područja koja su izmjerena.

Rukopisni atlas i izvješće čuvaju se danas u kartografskoj zbirci Nacionalne i sveučilišne knjižnice u Zagrebu. Godine 1972. atlas je otkrio u londonskom antikvarijatu splitski ljubitelj starina T. Radman i obavijestio o tome tadašnje vlasti, koje su ga kupile. Atlas ima iznimnu znanstvenu, ali i umjetničku vrijednost. Sve karte i panorame u atlasu crtane su tušem na akvarelnom papiru, te naknadno obojene tehnikom akvarela, a izrađene su u različitim dimenzijama od 28 cm × 39 cm do 169 cm × 158 cm, a mjerilo je približno 1:7200.

Nakon provedene hidrografske izmjere istočne obale Jadrana pod vodstvom Beautemps-Beaupréa, izrađena je serija topografskih karata koja prikazuje područje Dalmacije *La Carte de la Dalmatie a l'Echelle du 500 000 du Terrain*, danas poznata pod nazivom *Napoleonova karta Dalmacije*, a sastavljena od 13 listova karata i jednog preglednog lista, izdanih u Parizu 1807. godine. Karta je izrađena za potrebe Napoleonova osvajanja područja Dalmacije, a čuva se u *Archives des cartes Ministère de la guerre, Dépôt de la guerre*.

Za vrijeme kampanje Beautemps-Beaupré koristi resurse vojnogeografskog ureda iz Milana, kadrovi koje on osposobljava već 1816. do 1821. godine poduzimaju kampanju sustavne izmjere čitavoga Jadranskog mora. Rezultat je te izmjere serija od 2 generalne karte mjerila 1:500 000, 22 obalne pomorske karte u





*The building of the Hydrographic Institute of the Republic of Croatia in Split
Zgrada Hrvatskog hidrografskog instituta u Splitu*

184

atic Sea between 1816 and 1821. The result of this survey was a series of 3 general charts at the scale of 1:500 000, 22 coastal charts at the scale of 1:175 000, and 7 panoramic views of ports and significant navigational areas, making up the atlas of charts called *Carta di cabottaggio del mare Adriatico* printed between 1822 and 1824, a copy of which is kept in the State Archives in Zadar. All the charts were made in the Mercator projection, with the standard parallel of 42°N. In 1830, the first pilot was published, titled *Portolano del Mare Adriatico*, one copy of which is kept in the library of the Hydrographic Institute of the Republic of Croatia, and one in the Scientific Library in Zadar.

It was on 27 April 1860 that the Hydrographic Office was established within the Naval Academy in Trieste. Few countries around the world can boast such a long tradition in the hydrographic activity. Two years after its foundation, the Office moved to Pula, the major Austro-Hungarian naval port at that time, where it remained until the end of the First World War in 1918. During that period, the Adriatic was systematically surveyed under the guidance of Commander Tobias Österreicher. The second campaign started in 1866 and lasted for four years. As a result of the hydrographic survey, the following charts were produced in 1872: general chart at the scale of 1:1 000 000, 4 sailing charts at the scale of 1:350 000, 30 coastal charts at the scale from 1:40 000 to 1:100 000, and 8 harbour

charts at the scale from 1:20 000 to 1:40 000. The charts were printed at the Military Geographic Institute in Vienna. Two decades later, in 1893, a new pilot was published in German language, titled *Segelhandbuch für das Adriatische Meer*.

During the First World War, the hydrographic activity ceased, to be continued in Tivat four years later, in 1922, together with the personnel, equipment and charts recovered from the office in Pula. The following year the Hydrographic Office moved to Dubrovnik, where Naval Academy had been established, and remained there for six years. In October of 1929, the Office settled in Split, which was the centre of merchant shipping and navy and the central location in the Adriatic. It has remained there to the present day, except during the Second World War when it was seized by the Italian army again, which took away all the material and equipment once again. In 1937, the Hydrographic Office reorganized its work and changed its name into the Hydrographic Institute of the Navy.

During the occupation of Split in 1941 the hydrographic activity was suspended again, and the Italians once again removed all the instruments and cartographic material. The employees saved one part of the material and charts, and in 1943 established a cartographic office. The following year, the office moved from Allied territory in Italy to the island of Vis, where the topographic map of Vis and Biševo was made at the scale of 1:25 000 scale, being printed in Algeria.

After the end of the Second World War, the Hydrographic Institute continued its activities, and from the middle through the end of the 20th century published a series of coastal charts 100-xx, following current trends in nautical cartography. It was in 1952 that the first pilot of the Adriatic Sea was published in Croatian language, titled *Peljar po Jadranu – I. dio – Istočna obala* (Adriatic Pilot – Part I – Eastern Coast), and a year later *Peljar po Jadranu – II. dio – Zapadna obala* (Adriatic Pilot – Part II – Western Coast), whose author was Captain Antun Botrić.

Since 1991, the Hydrographic Institute has been functioning as a governmental institution, with 6 technical departments (nautical, hydrographic, oceanographic, cartographic, information science, and printing departments), and 2 survey vessels (Hidra and Palagruža). Its basic activities are safety of navigation, hydrographic and geodetic survey, oceanographic measurements, and publishing and printing. The publishing activities involve 120 charts and harbour plans and 20 nautical handbooks and publications, kept up to date through a monthly publication *Notices to Mariners*.

Following the current trends in nautical cartography, in the eighties of the last century the Institute published Small craft chart folio in two volumes, being designed for small craft and for the so-called leisure mariners. It was in 1999 that *Sailing Directions (Pilot) I – Adriatic Sea, Eastern coast* was published. Another product for small craft and leisure mariners is the *Adriatic Sea Pilot* (Volume I and Volume II).

Following the recommendations of the International Hydrographic Organization, all editions are kept up to date through the monthly publication *Notices to Mariners*. Experts from the Institute are trying to follow global trends in hydrography and nautical cartography, and adapt their products to current trends. Such a task may be very demanding, and in these days of global technological progress also very expensive.

Today, toward the end of 2006, 200 years since the first survey of the Adriatic ports, the production of Electronic Navigational Charts (ENC) at the Hydrographic Institute of Croatia (HHI) has been nearly completed. This technological breakthrough significantly marks two centuries of Institute's hydrographic activity, introducing a new era in the use of nautical charts.

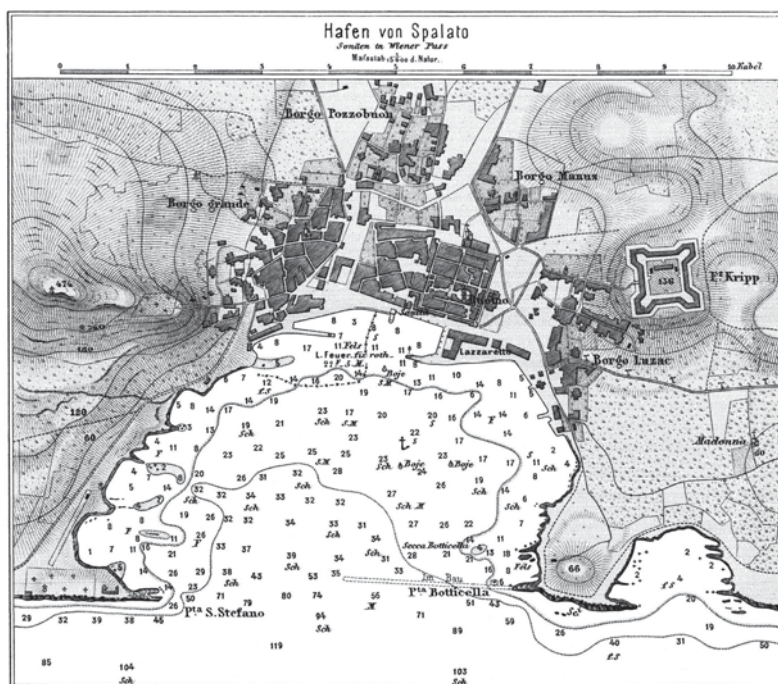
Tea Duplančić-Leder

mjerilu 1:175 000 i 7 panorama luka i važnijih navigacijskih područja, koje čine atlas karata *Carta di cabottaggio del mare Adriatico*, tiskan od 1822. do 1824. godine, čiji se primjerak čuva u Državnom arhivu u Zadru. Sve su karte izrađene u Mercatorovoj projekciji sa standardnom paralelom 42°N. Također se 1830. tiska i prvi peljar ili priručnik za plovidbu – *Portolano del Mare Adriatico*, kojega se jedan primjerak čuva u knjižnici Hrvatskoga hidrografskog instituta, a drugi u Znanstvenoj knjižnici u Zadru.

U sastavu mornaričke akademije osniva se 27. travnja 1860. godine Hidrografski zavod u Trstu, čime je hidrografska djelatnost na ovim prostorima konačno institucionalizirana. Tako dugom tradicijom hidrografske djelatnosti može se pohvaliti vrlo mali broj zemalja na svijetu. Dvije godine nakon osnivanja zavod seli u Pulu, tada najznačajniju austrougarsku ratnu luku, gdje ostaje do kraja Prvoga svjetskog rata 1918. godine. Za to je vrijeme Jadran drugi put sustavno izmjeren pod vodstvom austrougarskoga kapetana fregate Tobiasa Österreichera. Druga kampanja sustavne izmjere počinje 1866. i traje četiri godine. Kao rezultat hidrografske izmjere izrađena je 1872. godine generalna karta u mjerilu 1:1 000 000, 4 kursne karte u mjerilu 1:350 000, 30 obalnih karata u mjerilima od 1:40 000 do 1:100 000 i 8 planova luka i prolaza u mjerilima 1:20 000 do 1:40 000. Karte su tiskane u Vojnogeografskom institutu u Beču. Potom je 1893. godine objavljen i novi peljar na njemačkom jeziku *Segelhandbuch für das Adriatische Meer*.

Za vrijeme Prvoga svjetskog rata gasi se hidrografska djelatnost, a nastavlja se 1922. godine u Tivtu, s osobljem, opremom i kartama spašenima iz pulskog ureda. Već iduće godine Hidrografski ured seli se u Dubrovnik, gdje se osniva mornarička akademija, i ondje ostaje šest godina. U listopadu 1929. seli se u Split, središte trgovačke i ratne mornarice te središnju lokaciju na Jadranu, gdje ostaje do današnjih dana, s prekidom za vrijeme Drugoga svjetskog rata, kada ga je opet okupirala talijanska vojska i po drugi put odnijela iz njega sav materijal i opremu. Godine 1937. Hidrografski ured reorganizira svoj rad i mijenja naziv u Hidrografski institut mornarice.

Okupacijom Splita 1941. godine ponovno se prekida hidrografska djelatnost, a Talijani opet odnose sav instrumentarij i kartografski materijal. Zaposlenici su i ovaj put sačuvali dio



materijala i karata, pa se 1943. formira kartografski ured, koji iduće godine sa savezničkog teritorija u Italiji prelazi na otok Vis. Ondje se izrađuje topografska karta Visa i Biševa u mjerilu 1:25 000, tiskana u Alžiru.

Završetkom Drugoga svjetskog rata Hidrografski institut nastavlja svoju djelatnost, te izdaje do kraja 20. stoljeća seriju obalnih karata 100-xx, rađenu prema suvremenim trendovima u pomorskoj kartografiji. Godine 1952. izdaje se prvi peljar Jadranskog mora na hrvatskom jeziku *Peljar po Jadranu – I. dio – Istočna obala*, a godinu dana poslije i *Peljar po Jadranu – II. dio – Zapadna obala*, autor kojega je kapetan Antun Botrić.

Od 1991. godine Hidrografski institut djeluje samostalno kao državna institucija, koja danas ima 6 stručnih odjela (nautički, hidrografski, oceanografski, kartografski, informatički i tiskarski) te 2 istraživačka broda (Hidra i Palagruža). Djelatnosti instituta su sigurnost plovidbe, izvođenje hidrografske i geodetske izmjere, oceanoloških mjerenja, te izdavačko-tiskarski poslovi. Institut izdaje 120 pomorskih karata i planova te 20 priručnika i publikacija za plovidbu, koje redovito mjesečno održava u ažurnom stanju oglašavajući promjene na plovnim putovima mjesečnom publikacijom *Oglas za pomorce*.

U 1980-ima, također prema suvremenim trendovima, izdaju se, u dva dijela,

plovidbene karte za male brodove ili jahte. Male su karte manjih dimenzija, te su sadržajem, podjelom i načinom održavanja prilagođene potrebama manjih plovila i takozvanih vikend kapetana. Godine 1999. u Hrvatskom se hidrografskom institutu izdaje i novi *Peljar I – Jadransko more istočna obala*. Prateći ponudu proizvoda za male brodove u Institutu se tiskaju u dva dijela plovidbeni priručnici za male brodove *Peljar za male brodove – I. dio* i *Peljar za male brodove – II. dio*.

Sva svoja izdanja, prema preporukama Međunarodne hidrografske organizacije, Hrvatski hidrografski institut drži u ažurnom stanju mjesečnom publikacijom *Oglas za pomorce*. Stručnjaci koji rade u Institutu pokušavaju pratiti svjetske trendove u hidrografiji i pomorskoj kartografiji, te im se svojim proizvodima prilagoditi. To je katkad vrlo naporno, a u posljednje vrijeme globalnog tehnološkog napretka i iznimno skupo.

Danas, 200 godina nakon prve izmjere jadranskih luka, krajem 2006. godine, očekuje se mogućnost upotrebe elektroničkih navigacijskih karata (Electronic Navigational Charts – ENC) u Hrvatskom hidrografskom institutu (HHI), koji time zaokružuje svoja dva stoljeća hidrografske djelatnosti i ulazi u novu eru upotrebe pomorskih karata.

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