



# ISTRAŽIVANJE TREĆEG ANTIČKOG BRODA NA TRSTENIKU U KAŠTEL SUĆURCU

## Research of the third Roman ship at Trstenik in Kaštel Sućurac

### UVOD

**N**a nalazištu Trstenik u Kaštel Sućurcu, u plitkom se moru nalaze ostatci gospodarskog kompleksa iz rimskog doba, datiranog u vremensko razdoblje od kasne Rimske Republike do kasnog Carstva. Arheološka istraživanja započela su 2002. godine, vađenjem cjelovitog prošupljenog dolija, a uz kraće prekide, još su uvijek u tijeku. Godine 2006. uz jugozapadni kraj antičke operativne obale uočen je namjerno potopljen brod (Trstenik 1), a tijekom istraživanja 2020. godine uz njega su otkriveni ostatci još dvaju brodova (Trstenik 2 i Trstenik 3), također namjerno potopljenih kako bi se učvrstila konstrukcija operativne obale te zaštitila od vjetrova iz južnih kvadranta. U vremenu od 2012. do 2020. godine istraženi su ostatci broda Trstenik 1. Ostatci bro-

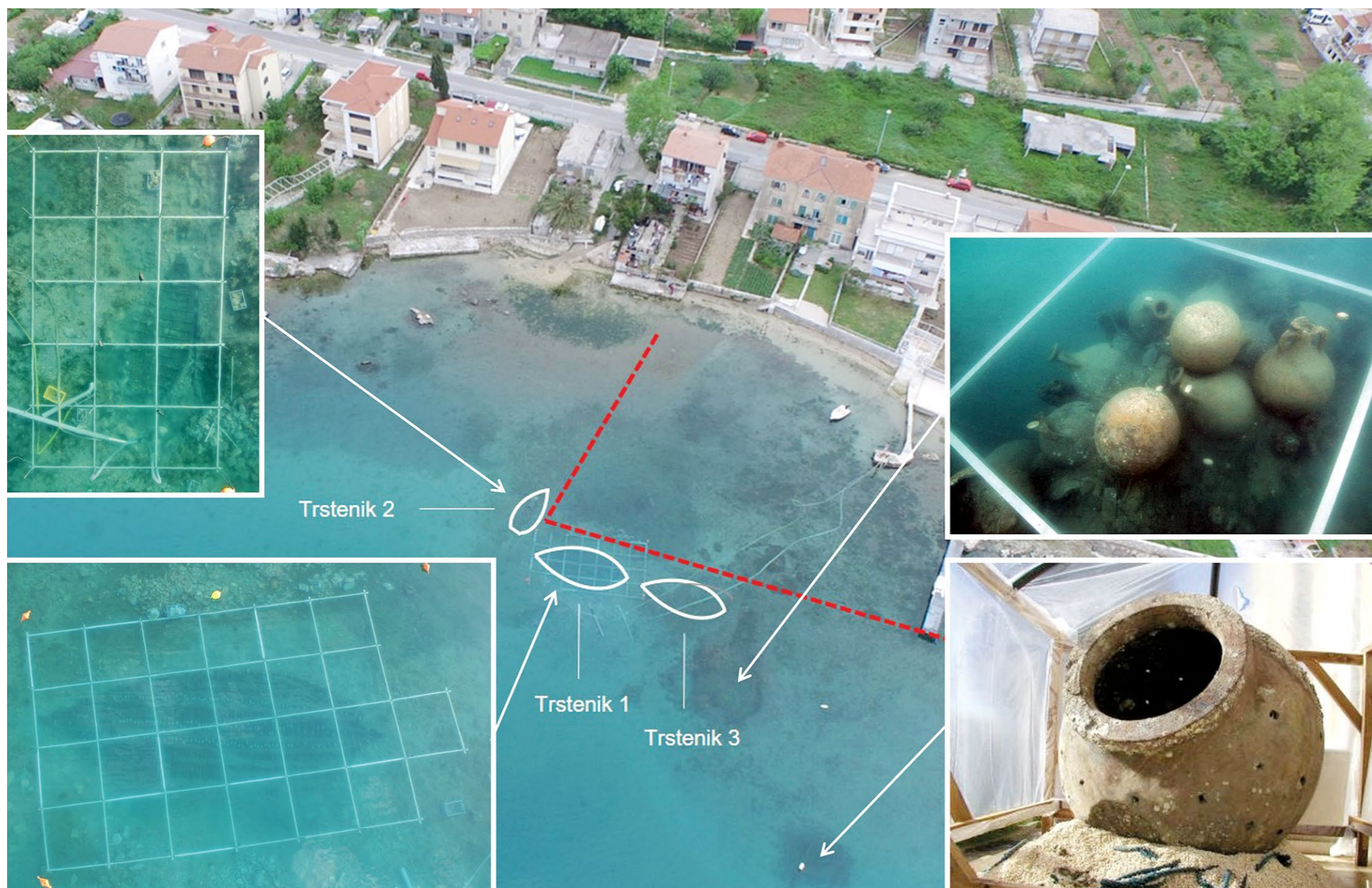
### INTRODUCTION

**R**emains of a Roman-era agricultural estate dating from the late Roman Republic to the late Empire are noticeable in the shallow sea at the Trstenik site in Kaštel Sućurac. Archaeological research began in 2002, with recovering a complete perforated dolium, and it is still ongoing, with short interruptions. In 2006, a scuttled ship (Trstenik 1) was spotted near the southwestern end of the ancient operational waterfront, and during research in 2020, the remains of two more ships (Trstenik 2 and Trstenik 3) were discovered next to it, also scuttled in order to reinforce the construction of the operational waterfront and to protect it from the winds from the southern quadrants. Between 2012 and 2020, the remains of the ship Trstenik 1 were investigated.

  
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Položaj važnijih nalaza na nalazištu Trstenik u Kaštel Sućurcu (foto: I. Šuta)  
Location of the most important finds at the Trstenik site in Kaštel Sućurac (photo: I. Šuta)

by the Ministry of Culture and Media of the Republic of Croatia, the Split-Dalmatia County, the Museum of the Town of Kaštela, the University of Zadar and the Maritime Heritage Institute ARS NAUTICA.<sup>1</sup> This year was marked by the beginning of systematic research of the ship Trstenik 3, and sampling of the wooden material of which the ship Trstenik 2 was made.

### Systematic research of the ship Trstenik 3

The research began by stretching two ropes in the north-south and east-west directions, which marked the wooden structure of the operational waterfront. After that, the location of the ship Trstenik 3 and the places intended for the disposal of stones from the underwater excavation were marked with orange buoys. An auxiliary metal grid made of 2 x 6 squares, with overall dimensions of 4 x 12 m, was placed over the ship Trstenik 3. The temporary protection made with geotextiles, sediment and stones was removed from the ship, and then water dredges were placed over the grid.

The research of the ship Trstenik 3 began with the removal of large stones and sediment from its central part, lasting five working days. During the underwater excavation, visibility decreased significantly, which had a negative impact on the documentation of the work progress. After the stones were removed, the ship structure was roughly cleaned of the remaining sediment, partially marked and documented with photographs, photogrammetry, and drawing. The preserved length of the ship is about 11 m, and the largest preserved width is about 3.5 m.

For now, the keel, stern and sternpost, ship frames consisting of floor timbers or half frames

da Trstenik 2 istraženi su 2021. godine, a sljedeće godine provedeno je probno istraživanje broda Trstenik 3 (Radić Rossi, Šuta 2023). Ostaci broda tlocrtno su definirani i zaštićeni *in situ* do nastavka istraživanja.

The remains of the ship Trstenik 2 were investigated in 2021, and the following year a trial excavation of the ship Trstenik 3 was conducted (Radić Rossi, Šuta 2023). The remains of the ship were defined in ground plan and protected *in situ* until the research continues.

### TIJEK I REZULTATI ISTRAŽIVANJA

Istraživačka kampanja 2023. provedena je u vremenu od 3. do 13. studenoga, a financirana je sredstvima Ministarstva kulture i medija RH, Splitsko-dalmatinske županije, Muzeja grada Kaštela,

### THE COURSE AND RESULTS OF THE RESEARCH

The 2023 research campaign was conducted between November 3 and 13, and was financed

Sveučilišta u Zadru i Instituta za pomorsku baštinu ARS NAUTICA.<sup>1</sup> Ove je godine započelo sustavno istraživanje broda Trstenik 3, a na brodu Trstenik 2 provedeno je uzorkovanje drvene građe od koje je bila izrađena brodska konstrukcija.

<sup>1</sup> Uz autore teksta, u istraživanju su sudjelovali Alice Lucchini sa Sveučilišta u Zadru, Vedran Katavić i Dominik Žanić iz Muzeja grada Kaštela, Dušanka Romanović iz Arheološkog muzeja u Zadru, Deni Demetlika, Renata Zorkić i Helena Žigić, studenti Sveučilišta u Zadru, te profesionalni ronioci Vedran Dorušić i Marko Lete. Istraživanju su se pridružile i Afke van Zijverden, mag. arheologije iz Nizozemske te Jasmine Misfud i Mieke Kassulke, koje su arheologiju diplomirale na Sveučilištu na Malti.

<sup>1</sup> Along with the authors of the text, research team consisted of the following participants: Alice Lucchini from the University of Zadar, Vedran Katavić and Dominik Žanić from the Museum of the Town of Kaštela, Dušanka Romanović from the Archaeological Museum in Zadar, Deni Demetlika, Renata Zorkić and Helena Žigić, students of the University of Zadar, and professional divers Vedran Dorušić and Marko Lete. Afke van Zijverden, archaeologist from the Netherlands joined the research as well as Jasmine Misfud and Mieke Kassulke, who graduated in archeology from the University of Malta.





Čišćenje pramčanog dijela broda (foto: B. Vukičević)  
Cleaning the bow part of the ship (photo: B. Vukičević)

### Sustavno istraživanje broda Trstenik 3

Istraživanje je započelo razvlačenjem dvaju konopa u smjeru sjever-jug i istok-zapad, kojima je označena drvena konstrukcija operativne obale. Nakon toga, mjesto nalaza broda Trstenik 3 te mjesta predviđena za odlaganje kamenja iz podmorskog iskopa označena su narančastim bovama. Iznad broda Trstenik 3 postavljeno je pomoćno metalno mrežište sastavljeno od 2 x 6 kvadrata, sveukupnih dimenzija 4 x 12 m. S broda je uklonjena privremena zaštita napravljena pomoću geotekstila, sedimenta i kamenja, a potom su nad mrežište postavljene vodene sisaljke.

Istraživanje broda Trstenik 3 započelo je uklanjanjem velikog kamenja i sedimenta iz njegova središnjeg dijela, u trajanju od pet radnih dana. Za vrijeme podmorskog iskopa vidljivost se znatno smanjivala što je negativno utjecalo na dokumentiranje tijekom radova. Nakon uklanjanja kamenja brodska je konstrukcija grubo očišćena od preostalog sedimenta, djelomično označena i fotografski,

Ortogonalni prikaz broda Trstenik 3 iz virtualnog 3D modela (autor: A. van Zijverden)  
Orthogonal view of the ship Trstenik 3 from a virtual 3D model (author: A. van Zijverden)



fotogrametrijski i nacrtno dokumentirana. Očuvana dužina broda iznosi oko 11 m, a najveća očuvana širina oko 3,5 m.

Za sada su posebnim oznakama označeni kobilica, pramčana i krmena statva, brodska rebra koja se sastoje od rebrenica ili polurebrenica i rebrenih nastavaka, proveze i bokoštavnice. Oplata broda nije označena jer će njezino označavanje uslijediti tijekom sljedeće istraživačke kampanje, kad bude provedeno detaljno čišćenje brodske konstrukcije. Osim toga, svjesno je izostavljeno i označavanje drvenih i metalnih čavala te drvenih čavlića koji pričvršćuju jezičce za platice brodske oplata, jer su zakovice kojima se oni označuju podložne koroziji pa bi do sljedeće godine izazvale veliku štetu na nalazištu. Tijekom istraživanja nalazište je u nekoliko navrata snimljeno iz zraka.

Od pokretnih nalaza pronađeno je tridesetak ulomaka amfora, tegula i keramičkog posuđa, među kojima vrijedi spomenuti jednu ručku hispanске amfore tipa Dressel 20. Te amfore prisutne su na nalazištu u većem broju, a vjerojatno su iskorištene za izgradnju manjeg mola namije-

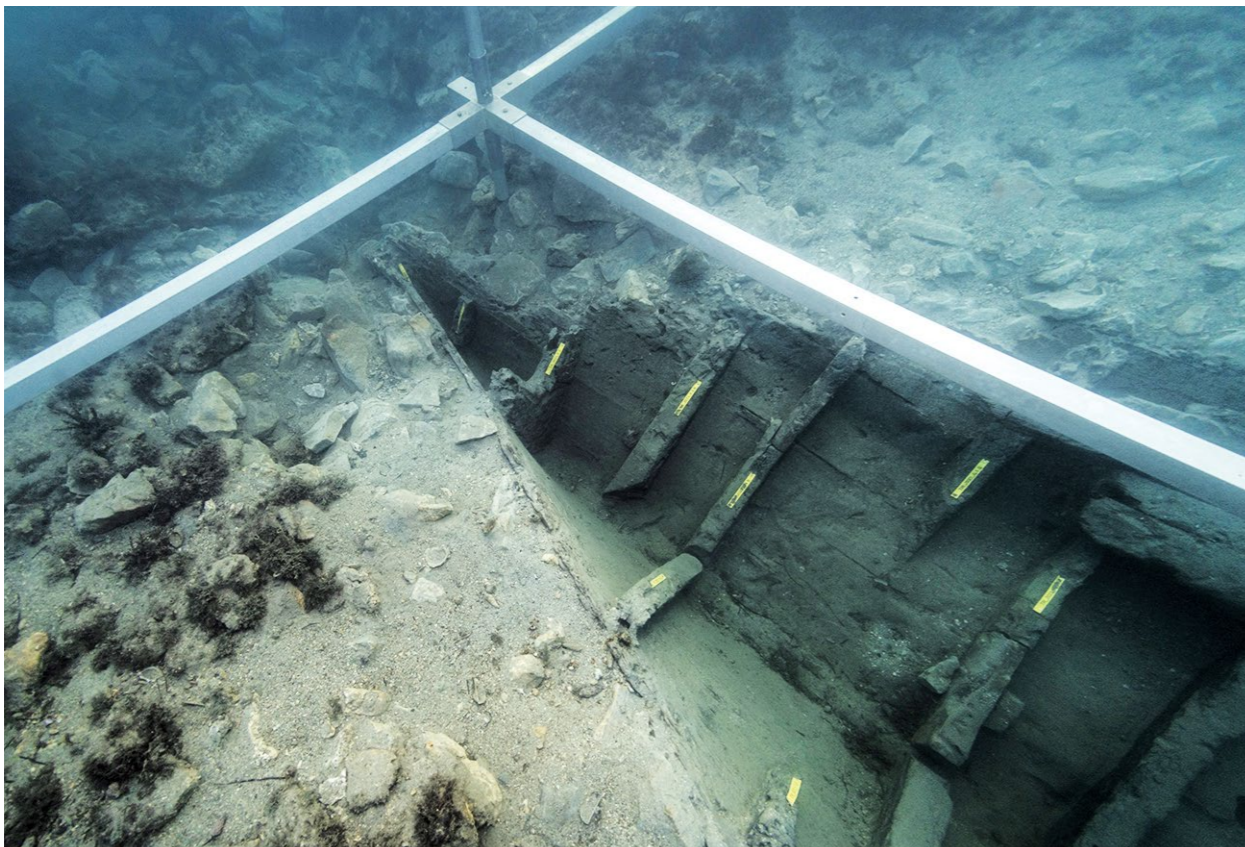
and futtocks, stringer and wale are marked with special markings. The planking was not marked, as it will be done during the next research campaign, when a detailed cleaning of the ship structure will be carried out. In addition, the marking of wooden and metal nails and wooden trenails that fasten the tenons to the planks was deliberately omitted, because the rivets used to mark them are subject to corrosion and would cause great damage to the site by the next year. During the research, the site was photographed from the air on several occasions.

Of the small finds, about thirty fragments of amphorae, tegulae and ceramic vessels were found, among which it is worth mentioning one handle of a Hispanic Dressel 20 amphora. These amphorae are present at the site in large numbers, and were probably used for the construction of a small pier intended for docking ships. There are also two fragments of a dolium rim, found in the northwestern part of the ship, that are particularly interesting. Unfortunately, it is not possible to conclude with certainty whether they were also used to fill the ship structure before sinking, or





Pogled iz zraka na nalazište tijekom istraživanja (foto: I. Šuta)  
Aerial view of the site during research (photo: I. Šuta)



... Pramčani dio broda (foto: B. Vukičević)  
 ... Bow part of the ship (photo: B. Vukičević)



... Čišćenje središnjeg dijela broda (foto: B. Vukičević)  
 ... Cleaning the central part of the ship (photo: B. Vukičević)

njenog pristajanju brodova. Osim toga, ističu se i dva ulomka oboda dolija, pronađena u sjeverozapadnom dijelu broda. Nažalost, nije moguće sa sigurnošću zaključiti jesu li i oni iskorišteni za ispunu brodske konstrukcije prije potapanja ili su se na tome mjestu našli u sekundarnom položaju nakon napuštanja gospodarskog kompleksa.

### Uzorkovanje broda Trstenik 2

Usporedno s istraživanjem broda Trstenik 3, ponovno su otkriveni ostatci broda Trstenik 2 koji je bio privremeno zaštićen na morskome dnu, u očekivanju odluke hoće li se izvaditi iz mora, konzervirati i izložiti u Muzeju grada Kaštela, ili ostaviti *in situ*. S obzirom na nedefiniranu situaciju, uzorkovanje elemenata drvene brodske konstrukcije nije provedeno tijekom sustavnog arheološkog istraživanja 2021. godine pa je odlučeno da se ono provede tijekom ovogodišnje istraživačke kampanje.

S broda je uklonjeno kamenje, sediment i geotekstil, a potom su izmještene i vrećice pijeska kojima je brodska konstrukcija bila u potpunosti prekrivena. Osim toga, iz mora su izvađeni svi elementi koji su 2021. godine bili dokumentirani na kopnu, nakon čega su umotani u geotekstil i pohranjeni uz ostatke broda. Svi su oni sustavno uzorkovani, nakon čega se pristupilo i sustavnom uzorkovanju elemenata brodske konstrukcije, ostavljenih *in situ*. Uzorkovana je kobilica, krmena statva, pramčano ogledalo, rebrenice i rebreni nastavci rebara od F1 do F14, platice od P1 do P34, razma i konstruktivni element nad razmom te četiri neidentificirana elementa. Osim toga, uzorkovani su i jedan jezičac, jedan drveni čavlič te jedna daska konstrukcije operativne obale. Analize uzoraka provest će Alice Lucchini u Laboratoriju za dendrokronologiju Instituta za bioekonomiju talijanskog Nacionalnog centra za znanstvena istraživanja (CNR).

Ponovno oslobođen pristup brodu iskorišten je za dokumentiranje kobilice i još nekoliko zanimljivih detalja. Po završetku uzorkovanja brodska je konstrukcija zasuta sedimentom i prekrivena vrećicama s pijeskom, nakon čega je nad nju postavljen geotekstil, pokriven slojem većeg kamenja koje prati oblik potopljenog broda. Čitav posao obavljen je tijekom prvog dijela istraživanja broda Trstenik 3.

they ended up in that place in a secondary position after abandonment of the agricultural estate.

### Sampling of the ship Trstenik 2

Parallel to the research of the ship Trstenik 3, the remains of the ship Trstenik 2, which was temporarily protected on the seabed, were uncovered, pending a decision on whether to recover it, preserve it and display it in the Museum of the Town of Kaštela, or leave it *in situ*. Due to the undefined situation, the sampling of the elements of the wooden ship structure was not carried out during the systematic archaeological research in 2021, so it was decided to do it during this year's research campaign.

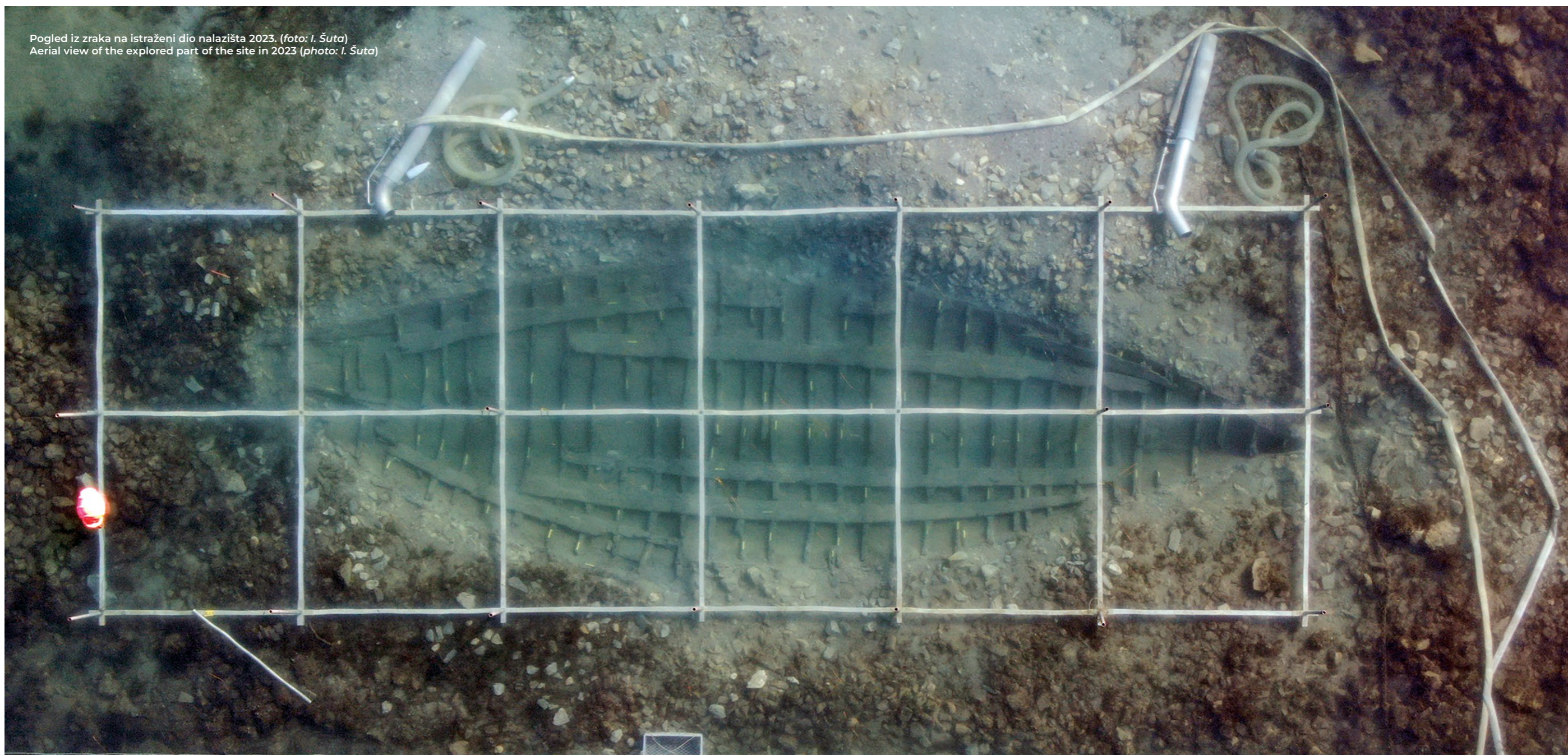
Stones, sediment and geotextile were removed from the ship, and then sandbags were moved, which completely covered the ship structure. In addition, all the elements that were documented on land in 2021 were taken out of the sea, after which they were wrapped in geotextile and stored next to the remains of the ship. All of them were systematically sampled, after which systematic sampling of the ship structure elements, left *in situ*, started. The keel, sternpost, transom bow, floor timbers and futtocks of frames from F1 to F14, planks from P1 to P34, sheer strake and structural element above the it and four unidentified elements were sampled. Furthermore, one tenon, one wooden nail and one board of the operational waterfront structure were also sampled. Sample analyses will be conducted by Alice Lucchini at the Laboratory of Dendrochronology of the Bioeconomy Institute of the Italian National Center for Scientific Research (CNR).

Once again, the free access to the ship was used to document the keel and a few other interesting details. At the end of the sampling, the ship structure was filled with sediment and covered with sandbags, after which geotextile was placed over it, covered with a layer of larger stones that outline the contours of the sunken ship. The entire work was done during the first part of the research of the ship Trstenik 3.

### CONCLUSION

Although it lasted only eleven days, the research campaign in 2023 resulted in the discov-





Pogled iz zraka na istraženi dio nalazišta 2023. (foto: I. Šuta)  
Aerial view of the explored part of the site in 2023 (photo: I. Šuta)

## ZAKLJUČAK

Iako je trajala samo jedanaest dana, istraživačka kampanja 2023. rezultirala je otkrivanjem cjelokupnih ostataka broda Trstenik 3. Iz broda je izvađeno kamenje kojim je bio ispunjen prije potapanja, a potom je uklonjen i ostatak sedimenta. Kako detaljno čišćenje nije provedeno, označeni su samo kobilica, statve, rebra, proveze i bokošitnice, a ostatak oznaka postaviti će se tijekom iduće istraživačke kampanje. Za sljedeću godinu planira se detaljnije očistiti i označiti brodska konstrukcija, proučiti njezini detalji, a potom ukloniti proveze kako bi se dokumentirala i situacija bez tih elemenata koji mjestimično

ery of the complete remains of the ship Trstenik 3. The stones with which it was filled before sinking were removed from the ship, and then the rest of the sediment was removed. As detailed cleaning was not carried out, only the keel, posts, frames, stringers and wales were marked, and the rest of the tags will be placed during the next research campaign. For the next year, it is planned to clean and mark the ship structure more thoroughly, to study its details, and then to remove the stringers to document the situation without these elements, which in places cover the joints of the frame components. The research definitely needs to be continued because the re-

prekrivaju spojeve sastavnih dijelova brodskih rebara. Istraživanje je svakako potrebno nastaviti jer su ostaci broda tek privremeno zaštićeni geotekstilom i slojem kamenja, a dugoročna zaštita postaviti će se kad brod bude istražen u cijelosti.

mains of the ship are only temporarily protected with geotextile and a layer of stones, and long-term protection will be installed when the ship is fully explored.

## LITERATURA / BIBLIOGRAPHY

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