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2<sup>nd</sup> International Conference “DIVE IN BLUE GROWTH”  
on the Promotion of Accessible Underwater Cultural Heritage Sites

VIRTUAL May 12-14, 2021



# Use of cheap surface and submarine automated vessels for research and promote Accessible Underwater Cultural Heritage Site (AUCHS)

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# Unmanned Surface Vehicle (USV)

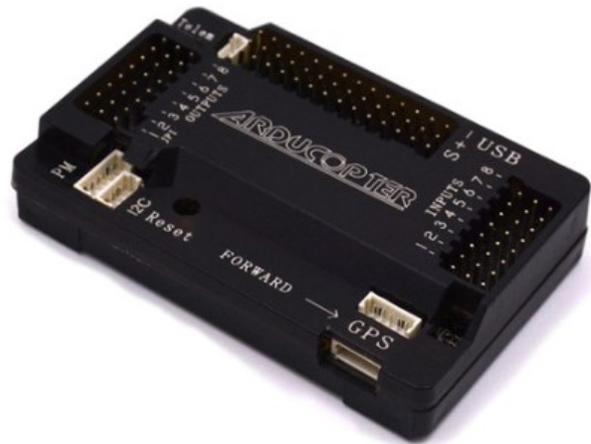
The development surface automated vessels progressing for more than 30 years, but their cost is too high for use in small scientific projects.



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Parallel with the development specialized companies, opensource solutions are being developed, which are most often used in amateur robotics.

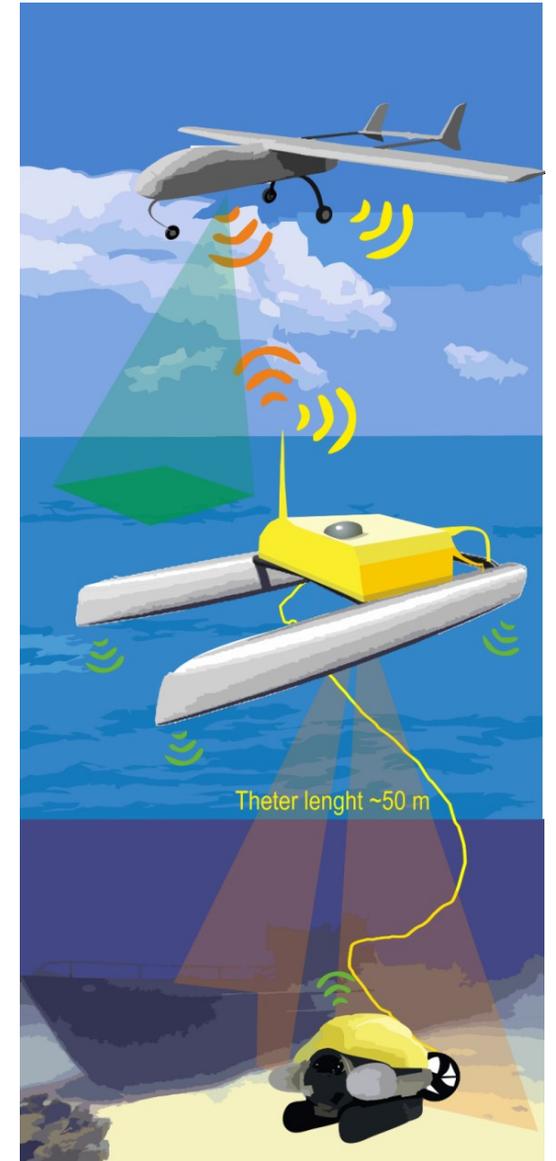
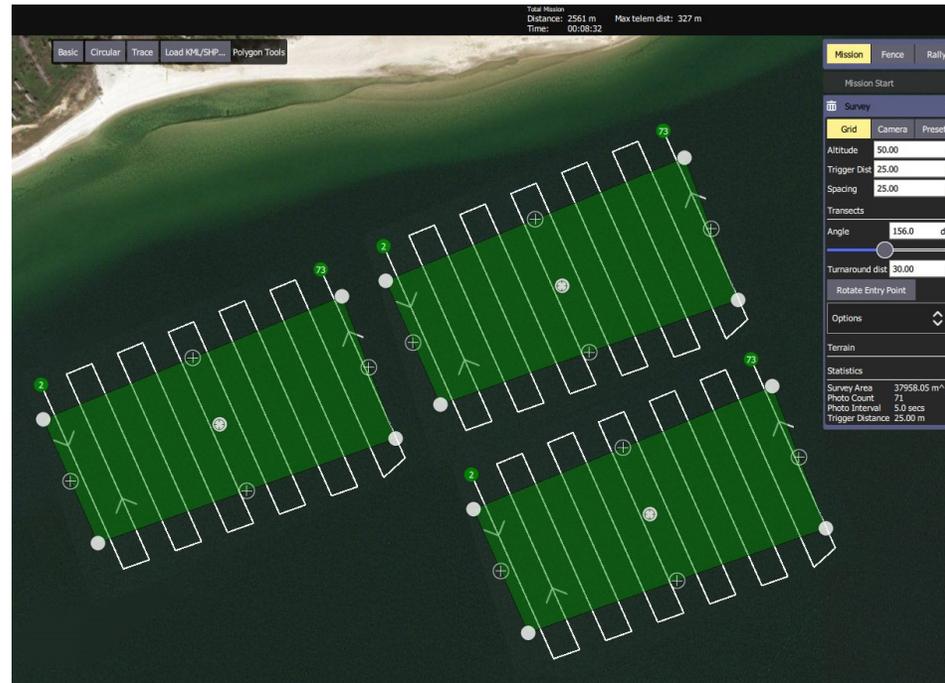
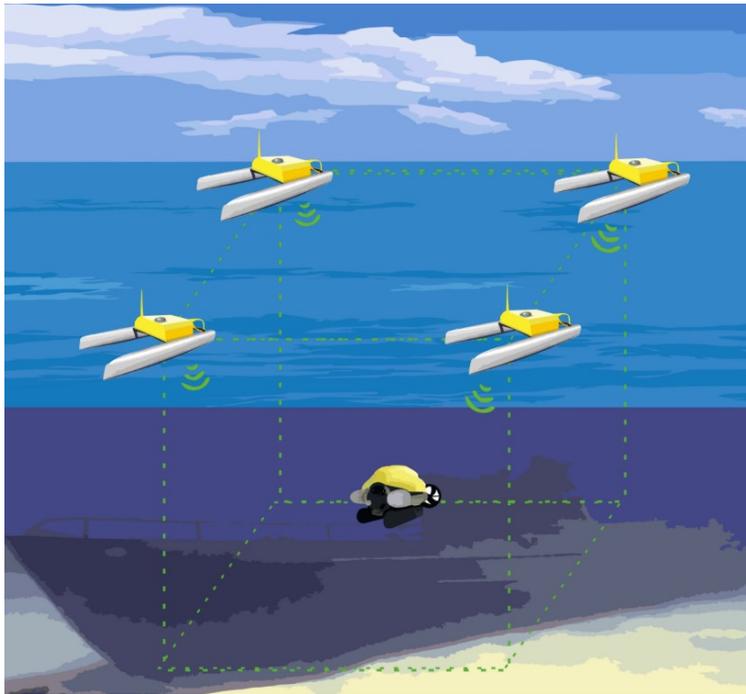


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# Network system of hydrophysical equipment carrier vessels

Our goal is to build on the basis of opensource solutions a modular system with interchangeable components with the possibility of simultaneous use of a fleet different devices, united into a single network.

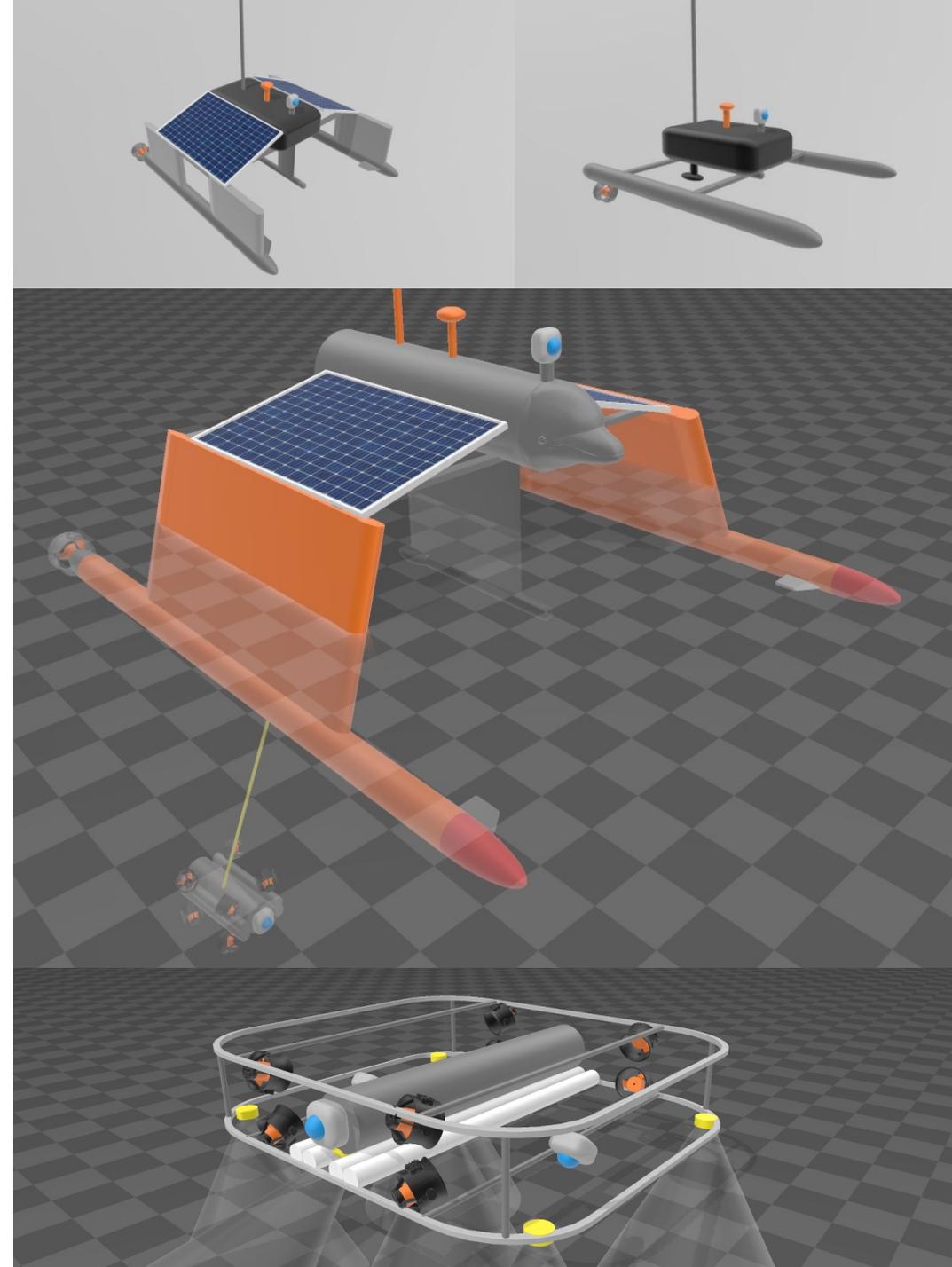


**Modular system building on opensource solution and 3D-printed parts much cheaper than existing commercial solutions.**

Using interchangeable components it can be assemble the necessary vessel for solving specific task.

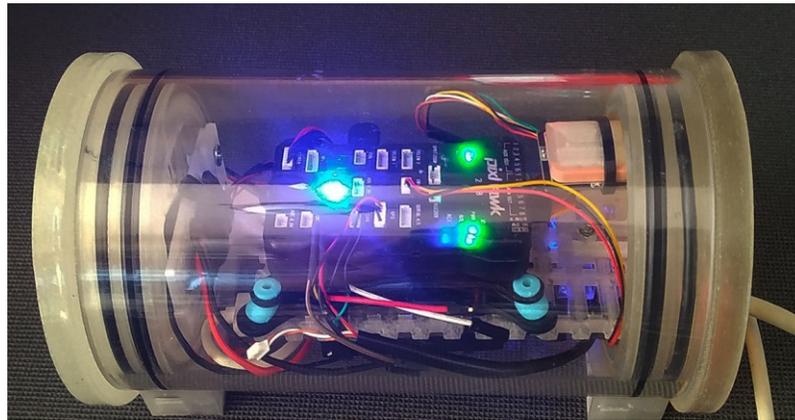
- Unmanned Surface Vehicle USV,
- Underwater Remote Operated Vehicle (ROV),
- Autonomous underwater vehicle (AUV)
- Monitoring online-video system for AUCHS.

**This will allow use those technologies in small-budget projects.**



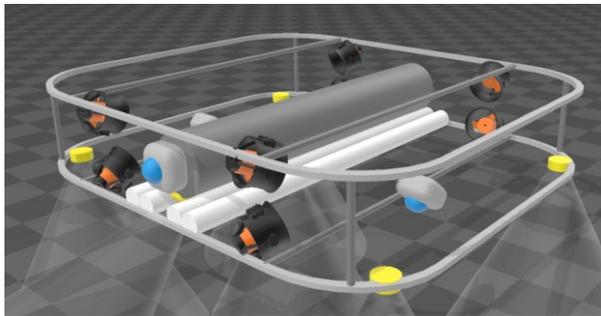
# The interchangeable computer control module

- + On site, you can assemble those vessels that are needed at the moment.
- + Reduces the volume and weight of equipment during transportation.
- + Interchangeable components increase the overall level of system reliability.

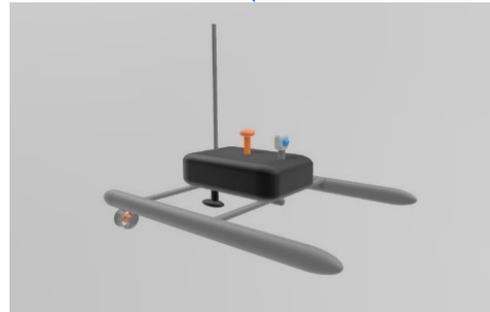


**interchangeable  
computer control module**  
(waterproof and pressure 250 m tested)

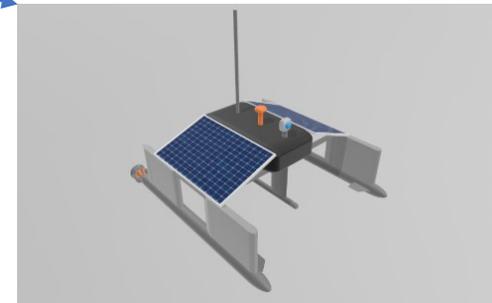
Underwater ROV or AUV



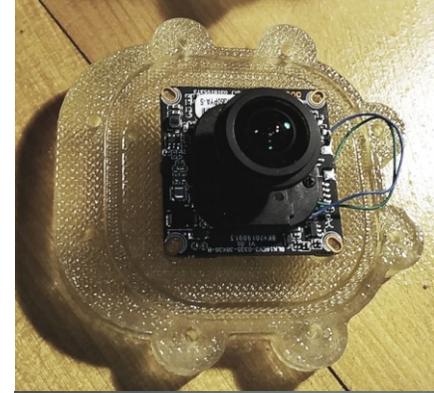
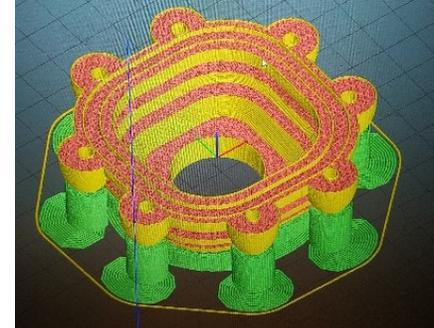
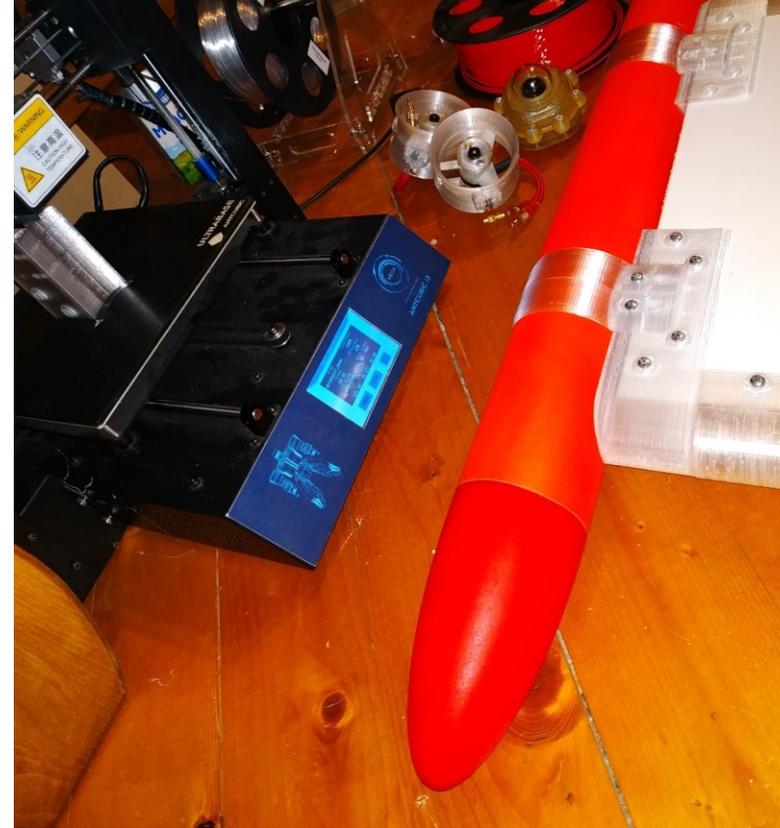
USV



USV (SWATH)

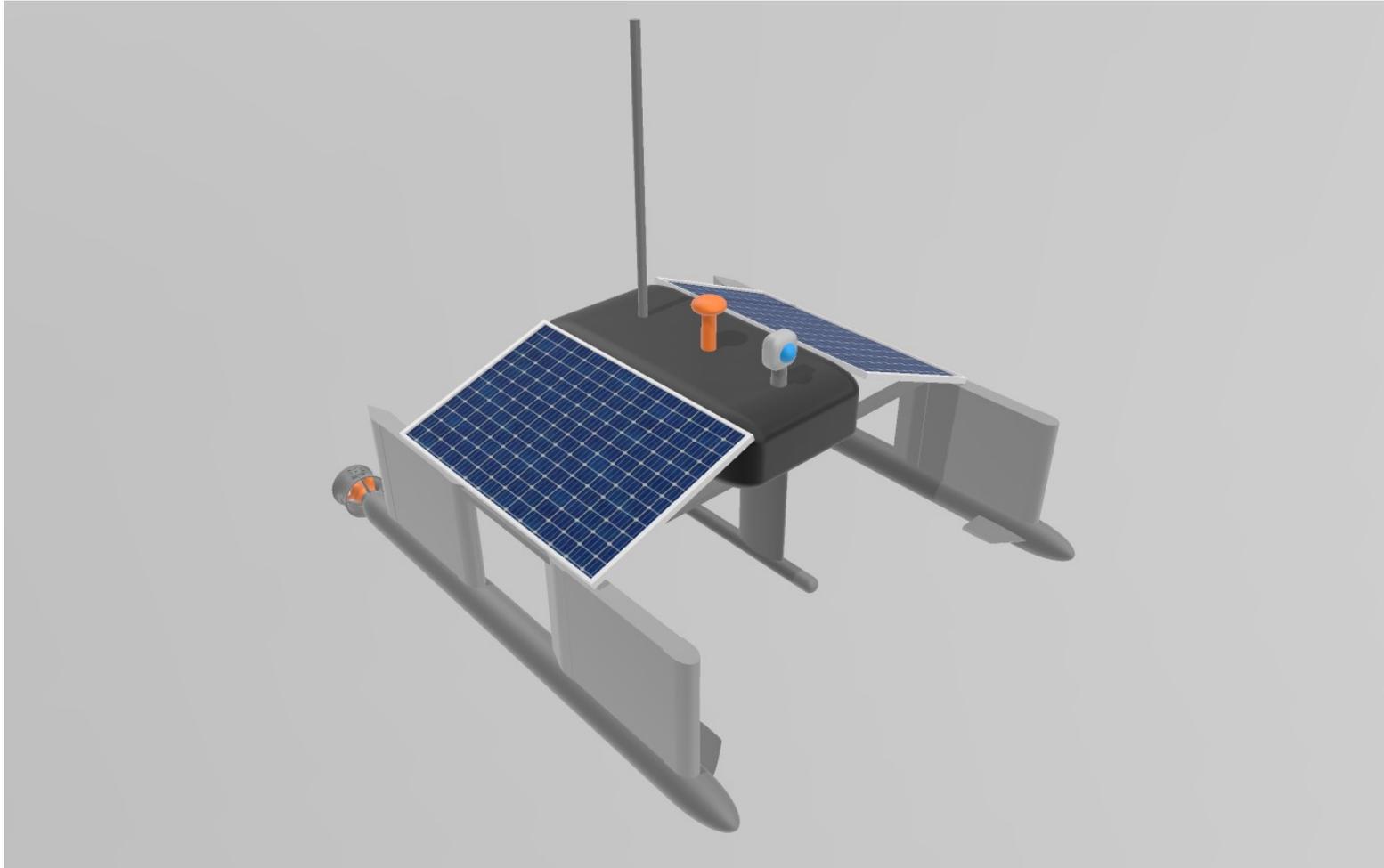


Using of 3D printing makes it possible to simplify reproduction and provide easy and flexibility in configuring for a specific task.



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# Model of Small Waterplane Area Twin Hull (SWATH)



# Waterproof box for hydrophysical third-party equipment and compact dimensions for transportation.



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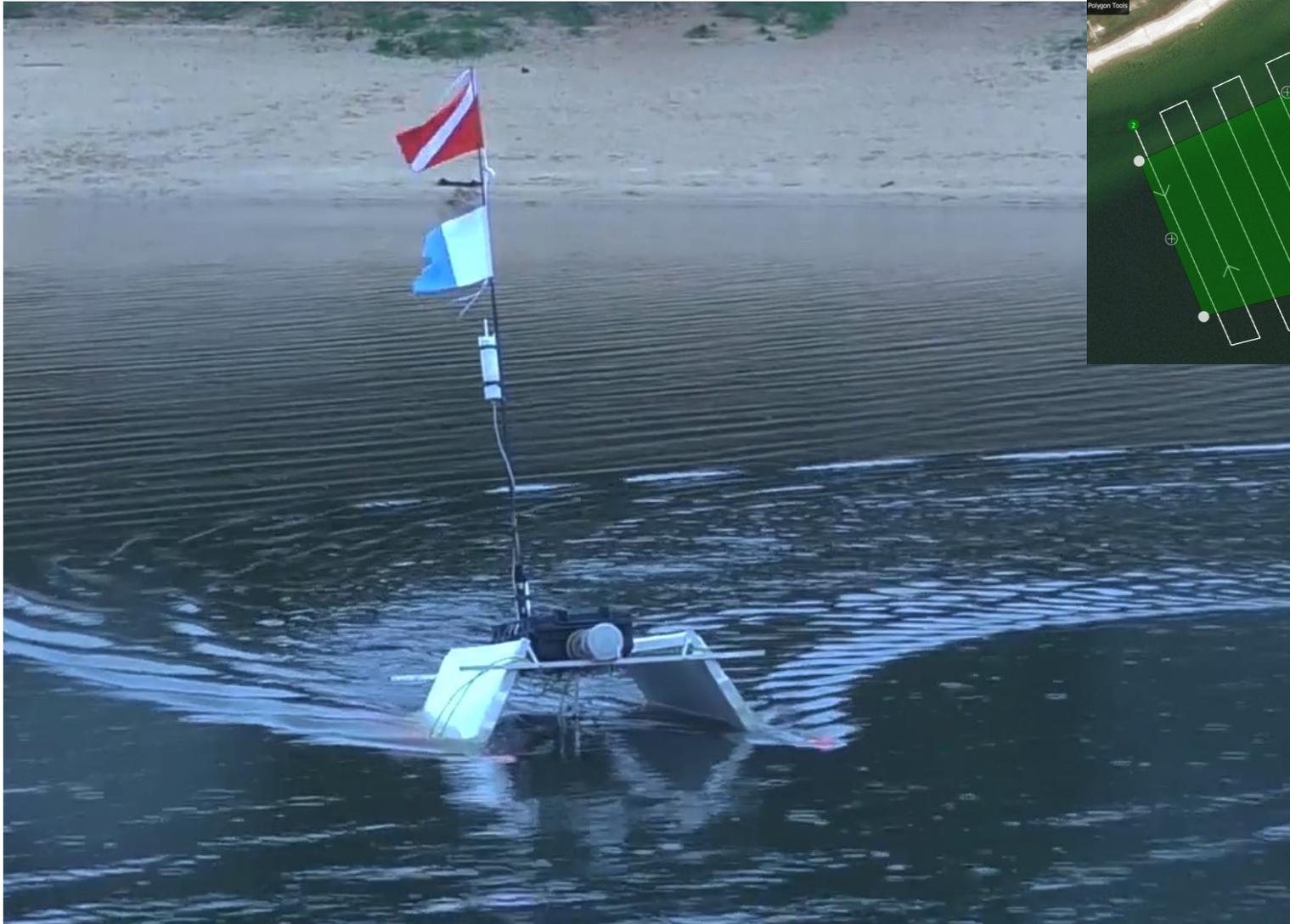
# Tests



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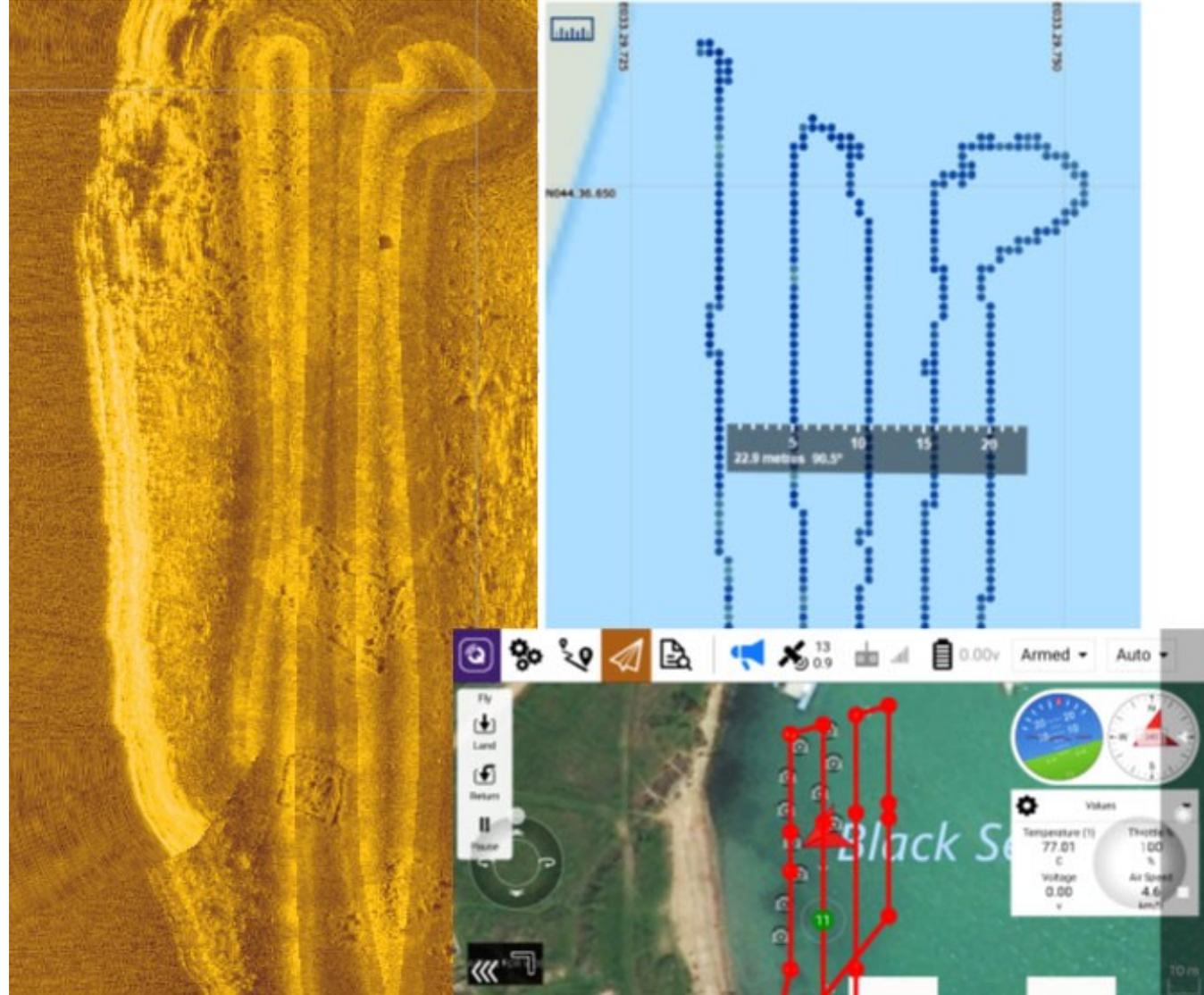
# USV prototype



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# Research ancient port area of Preserve "Tauric Chersonese" 2020, successful tests USV prototype for building a side-scan sonar mosaic.

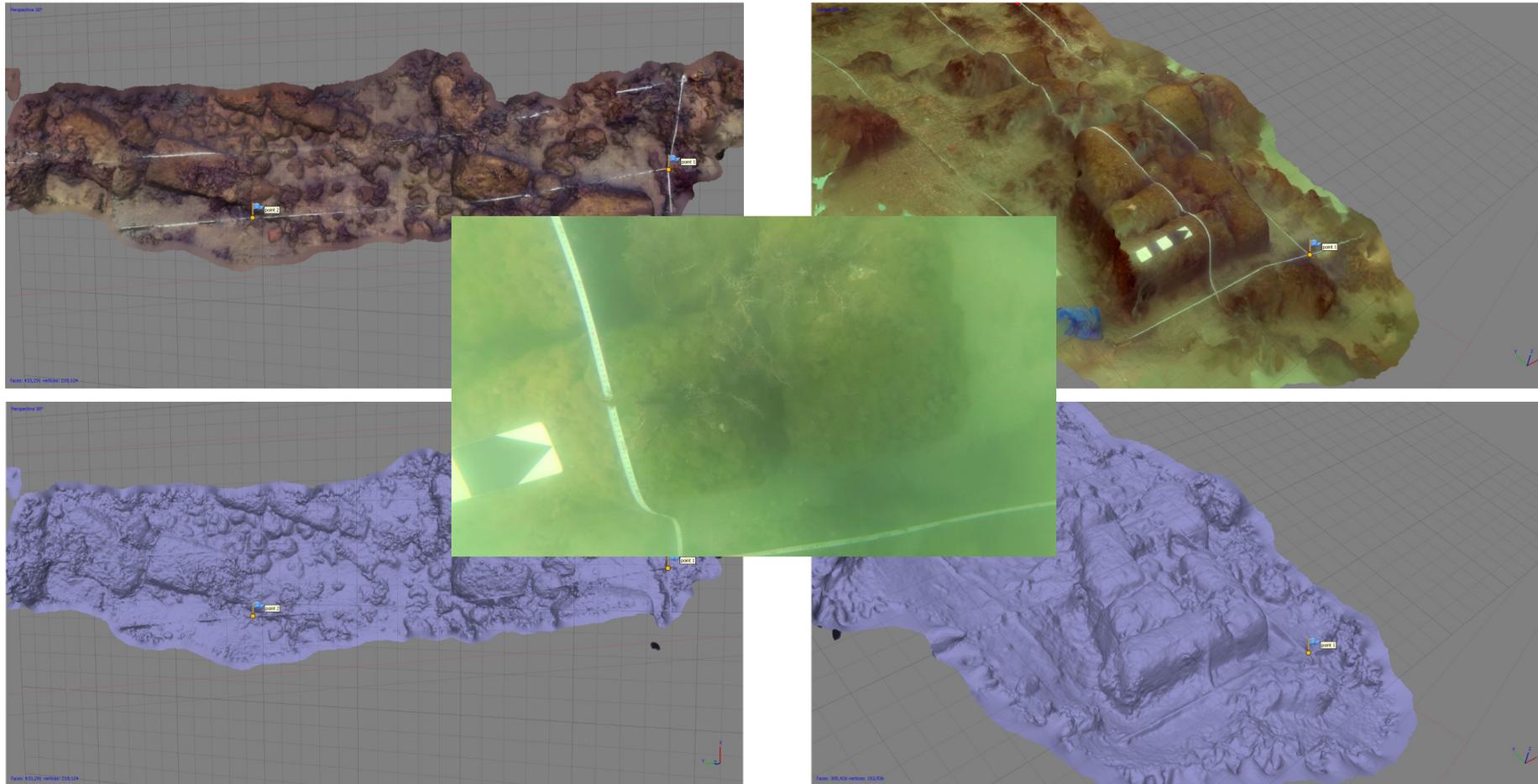


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# Our example photogrammetry in muddy water

## Research ancient port area of Preserve "Tauric Chersonese"

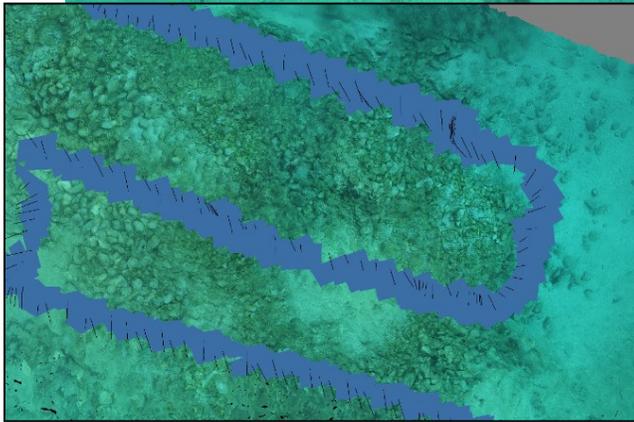
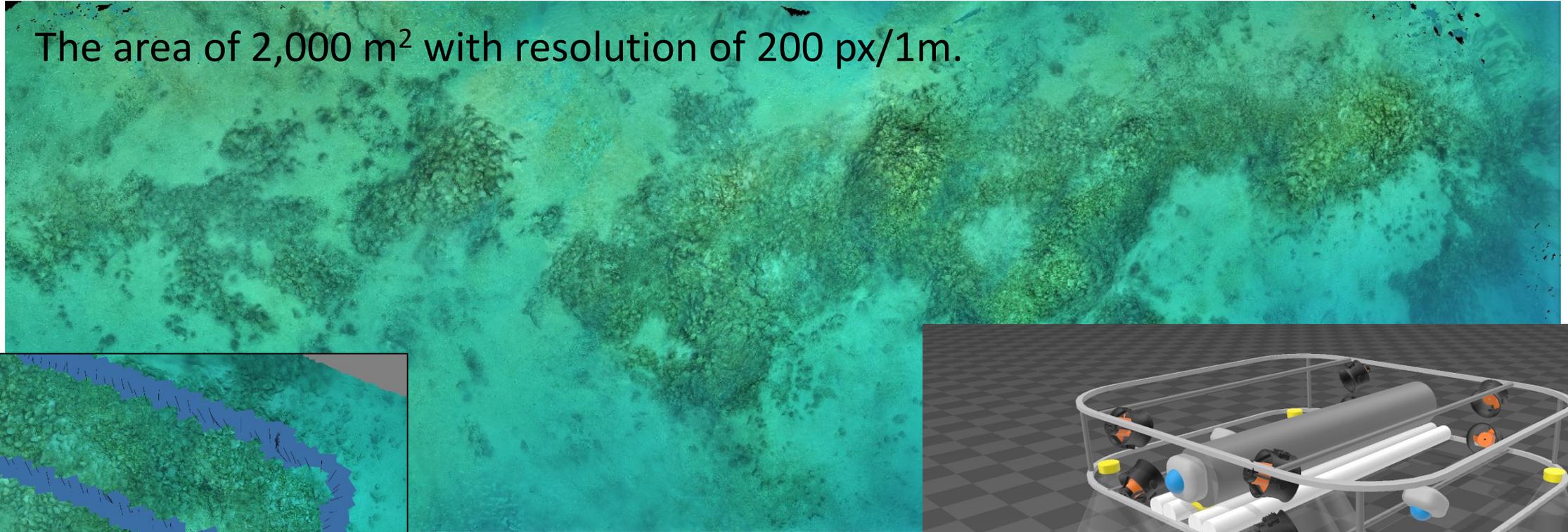


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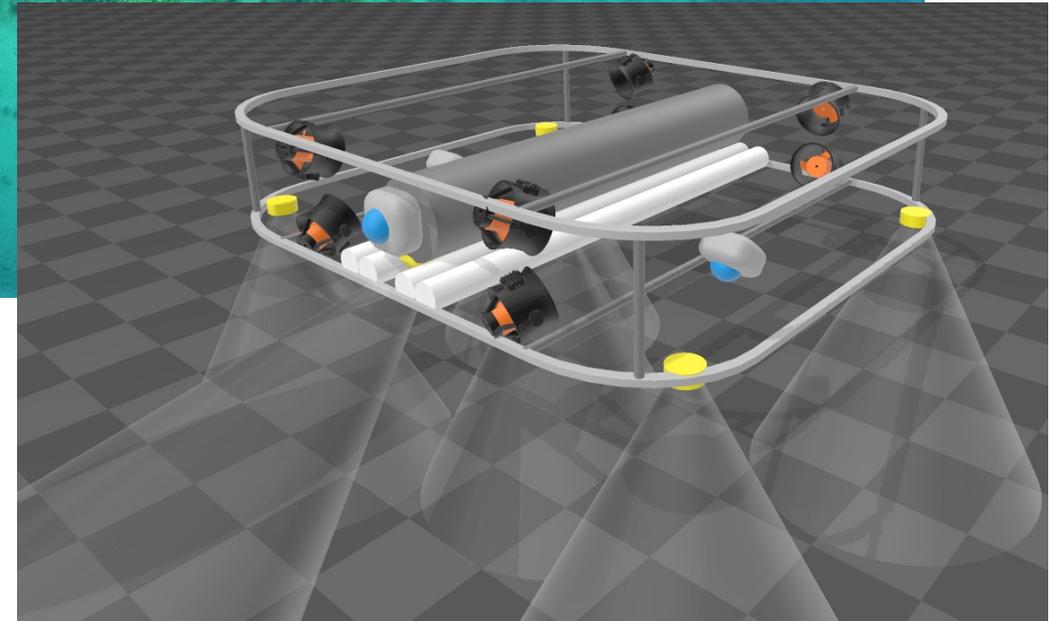


# Mapping and creating 3D-model of bottom using underwater ROV

The area of 2,000 m<sup>2</sup> with resolution of 200 px/1m.



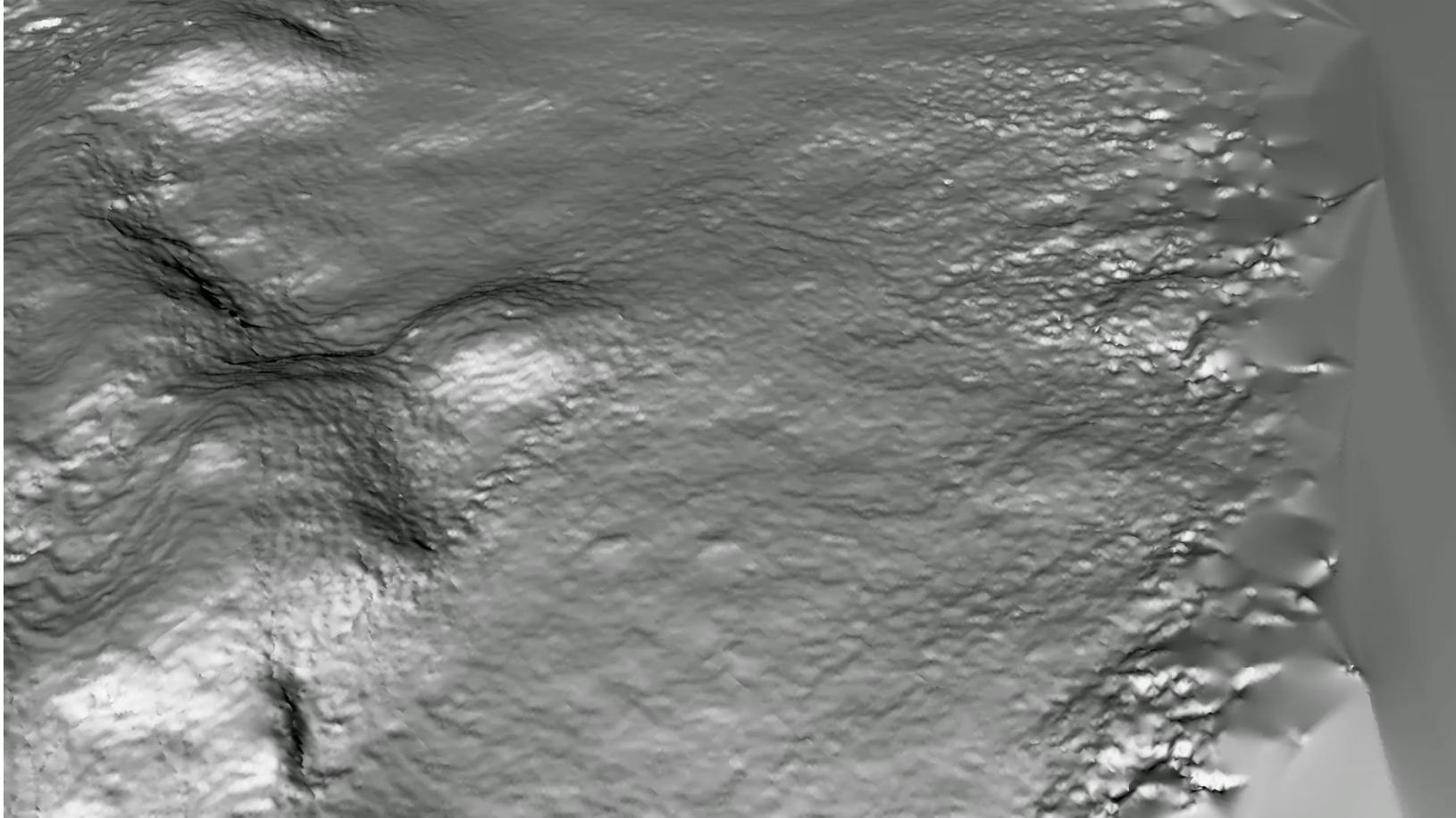
**Blue squares - places of underwater photoshoots, tracing a way of ROV.**



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# Mapping and creating 3D-model of bottom using underwater ROV



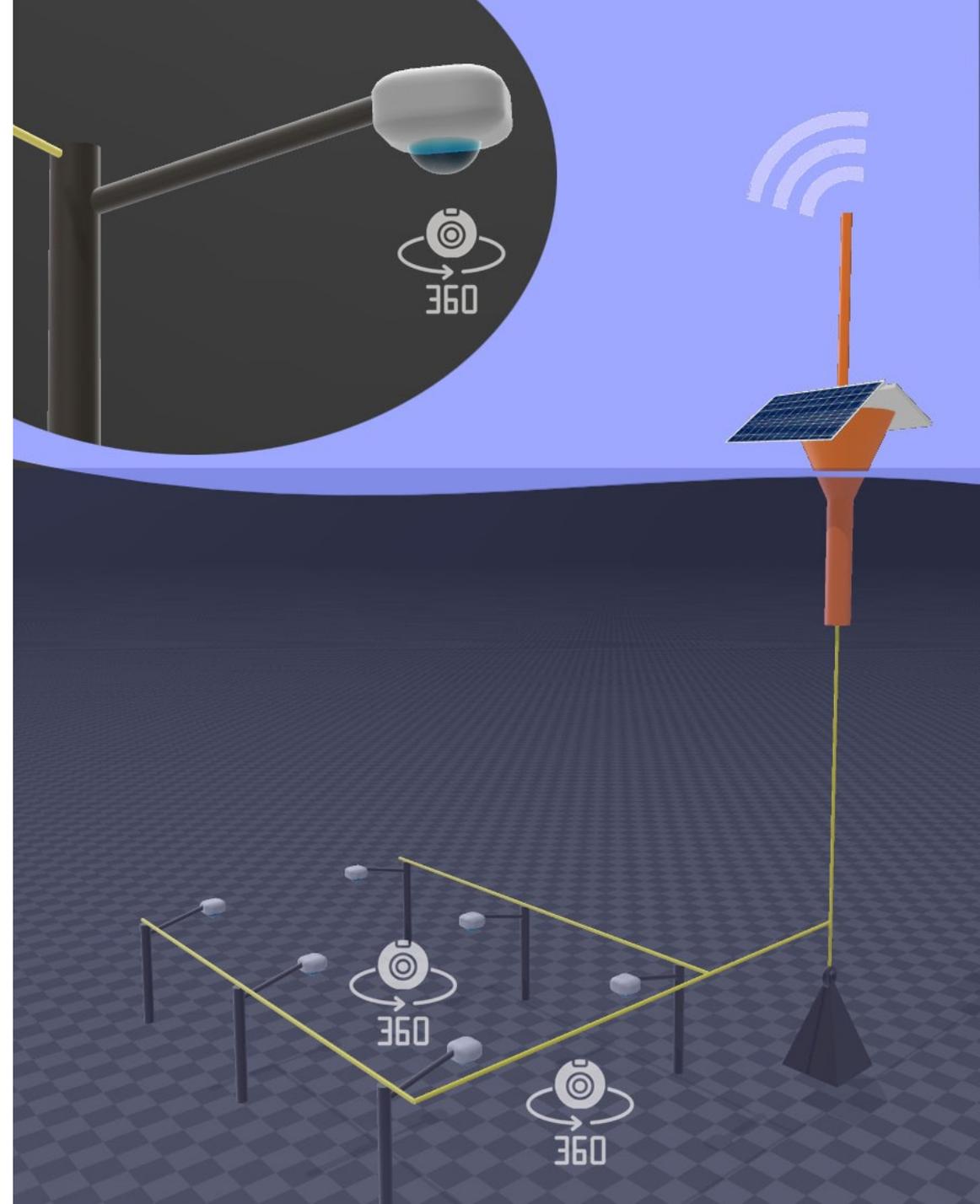
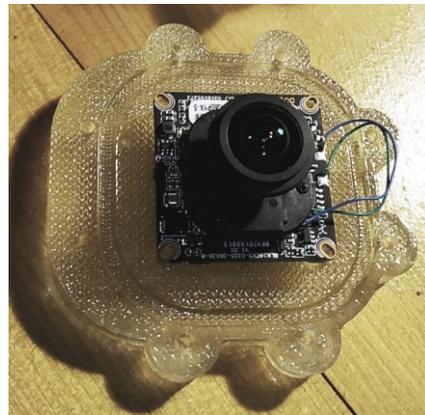
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# Monitoring online-video system for AUCHS.

360 Camera modules can share video from AUCHS direct to museum or web-site.

Video monitoring system can be used as secure system for AUCHS.





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If you are interested in this project our web-address:

[www.intersea.ru](http://www.intersea.ru)

Thank you.