OFOS Acoustic: A towed imaging and sonar platform for seafloor exploration and impact monitoring - data collection, processing and publication

Autun Purser[1,*], Yann Marcon[1,2], Simon Dreutter[1], Ulrich Hoge[1], Burkhard Sablotny[1], Laura Hehemann[1], Johannes Lemburg[1], Boris Dorschel[1], Harald Biebow[3], Antje Boetius[1,2,4]

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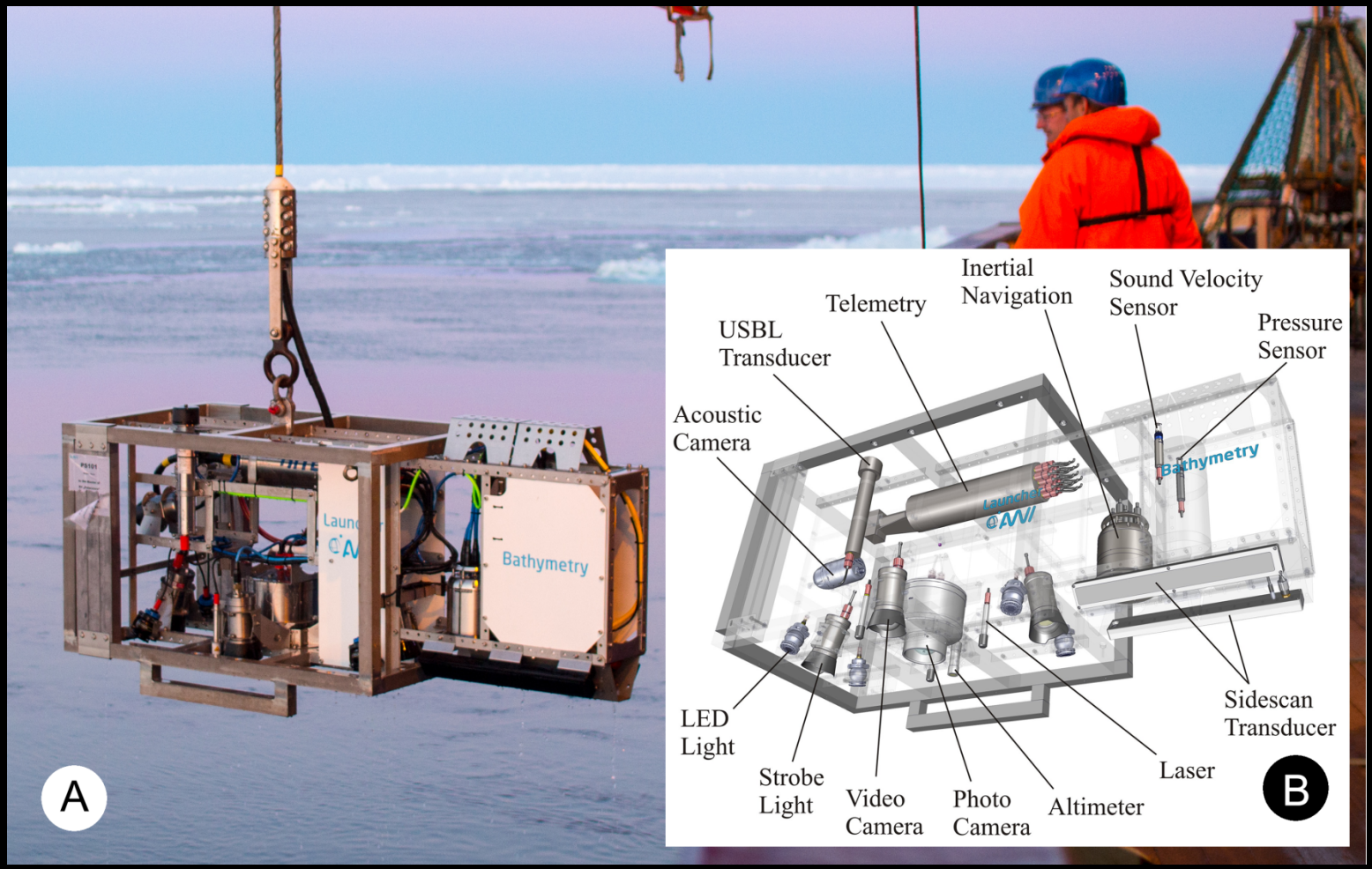

RENAMED: Ocean Floor Observation and Bathymetry System…. Better?

Autun Purser[1,*], Yann Marcon[1,2], Simon Dreutter[1], Ulrich Hoge[1], Burkhard Sablotny[1], Laura Hehemann[1], Johannes Lemburg[1], Boris Dorschel[1], Harald Biebow[3], Antje Boetius[1,2,4]

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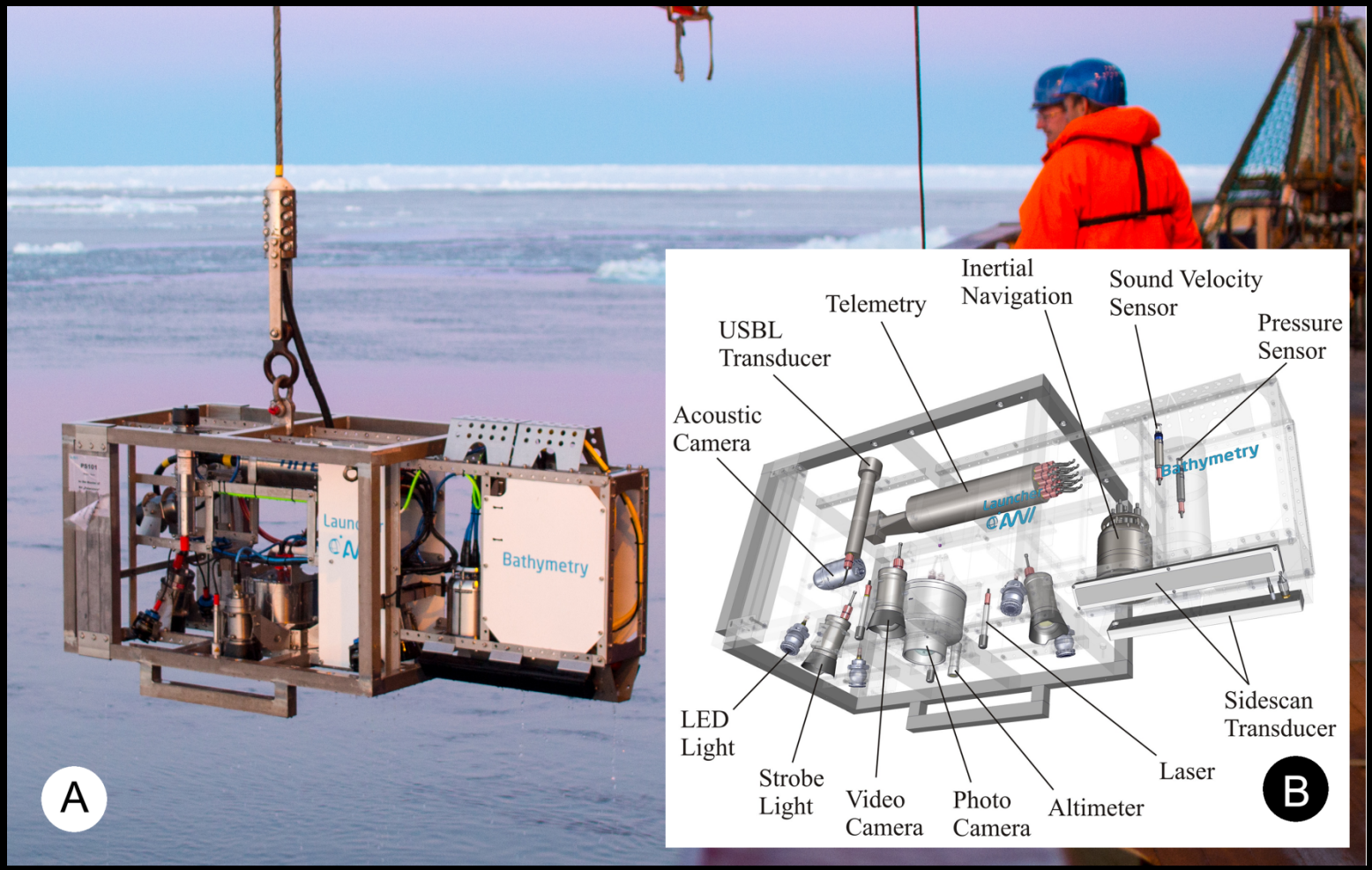

Basically a towed camera system, with good data transmission cable , acoustic camera and sonar.

OFOBS – Fundamentals

TOWED CAMERA / BATHYMETRY SYSTEM

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- Greater sonar resolution than shipbourne systems when deployed close to seafloor.
- ‚Ground truth' acoustic signals easily.
- Good under ice and in complex, high risk environments.
- Tow design means less able to spatially map areas than AUVs and ROVs

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- This allows for a high frequency in observations to be made, with all readings stored on surface hard drive.

OFOBS – Scope of work

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OFOBS allows a swathe of ~40 m of seafloor to be acoustically sampled in parallel to the collection of still images and video.

- All data can be viewed immediately on collection.

- Seafloor features such as reefs, corals, dropstones, muds, gravels etc can be acoustically ground truthed from the camera images, without the need of coring or further camera deployments.

OFOBS – Support required to operate

A small team is required to use the system

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- 1) Electrical engineer to deploy, maintain and troubleshoot the system.
  (ESSENTIAL – NOT NECESSARY FOR CONSTANT PRESENCE DURING DEPLOYMENTS)

- 2) Mission scientist to oversee the sensors and ensure data of relevance to the study.
  (ESSENTIAL)

- 3) Winch operator to maintian the correct height of the device above seafloor.
  (ESSENTIAL - USUALLY SHIP CREWMEMBER)

- 4) Positioning operator / protocol keeper. To map the positon of the vehicle underwater on a map and coordinate changes in heading of the research vessel with the bridge.
  (OPTIONAL)

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May be deployed via an A-frame or side winch.

System weighs 1000 kg in air.

A fibre / coaxial cable is required for two-way communication and for power delivery.

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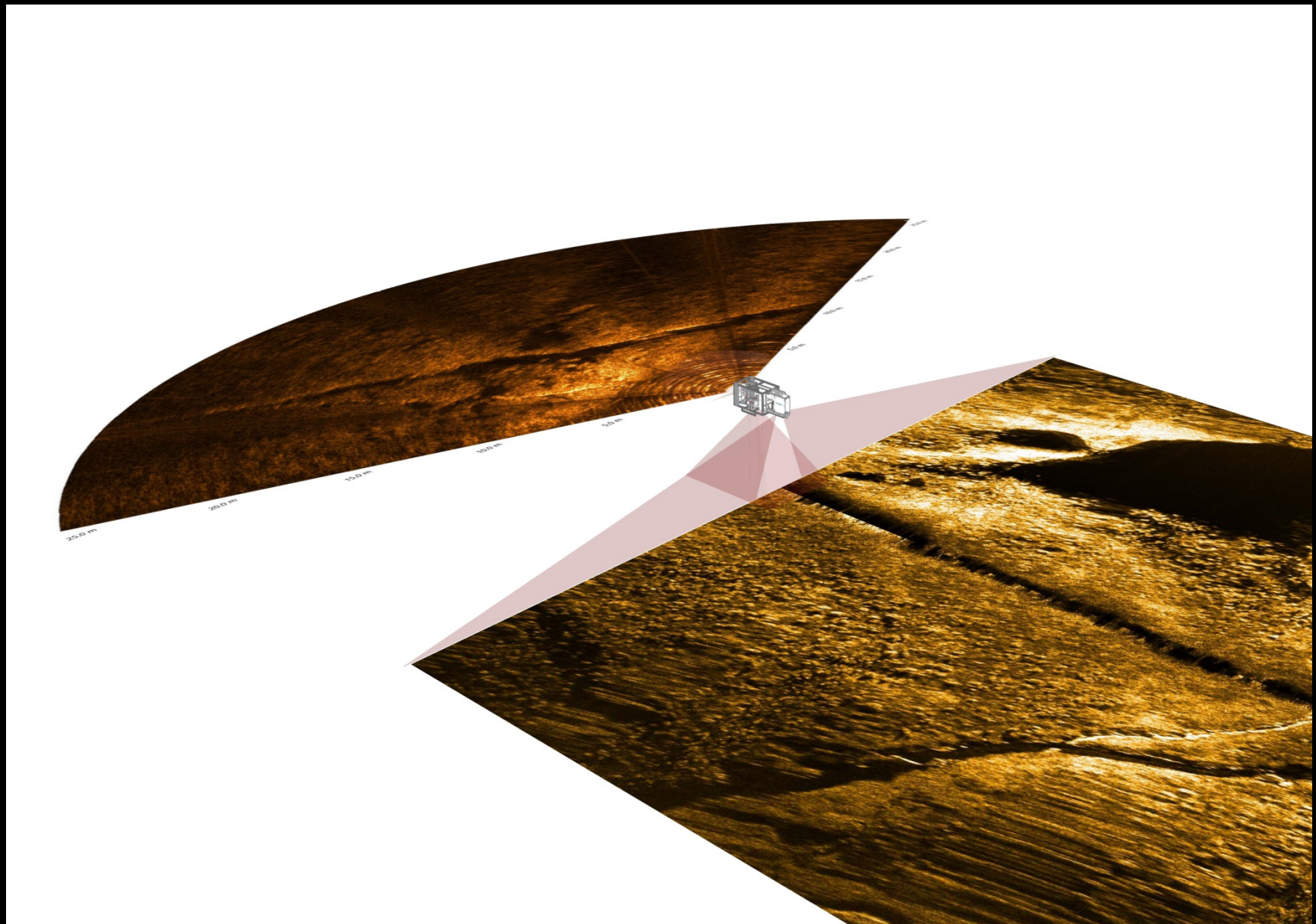
System is lowered at a speed of 0.5 – 1 m s-1 through the water column to a flight height ideally several meters above seafloor.

On attaining required depth, data recording commences and the ship can follow a waypoint course / heading, after which the OFOBS will follow.

OFOBS – Data collection



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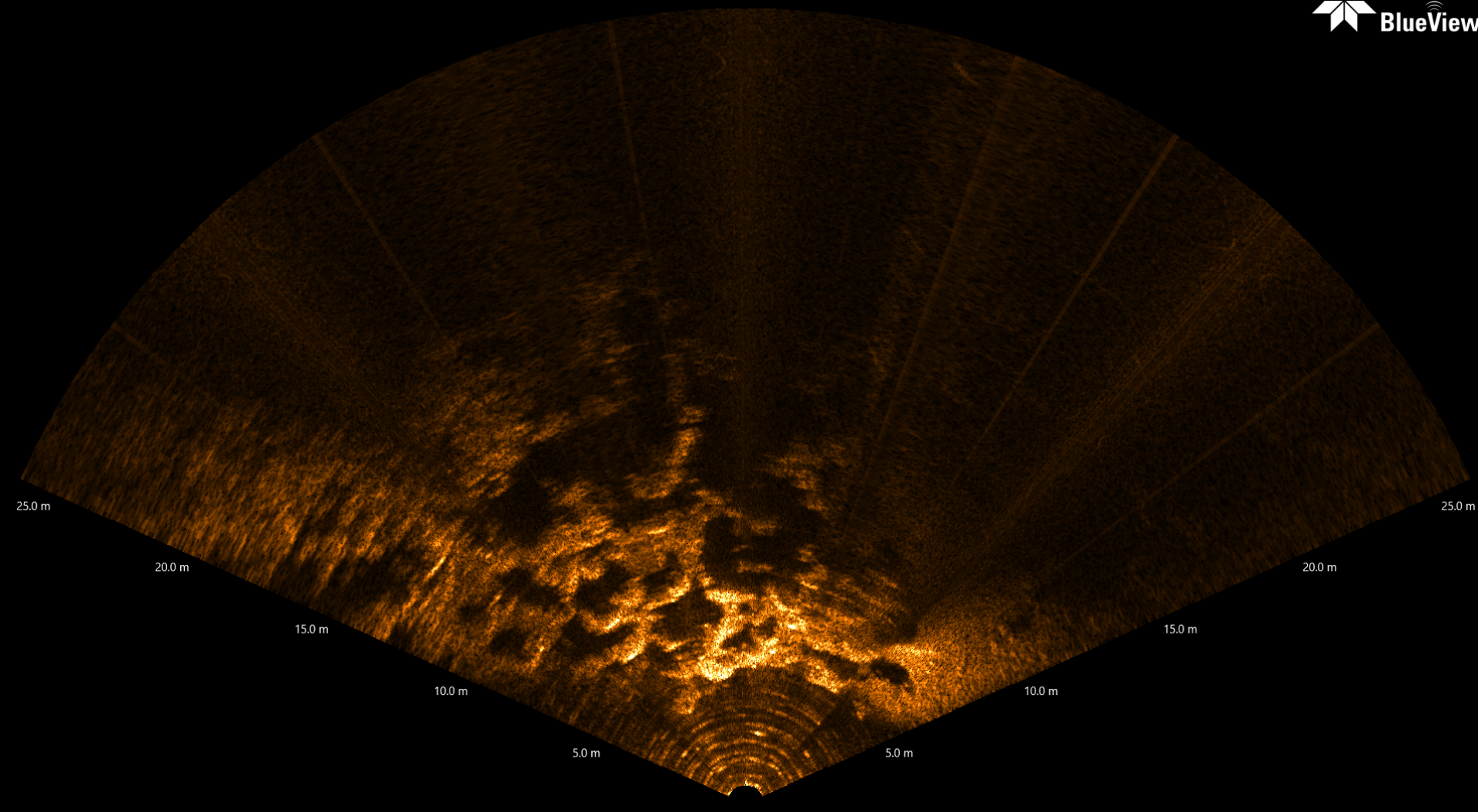

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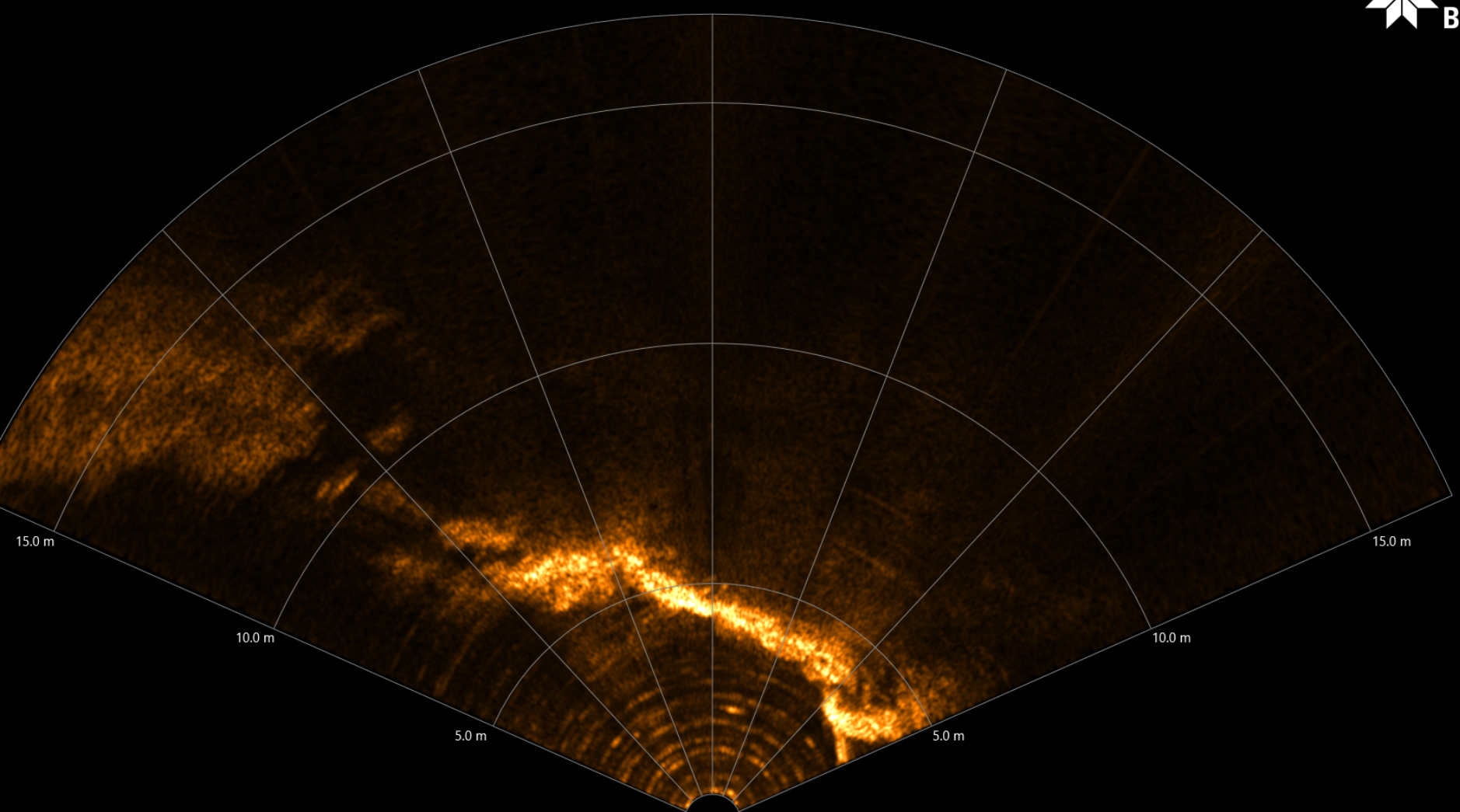

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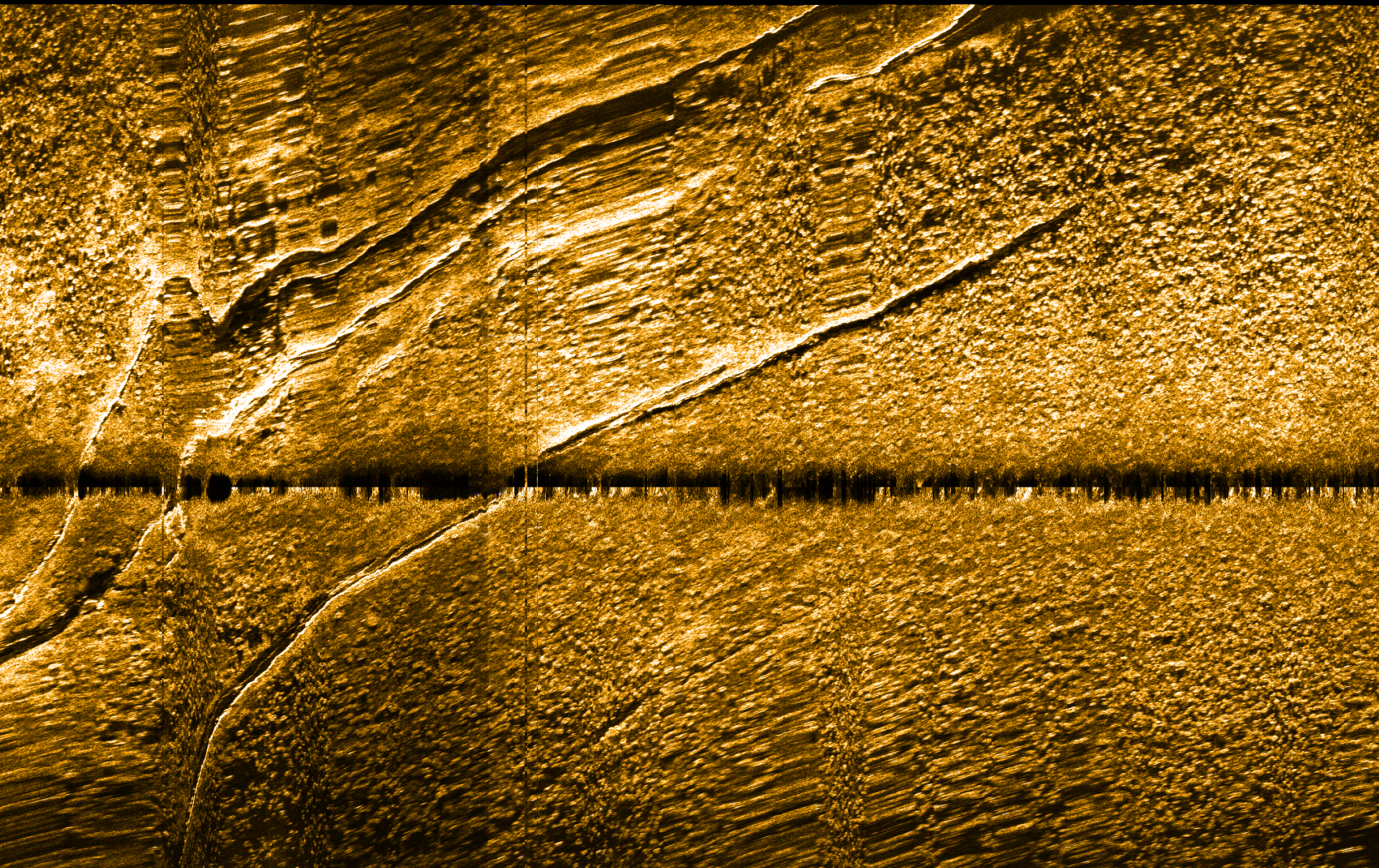

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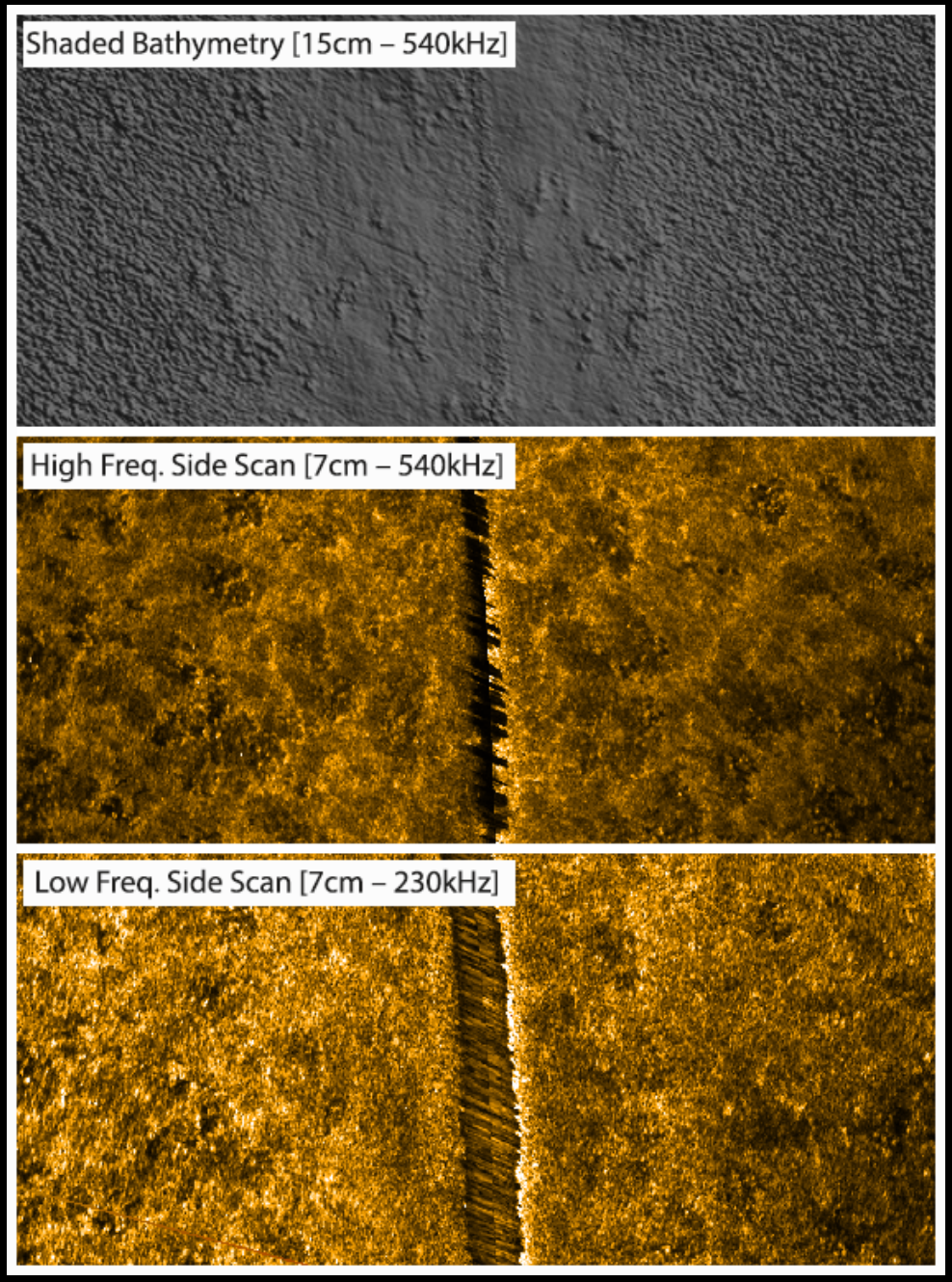

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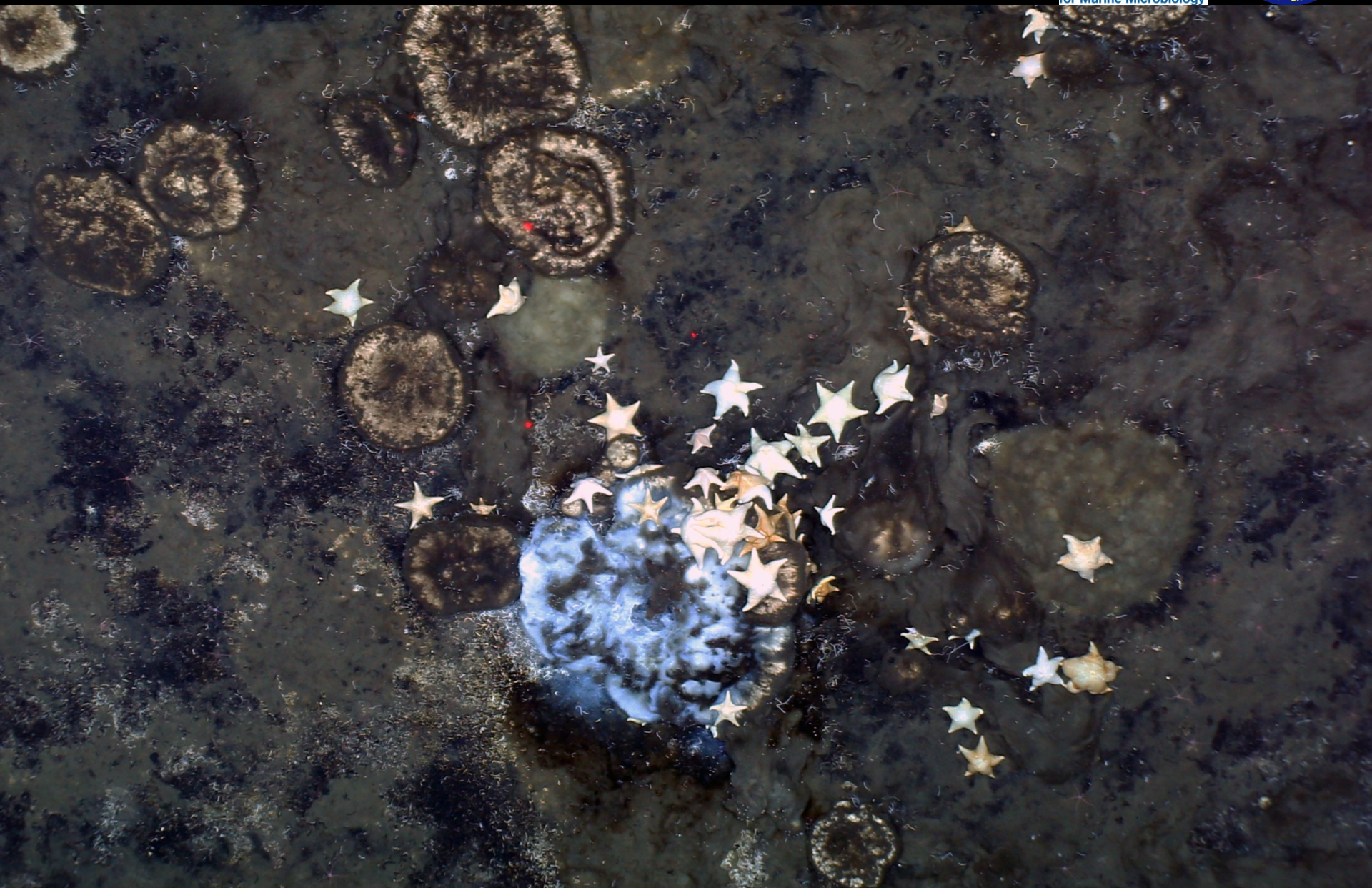
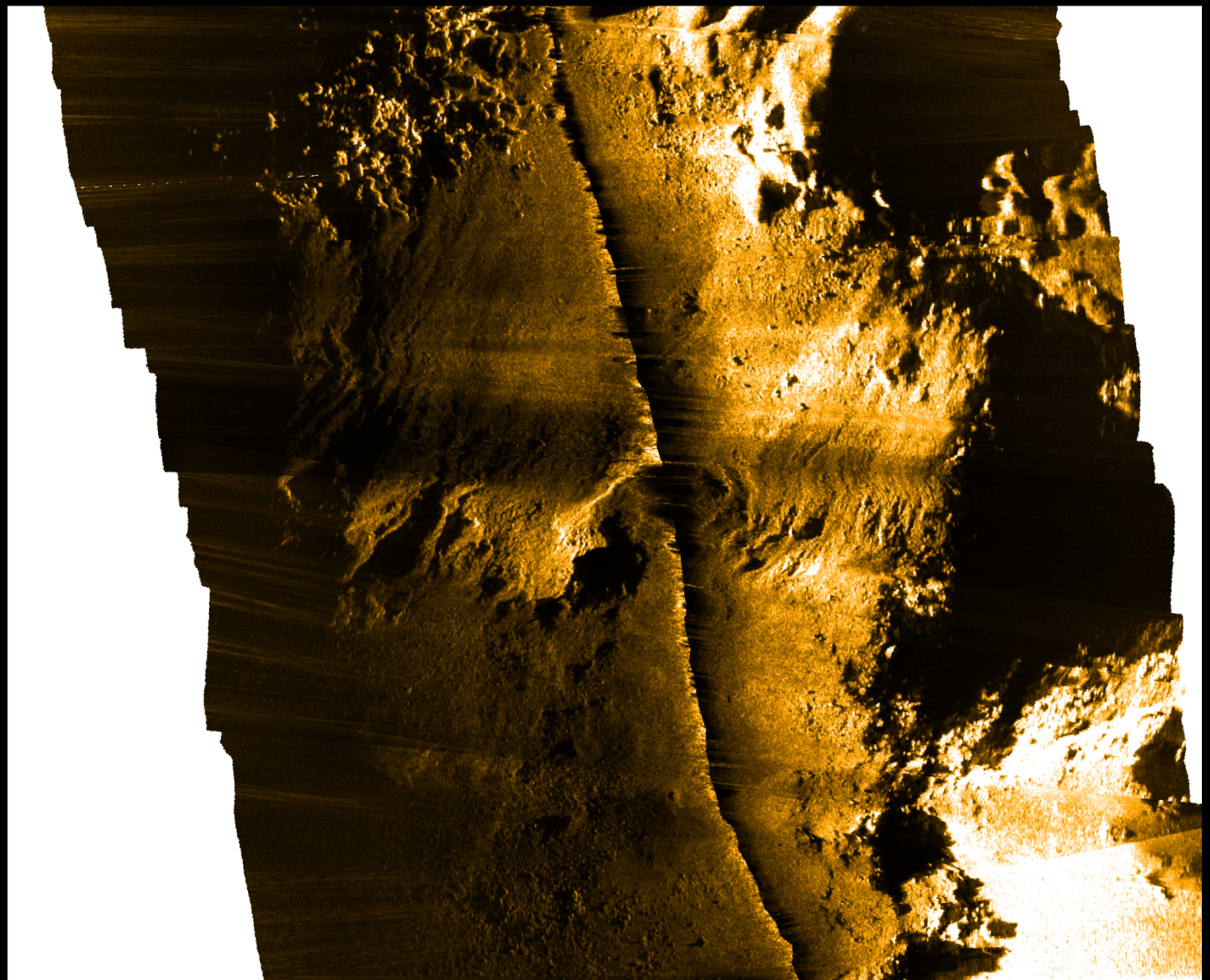
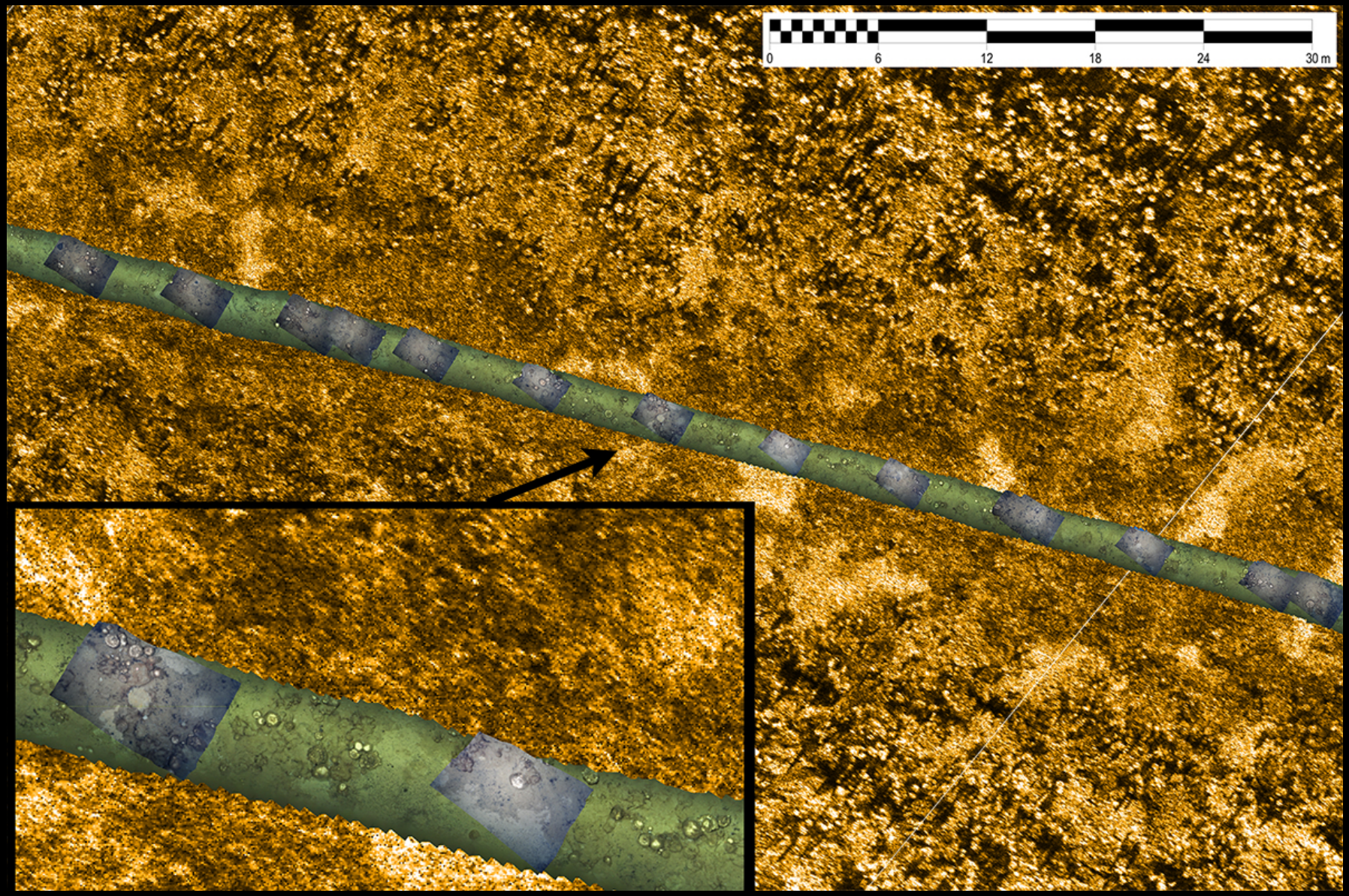


OFOBS – Georeferenced sonar data



OFOBS – Georeferenced image mosaics



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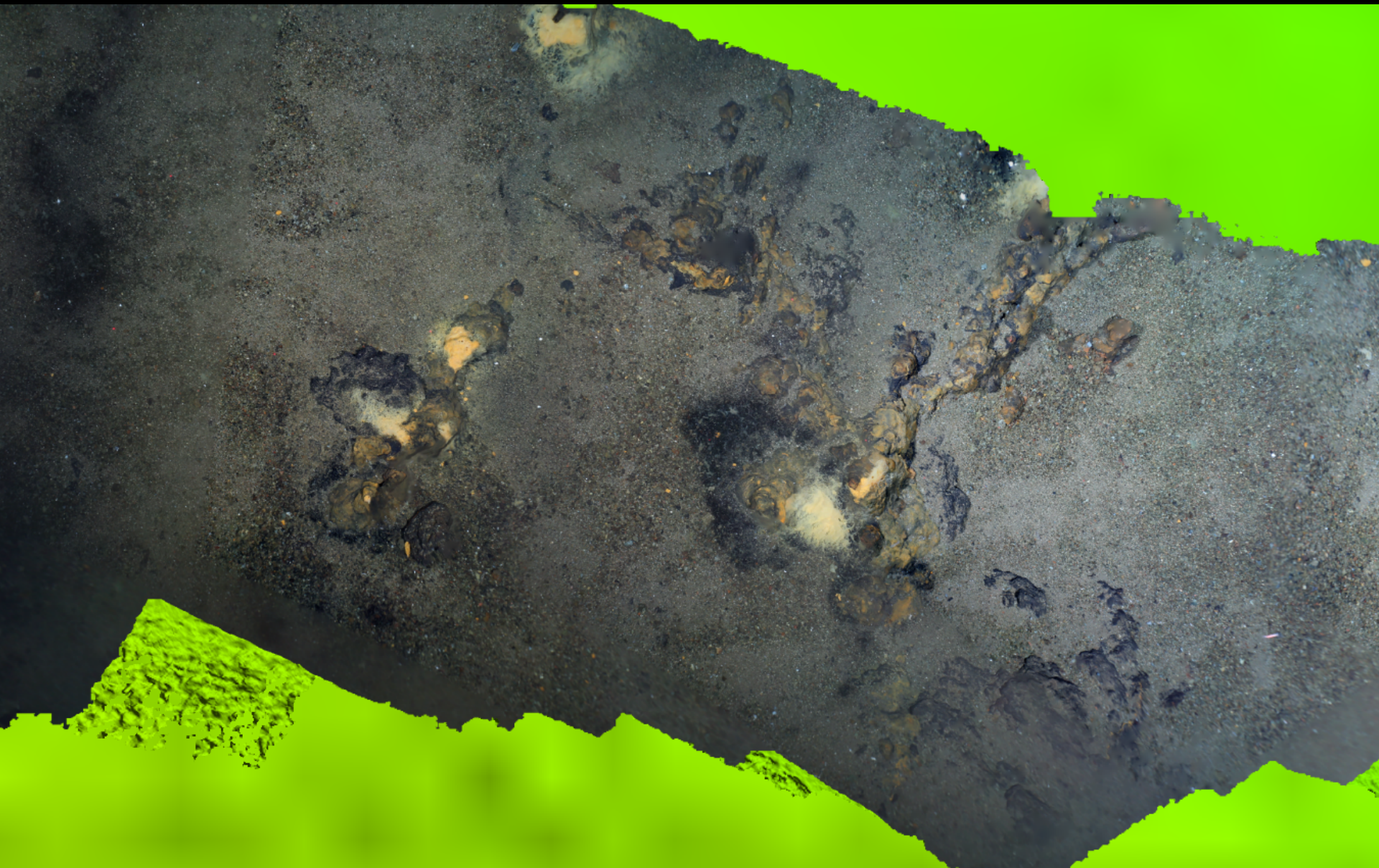
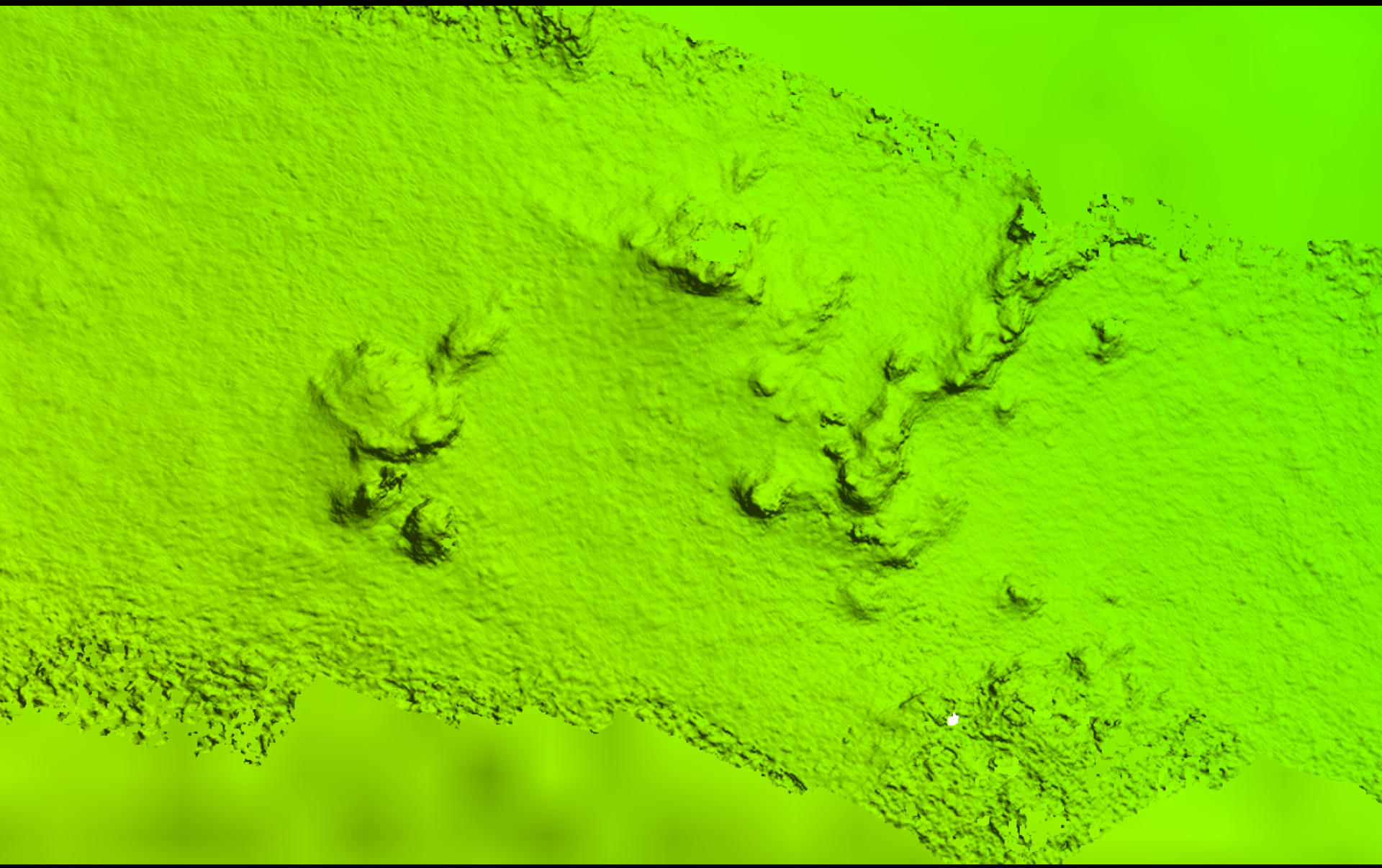


OFOBS – Georeferenced image mosaics – 3D



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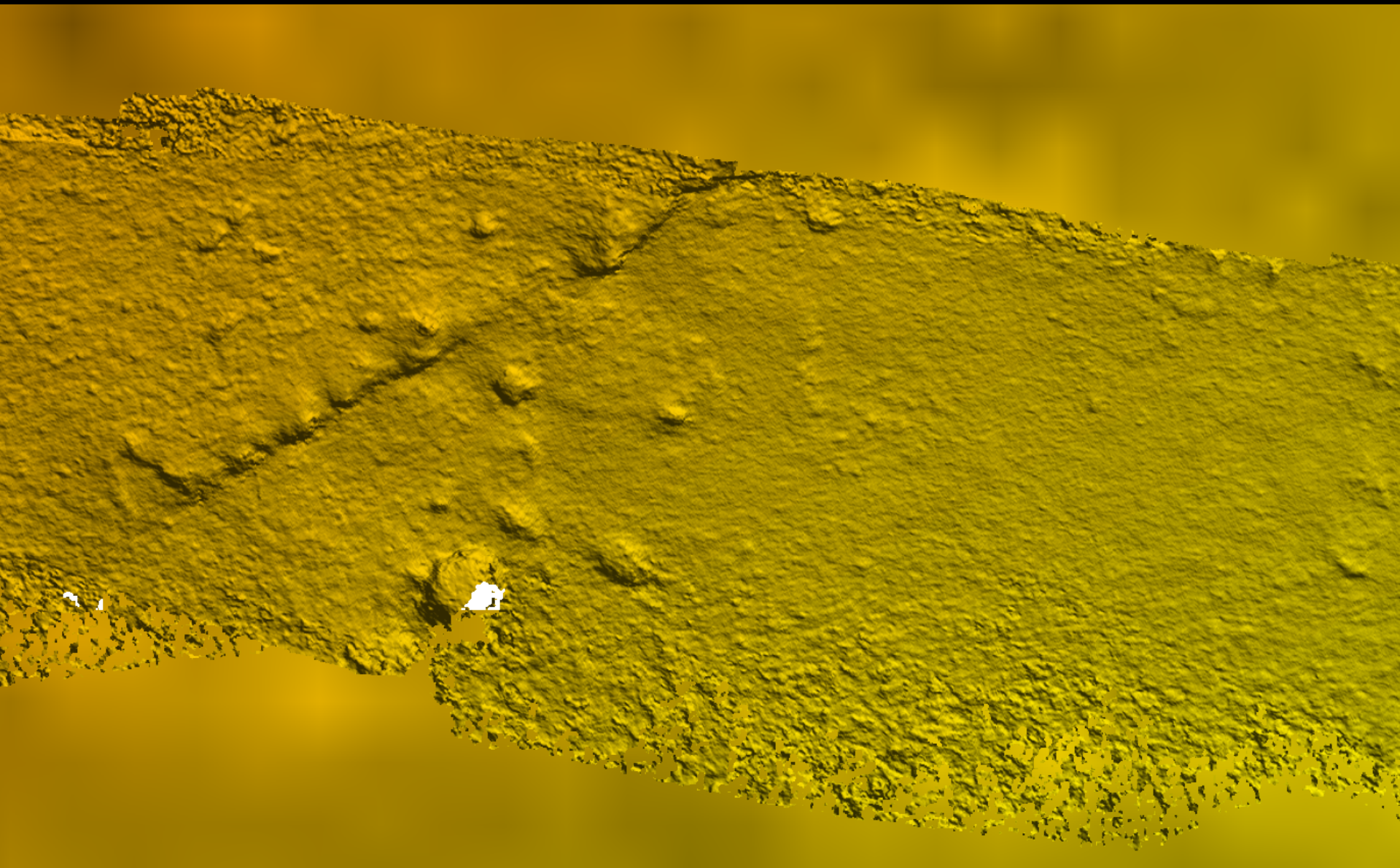
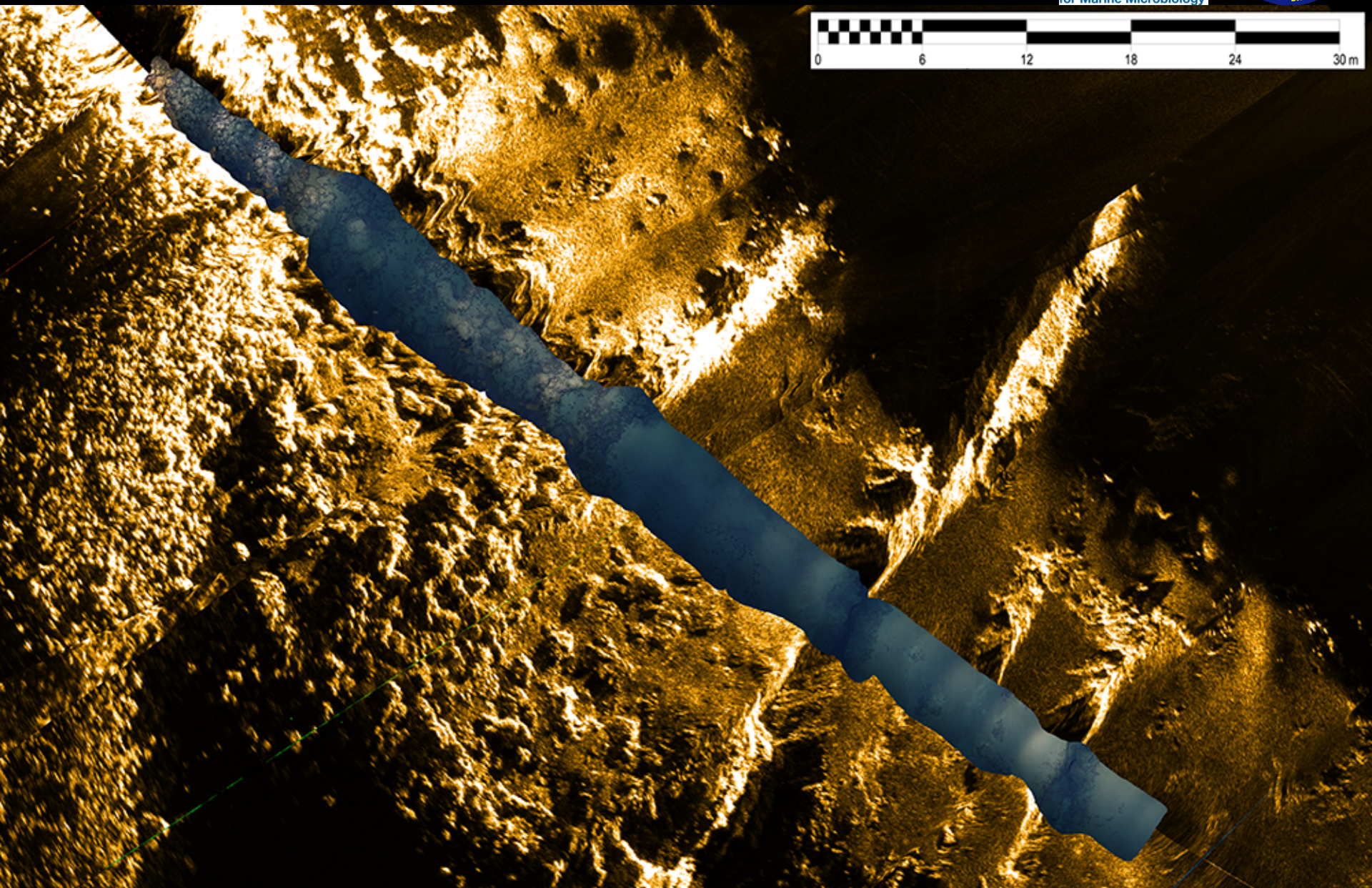
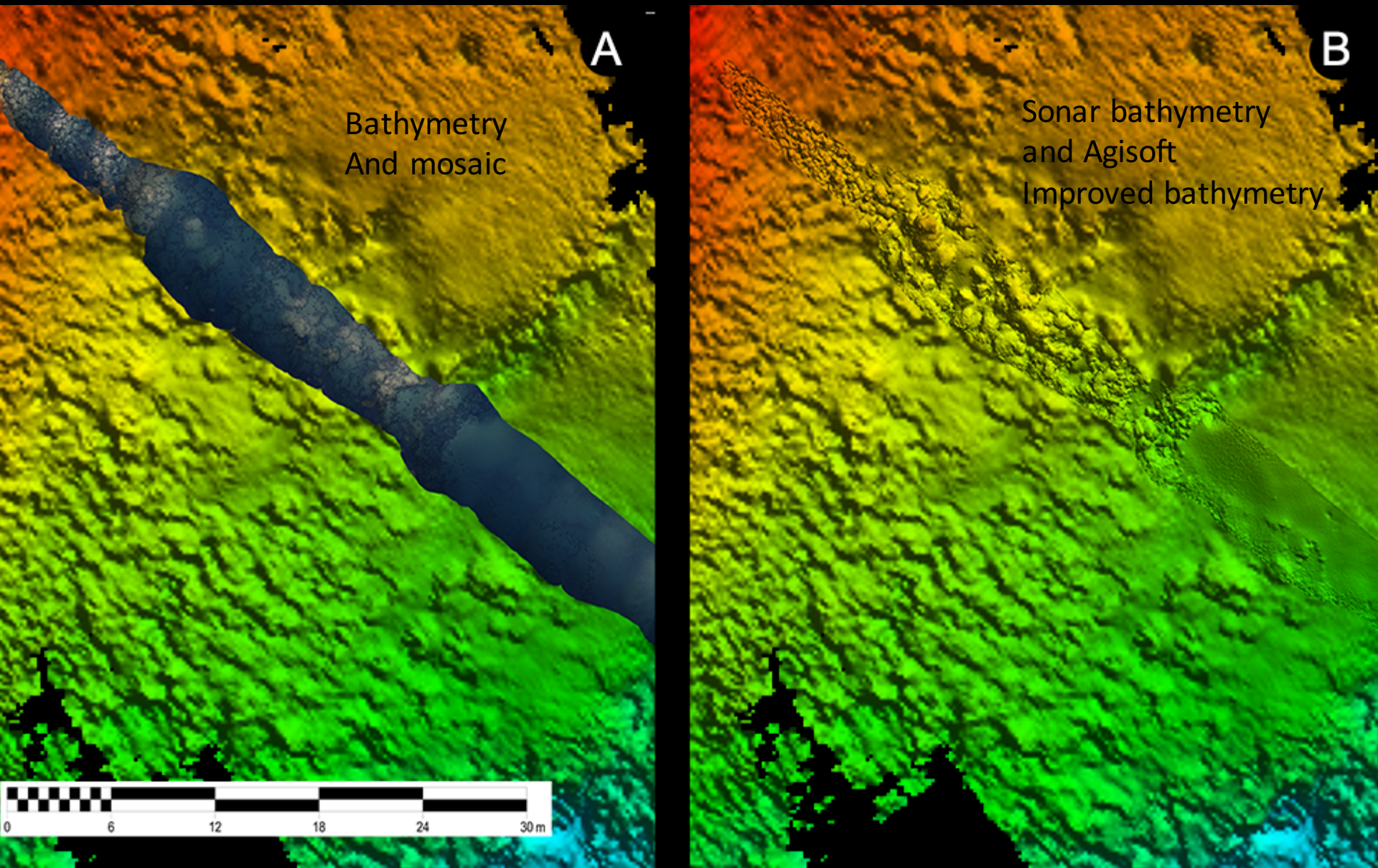
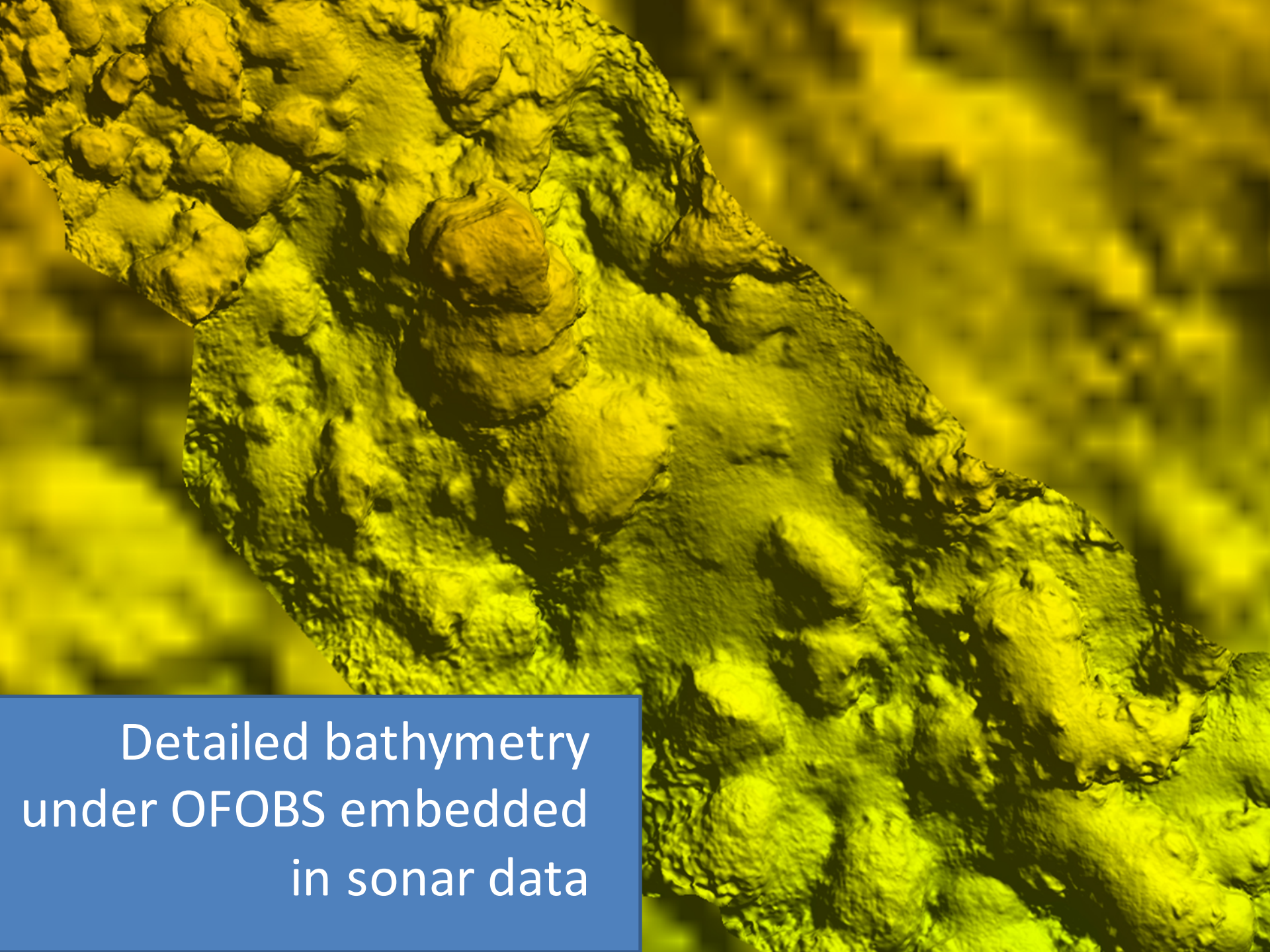


OFOBS – Integrated georeferenced data



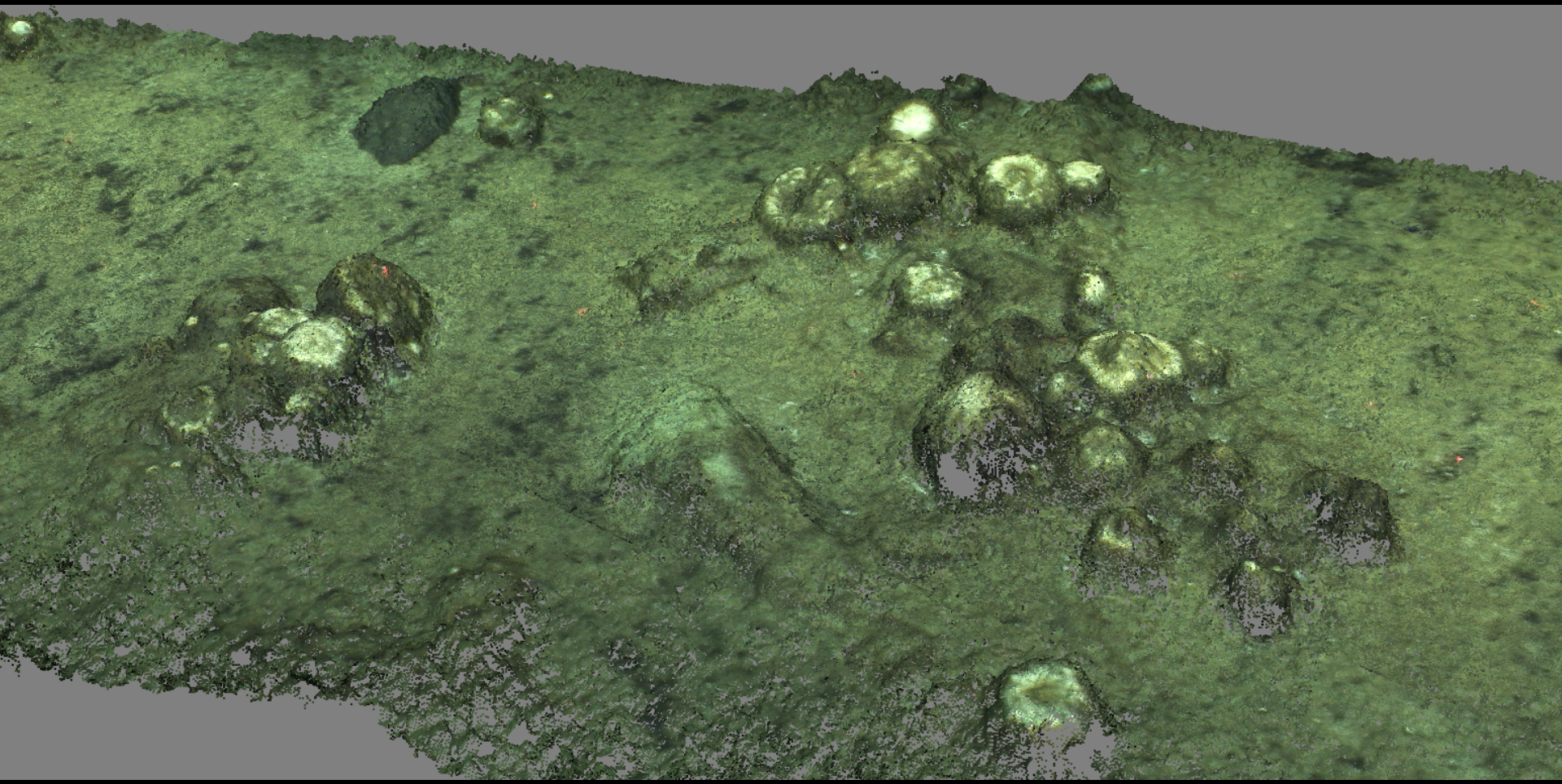
OFOBS – Improved georeferenced data





Detailed bathymetry under OFOBS embedded in sonar data

OFOBS – 3D data exploration



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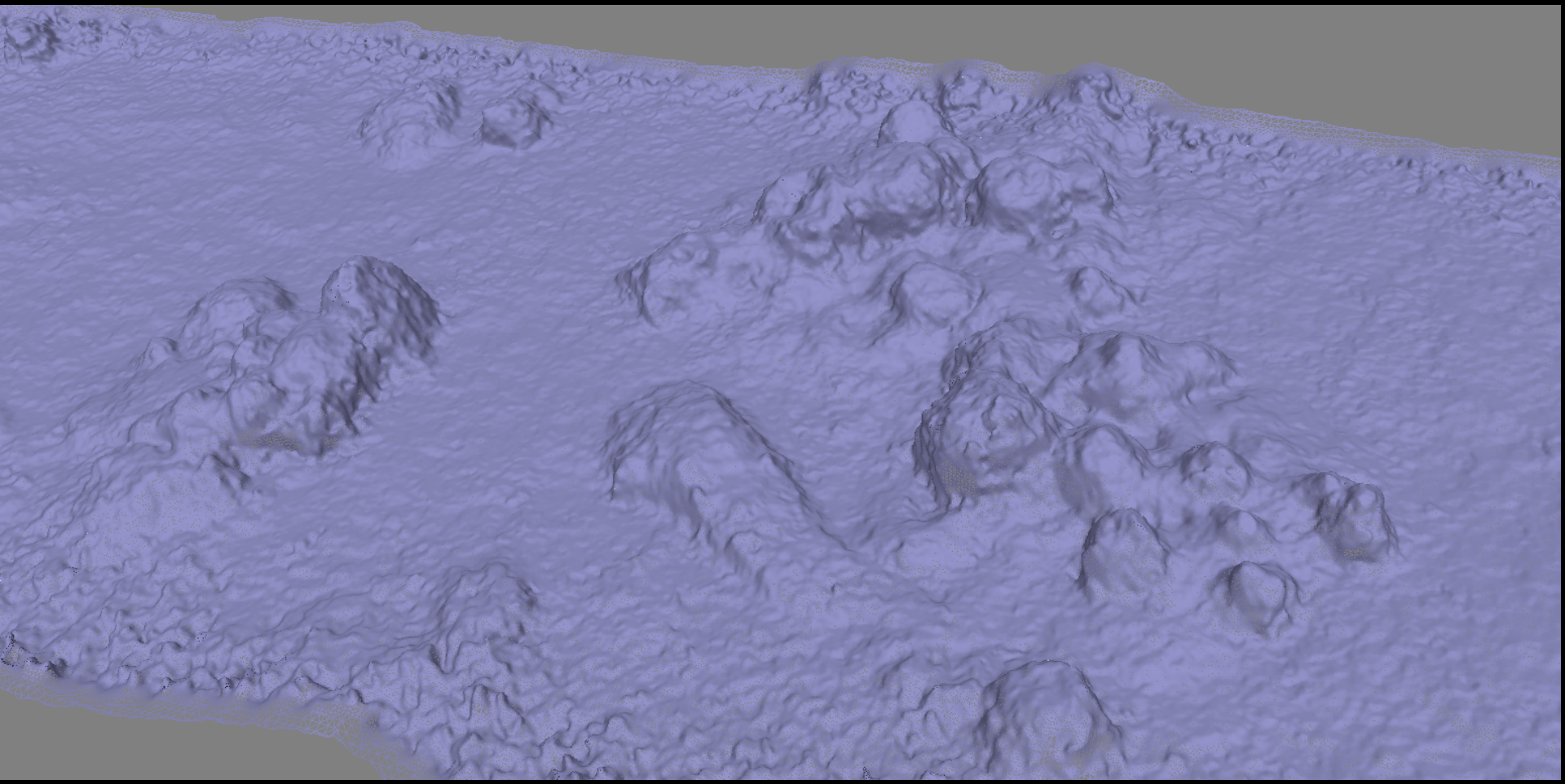

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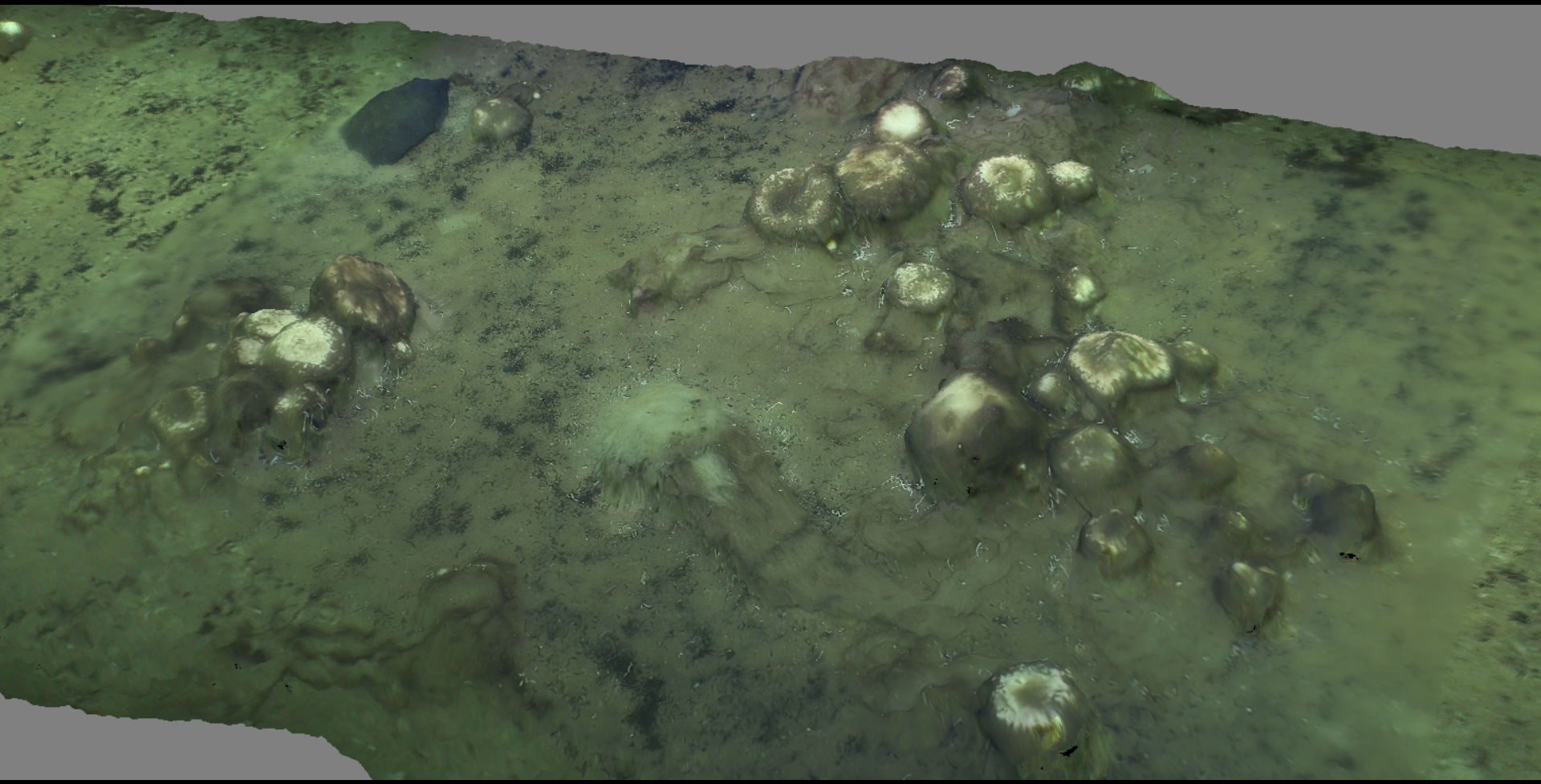

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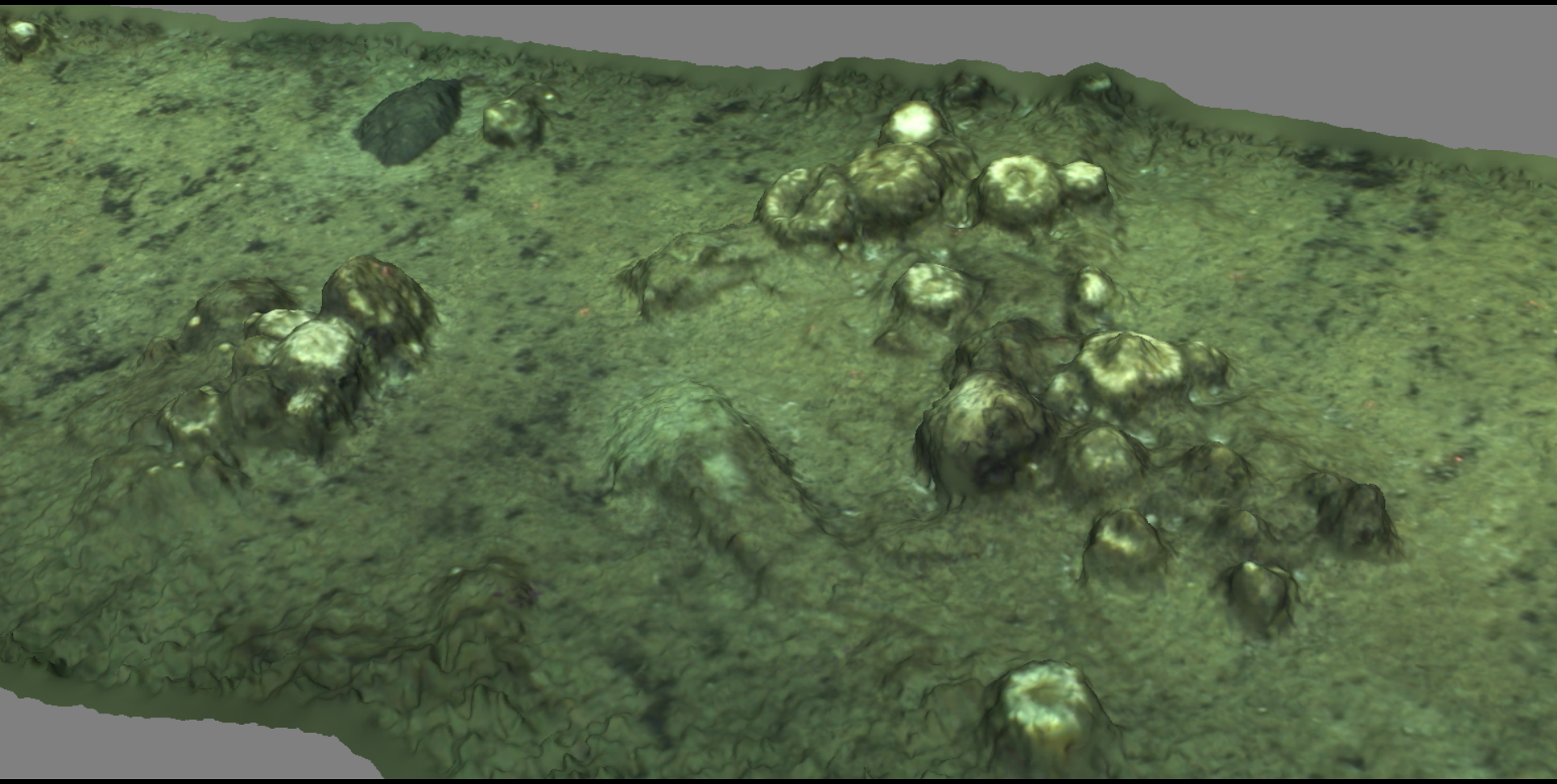

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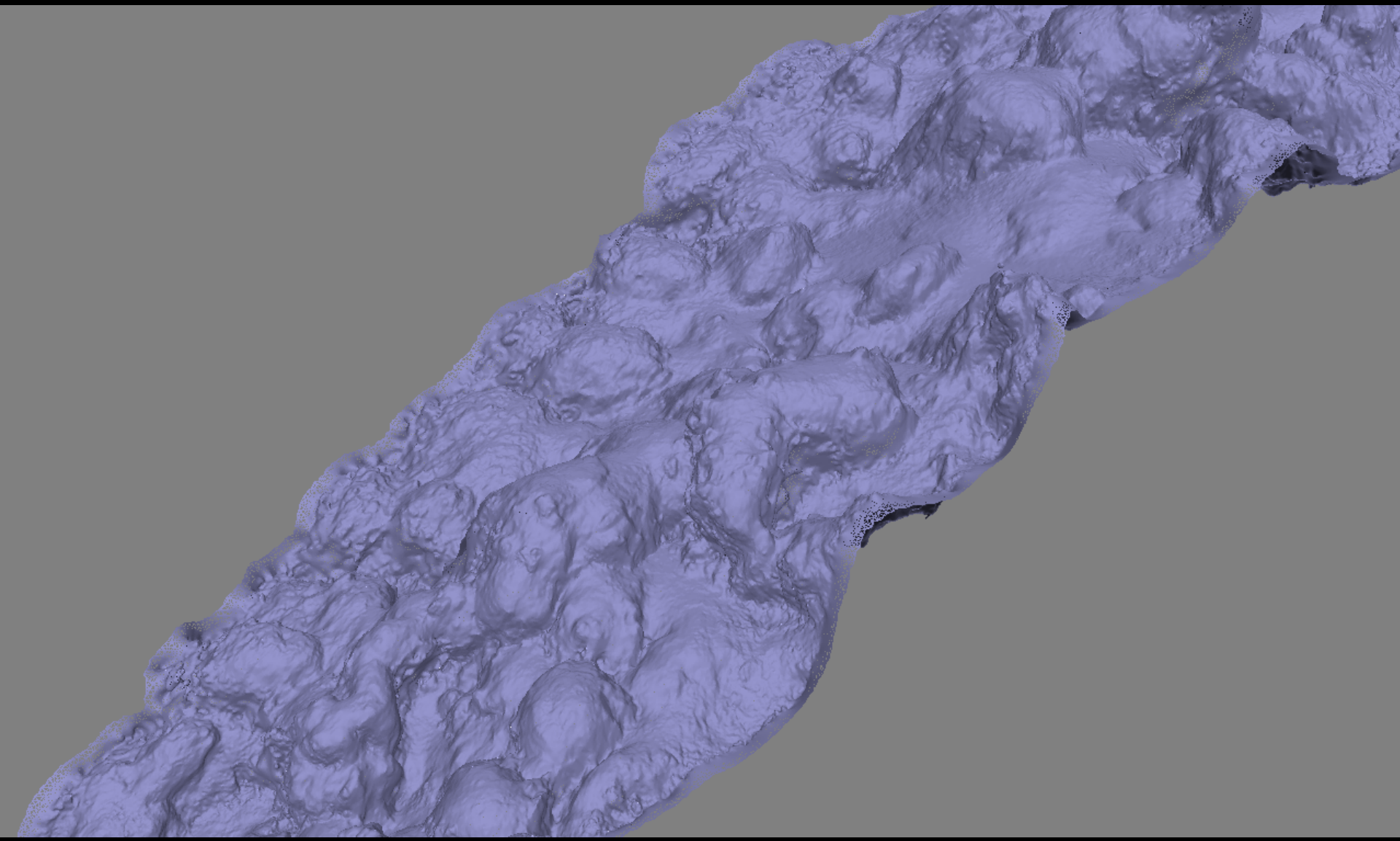

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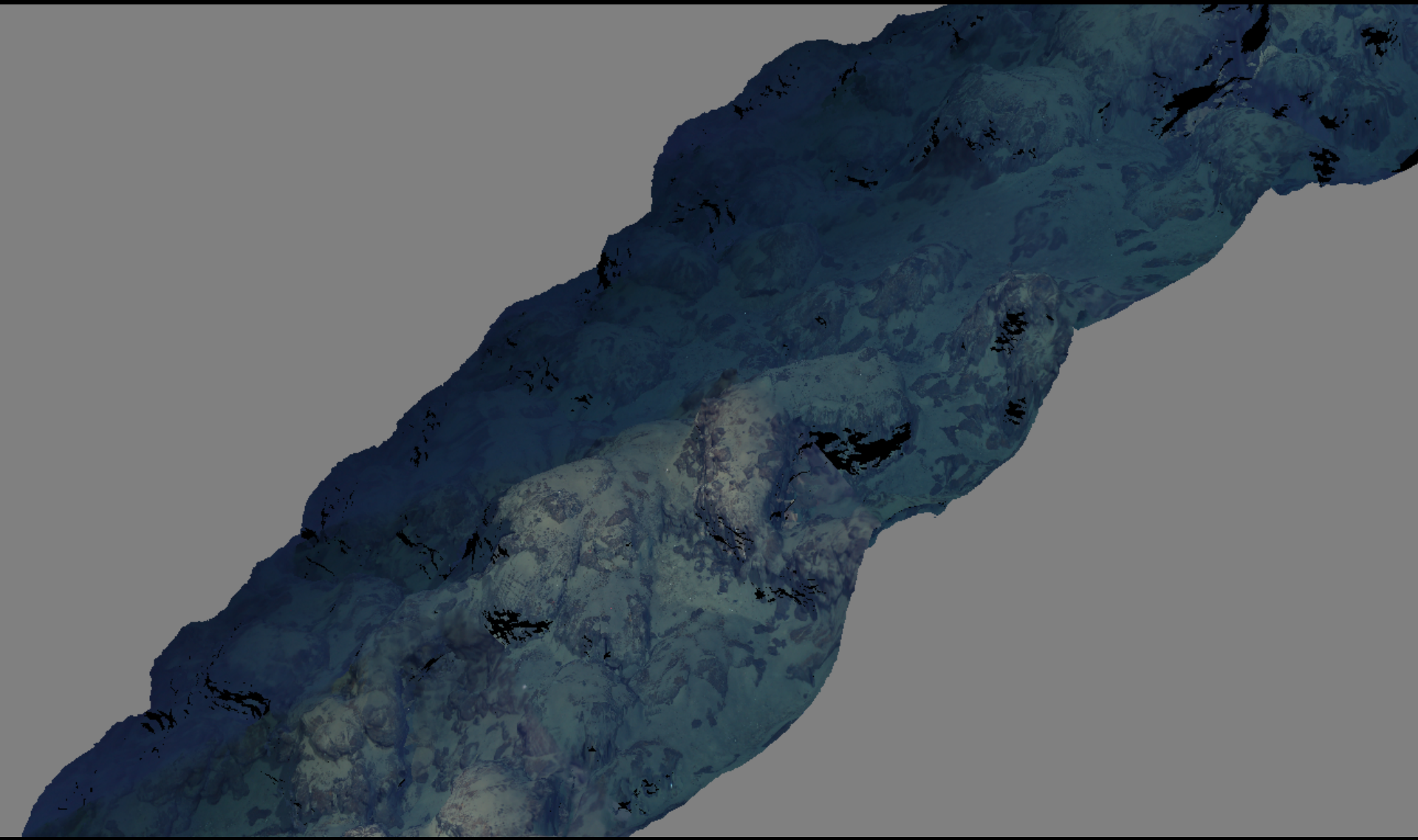

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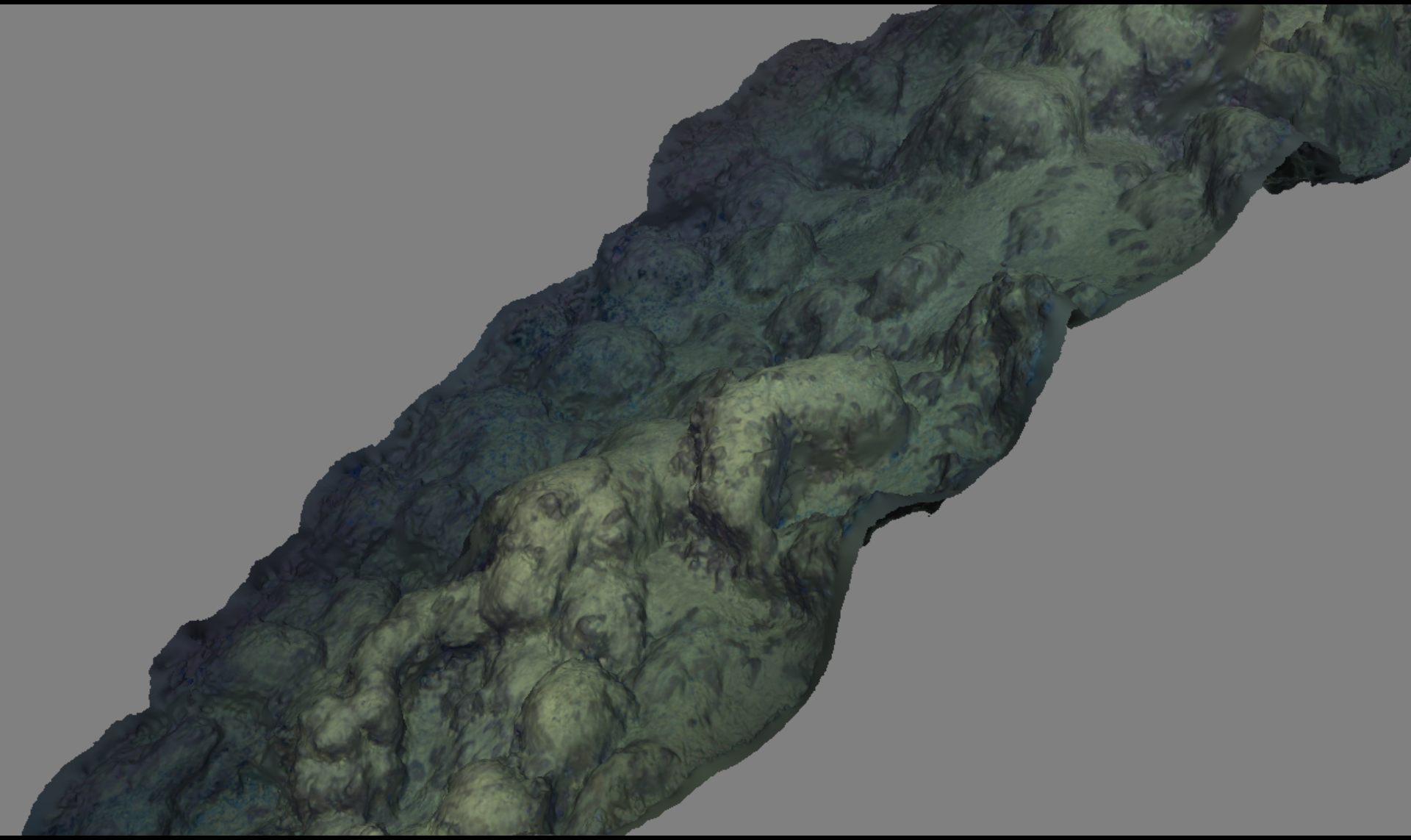

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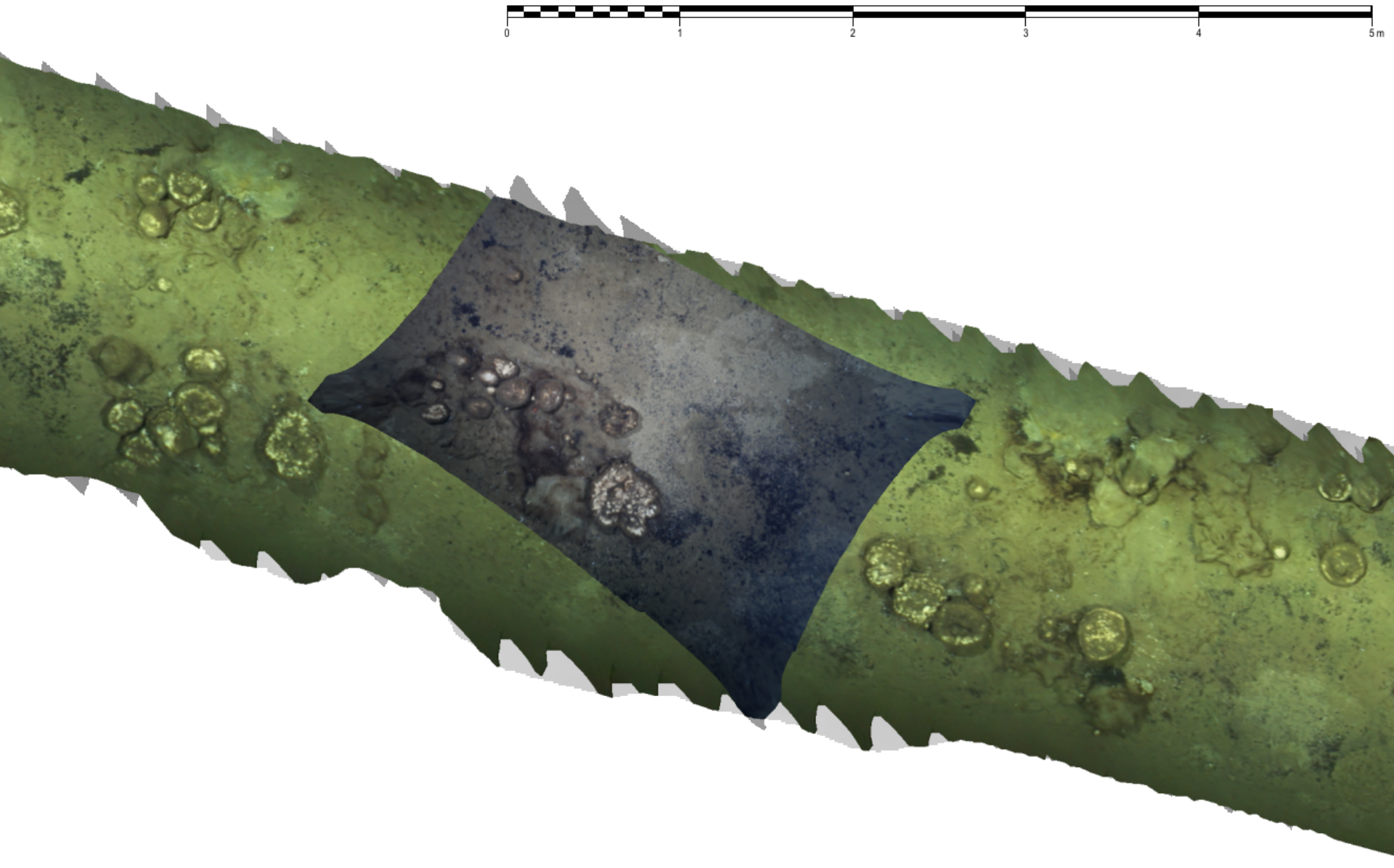

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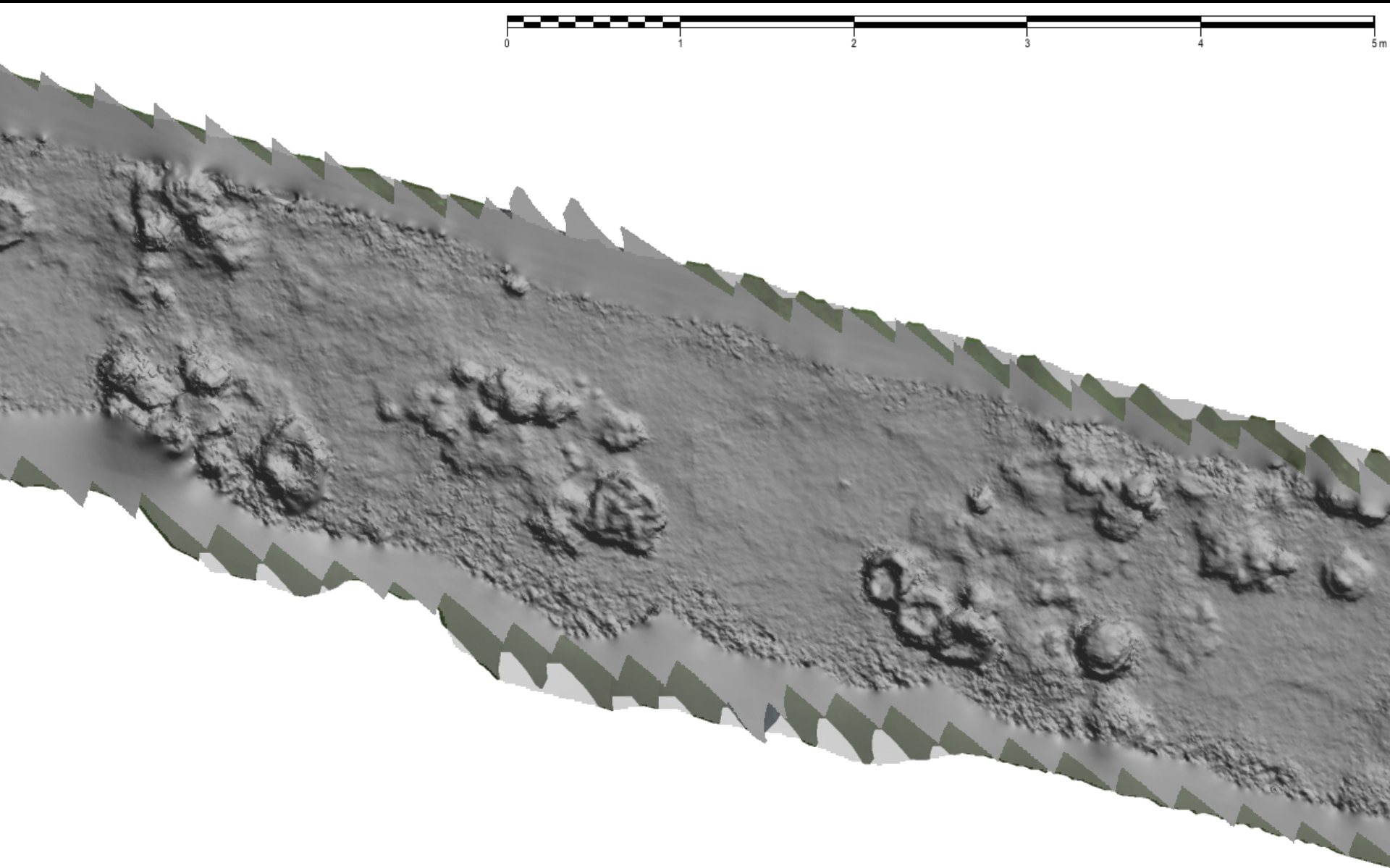

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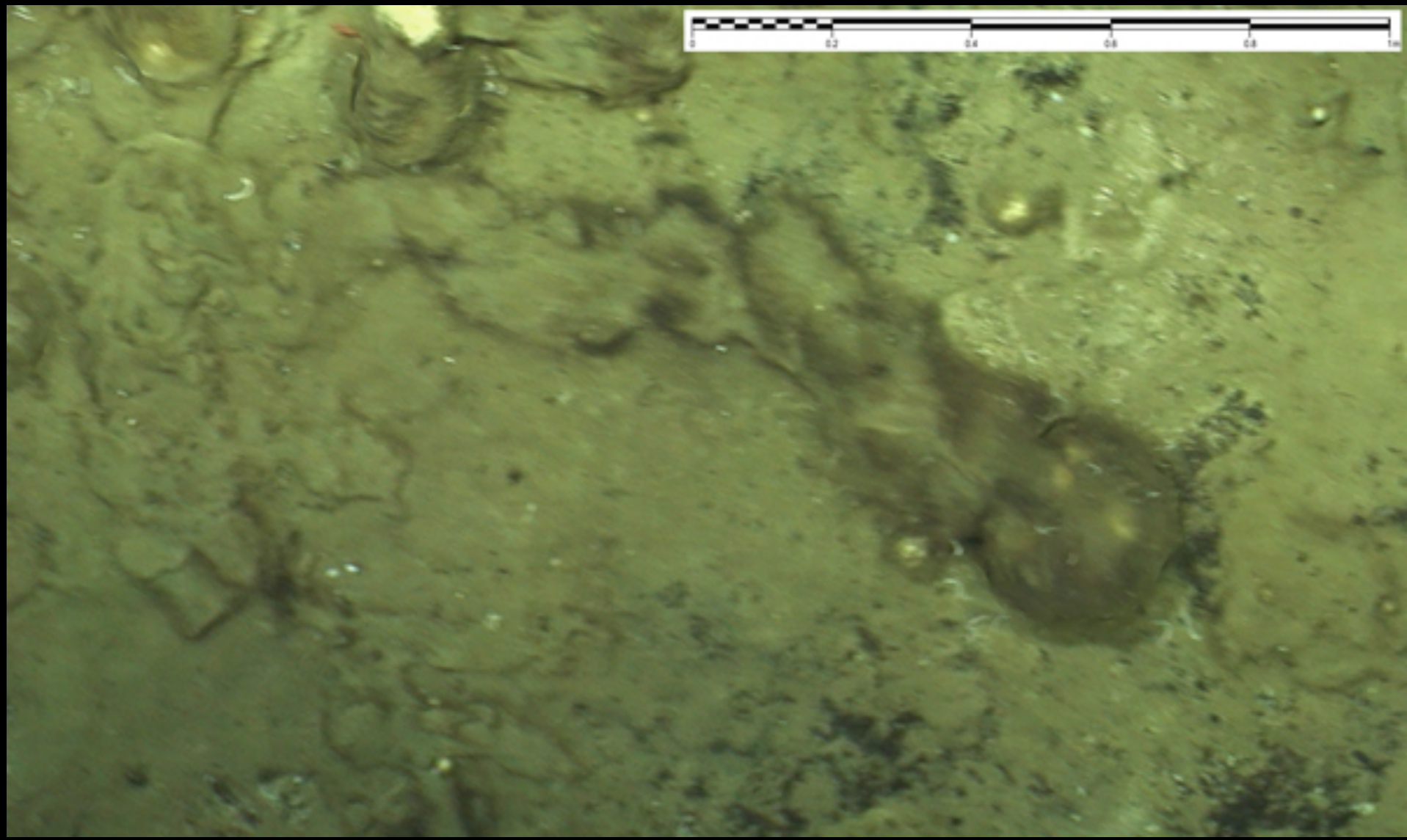

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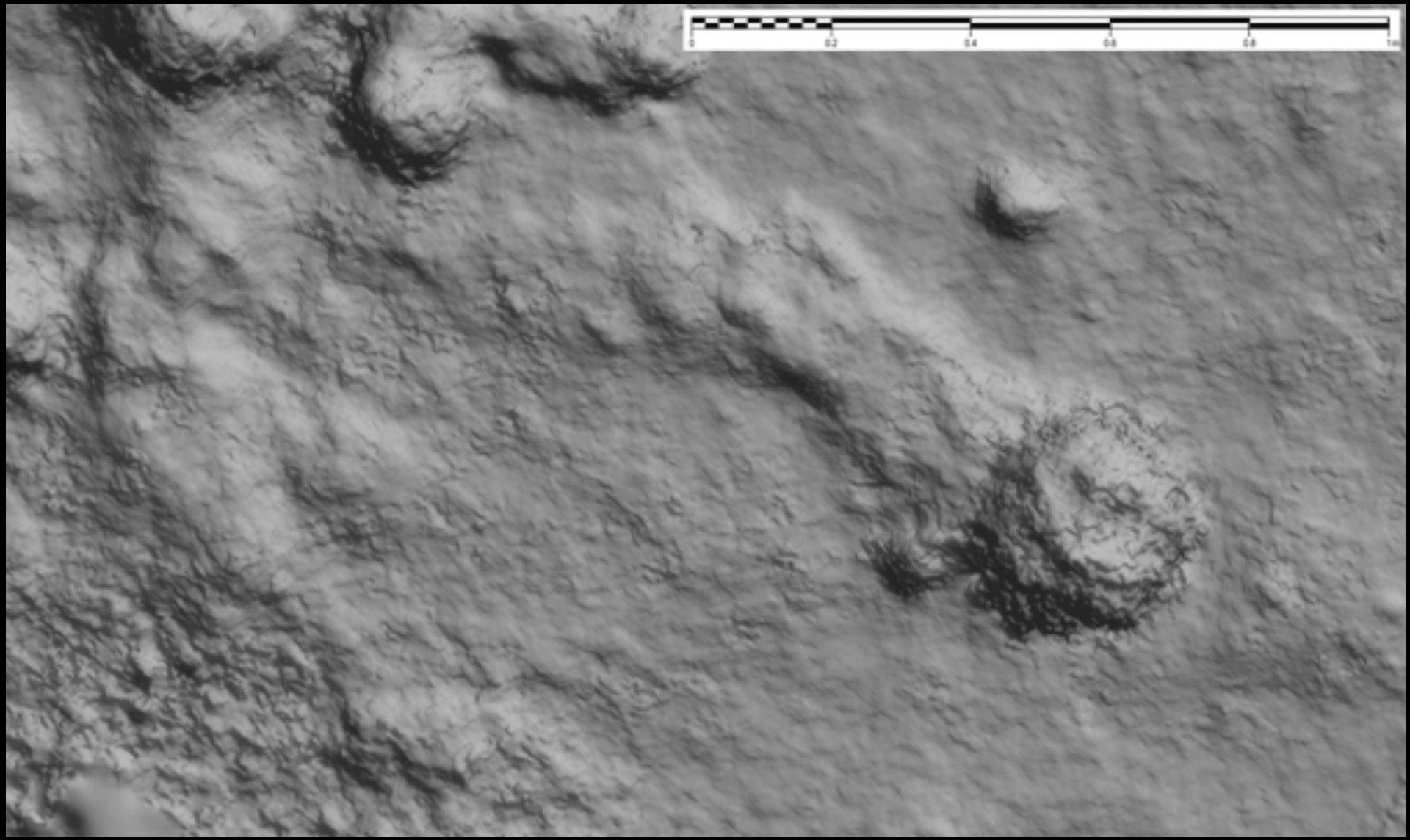

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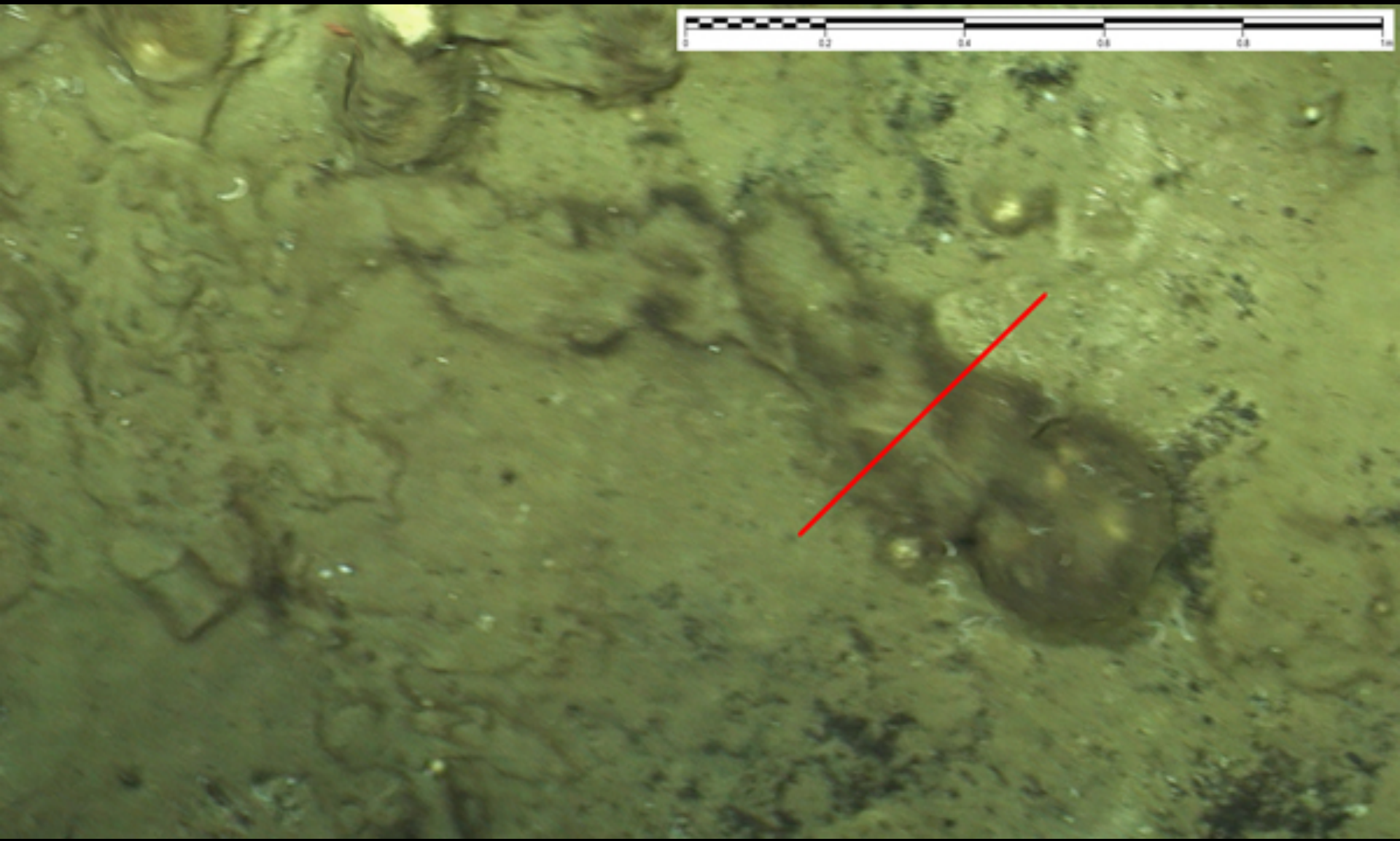

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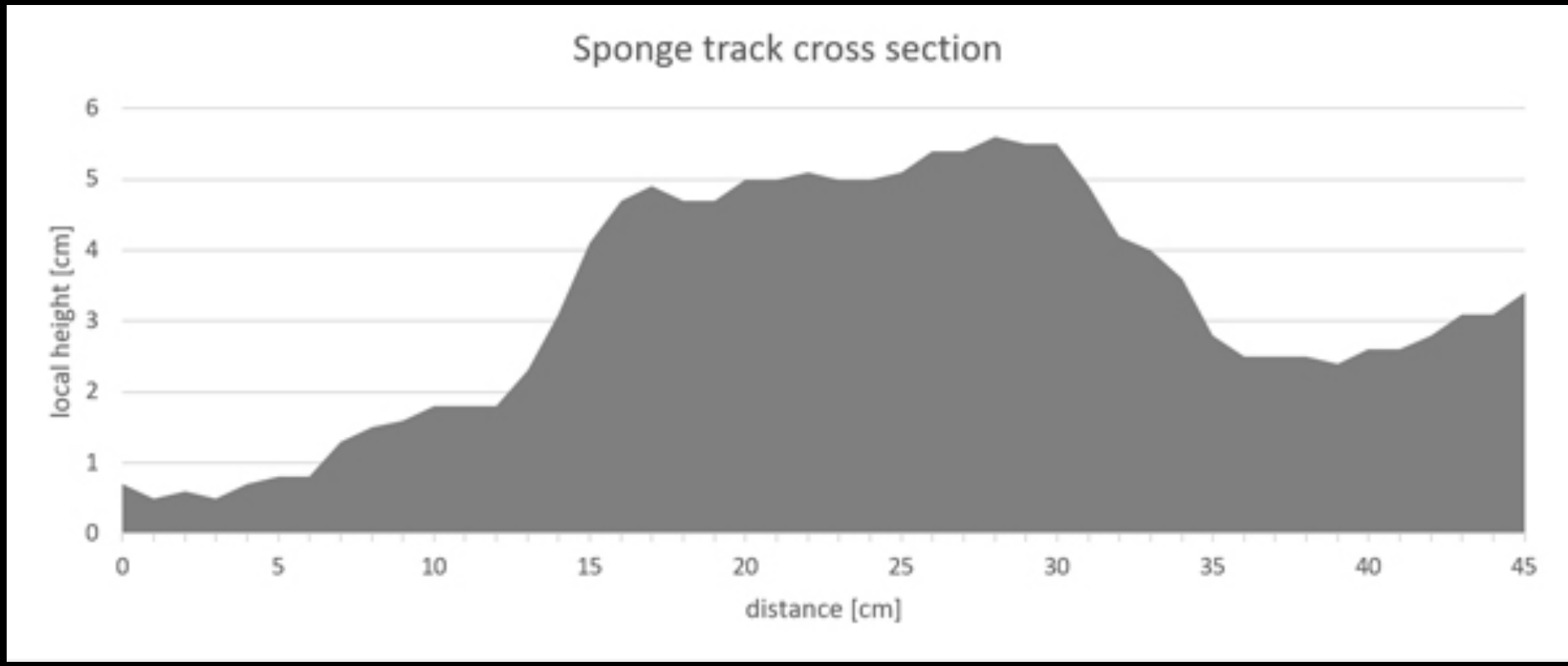
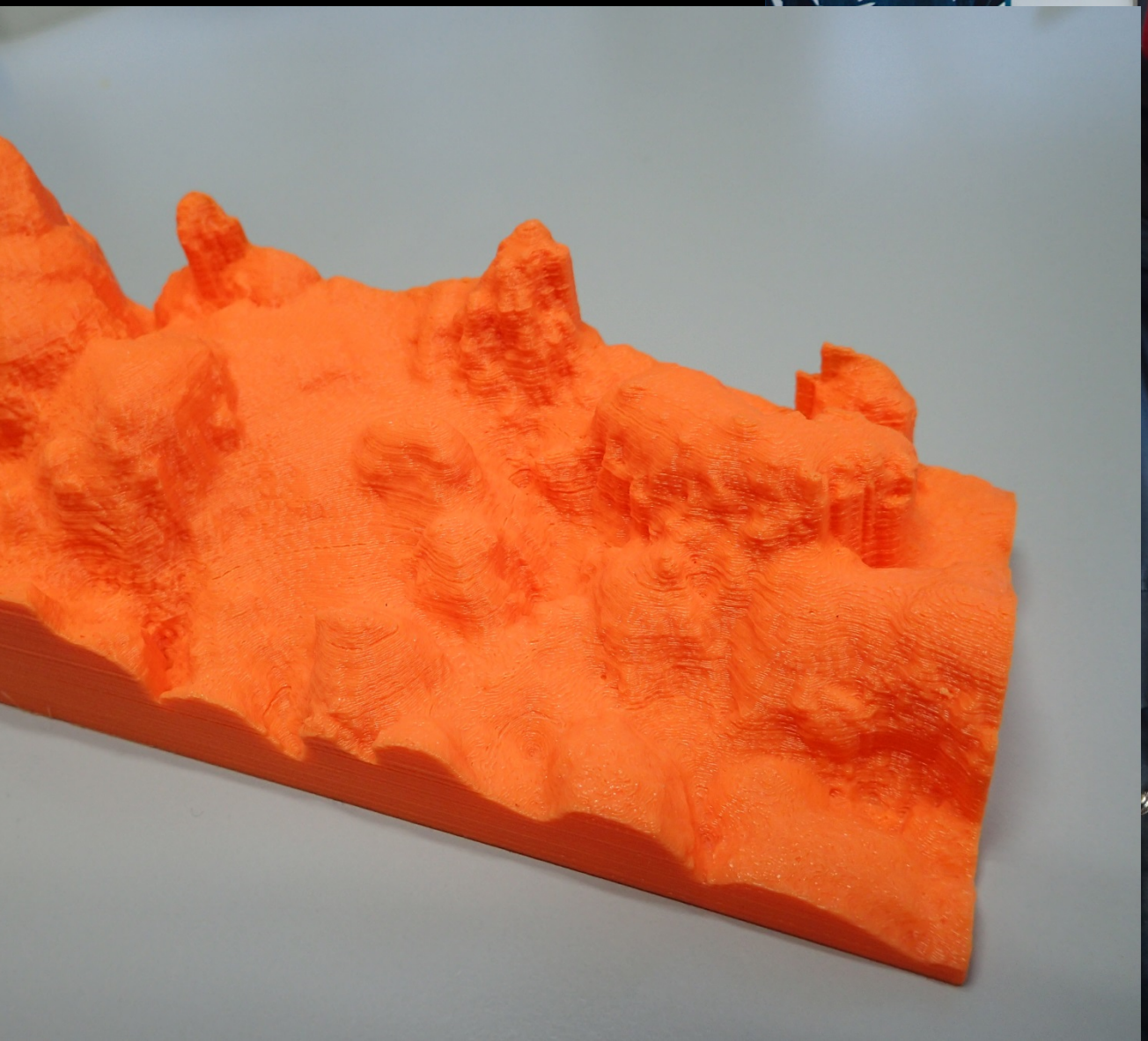


OFOBS – Printed outputs



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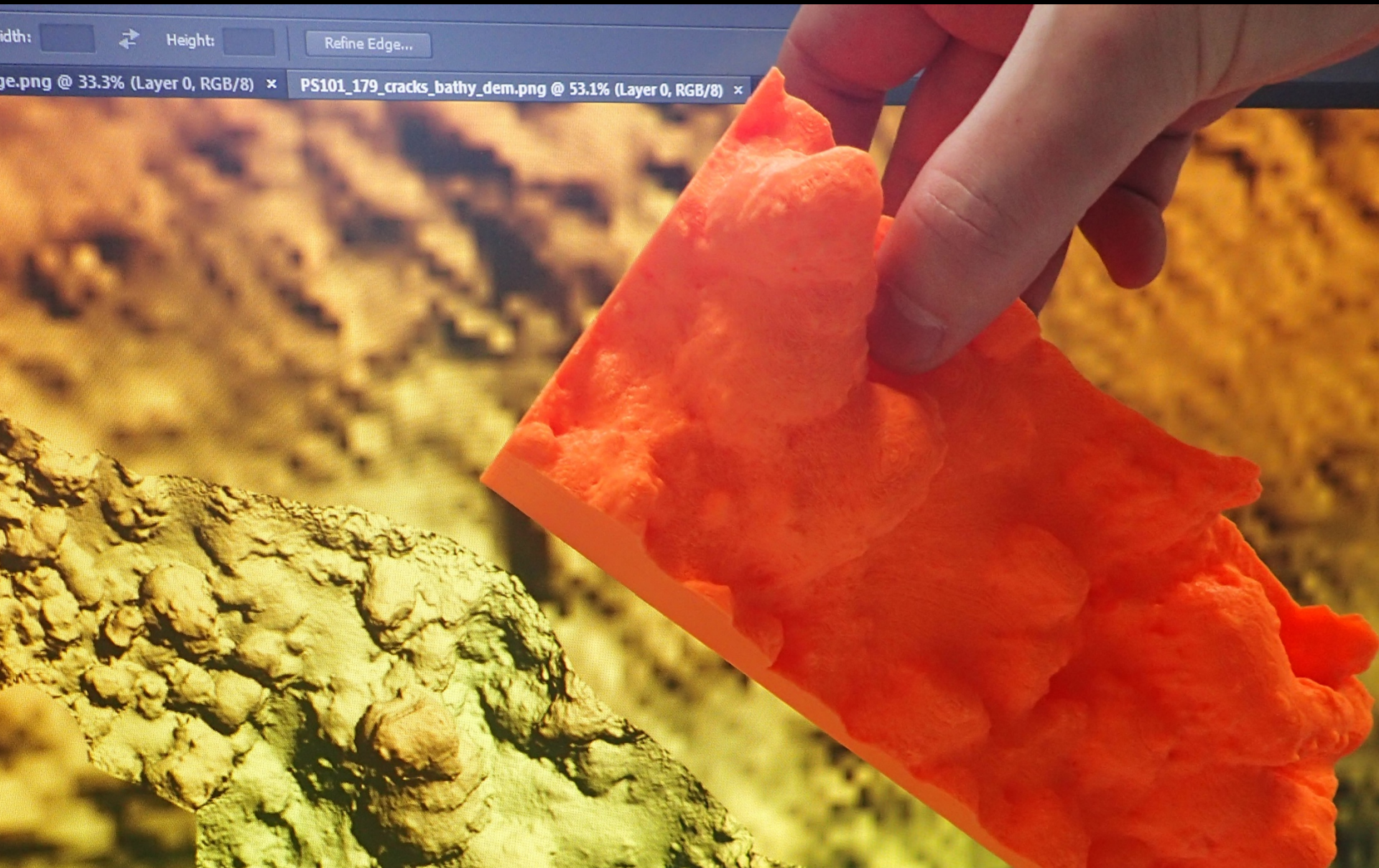
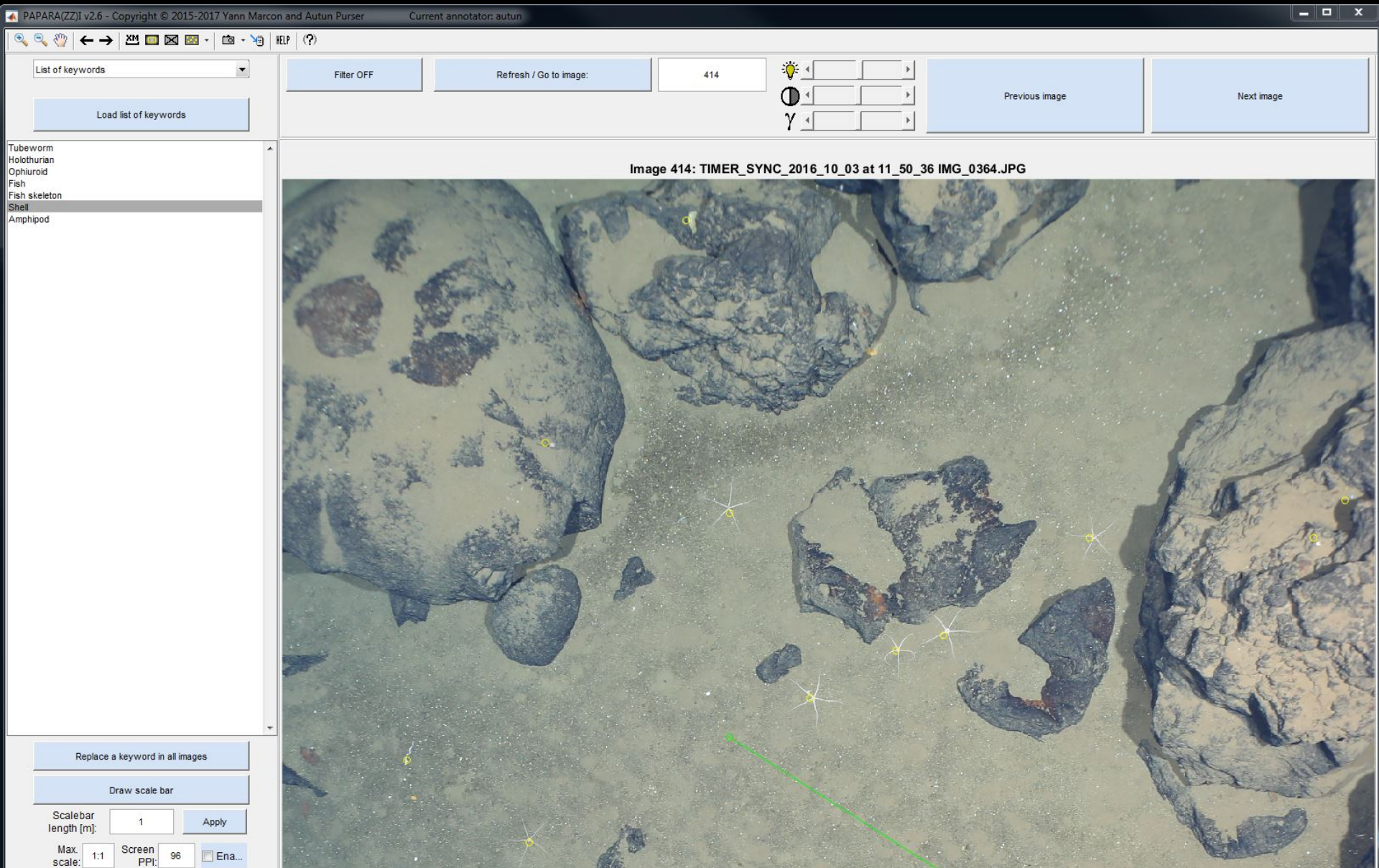


OFOBS – AWI labelling using PAPARA(ZZ)I



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Spatial data on faunal and feature abundances can then be compared across and between transects.

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Spatial data on faunal and feature abundances can then be compared across and between transects.

- Both spatial and temporal analysis possible.

- High resolution bathymetry likely very useful for quantifying mining impacts, or fishery damage to coral or sponge reefs.

Thanks for listening!

Thanks also to those on PS101 who helped test the system.