

# PRESS RELEASE

PRESS RELEASE

February 05, 2024 || page 1 | 3

Oceaonlogy International 2024

## Geomapping maritime surfaces: Finnish research institute uses measurement systems developed by Fraunhofer IPM

The renowned Finnish Geospatial Research Institute (FGI) will use LiDAR systems developed by the Fraunhofer Institute for Physical Measurement Techniques IPM to survey maritime surfaces in the future. The state-run research unit expects this technology to deliver higher-quality geographical data and more efficient field measurements than ever before. Both research units are working together on a joint research project to develop a particularly compact sensor platform for the laser-based inspection of critical underwater infrastructure, such as offshore wind turbines.

LiDAR (light detection and ranging) systems take measurements across comparatively long distances and provide precise 3D data. On land, using laser-based systems to take geodetic measurements has long been standard practice. When it comes to the 3D mapping of underwater objects or taking topographic underwater measurements, however, cameras and sonar systems have been standard. This is due to the strong light attenuation and turbidity that hinder the use of lasers under water. Fraunhofer IPM now introduces two LiDAR systems suitable for taking both laser-based 3D measurements under water and bathymetric measurements from the air for the very first time.

### 3D measurements with millimeter precision at depths of several hundred meters

The Underwater LiDAR system ULi maps infrastructure under water with millimeter precision using the pulsed time-of-flight method. The system scans statically or when in motion onboard an underwater vehicle or boat. Encased in a pressure-resistant housing, ULi can dive to depths of several hundred meters and measure objects across distances of several tens of meters. The system takes up to ten times more precise measurements than some sonar systems and generates an accurate 3D model of the object.

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#### Editorial notes

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**Ultra-lightweight LiDAR scanner for taking bathymetric measurements from the air**

PRESS RELEASE

February 05, 2024 || page 2 | 3

With the Airborne Bathymetric Laser Scanner ABS, Fraunhofer IPM introduces the first laser-based system capable of surveying the topography of coastal areas from the air. The system, which weighs around three kilograms and is the size of a shoe box, has two lasers with different wavelengths (multiwavelength measurement). While conventional laser bathymetry systems are too large and too heavy for standard drones, the ABS is so light it does not require a flight permit. The system is capable of taking measurements at up to twice the Secchi depth with a precision of just a few millimeters.

Both the ULi and ABS systems use a full waveform analysis to examine measurement data. This type of signal processing allows to separate the echo sequence conditioned by the water's surface, the water's floor and suspended particles, and to extract high-resolution topographical data.

In the future, the FGI will use a combination of both systems. "These two systems combined provide us with a novel and powerful tool to map coastlines and survey objects in 3D at great depths," enthuses Professor Juha Hyypä, Director of Remote Sensing and Photogrammetry at the FGI. "We will see an unprecedented level of data quality."

The CoLiBri (Collaborative LiDAR to Monitor Infrastructure in the Water and at the Shoreline) research project, funded by the Fraunhofer-Gesellschaft, is a collaboration between the FGI, Fraunhofer IPM and the Sustainability Center Freiburg (LZN). The project aims to develop an integrated monitoring process for underwater infrastructure and coastal areas, promote the collaborative use of the systems and evaluate their potential for various applications.

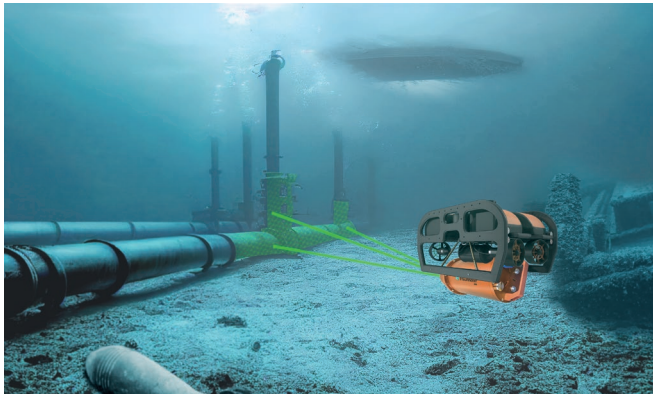
Fraunhofer IPM will present the Airborne Bathymetric Laser Scanner ABS and the Underwater LiDAR ULi systems at Oceanology International 2024 from March 12 to 14 in London. For more details, visit [www.oceanologyinternational.com](http://www.oceanologyinternational.com).

**FURTHER INFORMATION**

Projekt CoLiBri (Collaborative LiDAR to Monitor Infrastructure in the Water and at the Shoreline): <https://www.leistungszentrum-nachhaltigkeit.de/projekte-des-lzn/internationale-projekte/colibri/>

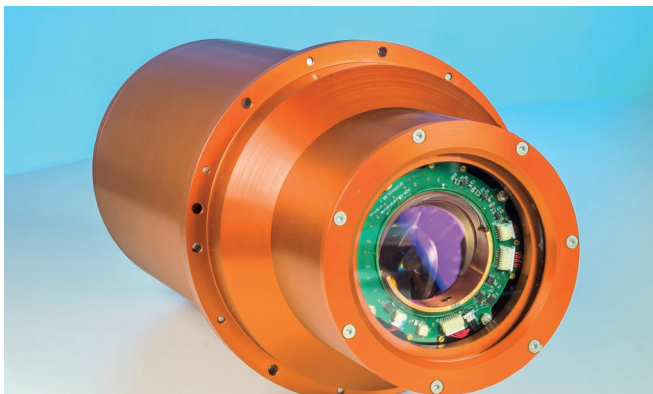
NLS National Land Survey of Finland (Finnish Geospatial Research Institute FGI): <https://www.maanmittauslaitos.fi/en/research>

FRAUNHOFER INSTITUTE FOR PHYSICAL MEASUREMENT TECHNIQUES IPM



Offshore wind turbines, oil rigs, pipelines and submarine cables – optical sensors enable effective condition monitoring of underwater infrastructure.

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The Underwater LiDAR system ULi can dive to depths of several hundred meters and record underwater objects in 3D with millimeter precision, statically or in motion. © Fraunhofer IPM



Thanks to its low weight, the Airborne Bathymetric Laser Scanner ABS by Fraunhofer IPM does not require a flight permit when used on a drone. © Fraunhofer IPM

The **Fraunhofer-Gesellschaft**, based in Germany, is the world's leading applied research organization. By prioritizing key technologies for the future and commercializing its findings in business and industry, it plays a major role in the innovation process. A trailblazer and trendsetter in innovative developments and research excellence, it is helping shape our society and our future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 76 institutes and research units throughout Germany. Around 30,800 employees, predominantly scientists and engineers, work with an annual research budget of roughly €3.0 billion, €2.6 billion of which is designated as contract research.

#### Other contacts

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**PRESS RELEASE**

February 05, 2024 || page 3 | 3  
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