

Advancing coastal habitat mapping: integrating aerial, surface and underwater remote vehicles USVs Unmanned Surface Vehicles

João Gama Monteiro¹, Patrício Ramalhosa¹, Soledad Álvarez¹, Rodrigo Silva¹, Francesca Gizzi¹, Emanuel Almada¹, Sílvia Almeida¹, Marko Radeta^{1,2,3}, and João Canning-Clode^{1,4}

¹MARE - Marine and Environmental Sciences Centre / ARNET - Aquatic Research Network, Agência Regional para

²Faculty of Exact Sciences and Engineering, Wave Labs, University of Madeira

³Faculty of Mathematics, Department of Astronomy, University of Belgrade

⁴Smithsonian Environmental Research Center

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João Gama Monteiro*¹, Patrício Ramalhosa¹, Soledad Álvarez¹, Rodrigo Silva¹, Francesca Gizzi¹, Emanuel Almada¹, Sílvia Almeida¹, Marko Radeta^{1,2,3} and João Canning-Clode^{1,4}

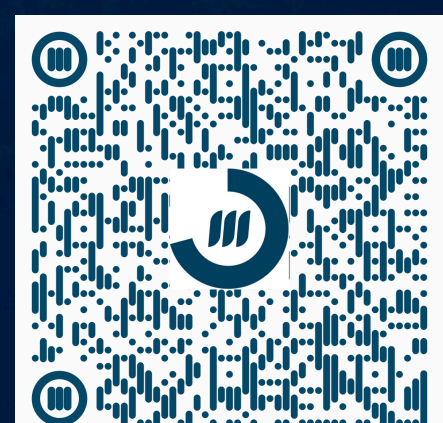
1. MARE – Marine and Environmental Sciences Centre / ARNET - Aquatic Research Network, Agência Regional para o Desenvolvimento da Investigação Tecnologia e Inovação (ARDITI) Funchal, Madeira, Portugal; 2. Wave Labs, Faculty of Exact Sciences and Engineering, University of Madeira; 3. University of Belgrade, Faculty of Mathematics, Department of Astronomy, Serbia; 4. Smithsonian Environmental Research Center, 647 Contees Wharf Road, Edgewater, MD 21037, USA



USVs

Unmanned Surface Vehicles

Video on QR-code

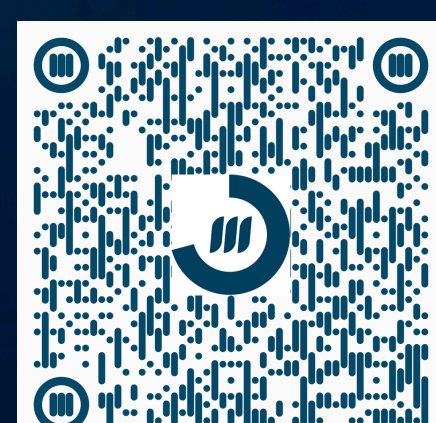


Even low-cost out of the shelf vehicles can be used to survey bathymetry and provide reference data for shallow Optically Derive Bathymetry (OBD) and ground truthing for aerial remote sensing platforms. OBD can be particularly useful for mapping bathymetry of large coastal extents at shallow depths, where sonar surveys from manned vessels is typically hampered by navigation and operational risks.

ROVs

Remotely Operated Vehicles

Video on QR-code

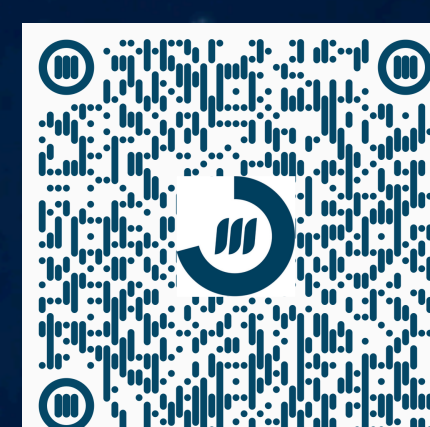


Equipped with sonar and video systems, these tethered underwater vehicles can be used for detailed side-scan surveys, underwater photogrammetry and video transects to map and assess habitats, biotopes and litter contamination. ROVs can be particularly useful to identify and/or classify habitat and biotope types (e.g. EUNIS hierarchical habitat classification) in depths below SCUBA operational limits and to consistently map the bottom using photogrammetry or with side-scan sonar.

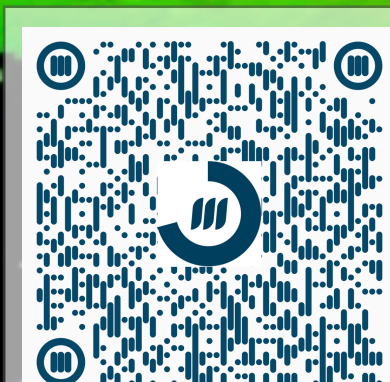
UAS

Unmanned Aircraft Systems

Video on QR-code

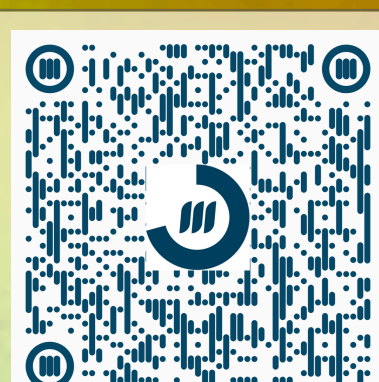


Commercial out of the shelf and custom designed drones (UAS) with RGB cameras or multispectral sensor payloads can be used to assess coastal topography and generate mosaics using structure from motion. Spectral analysis of color bands can be leveraged to Optically Derive Bathymetry and map rocky and sandy bottoms in shallow waters. Multispectral and/or hyperspectral sensors paired with AI image segmentation and in Object Based Imagery Analysis (OBIA) classification algorithms can be a particularly powerful tool, enabling to identify submerged vegetation and more accuracy in deriving bathymetry and substrate.



Coral Garden

Video on QR-code



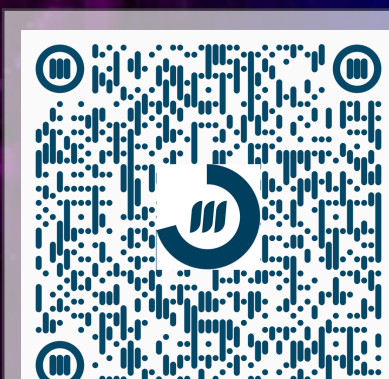
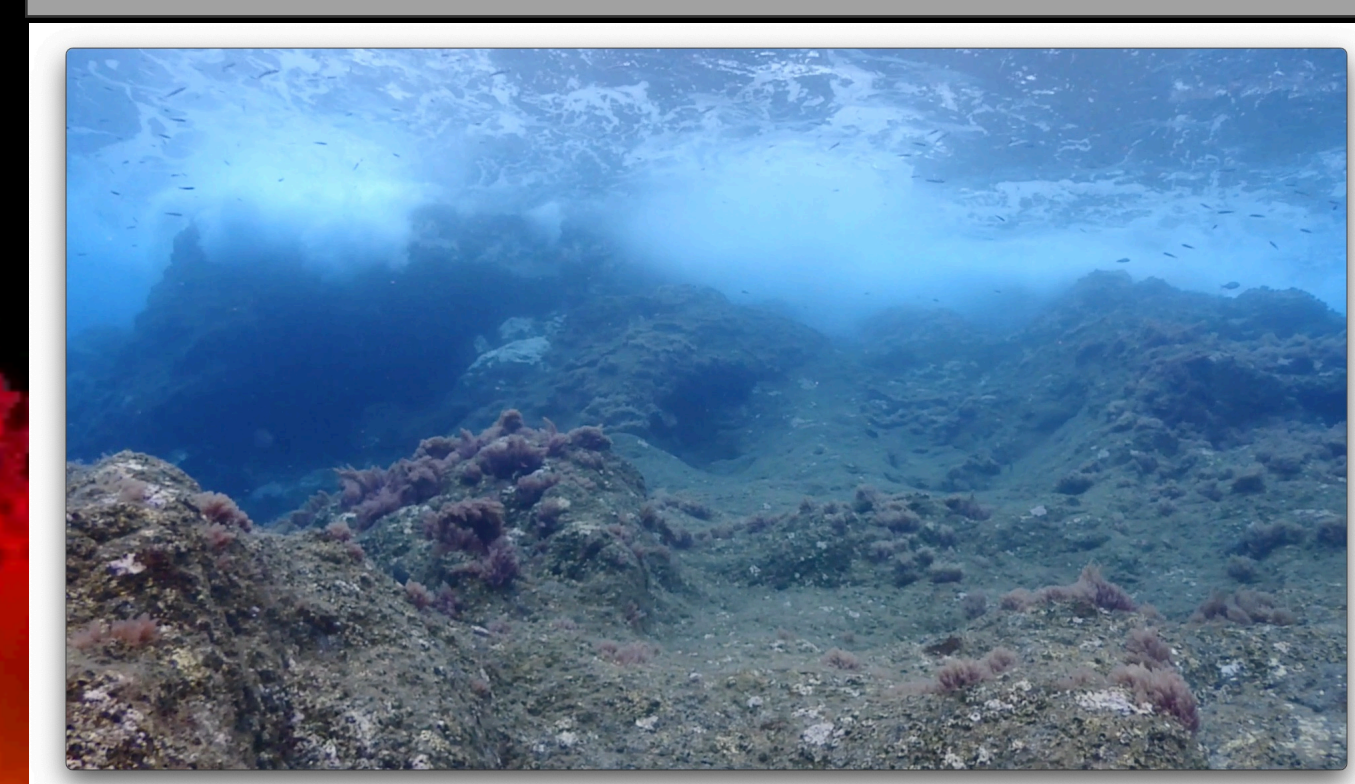
Sandy Plateau

Video on QR-code



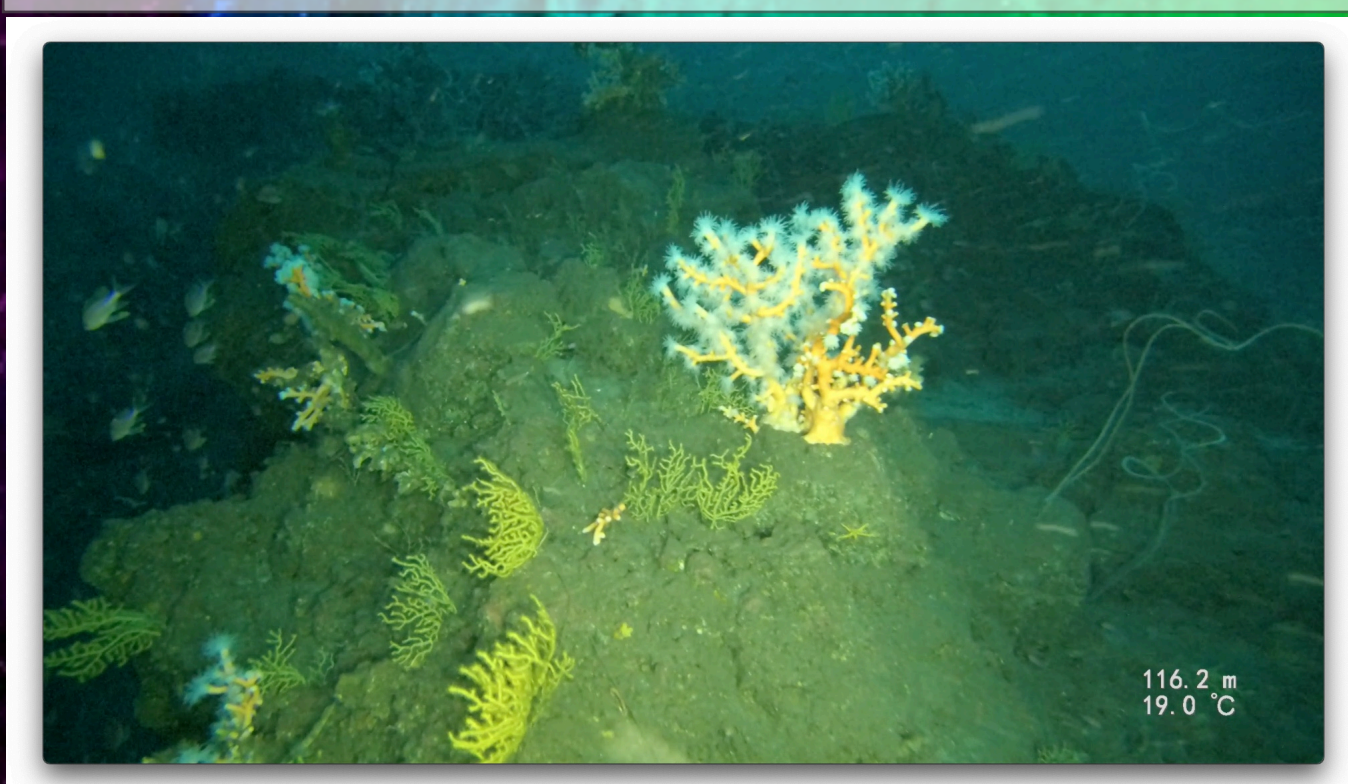
Shallow Rocky Reef

Video on QR-code



Coral communities

Video on QR-code



Integrated Habitat Mapping

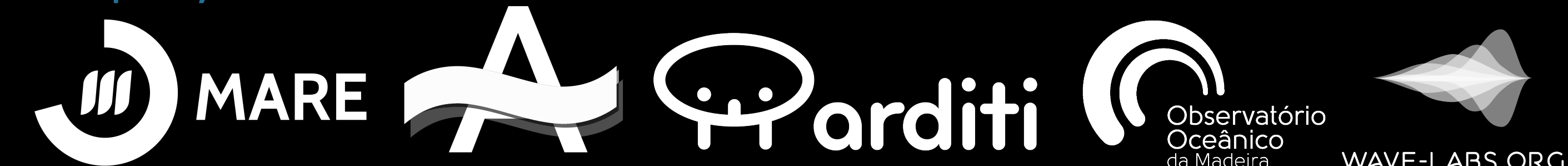
Integrating aerial, surface and underwater remote vehicles to enhance data collected by scientific divers and sampling to enhance habitat and biotope mapping in coastal areas. Leveraging commercial off the shelf and open-source technologies, these integrated approaches enable to combine physiographic habitat assessments and biological data and observations to: i) classify habitats; ii) identify distinct organism assemblages; and iii) predict their distribution, produce maps and other spatial data.

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