3D Scanning bathymetry applied for assessment and monitoring of protected marine hábitats: El Cachucho case study

I.P. Díez-García[1] (irene.diez@ieo.es) , M. Gómez-Ballesteros[1], F. Sánchez-Delgado[2], J.L. Granja-Bruña[3]

[1] Spanish Institute of Oceanography, Madrid, Spain , [2] Spanish Institute of oceanography, Oceanographic Center Santander
[3] Department of Geodynamics, Stratigraphy and Paleontology, Complutense University of Madrid, Spain.

@Irenne_dg

Introduction

ESMAREC proyect is focus on monitoring a Marine Protected Area (MPA) known as El Cachucho, located at Spanish Cantabrian margin (southern Bay of Biscay). During ESMAREC-2019 cruise the 75 m bathymetry was improved with the 3D scanning technique. That allows to obtain high resolution bathymetric surfaces, essentials for planning tracks and sampling stations with a remotely operated towed vehicle (ROTV) POLYTOLANA.

ROTV operations require high precision in order to identify species of gorgonians and sponges with video images.

Material and methods

ESMAREC-2019 cruise was on board of R/V Ramón Margalef, owned Spanish Institute of Oceanography (IEO). It is equipated with the Kongsberg EM710 multibeam echo-sounder, with the option to operate with 3D scanning. In this technique the vessel navigates to 0,5 knots and 250 beams sweep the bottom with an 45º opening angle and 10º horizontal movement.

All surfaces were processed with the module HIPS and SIPS of CARIS software.

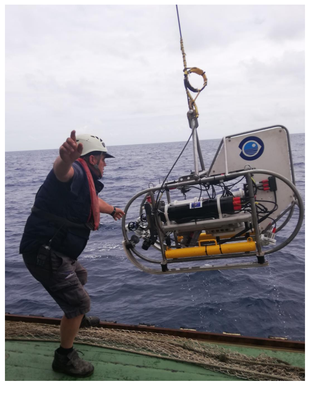

FIGURE 1 – ROTV POLYTOLANA owned Spanish Institute of Oceanography (IEO), and examples of video images.

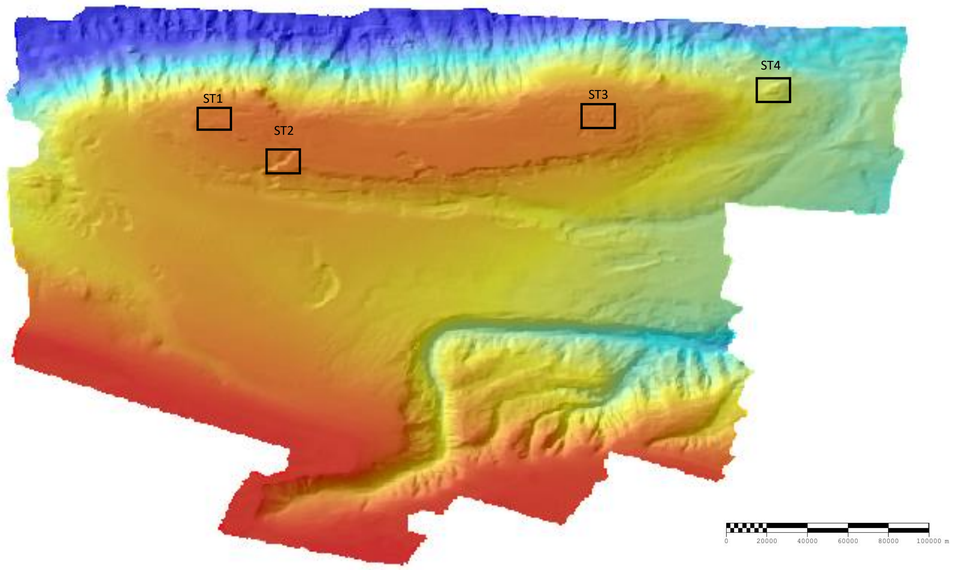

FIGURE 2 – Full view of 75 m bathymetry of marine protected area El Cachucho. Black squares indicate sampling stations (ST1,ST2,ST3,ST4) where bathymetrics were carried out with 3D scannin to improve their resolution.

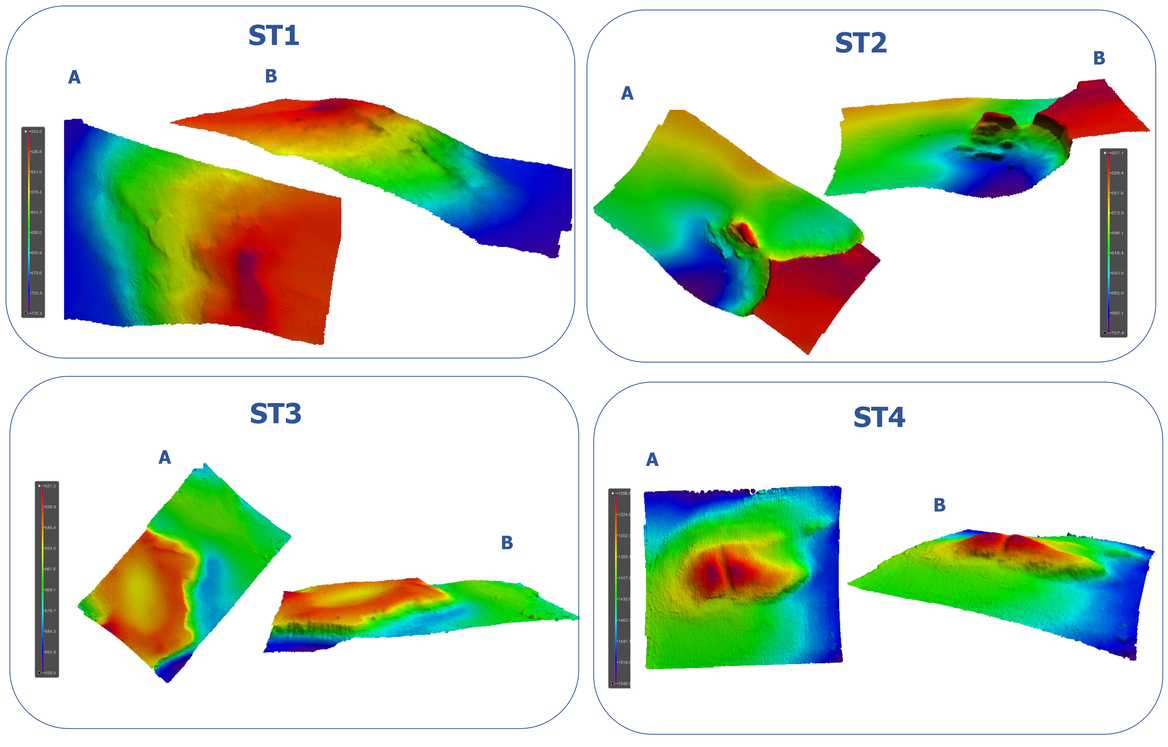

FIGURE 3 – Samples Stations view of 3D scanning bathymetry. A) High resolution bathymetry. B) 3D view

Results

Four sampling stations were selected for record endangered species to check the health of ecosystem. Along this stations were carried out high resolution bathymetry surfaces of 5 m.

Those surfaces were the base to optimize the planning time of ROTV operations on the seabed. Also the high resolution of the surfaces avoided damage to the vehicle and ensured its operability. It was posible to record images detecting individuals in 1 square meter, thanks to very high accuracy of the bathymetry.

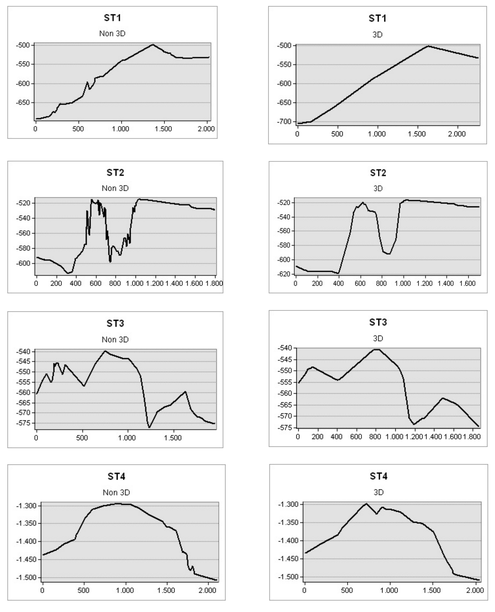

FIGURE 4 – Topography profile of all sampling stations. On the left profiles of previus bathymetries. On the right profiles of 3D scanning bathymetries, with a significant increase of morphology definition.

Conclusions

3D scanning is essential for safety and to optimize the operations with remote operated vehicles and towed vehicles. This technique allows a detailed knowledge of the seabed in order, for example, to better assess and monitor MPA.

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