Eighth GEBCO Science – presentation abstract

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Oral presentation title: The High Resolution Bathymetry of the Lagoon of Venice: a Base Map for Interdisciplinary Research

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Abstract

The lagoon of Venice is the biggest lagoon in the Mediterranean area with a surface of about 550 km2 with an average depth of about 0.8 m. The typical morphological features are navigation canals (20 m deep at the inlets up to 2 m), natural tidal channels and creeks (few m to few dm deep), tidal flats (often less than 1 m deep), intertidal areas and salt marshes. The lagoon began to form about 6000 yrs BP during the Last Marine Transgression and, since then, natural and artificial changes occurred over the centuries giving to the lagoon its actual configuration.

However, the morphological and ecological properties of the lagoon changed dramatically in the last century: the surface of the salt marshes was reduced by 60% and a deepening trend in some parts of the lagoon was observed with a net sediment flux exiting from the inlets. Moreover major engineering intervention are currently on going at the inlets (MOSE project). These changes at the inlets could affect substantially the lagoon environment.

To understand the future lagoon evolution and to assess the change of these complex environments ISMAR within the project RITMARE (a National Research Programme funded by the Italian Ministry of University and Research) started an extensive survey, involving a team of 20 scientists, to collect high resolution bathymetry of key study areas such as the tidal network and the navigation canals. Bathymetric data will be employed for geomorphologic studies, habitat mapping and modelling of evolution trends of the highly dynamical and complex transitional environment of the lagoon following a multidisciplinary approach.

As a case study in this presentation we focus on a natural channel in the northern part of the lagoon. In particular we carried out a two-dimensional (2D) spectral and textural analysis of the high resolution bathymetric and backscatter data collected. As a result of the 2D spectral analysis on the elevation data, we were able to identify and parameterize the geometrical characteristics of the main morphological features of the channel, like dunes, scours, crests and troughs and sedimentation areas and to extract the channel bottom roughness. We then performed an unsupervised classification of the backscatter data. As a result, we were able to identify different backscatter areas where several grab samples were collected for ground truthing. With the help of this sampling we calibrated a textural analysis and obtained a classification of the different kinds of substrate. Within this multidisciplinary approach, we

set up and successfully tested a combined method to quantitatively characterize an extremely shallow water dynamical environment.