Development and application of remote sensing observations to monitor erosional and morphological dynamics in the Venice lagoon

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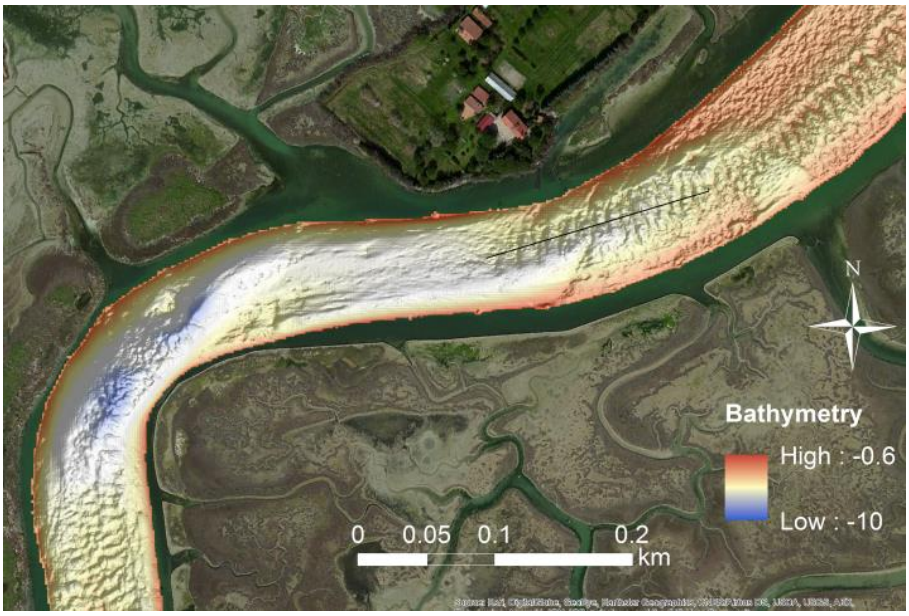
Summary: In this project we aim at monitoring the depositional, erosional, and morphological dynamics of tidal landforms in the Venice Lagoon, through the development and application of remote sensing observations.

Aim of the project. Repeated bathymetric surveys performed with a very high resolution Multi-Beam Echosounder System (MBES) and the creation of Digital Elevation Models (DEMs) obtained from images acquired with drones (Unmanned Aerial Vehicle-UAV) and aircraft-based LiDAR, combined with semi-automatic geomorphometric analyses, will allow the phD candidate to perform an innovative integration of different types of data from subaerial (UAV / satellite) and underwater (MBES) remote sensing techniques.



The analysis of the integrated bathymetry and photogrammetry data will provide a detailed description of the morphologies and to study the depositional and erosional dynamics over short (annual) time scales, through estimates of the volumes of mobilized on the salt marshes and adjacent channels compared with previously acquired or reconstructed DEMs. A second focus of the research will be the characterization of the spatial distribution of vegetation, a major geomorphic driver and indicator in tidal environments, using space-based and high resolution multispectral sensor. Among the goals is the characterization of changes in vegetation patterns in the Venice lagoon and of the associated morphological changes.

Expected Results. The results of this project will allow the PhD candidate to:
i) use multispectral satellite data to monitor the dynamics of salt-marsh bio-geomorphological patterns in the vertical and horizontal planes (e.g., morphological structures, depositional and erosional areas, together with the distribution of plant species that colonize the marsh surface);
ii) integrate data obtained from subaerial (UAV / satellite) and underwater (MBES) remote sensing to produce DEMs and high resolution bathymetries for the quantitative analysis of morphological changes in response to variations in the forcing and human activity.

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