EGU22-4873
https://doi.org/10.5194/egusphere-egu22-4873
EGU General Assembly 2022

Where do tidal channels begin? Insights from the Venice Lagoon

Francesca Uguagliati[1], Davide Tognin[2], Alice Puppin[1], Massimiliano Ghinassi[1], and Andrea D'Alpaos[1]

[1]University of Padua, Department of Geosciences, Italy (francescauguagliati@gmail.com)
[2]University of Padova, Department ICEA, Padova, Italy

Together with salt marshes and tidal flats, tidal channels are one of the fundamental components of tidal environments, because they crucially control the morphodynamic evolution of tidal landscapes. Despite tidal channels play a fundamental role in the hydrodynamics and morphodynamics of tidal environments, the mechanisms that govern their initiation, development, and evolution have received less attention compared to their fluvial counterparts. To address issues of conservation of tidal systems, exposed as they are to the effects of climate changes and increasing human interference, it is therefore of critical importance to improve current understanding of the origins and evolution of tidal channels, of their morphological characteristics, and of the sedimentary structures emerging from their evolution. The present work addresses this important issue, focusing on the study of the erosional and depositional patterns that can be observed in tidal channels cutting through different salt marshes of the Venice Lagoon, from north to south. In particular, we analyzed whether tidal channels are first initiated over tidal-flat surfaces and then inherited by salt marshes, or tidal channels are capable to incise the vegetated salt-marsh surfaces overwhelming the erosion resistance to channel incision provided by vegetation. This study was carried out by combining sedimentological, paleontological, and geomorphic analyses for a total of 30 meanders belonging to small tidal marsh creeks. For the sedimentological analyses, a total of 191 cores were recovered along axial transects of the 30 study bends with normally 6 cores per transect. These analyses allowed us to distinguish four main types of deposits: salt-marsh, point-bar, channel-lag and tidal-flat deposits. Their correlation emphasized the position and the size of the point bars within the different examined transects. Based on the position of the point bar and its brink trajectory within each transect we determined whether the erosive processes that led to channel primary formation occurred over a salt marsh or over a tidal-flat surface. The analyses showed that in most cases the considered channels are originated through the incision of a salt marsh. Lastly, the geomorphic analyses suggested that the analyzed saltmarsh creeks are strongly incised.