

Tidal channel initiation and evolution explored through field observations and modelling.

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Summary: Where do tidal channels begin (or end)? How do they evolve in space and time? Addressing these questions, echoing landmarks in fluvial geomorphology (Montgomery & Dietrich, 1988), is of the utmost importance, both from a theoretical and practical point of view, for the key role exerted by tidal channels on the ecomorphodynamic evolution of tidal landscapes.

Despite their importance in landscape evolution, tidal channels have received less attention when compared to their fluvial counterparts, particularly in terms of the chief processes governing their initiation and evolution. Our understanding of these processes is still very limited and the study of tidal channel dynamics has so far evolved within separate disciplines, like e.g., those concerned with the morphometric features of tidal channels based on remote sensing, ancillary field surveys and modelling, or those related to the analysis of tidal channel stratal architecture. Studies of these landform features on the basis of a multidisciplinary approach are still in their infancy and we still lack a comprehensive and predictive theory of tidal channel dynamics.



The project aims at analyzing the origins and evolution of tidal channels, together with their morphological characteristics, and the sedimentary structures emerging from their evolution. Towards this goal the PhD candidate will combine morphometric and sedimentological analyses, together with mathematical modeling. The planimetric configurations of tidal networks (determined through the use of high resolution images at different times) will be analyzed on the basis of modelling tools that allow one to quantitatively define their morphological characteristics and their temporal planform in time.. The analyses of sedimentary cores collected across channel sections will allow one to distinguish the main types of channel-related deposits and, through their correlation, will emphasize the presence erosive and/or depositional trends in proximity of the channel tips and in the portions of the channels close to the outlet sections. The possible occurrence of lateral migrations of tidal meanders will also be observed from the sedimentary facies distribution and stratal architecture.

Expected Results. The results of this project will allow the PhD candidate to:

- i) bring new insights into the processes driving the initiation and morphological evolution of tidal channels;
- ii) highlight similarities and differences between fluvial and tidal channels, and possibly suggest how to develop specific theories and modeling frameworks for the study of tidal channels;
- v) use the results to benchmark mathematical models which, to various degrees, conceptualize and simplify the actual governing processes.

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