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Controls on Submarine Erosion In The Valencia Channel Turbiditic System, NW Mediterranean Basin

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Submarine canyons can efficiently drain continental margins just as river systems drain subaerial catchments. Highly detailed seafloor topography acquired by state-of-the-art multibeam echosounders provides the opportunity to compare submarine and subaerial morphology with consistent resolution across a complete source to sink system. New bathymetric data show many geomorphic similarities between fluvial and turbiditic systems. Recent studies have focused on long-profile concavity and knickpoint occurrence (i.e. abrupt discontinuities in channel elevation) in submarine canyons when adopting subaerial process models to explain erosion in these systems. Using multibeam, seismic reflection, and sidescan sonar data from the NE Iberian margin (Catalano-Balearic Sea, NW Mediterranean), we extend this approach to better understand how models of fluvial erosion apply to submarine drainage networks.

The margin is drained by the Valencia deep-sea channel, which routes sediment from a network of submarine canyon-channel systems and unconfined mass-wasting events along most of its length before debouching onto the Valencia Deep-Sea Fan. The Valencia Channel has been active since the late Miocene, evolving in response to Plio-Quaternary episodes of erosion and deposition. Detailed morphometric analysis reveals patterns of erosion and profile adjustment along the entire length of the Valencia Channel. Several canyon-channel tributaries draining the Ebro and Catalan margins join the Valencia Channel at junctions with no morphologic discontinuity, indicating similar time-averaged erosion rates at these locations (analogous to Playfair's Law for fluvial systems). However, other tributaries do contain discontinuities (knickpoints, hanging valleys and incision of canyon heads). Such features are commonly assumed

to reflect a changing base-level, but unlike most fluvial systems, identifying the submarine base-level change that triggers profile adjustment is not straightforward. In the Valencia network, large mass failures along the Ebro slope have periodically disrupted canyon tributaries, complicating the response to base-level change downstream by modifying the frequency of erosive flow events through the network. Future survey work and modeling studies should help unravel the upstream and downstream controls on erosion along the Valencia Channel.