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Morphological evolution of the Venice lagoon: evidence from the past and trend for the future

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During the last century, the Venice lagoon has been experiencing a generalized degradation displayed by the deepening of tidal flats and the reduction of salt marsh areas. A conceptual model aiming at describing the long term evolution of the lagoon has been recently proposed. The model describes the evolution as consisting of two steps: the first step sees a gradual deterioration of salt marshes which, in turn, feed with sediments the adjacent tidal flats which, therefore, are able to maintain their original elevation. This step is followed by a second phase during which marshes have already reduced their extension as much as the sediment supply to tidal flats is no more sufficient to balance the erosion acting on such areas. As a consequence, the average tidal flat elevation decreases toward a deeper equilibrium depth.

We verify the long term evolution model through the analysis of four different bathymetries of the Venice lagoon during the last century (1901, 1932, 1970, and 2000 respectively). The result of the analysis confirms that the recent past morphological evolution of the Venice lagoon has actually followed the above two steps. This result enable us to infer the likely future trend of the Venice lagoon as long as the present erosive trend continues, and may also be helpful to predict the morphological evolution as a consequence of an increased sediment supply induced to face the actual lagoon degradation.