



Salt-marsh change detection using satellite data and aerial photographs

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This contribution describes the use of a series of remote sensing data acquisitions, including aerial photos and satellite data, to characterize morphological changes over the past 65 years in study salt marsh within the Venice Lagoon. Traditional methodologies to monitor the morphological evolution of intertidal areas require accurate, repeated and extensive field surveys and cannot achieve a truly space-distributed description of the system. On the contrary, procedures to extract quantitative information from remotely sensed data could provide access to spatial information in a repeatable, allowing an effective characterization of the temporal evolution of intertidal areas. The data presented cover the period 1938-present and include three b/w aerial photos (1938, 1954 and 1987) and two QuickBird satellite acquisitions performed in 2002 and 2003. Aerial photos have been sampled at a resolution of about 1 m, whereas QuickBird data were re-sampled using the panchromatic band to a resolution of 0.8 m/pixel. The historical aerial photos were not rectified and no information was available about flight altitude or lens characteristics and thus resolution and georeferentiation were only approximately derived from direct knowledge of modern marsh geometry. Furthermore, no information on the tidal level at the moment of photo acquisition is available. In spite of these limitations, historical photographs allow the detection of broad scale changes in salt-marsh morphology over time. Furthermore, the images were also analyzed to study the histogram of grey-scale values distribution, after enhancement by a specific image filter (Local Sigma Filter). This procedure allowed the identification of relevant soil cover properties (bare soil, water and vegetation) and the characterization of their spatial distributions and temporal changes. Inspection of the results indicates that remote sensing observations allow effective, quantitative and space-distributed descriptions of intertidal system evolution.