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Salt marshes and mudflats monitoring from remote sensing

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Coastal wetland areas, such as lagoons and estuaries, are complex and delicate environments subject to rapid morphological and ecological evolution, often in response to strong anthropogenic pressure. The combined ecological and economic importance of these dynamic environments has focused attention on monitoring and forecasting change in these natural coastal deposits.

Salt marshes and mudflats in tidal environments are characterised by complex spatial patterns of form, both in their geomorphological and ecological features. Spatial patterns of microbial and vegetation assemblage distribution, relationships and composition provide essential information for describing the state of intertidal systems while any alteration in these patterns help to understand and assess system change. Direct observations of microphytobenthos and vegetation distribution are challenging and work-intensive. The high repeatability of remote observations, their improved resolution and field of view make modern remote sensing a useful tool to study and monitor the heterogeneous patterns of intertidal biotic and abiotic components. The present contribution describes quantitative observations of ecological (vegetation and microphytobenthos) and morphological (topography and channel network geometry) of selected systems using remote sensing and field observations performed during the European research project TIDE (Tidal Inlets Dynamics and Environment). The best observation/classification schemes were assessed considering: the most appropriate spatial and temporal range; use of both airborne and satellite sensors with different

spectral and spatial resolutions; the observation techniques required; ancillary datasets available; images pre-processing and classification analyses; and calibration and validation procedures. The objective was to retrieve the most accurate quantitative maps of salt marsh plants, macroalgae and microphytobenthos possible with current technology and with specific reference to the selected sites, on the salt marshes of the Venice Lagoon (Italy) and on the mudflat of the Eden Estuary (Scotland).