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The vegetation-elevation relationship in salt marshes

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Salt marshes are coastal ecosystems of high importance from ecological and geomorphological perspectives which have been disappearing fastin thelast centuries. Halophytic vegetation can support marsh survival through complex ecomorphic feedbacks. A better understanding of vegetation distribution and related variations in response to environmental changes is of central importance to analyze marsh evolution. Towards this goal, we analyzed the vegetation-elevation relationship in a microtidal marsh in the Venice Lagoon (the San Felice marsh) by coupling *in-situ* measurements in different years (between 2000 and 2019) and multi-spectral and Light Detection and Ranging (LIDAR) data. The vertical distribution of above-ground biomass (AGB) was also analyzed by using NDVI and an empirically estimated AGB (eAGB). Our results suggest that: 1) the known species sequence with increasing elevations maintained constant over the monitored period and at the whole marsh scale, although the overall increase in relative sea level rise altered the relative vertical position of each species; 2) the *in-situ* observed species sequence is found to be reliable and consistent at the whole marsh scale; 3) AGB increases with marsh elevation, values of NDVI and eAGB being generally higher in higher marsh portions. We also observed the dieback event of *Spartina* and the *invasion* of *Salicornia* in the San Felice marsh. All these results bear important implications for future marsh eco-morphodynamic analyses concerning landscapes populated by multiple vegetation species.