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Spatial and vertical patterns of Soil Organic Matter and Carbon content in the salt marshes of the Venice Lagoon (Italy)

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Salt marshes are intertidal ecosystems characterized by mostly herbaceous halophytic vegetation and shaped by complex feedbacks between hydrodynamic, morphological, and biological processes. These crucial yet endangered environments are among the most carbon‐rich ecosystems on Earth and support a diverse range of ecosystem services, including coastal protection and biodiversity increase. Their primary production coupled with rapid surface accretion results in the ability to sequester and store atmospheric carbon at high rates. Accumulation of organic matter in salt marshes has also a structural role, as it contribute to vertical accretion necessary for marshes to keep up with relative sea-level rise. A better understanding of the processes regulating soil organic matter (SOM) dynamics in tidal environments is a critical step to predict salt-marsh evolution in the face of climate change and anthropogenic disturbances and to further elucidate carbon sink potential of salt marshes, to the benefit of management and conservation strategies. Toward this goal, we analysed organic matter content in salt-marsh soils of the Venice Lagoon (Italy) from 48 sediment cores to the depth of 1 m, collected along 8 transects in different salt marshes. Soil samples were taken at 12 depths from each core and subsamples were prepared for different analyses, including soil density, organic matter content and grain size distribution. Percent organic matter was evaluated using Loss On Ignition and was used to estimate carbon stock and accumulation rate. Organic matter content in salt marshes showed a large variability, with important implications on marsh resilience and on the related ecosystem services. We observed a vertical decrease of organic matter with depth, but also the presence of organic-rich layers below the surface, as stratigraphy retains the signature of past depositional history. Furthermore, observed landward increase of organic content emphasizes the crucial role of fluvial inputs. Dry bulk density showed a clear relationship with percent organic matter, providing additional insights to evaluate contributions of organic and inorganic matter to surface accretion in salt marshes. Preliminary results offer insights on spatial and vertical patterns of SOM in salt-marsh soils and highlight the often overlooked carbon sink potential of salt marshes, showing carbon stock and accumulation rate values comparable to those attributed to forest environments. Differences between measured values along transects and at different study sites suggest that SOM accumulation primarily varies depending on organic source and conservation conditions, mostly affected by vegetation, physical and

hydromorphological factors, which are in fact interrelated.