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Sea-level rise linked to higher carbon stores in coastal saltmarsh

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Coastal mangrove and saltmarsh provide important ecosystem services, including comparatively high rates of carbon sequestration compared to terrestrial forests. The relationships between the rate and permanence of carbon sequestration in tidal wetlands and the rate of sea-level rise is poorly understood. We explore two lines of evidence suggesting accelerating sea-level may increase the rate and retention of organic carbon. First, we use a subsiding shoreline in New South Wales, Australia, as a surrogate for rapid acceleration in sea-level. The Chain Valley Bay wetland subsided one metre in the mid 1980's and subsequent accretion trajectories show a doubling of vertical accretion post-subsidence, associated with a four-fold increase in organic carbon. This relationship between sea-level rise and organic carbon accumulation is reflected in regional differences in saltmarsh carbon across the globe. Our analysis of 345 observations suggests regions experiencing continuous sea-level rise over the mid to late Holocene, such as NE USA and Europe, store substantially more carbon than wetlands in tectonically stable southern hemisphere regions where sea-level has been stable, such as Australia. The implication of these findings is that acceleration in sea-level rise will increase carbon sequestration and storage in southern hemisphere coastal wetlands.