Gulf Coast Deep-Seated Subsidence Rate Dynamics, Bias, and Spatial-Temporal Depocenter Complexities

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EXTENDED ABSTRACT

Deep-seated subsidence contributions to overall land loss remain poorly constrained over extended time scales leading to increased uncertainty in relative sea level rise modeling in the Gulf Coast region. Although it has been well-documented that deep-seated subsidence processes (i.e., fault motion, allochthonous salt tectonics, fluid extraction, glacio-isostatic forebulge collapse, and lithospheric flexure), are responsible for the long term accommodation space required for development of continental scale depocenters the size of the Mississippi or Colorado-Brazos (Galloway, 2008; Blum and Roberts, 2012), most research to date has focused on shallow surface subsidence processes (i.e., compaction and de-watering of Holocene sediments) that account for ~80% of total land surface subsidence (González and Tornqvist, 2006; Blum and Roberts, 2012; Jankowski et al., 2017; Shen et al., 2017). Herein we build upon the work of Frederick et al. (2018) in drawing contrast to the alongshore spatial variability observed in coastal deep-seated subsidence processes, along a passive margin dominated by avulsive fluvial processes, glacial-interglacial and associated eustatic sea level cyclicity, and the waxing and waning of continental-scale drainage systems, across disparate time scales extending from 10^4–10^7 yr. This improvement on coastal deep-seated subsidence quantitation aims to provide more accurate baseline geodetic benchmark stability modeling input by drawing contrast between the isostatic response of two fluvio-deltaic depocenters on the northern Gulf of Mexico coast. Here, by extracting further

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spatial variability detail from the coastal deep-subsidence records, we further reduce the uncertainty of climate models so critical to urban planning efforts to mitigate relative sea level rise risk.

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