

Settlement of the Caminada Headlands Beach and Dune Nourishment in Coastal Louisiana

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Abstract: The Caminada Headlands is a beach and dune system that provides natural protection for back barrier marshes against storm surges and wave overtopping. Due to significant shoreline erosion and regional subsidence, a beach and dune restoration project was initiated in 2012 to replenish the shoreline front. Because of the underlying soft deltaic sediments, this restoration effort was expected to cause significant sediment settlement due to the increased stresses applied by the replenishment. To quantify the degree of settlement occurring within the compressive sediment layers and the fill, extensive geotechnical investigations were conducted in addition to the installation of settlement plates and subsurface settlement anchors. This paper presents the inverse settlement analyses using SETTLE^{3D} and Primary Consolidation, Secondary Compression, and Desiccation of Dredged Fill (PSDDF) programs, which are based on Terzaghi small strain and finite strain theories, respectively. The model predictions show both software can replicate field settlement measurements, which are subsequently used to predict the end of primary consolidation for the Caminada Headlands and validate empirical correlations in the companion paper. Guidelines are also provided on conducting settlement and consolidation analyses to facilitate design of future coastal restoration and protection projects. **DOI: [10.1061/\(ASCE\)GT.1943-5606.0002170](https://doi.org/10.1061/(ASCE)GT.1943-5606.0002170)**. © 2019 American Society of Civil Engineers.

Author keywords: Barrier islands; Beach restoration; Delta; Subsidence; Consolidation; Coastal restoration; Storm surge protection; Stress distribution.



. Caminada Headland site showing dredge pump out areas, subsidence control benchmark, and settlement monitoring locations at sites labelled A, B, and C.

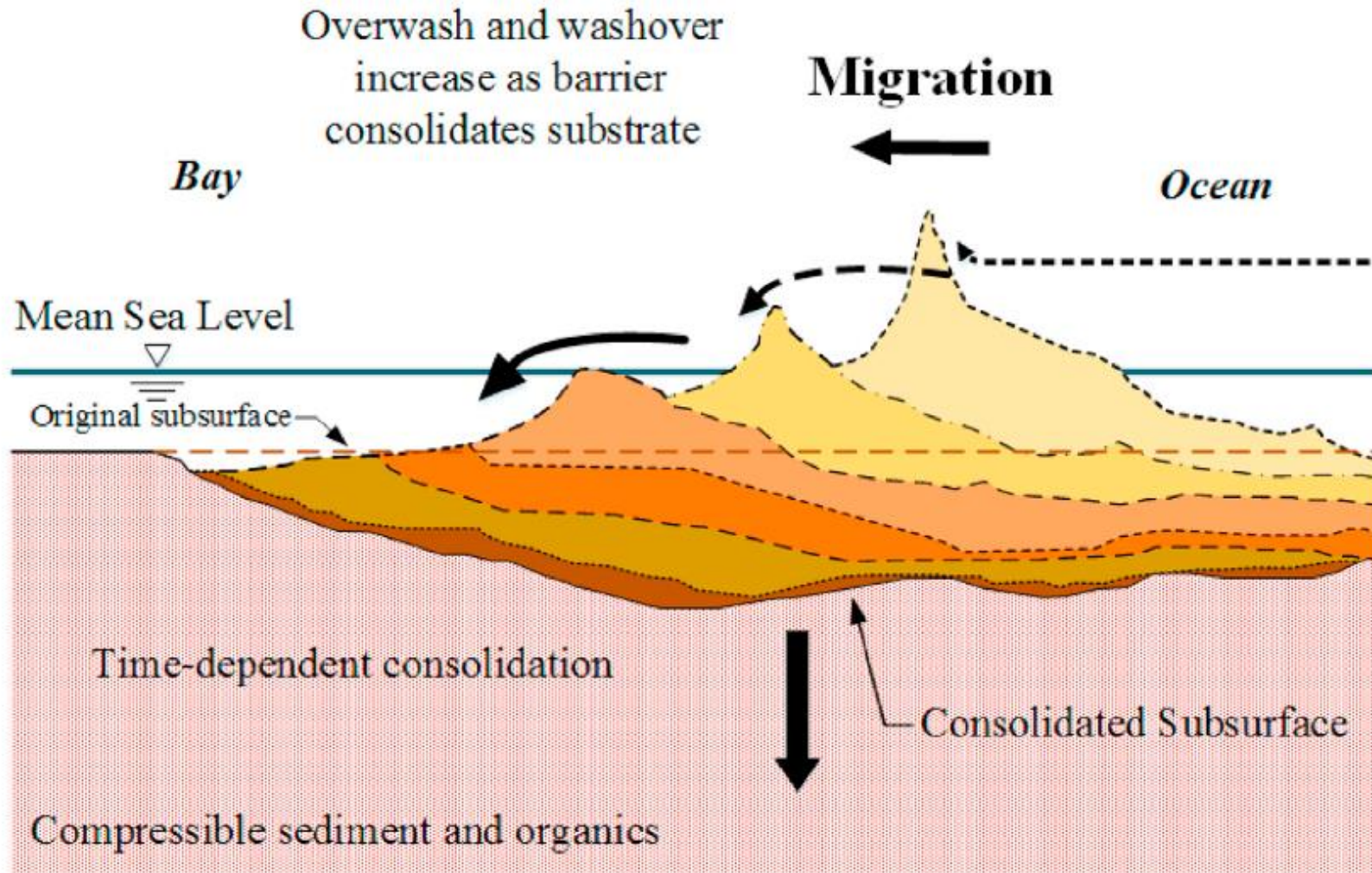


Fig. 2. Schematic of barrier island retreat by overwash (modified from Rosati, 2009).

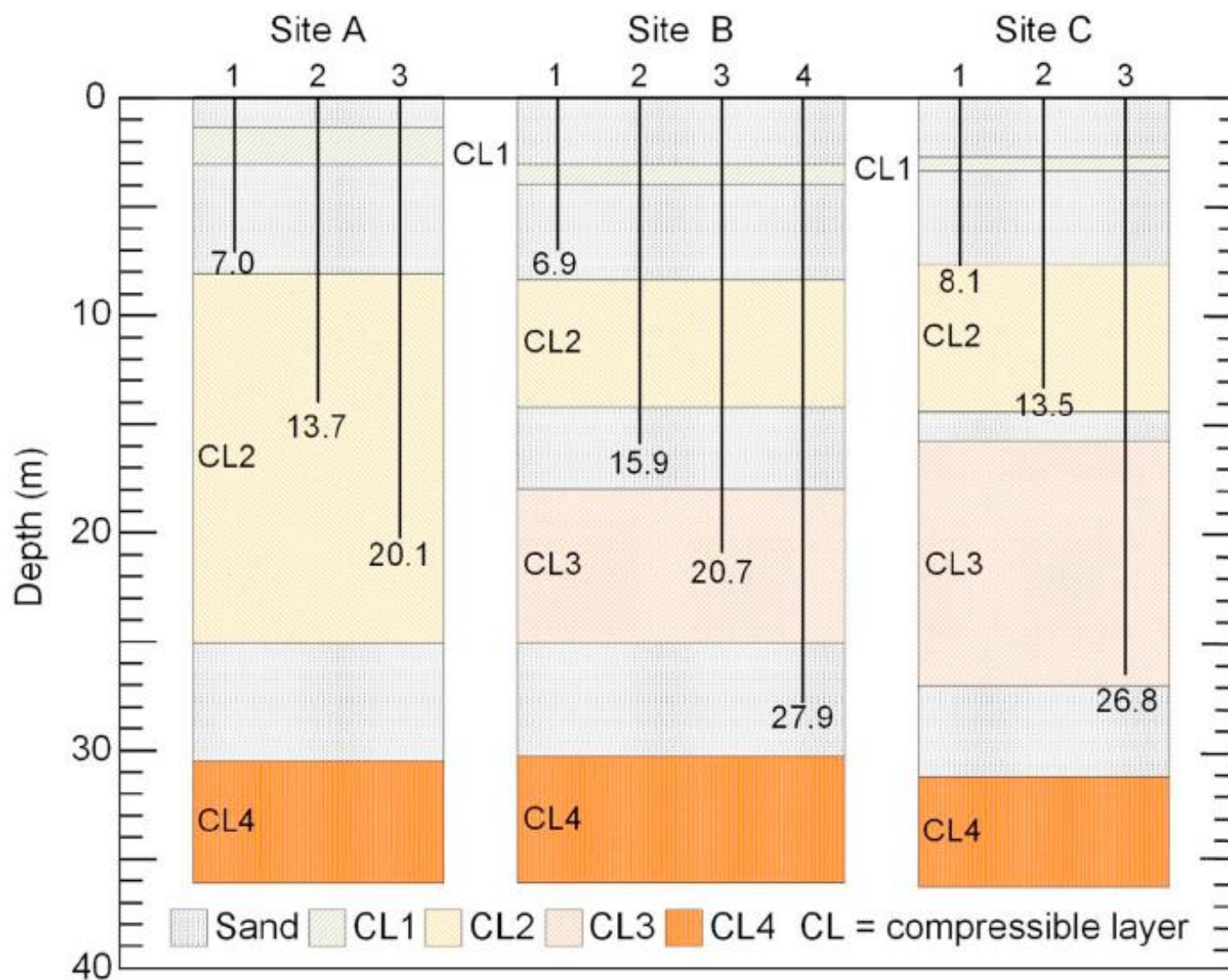


Fig. 3. Subsurface profiles at Sites A, B, and C with field settlement anchor locations across Caminada Headland.

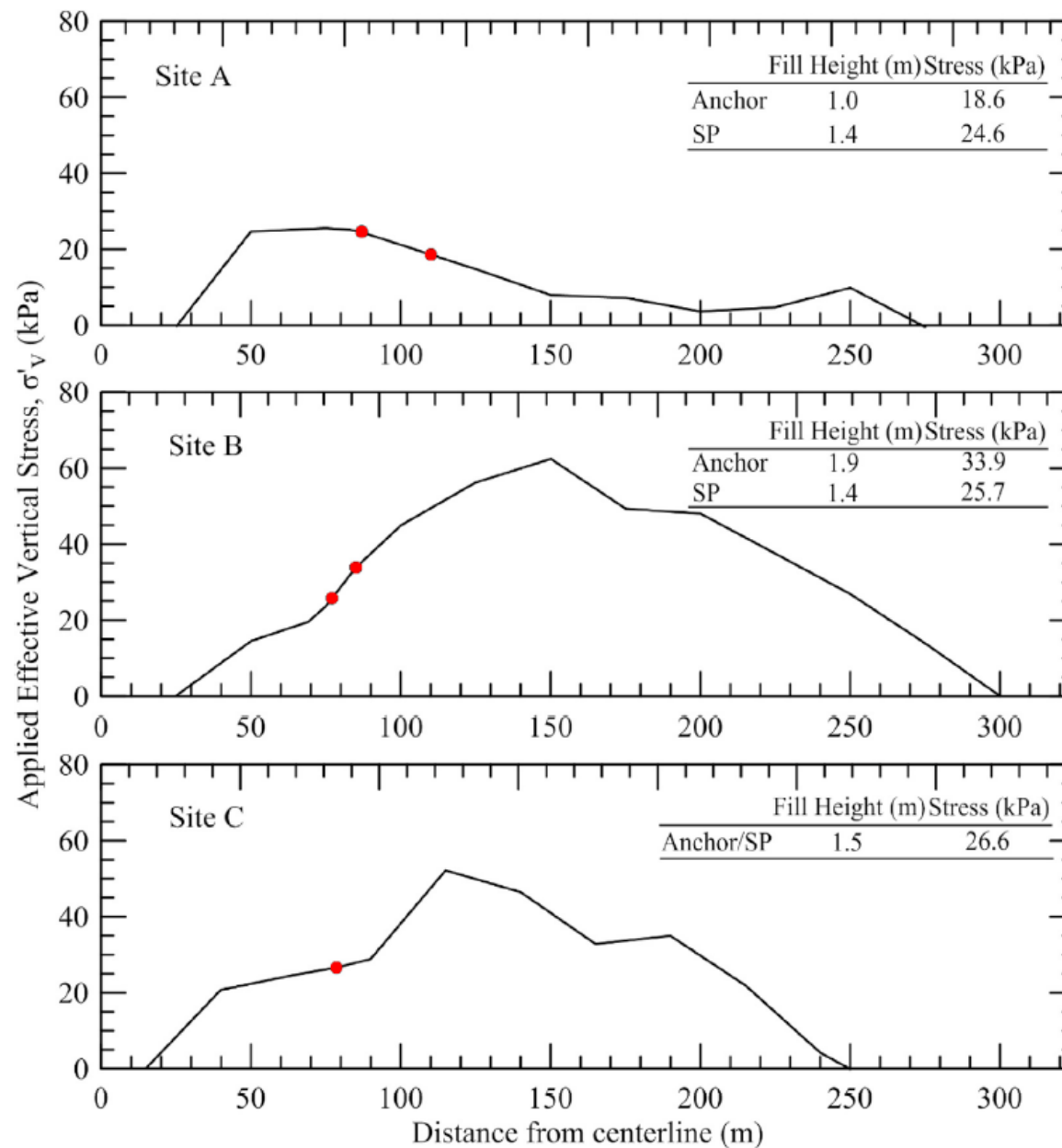
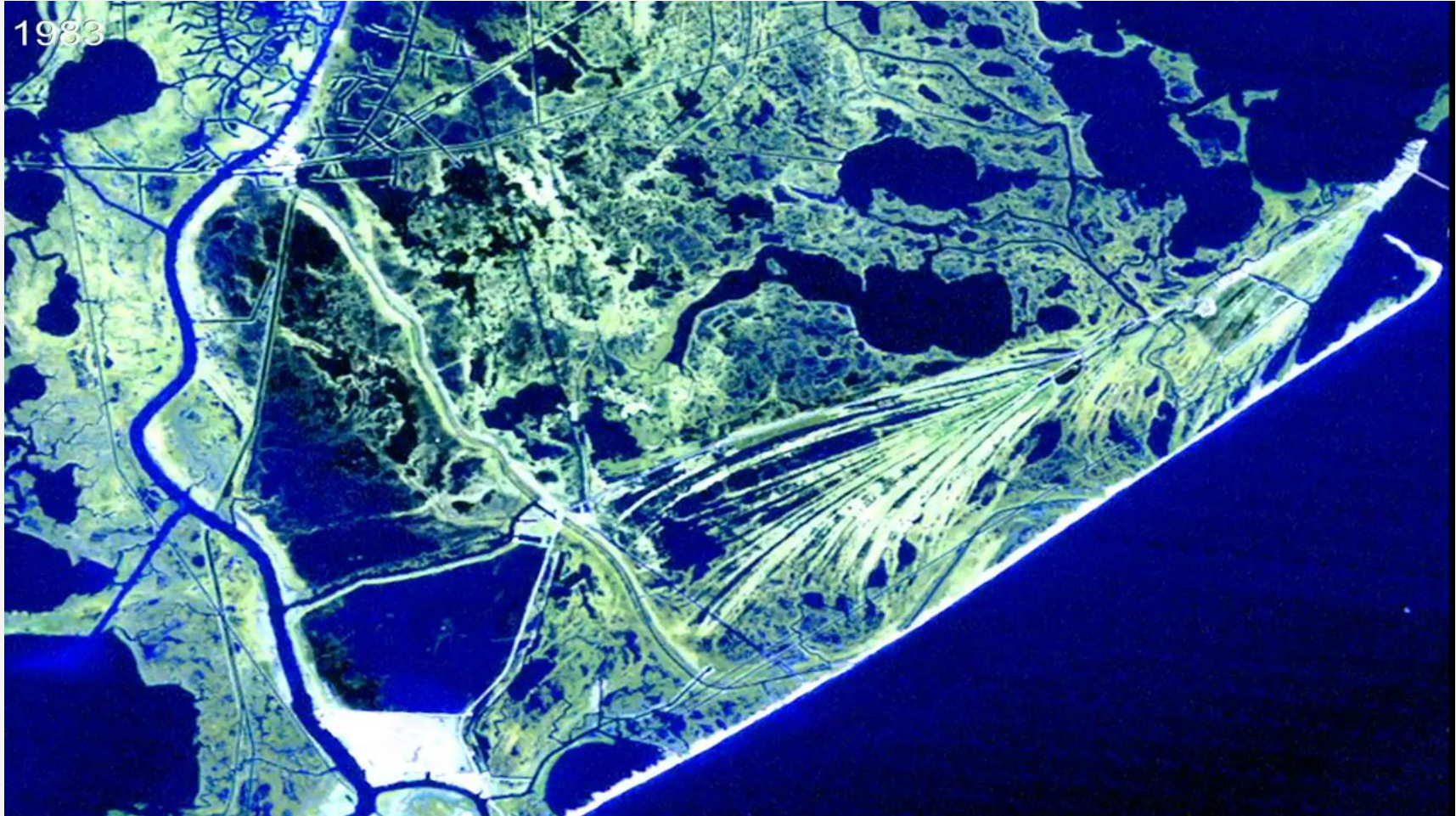


Fig. 14. Applied effective vertical stress at Sites A, B, and C induced from beach fill as calculated using RS2.



<https://www.youtube.com/watch?v=qBXjZr7HyTU>



<https://www.youtube.com/watch?v=PALwSgiLPI8>



Prabesh Bhandari

Pratibha Pandey



GeoVideo Competition ICFEE, 2018

<https://www.youtube.com/watch?v=nK4oDD-4CeE>