

Multivariate Nonlinear Modeling of Beach-profile Evolution: A Case Study along Pinellas County Coast, Florida

Student Researchers:

- o Jun Cheng (Team Leader)—College of Arts and Sciences—Geology
- o Yun Chen—College of Engineering—Industrial & Management Systems
- o Dongping Du—College of Engineering—Industrial & Management Systems
- o Meng Lu—College of Engineering—Computer Science & Engineering

Abstract:

Sandy beach is one of the most dynamic environments on the earth surface and changes rapidly and complicatedly in space and time. The shape of the beach is often represented by cross-shore profiles, factors controlling beach profile changes are complicated and interactive, including antecedent (initial) morphology, driving forces such as waves and currents, and sediment characteristics and availability. Spatial variations are rapid in that two adjacent beach profiles may change differently. Temporal scales can be dynamic in that large changes can happen in a short time during storms, while during calm conditions, little to no changes occur during a long period of time. The proposed study will examine time-series beach profile data collected on three adjacent barrier islands in Pinellas County, Sand Key, Treasure Island, and Long Key. Multivariate nonlinear data-driven modeling will be conducted to reproduce the measured changes and, once calibrated, to predict future changes. The ability to forecast beach change can aid coastal managers in efficiently managing public resources and critical coastal habitat.