USACE Dredging Operations and Environmental Research (DOER) program creates powerful beneficial use tool

Impact Statement: This computer program will allow USACE and other stakeholders to design beneficial use projects incorporating the complex engineering behavior of fine-grained soils. The coupling of PSDDF and PEST++ is a significant advance in USACE capabilities to design beneficial use projects and to understand the behavior of these systems.

As the USACE moves towards the 70/30 beneficial use goal, there is an immediate need for improved tools and capabilities to better understand the behavior of fine-grained dredge material. This summer, student trainee Jonathan Moore, a master's student at Virginia Tech, developed code to couple PEST++ and PSDDF to better predict soil consolidation and help inform the placement of fine grain soils in coastal environments. PEST++ is "a Software Suite for Parameter Estimation, Uncertainty Analysis, Management Optimization and Sensitivity Analysis". PSDDF is a 1-D consolidation finite difference software that predicts the temporal change in surface elevation of placed fine grained soils. To do this, PSDDF requires soil property data from lab and field testing. However, getting accurate measurements of soil properties can be difficult. PEST++ enables testing to be done to determine how sensitive PSDDF is to soil input properties and allows PSDDF to be used in an inversion problem. For example, if a coastal design requires a certain final surface elevation that information can be provided to this coupled software and be used to determine a placement strategy.

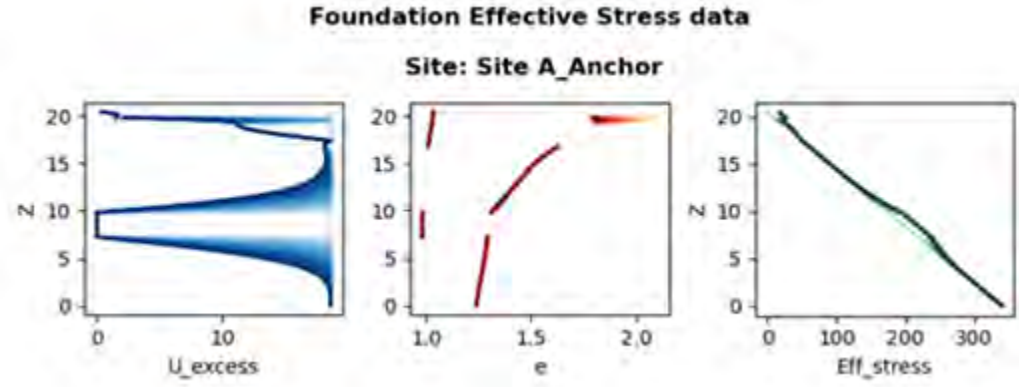

Figure 1. Comparison of PSDDF-PEST++ and observed field data from the Caminada Headlands nourishment project in southern Louisiana.

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