C SHORE: Cross-shore numerical model
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SUMMARY
- CSHORE is a one-dimensional time-averaged nearshore profile model for predictions of wave height, water level, wave-induced steady currents, and beach profile evolution and stone structural damage progression.
- This is NOT an open source code, developed by the USACE and Delaware University. Executable and manual can be downloaded from https://sites.google.com/site/cshorecode/
- Applied to spatial scales of 100m to 10 kms and time scales of hours to days (decadal simulation under development)
- Profile change is driven by gradients in alongshore suspended and bed-load sediment transport.
- Shallow water hydrodynamics driven by wind and waves
- Profile can be made of sediment types and three sediment fractions (sand, gravel or stone)
- Representation of swash zone and over-topping

CSHORE consists of the following components: a combined wave and current model based on time-averaged continuity, cross-shore and longshore momentum, wave energy or action, and roller energy equations; a sediment transport model for suspended load and bed load; a permeable layer model to account for porous flow and energy dissipation; formulas for irregular wave run-up; a probabilistic model for an intermittently wet and dry zone on impermeable and permeable bottoms for the purpose of predicting wave overwash of a dune and armor layer damage progression, respectively; a drag force model for piles interacting with waves and sand dunes; and a dike erosion model by irregular wave action.

ASSUMPTIONS
- Local alongshore uniformity is assumed (i.e. this model cannot be applied to a beach with large alongshore variability)
- Cohesionless uniform sediment size distribution (sand, gravel or stone)
- Hydrodynamic modelling in CSHORE for the sediment transport modeling is limited to the mean and standard deviation of the free surface elevation and depth-averaged cross-shore and longshore velocities on the impermeable and permeable bottoms of alongshore uniformity.

Data
- The model requires an offshore (~unaffected by refraction, shoaling and shadowing) wave data and the Still Water Level at the beginning and the end of the simulated period.
- Natural sediments are represented by the single diameter, specific gravity, and fall velocity.