Grand research challenges #1:
Models and validation

•Compounding, sequential and multivariate extreme events near the coast (e. g. sea-level rise, flooding etc.) require a more integrated approach to modeling their impacts.

•Model resolution must continue to increase to better represent small-scale processes associated with surface-atmosphere interactions at both the air-sea and land-atmosphere interfaces, identify critical resolution for the coastal problem.

•Coastal zone characterized by larger uncertainties, and models demonstrate less degree of confidence in simulating coastal processes/impacts.

•Use of hybrid approaches to model rare events (e.g. development of statistical dynamical/ML models that leverage observations).

•Improvement in model physics (investigate atmospheric boundary layer parametrization's role in modeling coupled processes, role of LES).

•Novel (specific science questions-driven) observational datasets and novel usages, to better understand the systems and validate them.

Grand research challenges #2: Metrics

Current widely-used metrics are inadequate to coastal impacts from TCs/Precipitation extremes, unable to quantify model ability to simulate coastal storms.

While there are many land-atmosphere coupling metrics, very fewer for atmosphere-ocean/lake coupling and land-ocean/lake coupling.

New metrics, which are interpretable, encapsulate physical processes and better capture effects of complex large-scale processes on storm characteristics, must be developed.

Two types of metrics are needed: Diagnostic (Tell us what is wrong with the model) and Process-based (Tell us why its wrong)