



## **Extreme waves from tropical cyclones and climate change in the Gulf of Mexico**

Christian M. Appendini (1), Adrian Pedrozo-Acuña (2), Rafael Meza-Padilla (1), Alec Torres-Freyermuth (1), Ruth Cerezo-Mota (1,3), and José López-González (1)

(1) Instituto de Ingeniería, Universidad Nacional Autónoma de México, Sisal, México, (2) Instituto de Ingeniería, Universidad Nacional Autónoma de México, CU, México, (3) CONACyT-UNAM

Tropical cyclones generate extreme waves that represent a risk to infrastructure and maritime activities. The projection of the tropical cyclones derived wave climate are challenged by the short historical record of tropical cyclones, their low occurrence, and the poor wind field resolution in General Circulation Models. In this study we use synthetic tropical cyclones to overcome such limitations and be able to characterize present and future wave climate associated with tropical cyclones in the Gulf of Mexico. Synthetic events derived from the NCEP/NCAR atmospheric reanalysis and the Coupled Model Intercomparison Project Phase 5 models NOAA/GFDL CM3 and UK Met Office HADGEM2-ES, were used to force a third generation wave model to characterize the present and future wave climate under RCP 4.5 and 8.5 escenarios. An increase in wave activity is projected for the future climate, particularly for the GFDL model that shows less bias in the present climate, although some areas are expected to decrease the wave energy. The practical implications of determining the future wave climate is exemplified by means of the 100-year design wave, where the use of the present climate may result in under/over design of structures, since the lifespan of a structure includes the future wave climate period.