

Title: 'Oceanic and Atmospheric Sources of Tropical Cyclone Predictability'

Authors: Christina M. Patricola¹ with Ping Chang², R. Saravanan², Wei-Ching Hsu², Dan Fu², Daithi A. Stone¹, and Michael F. Wehner¹

¹ Lawrence Berkeley National Laboratory

² Texas A&M University

Abstract: Tropical cyclones (TCs) are among the costliest and deadliest natural hazards. This research improves prediction of seasonal to centennial Atlantic TC activity by understanding the physical relationships between TCs and modes of climate variability, using observations and high-resolution climate models. One major source of seasonal TC predictability is upper ocean temperature patterns, which can be predictable in advance of the hurricane season and can influence environmental favorability for TCs. I will discuss the compensating and constructive influences of Atlantic and Pacific sea-surface temperature patterns on TCs, as well as the mechanisms by which the location and intensity of tropical Pacific warming during El Niño impact TCs. In addition, the roles of atmospheric tropical easterly waves and atmospheric internal variability on seasonal TC activity will be quantified. Furthermore, reliable future TC projections depend on our coupled atmosphere-ocean climate modeling capability. Systematic climate model biases are found to hinder representation of Atlantic TCs in the coupled system, pointing to needed improvements in model representation of specific physical processes. Finally, the influence of climate change on the intensity and precipitation of recent impactful hurricanes in convection-resolving climate model simulations will be discussed.