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**Rain-induced dissipation in hurricanes**[1] TAPAN SABUWALA, GUSTAVO GIOIA, PINAKI CHAKRABORTY, Okinawa Institute of Science and Technology — Hurricanes originate from a potent mix of atmospheric and oceanic conditions, and manifest intensely swirling winds and torrential rains. The drag forces on the falling raindrops act to dissipate energy, which, in the context of global precipitation, has been shown to play a key role in global atmospheric circulation. And yet, the role of rain-induced dissipation in the energetics of a hurricane remains uncharted. Here, using dimensional analysis and satellite data assimilated from the Tropical Rainfall Measuring Mission, we propose a simple model of rain-induced dissipation in a hurricane. We modify Emanuel's idealized heat engine model of hurricanes by incorporating the rain-induced dissipation and predict the maximum intensity a hurricane can achieve for a given set of atmospheric and oceanic conditions. We find that the modified model predictions are closer to the observed data as compared with Emanuel's model. Further, we use the modified model to predict inter-annual trends in various metrics of hurricane activity in the North Atlantic basin and show that the model predictions compare well with the observed trends. We conclude that rain-induced plays a significant role in the energetics of hurricanes and should be incorporated in global climate models.

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