6.2 Tropical cyclones in global convection-permitting MPAS simulations.

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Traditionally, tropical cyclone (TC) track forecasts are based on global model predictions whereas TC intensity forecasts are based on regional model predictions since the grid spacing of global models (~10-15 km) is inadequate to accurately simulate the TC inner core. However, this approach is not ideal because global and regional model solutions are often inconsistent. One way to overcome this problem is to use global models with high enough resolution to accurately simulate the TC inner core. To determine whether global-convection permitting models can, in principle, skillfully predict TC track AND intensity, TCs were analyzed in several simulations produced with the Model for Prediction Across Scales (MPAS) on a 4-km globally uniform mesh. Tracks and intentensities of the simulated TCs were evaluated with “best track” data and furthermore compared against surface wind analyses and rainfall observations. Overall, the evaluation demonstrates that the 4-km MPAS tends to spin up more TCs than observed. While capturing the intensity evolution of 2012’s Typhoon Son-Tinh, the model generally over-intensified TCs in the Indian Ocean and central Pacific. These biases indicate that MPAS needs to be improved before it can be a “one-stop shop” for accurate TC track and intensity forecasts across the globe.