In late October 2012, Storm Sandy made landfall near Brigantine, New Jersey, devastating surrounding areas and causing tremendous economic loss and hundreds of fatalities (Blake et al., 2013). Central questions to be addressed include (1) to what extent the lead time of severe storm prediction such as Sandy can be extended; and (2) whether a high-resolution global model can help effectively illustrate the complicated physical processes that may contribute to the improvement of high-impact storm predictions.

In this study, we investigate the predictability of Sandy with a global mesoscale model and focus on short-term (or extended-range) genesis prediction as the first step toward the goal of understanding the relationship between extreme events, such as Sandy, and the current climate. We first present 10 track and intensity forecasts of Sandy initialized at 00Z and 12Z October 22-26, 2012, realistically producing its movement with a northwestward turn prior to its landfall. We then show that three experiments initialized at 00Z October 16-18 captured the genesis of Sandy with a lead time of up to six days and simulated reasonable track and intensity in the next two-day period of 18Z October 21-23. Results suggest that the extended lead time of formation prediction is achieved by realistic simulations of multi-scale processes, including (1) the interaction between an easterly wave and a low-level westerly wind belt (WWB); (2) the appearance of the upper-level trough at 200-hPa to Sandy’s northwest. The low-level WWB and upper-level trough are likely associated with a Madden-Julian Oscillation.

References: