403 - How Far in Advance Can Deep Learning Predict Tropical Cyclone Formation?

Tuesday, January 30, 2024

3:00 PM - 4:30 PM

Hall E (100 Level, The Baltimore Convention Center)

Abstract

Predicting tropical cyclone (TC) formation is currently based on consensus among operational full-physics models, which can provide good information on tropical cyclogenesis several days in advance. This numerical approach however provides also a high false alarm rate, thus hampering the operational effort in early prediction of TC formation. Using common deep-learning architectures including the residual net (ResNet) and UNet, we show that these deep-learning models could provide a promising capability for predicting TC formation in the North Pacific basin from a given set of large-scale environments up to 2 days in advance. However, the forecast skill by deep learning quickly decays afterward as compared to numerical models. Our sensitivity analyses also show that both of these architectures perform the best when using a large domain covering the entire Pacific Ocean for input data, as compared to a smaller subdomain in the western Pacific. The results in this study present an alternative way to predict or detect TC formation beyond the traditional vortex-tracking methods in the current numerical weather prediction.

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