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Simulating Convective GWs forced by Radar-Based, Neural-Network-Predicted Diabatic Heating

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Convection, both observed and modeled, generates gravity waves (GWs) that significantly impact large-scale circulations in the stratosphere and above. However, models that permit convection and resolve the GWs they generate cannot reproduce the timing, location, and intensity of the actual convective cells that generate the observed convective GWs. This issue prevents comparison of observed and modeled convective GWs and model validation/evaluation.

Here, convective latent heating is predicted based on radar observations and provided to an idealized version of WRF, allowing WRF's dynamics to generate convective updrafts/downdrafts and generated convective GWs both mechanically and diabatically. Two methods are used to predict convective latent heating: the composited lookup table of Bramberger et al. 2020 and neural networks (NNs) using the same, and additional, input variables. Offline performance of the NN-predicted latent heating can be improved over the previous method when more input variables are used. Preliminary comparisons of modeled and observed (via superpressure-balloon and satellite) convective GWs will be presented.