

Data-Driven Interpretable Equation for Predicting Convective Precipitation.

Author: Sara Shamekh

Precipitation continues to be one of the most challenging variables to model in both traditional climate models and modern data-driven ones. Climate models typically do not reproduce the rain distribution accurately, with most underestimating heavy precipitation. Many unknowns still exist, including the exact dependency of precipitation on its environmental conditions (both thermodynamic and dynamic) as well as the role of small-scale structures such as convective organization. Here, we use observational data and equation discovery to derive a transparent and interpretable equation for convective precipitation. We show that precipitation can be accurately predicted if the convective area is known, and this prediction can be modestly enhanced with the inclusion of a metric for organization. The prediction accuracy dramatically decreases when only large-scale conditions are known. The discovered equation not only reveals the dependency of precipitation on its environmental conditions but can also be used to evaluate predicted precipitation by AI or convection schemes.