

# **Using artificial neural networks for generating probabilistic subseasonal precipitation forecasts over California**

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## *Abstract:*

Ensemble weather predictions from global forecast systems require statistical postprocessing in order to remove systematic errors and to obtain reliable probabilistic forecasts. Many traditional postprocessing methods are based on statistical models that make parametric assumptions about the forecast distribution and/or the relationship (e.g. linearity) between predictors and predictands. A number of recent papers, however, have demonstrated for ensemble temperature and wind speed forecasts that more accurate predictions can be obtained using artificial neural networks (ANNs) for statistical post-processing. Here, we propose a statistical post-processing approach for precipitation forecasts that is built around an artificial neural network (ANN) and addresses the statistical peculiarities of precipitation as well as the challenges that come with the low signal-to-noise ratio encountered at subseasonal forecast lead times.

Our basic approach uses only precipitation forecasts from a numerical weather prediction model and geographic information as predictors. In a subseasonal forecast context, however, predictors like geopotential height at 500 hPa (Z500) and total column water (TCW) may be more useful since the NWP models may have better skill in predicting large-scale weather patterns than surface weather variables at a specific location. We therefore propose an extension of our basic framework that uses a convolutional neural network to process images of Z500 and TCW over a larger domain and uses them as predictors for localized precipitation amounts.