



## Conditional Distribution Modeling of Rainfall from One Product Given Another

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The lack of statistical models to derive ensembles of realistic rainfall values given the less-accurate satellite rainfall estimates is a major setback for the utilization of satellite rainfall products in hydrological and other applications. In this study, we present a new statistical model that can be used to generate ensembles of rainfall values that contain actual rainfall values given satellite rainfall estimates. Because rainfall can be zero with strictly positive probability, the conditional model is a mixture of a non-parametric positive continuous distribution and a point mass at zero. The model is developed and validated using the less-accurate CMORPH satellite product and the more accurate NEXRAD product over the Oklahoma region in the United States. The rainfall values generated using this model are more informative than deterministic satellite rainfall estimates since the whole conditional distribution enables users to take appropriate actions according to their own risk assessments and cost/benefit analyses.