



## **An Object-based Approach to the Verification of Precipitation Field**

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Accurate representation of observed precipitation spatial patterns and structures is essential for climate studies and hydrologic applications. A number of coordinated verification activities have been established to evaluate the accuracy of precipitation estimation against ground observations. In general, these activities have focused on pixel-based measures of errors. The pixel-based verification measures summarize pixel-to-pixel differences between observations and estimates. However, while providing valuable information, these measures do not explicitly quantify errors related to spatial patterns, structure, and placement of precipitation. In this study, an object-based verification approach is proposed to provide diagnostic information regarding the ability of a model to depict the spatial characteristics of precipitation entities. This object-based approach is developed for the verification of localized precipitation areas focusing on their spatial and geometric features. An image processing technique known as the watershed transformation is adopted in the object-based approach to detect the closely spaced, but separable localized precipitation areas. The object-based approach then uses a distance measurement for selected precipitation object attributes by estimating the interest values. Three verification metrics are summarized to determine the overall performances of precipitation estimations. A case study using this object-based approach for Mesoscale Verification Inter-Comparison over Complex Terrain is discussed.