

7. Evaluation of New Analyses and Methods for Verification of Cloud Predictions

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Verification of gridded cloud predictions continues to be a challenge, particularly with regard to obtaining information about how well forecasts replicate spatial features. Recently, a variety of spatial verification methods (e.g., object-based, neighborhood, scale separation, image warping) have been developed, primarily focused on application to numerical weather prediction (NWP) model forecasts of precipitation. Although these approaches are suitable for application to any variable characterized by coherent spatial features, they have not been widely applied to other fields. In a project collaboration between the DTC and the Air Force 557th Weather Wing, a number of new approaches for evaluation of gridded cloud predictions have been examined. The forecasts included advection products as well as predictions from NWP models. The analyses used included the World Wide Merged Cloud Analysis (WWMCA) and WWMCA Reanalysis. WWMCA is a cloud analysis built from seventeen different satellites, including geostationary and polar orbiters. It includes many fields, including cloud fraction, cloud base, cloud top, along with cloud layer and phase information. WWMCA is currently used for cloud verification at EMC within the Mesoscale Modeling Branch.

The verification approaches examined include the Method for Object-based Diagnostic Evaluation (MODE); several distance measures; the Structure, Amplitude, and Location (SAL) approach; and image warping. Some of these methods are available in the Model Evaluation Tools (MET), the state of the art verification package supported to the community via the DTC, and others are slated for inclusion in MET soon. While the methods were tested using Air Force cloud analyses, they are applicable to similar individual satellite cloud products, including those from the recently launched GOES-R. Results of the application of these different approaches to a set of advection and NWP-based cloud amount predictions will be presented; positive and negative aspects of the application of each method will be discussed.