# The Scale Sensitivity experiments of Precipitation Neighborhood Ensemble Probability method

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Abstract The Precipitation Neighborhood Ensemble Probability Method is a new method to deal with the uncertainty of high resolution ensemble forecast. Based on the 24-h accumulated precipitation data from May to July 2017 of GRAPES (Global and Regional Assimilation and Prediction Enhanced System) regional ensemble forecast system. The experiments of precipitation neighborhood ensemble probability method were carried out. At the same time, aiming at the equal weight and neighborhood scale problems of neighborhood probabilistic method, two kinds of weight correction schemes are designed, which are weight correction neighborhood scheme and binary weight correction neighborhood scheme respectively. Meanwhile, the grids correlation and sensitivity experiments of four groups of precipitation probability forecasts were implemented by using ensemble probability forecast, equal weight neighborhood ensemble probability method, weight correction neighborhood ensemble probability method and binary weight correction neighborhood ensemble probability method. The results of precipitation probability prediction were verified by multiple probability scores, which show that: (1) the precipitation probability scores of neighborhood calculation scheme are superior to the original ensemble probability forecast method. Although the precipitation probability scores of the three neighborhood set probability methods have their own advantages and disadvantages. For example, the relative working characteristic area (AROC) score of the equal weight neighborhood ensemble probability method is slightly better. However, the reliability of precipitation probability prediction is determined by weighted correction neighborhood ensemble probability method and binary weighted correction neighborhood ensemble probability method. (2) The forecast skill of the precipitation neighbourhood ensemble probability methods is very sensitive to the neighborhood scale. The optimal neighborhood radius is 5-8 times the horizontal grid scale of the model. (3) The two neighborhood ensemble probability methods combined with weight correction have largely improved the forecast skill of the threshold more than 10mm/24h and provided more objective probability forecast results. Generally speaking, the precipitation neighborhood ensemble probability method has a well application values. By selecting the appropriate neighborhood probability method and neighborhood radius, more objective prediction results can be obtained.

Keywords Ensemble forecast, Precipitation probability forecast, Neighborhood method, Weight correction, Radius of neighborhood