

# Daily rainfall forecasting through an ensemble numerical weather prediction system with an AI-based integration strategy

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Typhoon rainfall is one of the most important water resources in Taiwan. However, heavy typhoon rainfall often leads to serious disasters and results in loss of lives and properties. To overcome this problem, the control of water by reservoirs is the most common measure. When a typhoon approaches Taiwan, the major goal of reservoir operation is to control floods. But as the typhoon leaves, the goal is changed to store sufficient water. To achieve these two goals, accurate typhoon rainfall forecasts are always required as an important reference for making appropriate reservoir operation decisions. In this study, by means of an ensemble numerical weather prediction system in Taiwan, the ensemble forecasts of typhoon rainfall are obtained. Furthermore, an artificial intelligence (AI) based strategy is developed to effectively combine these ensemble forecasts for providing better typhoon rainfall forecasts. To verify the performance of the proposed strategy, actual application is conducted to provide typhoon rainfall forecasts with a lead time of 1 to 3 days. The results indicate that the proposed strategy provides more accurate forecasts as compared to the simple mean of all ensemble forecasts. In conclusion, through the proposed strategy as well as the ensemble numerical weather prediction system, improved typhoon rainfall forecasts are obtained. The improved rainfall forecasts are helpful for making appropriate reservoir operation decisions during typhoons.

Keywords: Daily rainfall forecasting, Ensemble numerical weather predictions, AI-based integration strategy