

Abstract: A Watershed Level Early Flood Warning Approach by Using Grand-ensemble Weather Predictions: Verification and Application for a Case Study in the Linyi Watershed, Shangdong, China

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Abstract: Early and effective flood warning is essential to initiate timely measures to reduce loss of life and economic damage. The availability of several global ensemble weather prediction systems through the TIGGE archive provides an opportunity to explore new dimensions in early flood forecasting and warning. In this study we demonstrate how grand-ensembles can be used with multiple hydrological models for early flood warning in watershed level with the example of the major flooding event since the TIGGE archive from 3 numerical weather prediction (NWP) centers of CMA, ECMWF and NCEP became available after May 2007, i. e. the 29th of June to the 1st of July, 2007 monsoonal severe rainfall event in the Linyi watershed, Shandong Province, China. The ensemble forecasts from the three centers form a TIGGE grand-ensemble forecast (87 forecast members) by merging the single forecasts with equal weights. We use TIGGE weather forecasts to drive 3 hydrological models of XXT, TOP X and ESSI to provide early flood warning information on a catchment scale with probabilistic flood forecasting information up to 10 days in advance based on 4 warning thresholds (low, medium, high and severe) as defined by the watershed management authorities. Results illustrate that the flooding forecast using TIGGE data from NCEP forecast centre was closest to observations and that awareness for this case of flooding could have been raised as early as 8 days before the event, however, the Grand-Ensemble was found not performed better than each single Ensemble Prediction Systems. In particular, this study suggested that multi-hydrological models (instead of single hydrological model) produce more reliable forecasts of a flooding event and the subsequent forecasts with these several hydrological models provide increasing insight into the range of possible flood conditions, which, therefore, add significant value for an operational flood forecasting system.

Key Words: TIGGE; ESSI; XXT; TOPX, Flood warning; Grand-Ensemble

Submission area: TIGGE