

EGU22-3374

<https://doi.org/10.5194/egusphere-egu22-3374>

EGU General Assembly 2022

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## Real-time Flood Forecasting Using Numerical Weather Prediction System Through NICAM-LETKF Data Assimilation in the Prek Thnot River, Cambodia

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Flood is widely recognized as the most common and frequent natural phenomenon which currently threatens huge damage worldwide. The Prek Thnot River (PTR) in Cambodia is one of the flood-prone areas where severe floods occur every year and cause damage to residents downstream. This study aims to evaluate the forecasting performance of flooding in the PTR using near real-time datasets from satellite observation (i.e., GSMaP and GPM) and forecasted rainfall from NICAM-LETKF numerical weather prediction (so called GSMaPxNEXRA) dataset. GSMaPxNEXRA data is produced by Global Cloud Resolving Model with Data Assimilation. This study used a fully distributed rainfall-runoff-inundation (RRI) model for river discharge and water level simulations. The RRI model was calibrated and validated with gauged observed rainfall during flood events in 2000, 2001, 2007, 2010, and 2020 with satisfactory and acceptable results. The most recent flood event in 2020 was considered to evaluate real-time flood forecasting. The near real-time simulation indicated the results discharge and water level with statistical indicators  $KGE = 0.80$  and  $0.07$  and  $r^2 = 0.83$  and  $0.87$  for GPM and  $KGE = 0.48$  and  $-0.12$  and  $r^2 = 0.54$  and  $0.67$  for GSMaP. The GPM rainfall product outperforms GSMaP rainfall in the PTR. Flood forecast from the GSMaPxNEXRA showed an accuracy with  $KGE = 0.79$  and  $r^2 = 0.89$  (1-day forecast) to  $KGE = 0.66$  and  $r^2 = 0.76$  (5-day forecast). On the other hand, the performance of 1-day to 5-day forecast indicated with coefficient of extrapolation (CE) and coefficient of persistence (CP) between  $CE = -2.62$  and  $CP = -2.65$  for 1-day forecast to  $CE = 0.71$  and  $CP = -0.06$  for 5-day forecast. To conclude, real-time flood forecasting in the PTR was successfully assessed and evaluated in this study; however, the accuracy of flood prediction should be further improved in the future by considering data assimilation and machine learning.