

Interactive comment on “Data-driven Flood Analysis and Decision Support” by Meng-Han Tsai et al.

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After carefully reading the aims and scopes provided on the Journal website, we believe that our research fits within the outlined scope.

Our research outlines the development of new methods for the detection, mapping, monitoring, and modelling of natural hazards and their societal consequences. Taiwan is presented with challenges from a broad range of natural hazards such as typhoons, floods, earthquakes and landslides. In recent years, heavy rain has occurred more frequently compared with earlier decades, along with an increase in flood events. In terms of the response to this new challenge, we proposed a methodology which is designed to strengthen the capacity of early warning systems and thus provide communities with ample information regarding flood-related dangers.

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Our methodology integrated three processes: rainfall data acquisition, flood analysis, and visual presentation. In the data acquisition phase, we adapted the Ensemble Typhoon Quantitative Precipitation Forecast (ETQPF) as the input source in the typhoon scenario used to predict flood events. The ETQPF is a novel technique invented to improve the accuracy of rainfall forecasts especially for long-duration estimations. To cope with the challenges of flood prediction, we improved the analysis by incorporating an empirical rainfall threshold methodology. This methodology associated the maximum observed rainfall with the rainfall from the ETQPF to calculate whether it is in excess and thus judge whether a region will be subsequently flooded. Thus, flood hazards can be identified within the 368 districts which comprise Taiwan's 19 cities and counties. After completing the theoretical assessment, the strategies regarding how to respond to flooding were developed based on humanitarian needs, such as evacuating occupants, coordinating pumping systems for areas that need them, deploying disaster relief, etc. Therefore, our visually-aided module plays an important role in aiding Taiwan's decision makers by clearly presenting the flood assessments for the country.

The methodology presented in this research has already been put into place over the past few years in real operational cases during typhoon strikes and also during torrential rain periods over. Our core purpose is to facilitate improved efficiency during the decision phase. We have two main research findings: 1) A methodology which utilizes ICT (Information Commutation Technology) and Cloud Computing technology, which smooth the process from data acquisition to flood assessment. This technology can minimize the time spent collecting, analyzing, and integrating data and enable more time for coordinating resources like manpower, disaster relief, etc. 2) A visualization which helps practitioners understand the assessment results more efficiently and endeavors to reduce ineffective communication between different domain experts to achieve the best outcome.

We believe that our research corresponds to the aims of this Journal. We want to again thank the referees for carefully reading our manuscript and providing such constructive

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comments, which have helped in substantially improving the quality of our paper. We aim to continue with the intention to publish our paper at NHESS. Our future work will focus on providing concrete evidence to convince the public that our flood warning practices can be fostered by adopting a data-driven methodology.

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