



Efficiency of MRC Flash Flood Guidance System (MRCFFGS) for Northeastern Thailand : Case Study of Tropical Storm Impact in 2019-2020

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Abstract

Flash flood is a globally drastic natural disaster. Hence, the World Meteorological Organization (WMO) arranges cooperation to develop a tool for flash flood forecasting in each WMO region which is Flash Flood Guidance System (FFGS). In Thailand, FFGS is implemented under a collaboration with the Mekong River Committee and it is called MRCFFGS. This system uses a hydrological model to calculate the capacity of water restoration inland before triggering flash floods in a small river basin. The study of MRCFFGS in Thailand shows that in the Northeast region affected by three tropical cyclones, KAJIKI, PODUL, and SINLAKU, it is found the statistic skill score callings as the following: The probability of detection (POD) is 0.14, and false alarm ratio (FAR) is 0.33. It is not a good score for prediction especially POD. After adjusting the FFG value by half, the result shows that POD is 0.50 and FAR is 0.36. While adapting the FFG value by one-third, the result reveals that POD is 0.50 and FAR is 0.42. In this study, it can be concluded that adjusting the FFG value by half shows the best result. It is suitable for flood simulation and prompt response to rainfall

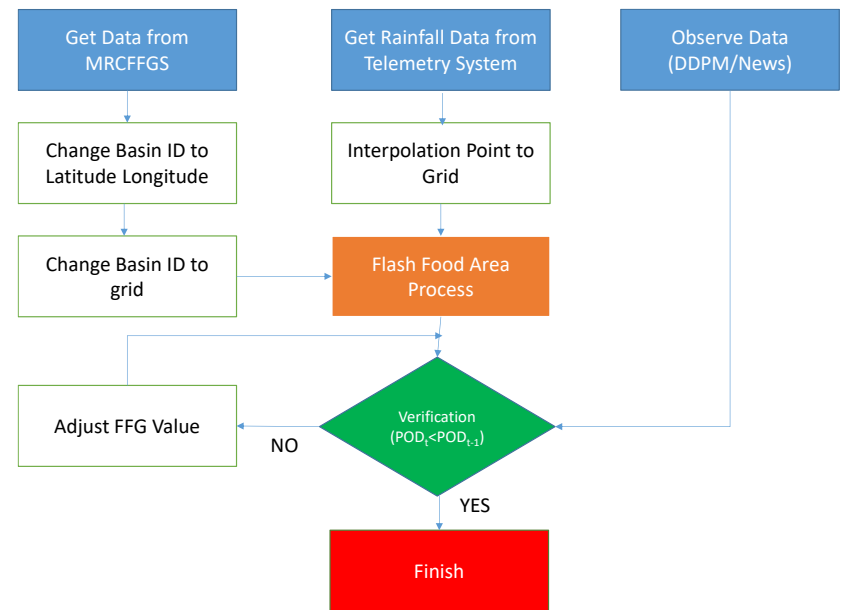
Introduction

Flash flood is one of the most dangerous natural disasters. In a year, at least 5000 people lost their lives and many people lost their properties, it is 85% of casualties of the flood came from the flash flood. Flash flood occurs in a short time and small particular area, unlike overbank flow which occurs in the large area in the basin. The flash flood guidance system is supported by WMO, HRC, NOAA, and USAID. The mission of this system is to contribute to forecasting flash flood events for meteorologists and relate agents in each member country and regional area and enhancing flash flood warning for the overall area of the globe but separate responsibility by zone such as country. To launch flash flood warning issued, because of its flash in time and small of the region, some flash flood cases are miss and the information from FFGs show only heavy rainfall and soil moisture saturation in area, meteorological and hydrological expertise is required to deal with flash flood warning issue inclusive with high-resolution weather station network and 24-7 monitoring (WMO, 2016)

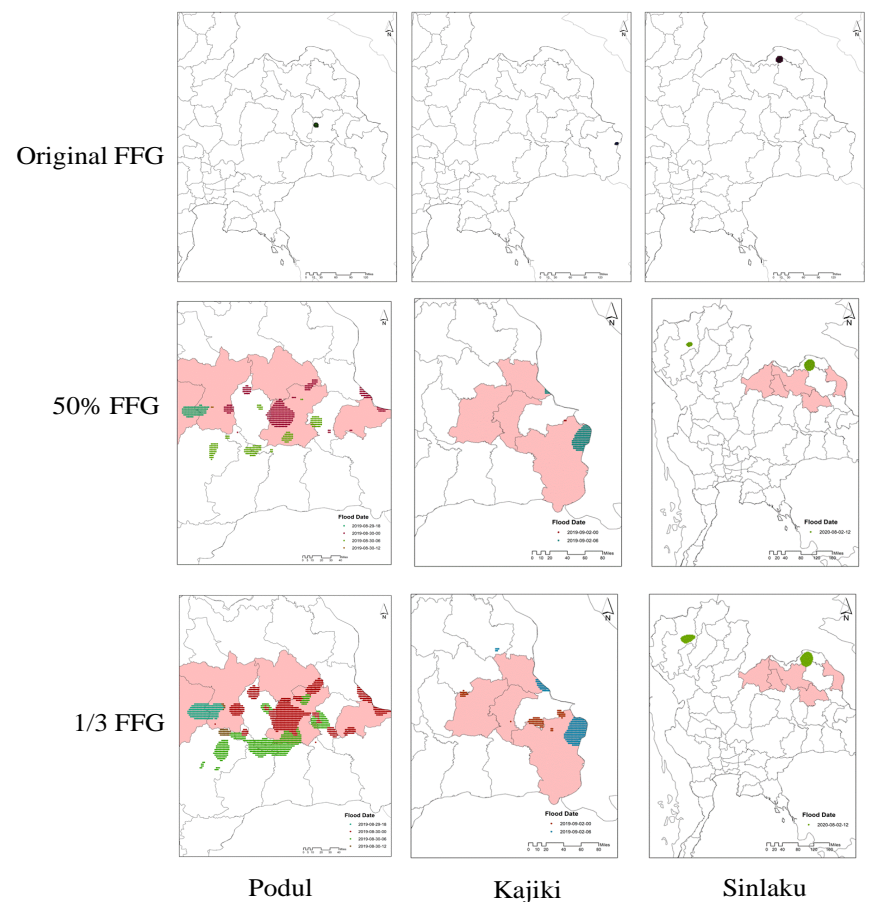
FFGS that cover Thailand area is operated under MRCFFGS, system development in term of Mekong river basin. This study aims to correct the product of MRCFFGS by comparing it with ground truth. From flash flood operation finds that FFG rarely launch issue in flood warning which congenial with the study of Patsinghasanee et al. (2018) so bias correct as a result of the system are needed cause we cannot correct in process of the system.

Methodology

1. Write Program computer script to download data from MRCFFGS and connect to TMD rainfall database for verification FFGs
2. Develop a script to transform format FFG from polygon of the small basin to grid cell of FFG and transform point rainfall to areal rainfall as grid cell of rainfall. The two grids are the exactly same size.
3. Comparing two types of data as mention earlier for two cases that have an influent of TC (2019 and 2020).
4. Bias correction for FFGs



Result



FFG	POD	FAR
FFG (Non adjusted)	0.14	0.33
50% FFG	0.50	0.36
1/3 FFG	0.50	0.42

Conclusion

Two types of reducing rainfall are designed, 50% FFG and one-third FFG, to prove appropriate of the northeast of Thailand. POD scores are 0.5 in both cases but FAR scores are poorer in both cases especially in one-third score reduce to 0.42. 50% FFG is suitable for this area.

Reference

- Patsinghasanee, S., Laonamsai, J., Suwanprasert, K. and Pracheepchai, J., 2018. Evaluation of MRC Flash Flood Guidance System for the Southern Thailand: Case study from 28 th November to 4 th December 2017. The 23rd National Convention on Civil Engineering. Nakhon Nayok, Thailand
- WMO, 2016. Flash Flood Guidance System (FFGS) with Global Coverage. Geneva.