Reviewer #1

People's response to flood warnings is an important factor that affect the performance of flood evacuation processes. This study develops an agent-based model to simulate the people's response processes to the warnings, and to determine the threshold for issuing flood warnings. The Liulin Town in China is selected to analyze the role of flood warning threshold and forecast variance in flood fatality rates. The modeling results provide interesting insights into effective flood management. Overall, this is a well conducted research with clear presentations. Below are some minor comments:

Response: Thank you very much for your comments that have significantly improved the quality of this study. In the following, we have detailed how these comments (in black) are raised and our responses (in dark blue).

Comment 1

Table 3 lists three parameters to represent flood forecast skills. Please add some text to describe the meaning of these parameters, and how to quantify these parameters in real-world flood warning scenarios.

Response 1

Thank you for the valuable comment. Indeed, these three parameters are highly generalized, and there is insufficient explanation to help readers intuitively understand their meanings and how to quantify their values.

If the probability distribution of forecasted rainfall is assumed to be normal distribution, the deviation between the median value of forecasted rainfall and the actual rainfall (denoted by η) is determined by σ_{PA}. In other words, η follows a normal distribution with a mean of 0 and a variance of σ_{PA}^2. Therefore, there is a positive correlation between $|\eta|$ and σ_{PA}. For example, assuming the actual rainfall is 0.5, if $\sigma_{PA} = 0.05$, the median value of forecasted rainfall from each probability forecast is around 0.5. However, if $\sigma_{PA} = 0.15$, the median value of forecasted rainfall is likely to deviate from 0.5 (see **Figure 1**). In fact, the probability of η in the interval (-3σ_{PA}, 3σ_{PA}) is 99.73%.

The variance of forecasted rainfall is determined by μ_{PP}. For example, the probability distribution of forecasted rainfall is relatively concentrated if $\mu_{PP} = 0.1$ while the probability distribution of forecasted rainfall is relatively deconcentrated if $\mu_{PP} = 0.2$ (see **Figure 2**). And the variance of the variance of forecasted rainfall is determined by σ_{PP}. As shown in **Figure 3**, by conducting three probability forecasts, there is a similar dispersion degree of probability distributions if $\sigma_{PP} = 0.01$ while there is a distinguish dispersion degree of probability distributions if $\sigma_{PP} = 0.1$.

In real-world flood warning scenarios, these three parameters can be estimated by statistical methods, such as moment estimation method and maximum likelihood estimation method. Specifically, the actual rainfall and the corresponding probability forecasting results in the history can be collected under a certain forecasting skill. Each rainstorm event is taken as a sample, and the observed rainfall, the median value of probability forecasted rainfall, and the variance of probability distribution for the rainstorm event are estimated. By collecting multiple rainstorm events, these three parameters can be estimated using statistical methods for a certain forecasting skill.

We will add the above discussion to the manuscript.

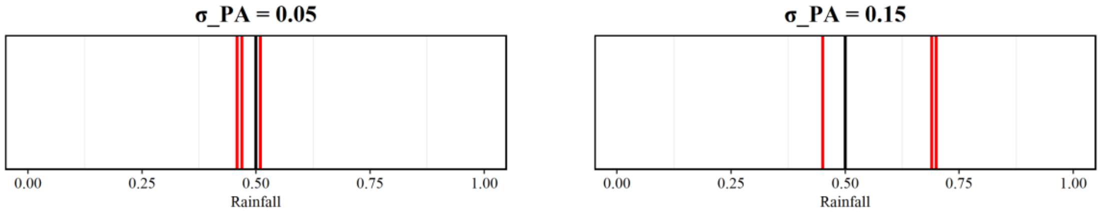

Figure 1. The median value of forecasted rainfall (represented by the red lines) by conducting three probability forecasts under different σ_{PA}. The black line represents the actual rainfall. The value of forecasted rainfall is normalized to 0-1

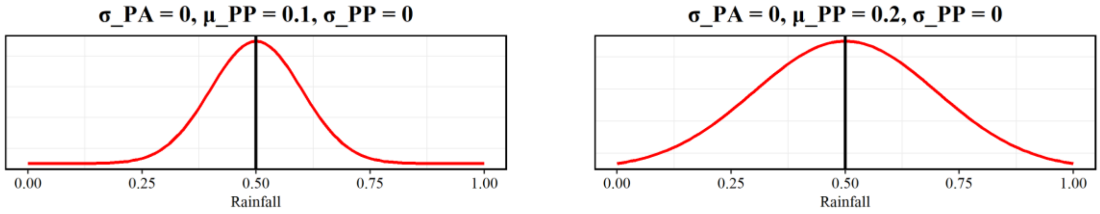

Figure 2. The probability distribution of forecasted rainfall (represented by the red line) under different μ_{PP}. The black line represents the actual rainfall. The value of forecasted rainfall is normalized to 0-1

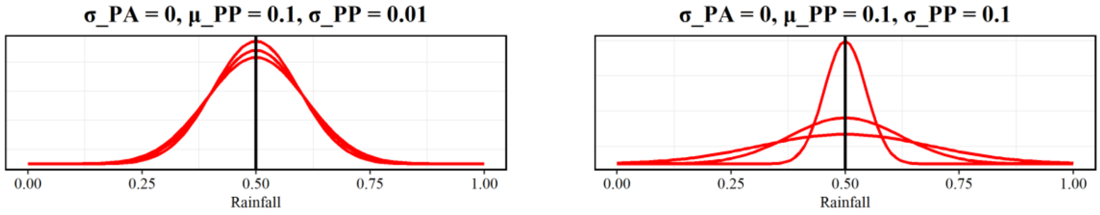

Figure 3. The probability distributions of forecasted rainfall (represented by the red lines) by conducting three probability forecasts under different σ_{PP}. The black line represents the actual rainfall. The value of forecasted rainfall is normalized to 0-1

Comment 2

The model is quite complex with a lot of parameters. A modeling framework diagram is needed to show all the model components, the associated parameters and their relationships.

Response 2

Thank you for the constructive comment. We will add a modeling framework that determines the warning threshold based on people's response processes to the manuscript. The modeling framework includes the development of an ABM and its surrogate model for simulating the people's response processes to flash flood warnings and a chain simulation of "forecasting – warning - response" (see **Figure 4**). First, rainstorm probability forecasting is performed according to actual rainfall. And then the warning administrators make decisions to issue warnings based on the rainstorm probability forecasting and warning thresholds. If it is decided to issue warnings, the warning information and the actual rainstorm jointly drive the surrogate model of ABM to simulate the people's response processes. Finally, the casualty rate is estimated and the warning threshold that minimizes the casualty rate can be determined based on the proposed modeling framework.

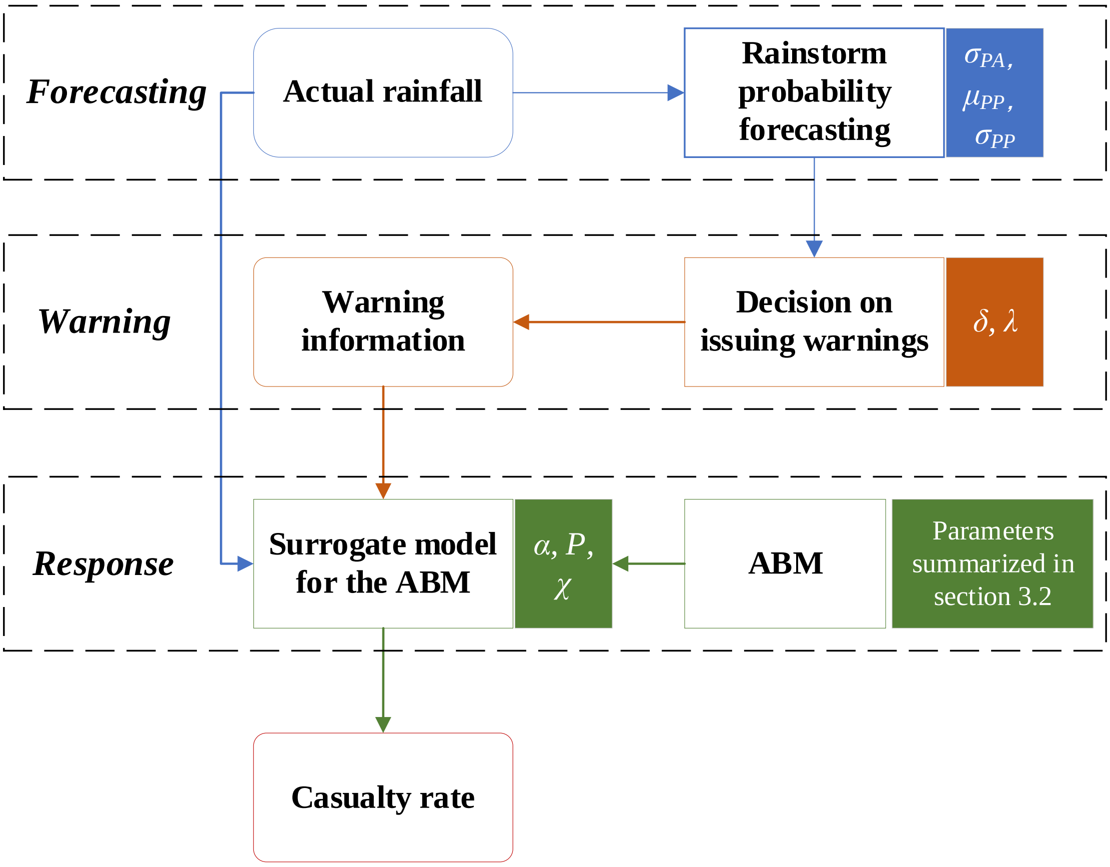

Figure 4. The proposed modeling framework for determining the warning threshold based on people's response processes (the parameters in a simulation step are indicated by a rectangular box with the corresponding color background)

Comment 3

Equation (1) describes the fatality probability as a function of flood water depth and flood water velocity. Where does this equation come from? A concise literature review on flood causality function could be helpful to make the paper more solid.

Response 3

Thanks for your comments. The equation comes from the experimental results of Takahashi et al. (1992). Current studies generally estimate flood casualties through two types of influencing factors: environmental factors, and victim characteristics (Petrucci, 2022). The first type includes the hazard conditions (measured by flood depth and velocity) and the location and environments where the hazard occurs (e.g., urban/rural, indoor/outdoor, and distance from floods) (Creutin et al., 2009; Penning-Rowsell et al., 2005; Spitalar et al., 2014). The second type includes the attributes of people (e.g., age, gender, weight, and height), the status of the residence, and whether the victim has taken adaptive or emergency measures (Papagiannaki et al., 2022; Petrucci et al., 2019; Petrucci, 2022; Salvati et al., 2018). We will provide a detailed review to discuss the estimation of flood casualties.

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