

## ***Interactive comment on “Flood forecasting using transboundary data with the fuzzy inference system: The Maritza (Meriç) River” by A. Aydın et al.***

### **Anonymous Referee #1**

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This paper presents the application of the fuzzy inference system (FIS) to predict the streamflow at the Kirishane gauging station located in the River Maritza. The input data is the streamflow recorded at two gauging stations located upstream the site of interest: Plovdiv and Svilengrad stations. Four models are tested with different lag times. All of them use a triangular fuzzifier function with 26 members. The results show that the best model is the M2 that uses the predicted flow at Svilengrad in 2 hours and at Plovdiv in 4 hours as input. The authors conclude that the model can predict floods satisfactorily.

However, the paper in its current form has some important drawbacks that should be overcome before it can be considered for publication:

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- The observed data series used in the paper is quite short. A series of 12 days with a temporal resolution of two hours that includes an only flood event is used to calibrate the model. A longer streamflow series is required to calibrate and validate the proposed model. On one hand, a longer streamflow series should be used to calibrate the model, including a variety of flood events and catchment responses. In the other hand, some flood events should be used to validate the model.
- Another essential task is to show how the model improves other existing or simpler forecast models. Maybe, a simpler deterministic model that uses the travel time through the reach could give similar results.
- The model has not been validated. This is an essential step that should be included in the paper. Section 2.2 is not the model validation, but the model selection.
- The fuzzy inference system and the Mamdani model should be described in more detail. A section should be devoted to describe the proposed model.
- Different fuzzifier functions should be proved. The results of the sensitivity analysis to select the number of membership functions should be included in the paper.
- Something seems to be wrong with the determination coefficient formula shown in Eq. 4.
- The correlation coefficient values shown in Table 3 seem to be wrong. The correlation coefficient should give values between -1 and 1.
- Table 1 and Figure 5 should be removed from the paper.
- The paper concludes that the best model uses the prediction of streamflow at Svilengrad two hours ahead and at Plovdiv four hours ahead. I am not sure the authors could have these predictions to use the proposed model in real time. In addition, the Kirishane station is downstream the Svilengrad and Plovdiv stations. Consequently, it should be more coherent to use recorded streamflow in the past to forecast the streamflow at Kirishane in the future.

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