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Discussions

Interactive comment on "Identification of spatial and temporal contributions of rainfalls to flash floods using neural network modelling: case study on the Lez Basin (Southern France)" *by* T. Darras et al.

Anonymous Referee #2

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This paper applies KnoX methodology to extracting knowledge from a neural network model to better determine the contributions and time responses of several geographic zones of an aquifer. It is very interesting to read and learn how ANNs can be used to extract the geographical knowledge. The introduction section is nicely rewritten, which is interesting to read, while the remaining parts are difficult to follow and/or easy to lose the points. I do not see a solid conclusion about the extraction of knowledge from ANNs, instead the knowledge and/or inferences presented in the discussion section are mainly based on the authors' geographical senses, not on ANNs. To increase the

readability of this manuscript, I make a number of comments and/or suggestion for your consideration.

1. In Section 2 Artificial neural network modelling for better characterize processes: (1) There are many kinds of ANNs. It is suggested to mention what kind (type) of ANNs is used in the very beginning (Sec. 2.1) before going into details. (2) A brief presentation of the Knox method and why and how to implement the Knox method in this study should be provided.

2. In Section 4.1 From postulated model to neural network model: (1) The purpose (reason, logic) of this section should be given. (2) It will be of help to clearly present "The postulated model". (3) What is the point of "Application of the KnoX method would provide this quantification"? Why and how?

3. Figure 3 is crucial but difficult to follow (also not clear). For instance, what is the "elements used in Eq.4 and 5"? A more detailed description of the corresponding method and process would be helpful.

4. Model selection is done using cross-validation and a predefined number of training iterations. A more detailed description of cross-validation and the number of iterations should be given.

5. What does the "window-width" mean? Where is the number of hidden neurons? Is there anything to do with the "Optimisation" of the rainfall temporal window widths?

6. The symbol of variable (for instance, rz(k -d)) in Equation 4 is difficult to learn (read). It is suggested to re-design the symbol and formulation!

7. Page 3697: "The contribution of the previous measured discharges used as input to the model ranges from 21 to 30% (respectively 89 to 70% for total rainfall) depending on the considered model Tn (n = 1, 7). Nevertheless, only rainfall contribution values are considered (for a total of 100 %) because the measured input of discharge plays the role of state variable (Artigue et al., 2012)." How to verify those results?

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8. Section 4.4 Time distribution of contributions: (1) Line 5 on Page 3698: “Figure 4 shows the time distributions . . .,”, should it be Figure 5?

9. Figure 5 displays the Median and total spread of time distributions of North-western, North-eastern, Southwestern and South-eastern rainfall inputs contributions calculated from parameters of the 7 designed models. The fluctuations of North-western and North-eastern parts seem small and flat. How to tell (prove) the difference?!

10. This contribution calculus of Equation 5 is done for each exogenous input: rainfall or measured discharge, and for each designed model. However, in the Conclusion Section, I do not see “Moreover efficient new approaches were demonstrated to extract information from a set of parameters” and “Among these methods, the KnoX method can identify contributions from various geographic zones to discharge at the basin outlet”. More to address?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 3681, 2015.