

Interactive comment on “The extreme runoff index for flood early warning in Europe” by L. Alfieri et al.

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Received and published: 21 March 2014

The authors wish to thank the Reviewer, Dr. Massimiliano Zappa, for the positive and constructive comments provided on the discussion article. In the following we reply to the comments and questions posed.

#1: we agree with the reviewer that a comparison with discharge observations would provide a deeper insight on the skill of the proposed indicator. This comparison was not performed in this study because the method is based on a threshold exceedance approach, hence a comparison with observations would require the collection of observed streamflow and of warning thresholds for the same return period used in the forecast. The latter information was scarcely available, so we preferred to focus on a

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recent case study (i.e., the flood in Central Europe in 2013) where the exceedance of the selected threshold (i.e., 2-year return period) was clearly documented by media reports.

#2: The text in Sect. 4.1 was expanded as in the following: “In 14% of points, no exceedance of the 2-year return period was simulated in the considered time window, making the application and interpretation of the BSS more difficult. In these points the optimization of the timing of the forecasts often resulted in null or negative time shifts, due to the difficulty in matching a forecast threshold exceedances with no simulated ones.” On the other hand, when both simulated and forecast threshold exceedances occur, the optimal time shift tends to be positive, compared to the initial assumption stated in Sect 4.1 (2nd paragraph).

#3: The authors acknowledge that this evaluation approach based on all time steps penalizes the obtained forecast skills (compared to an event-based evaluation). An example of the same performance at the event scale is shown at the end of Sect. 4.1, to stress that the actual skills in early warning are likely to be higher. Further analyses at the event scale will be performed in future works, particularly for selected stations where observed streamflow can be collected. The text in Sect 4.1 was expanded to include further details on the approach and on the interpretation of the results.

Minor comments:

#1: We have added a sentence in Sect. 4.3, mentioning that further details on the flood and on the underlying atmospheric processes are described by Blöschl et al. (2013) and by Grams et al. (2014).

#2: The paper by Fiorentino et al. (1987) and partly that by Viglione and Blöschl (2009) show that critical storm durations which produce floods can sometimes be longer than the basin time of concentration. For this reason we chose 1.2 tc as limit, being twice the basin lag time. Reference to these papers is included in Sect. 2.2.

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#4: We agree. Figure 3 was modified according to the reviewer's suggestion.

#6: The right panel of Fig. 11 was taken from the EFAS web interface, for a dynamic reporting point on the Danube River near the city of Linz. It is shown for comparison with the corresponding ERI forecast, but cannot be easily reproduced/rerun with different graphic settings.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 7517, 2013.