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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Using damage reports to assess different versions of a hydrological early warning system" *by* D. Defrance et al.

Anonymous Referee #1

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"Using damage reports to assess different versions of a hydrological early warning system"

By Defrance et al.

The manuscript investigates the use of damage reports to assess flash flood prediction models in ungauged or poorly gauged basins. The topic is interesting and well suited to the readership of HESS. The data and the methods used in the work are suitable to the task and permit to gather interesting findings. However, the general organization of the paper and its presentation should be heavily revised before the work is suitable for publication in HESS. Owing to these limitations, I recommend moderate revisions for this work.

First of all, the English has to be strongly improved. I am not a native English speaking myself and to correct all language issues in the paper is not my task as a reviewer. Nevertheless, I reported below some examples of bad language use. In general, using the term 'alarm' instead of 'alerts' could contribute to improve the understanding.

One main issue with the work is that there is no clear framework for the use of damage data for the sake of flood model validation. Two points may be made here.

First, the paper should make clear what kind of flood damages are used in the work (and more in general, can be used for the stated purpose). Flood damage is a generic term which includes a number of categories of damages: direct and indirect damages; tangible and intangible damages. The flood damages which can be used for the scope of flood model assessment should include the varieties of harm which relate to the immediate physical contact of flood water to humans, property and the environment. This clarifies also the need to collect proper damage data. For instance, flood damage may include impacts due to debris flows and landslides triggered by the same rain event that produced the flood. I don't think that these data can be used for the validation of an hydrological model. Moreover, the paper should clarify how the damages are reported: are this data in monetary units, or it is just a list of impacts that generated damages?

Second: Flood damages result from the interaction of flood hazard and vulnerability. Using damages for flood model assessment implies that some hypothesis on the vulnerability are made (for instance: vulnerability is represented as spatially uniform, and do not show variability over years). These hypothesis should be reported and discussed.

Actually, this is made in a very cursory way at P4369 L23-27. This text should be made more comprehensive and moved to the introduction.

Specific issues:

Title: The title is someway misleading. The paper is not about an 'hydrological early

warning system'; it is about flash flood prediction in ungauged basins.

Abstract

P4366 L1-2: Flash floods are not affecting mainly the Mediterranean regions. Many flash floods occur also in other regions in Europe (a lot of them in the eastern-central part of Europe). See Gaume et al. (2009) on this.

P4366 L10-13: "as demonstrated by Irstea's "Adaptation d'Information géographique pour l'Alerte en crue" for "Geographic information adaptation for flood warning" (AIGA) flood forecasting system and by the new version of AIGA for high-altitude catchments". Please remove this element from the sentence. It sounds like an acknowledgment, and as such the abstract is not the correct place.

P4366 L10-18: There is very few quantitative information from the text here. The abstract should not just underline the need to extend the assessment of flash flood predictions on ungauged basins; it should provide in a few words what was gathered in the assessment by using the damage reports.

Section 1 Introduction

The organization of the Introduction should be heavily revised. In the current version of the paper, the Introduction is articulated into three main sections: 1) an introductory text (the current Section 1.1); 2) a review of existing methods to evaluate flash flood predictions methods in ungauged basins (Sections 1.1.1, 1.1.2, 1.1.3, and 1.1.4, 1.2); 3) the objective of the paper (Section 1.3). This structure doesn't serve well the scope of the paper. I suggest to use a different articulation, where the objectives of the paper are stated just after the introductory text and a small review of the state of the art (where only the main methods are presented), and where the extensive review of existing methods is moved to a specific section (Section 2). Indeed, any review of existing methods should be provided after the objectives of the work are identified.

Section 1.1.1 Post-event reports. This section illustrates the use of post flood surveys

to gather flood peak data based on high water marks, flood traces and eyewitnesses interviews. Specific aspects of these surveys are described by Marchi et al. (2009, 2010) and Borga et al. (2008). As such, these surveys are not at all based on 'comprehensive damage inventories'. The main elements of these surveys are i) identification of high-water marks, ii) topographical surveying of the cross section, and iii) estimation of the flood peak based on hydraulic models and a set of simplifying assumptions.

The surveys can be made even on moderately intense events, but they are quite costly in terms of time and resources. The text at P4367 L22-23 'estimating false alerts emanating from the model' should be rephrased.

Section 1.1.3 Damage data with quasi-real time monitoring. This title could be better phrased as 'Damage data from quasi-real time monitoring'.

Section 2.2: "The RTM damage reports dataset: a unique opportunity to explore real ungauged catchments." This title should be rephrased. 'Unique' shows an emphatic attitude; 'explore' is very uninformative; 'real' ungauged catchments make sense if there are hypothetic ungauged catchments.

Section 2: The HYDRO and RTM databases provide information for a number of flood events (HYDRO) and of damage-triggering events (RTM). The text provide a comparison between the catchments, showing that they are comparable and that they are relevant for flash flood models. It is interesting to provide a comparison for the events themselves, showing in this way that the investigation aim to flash flood cases. This could be reported in term of seasonality distribution of the 26000 HYDRO events and of the 179 damage reports.

Section 2.3 The AIGA early warning system and its new version The text in this section describes the models used for the assessment of flash flood predictions. Overall, this section is drafted in a very poor way, with two different models (one daily and continuous, the second hourly and flood-focused) and two different versions whose characteristics and linkages can be barely understood from the text. This section is very

poor because it uses a poor English that prevents a clear understanding. Example: P4373L16-17: 'Both are preceded by a unit hydrograph'. This cannot be understood. The structure of the model and the variables and storages that are illustrated in Fig. 2 should be more clearly linked and identified in the text.

At P4374 L13-14 the authors mention 'a bias of HYDRO and RTM models'. There is no way to understand what kind of bias is this one.

Equations (1) and (2) cannot be understood and cannot be used to shed light on how the model works, since the variables included in the Equations (S, A, etc) are not defined. Some titles here are very uninformative: an example is 'Overall operation' (P4373, L4). Sections 2.3.2.and 2.3.3: 'The original AIGA version' and 'The new version of AIGA'. My only comment here is: one page of text and no way to understand how the two versions of AIGA differ, and the implications on the differences.

Section 3: 'Proposed assessment methodology to avoid censored-data issues'. A quite long title which should be rephrased.

Section 3.2: "A graph to compare models." Another title which is not informative.

The text in this section includes many cases of bad use of English. A key example is the following: "To test several alert thresholds simultaneously, the number of alerts simulated by the model must correspond to a certain number of damage reports. The detection threshold for each catchment is made to vary, which changes the number of alerts simulated, but maintains a set number of damage reports. The number of correct, missed and false alerts is then changed for each catchment." This text should be rephrased, since it was of no help to understand the proposed method at first reading.

Section 6. Conclusion and future works. I agree on the conclusions identified by the authors. However, they reported only partial conclusions. Before suggesting the use of damage reports as a method for flood model assessment, they should summarise the identified limitations for this method (confounding effects due to damages related

to debris flows) and to the assessment itself.

Figure 1: This figure should report the position of the general area in Europe. Also, it would be great to display the regional river network.

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