

Journal: NHESS

Title: **The object-specific flood damage database HOWAS21**

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Iteration: First review

The objective of the paper is to present the flood damage database HOWAS21, and to demonstrate its use to support forensic flood investigation and for the derivation of flood damage models. Accordingly, first the database is introduced, with respect to both conceptual and technical contents, and data sources. Then, exemplary analyses of the two application areas are supplied and commented.

The paper is generally well written and organised, methods and results are quite well explained; in this regard, I would suggest only minor revisions. Still, my doubt is about the suitability of the paper for publication in NHESS. In detail, two main aspects must be considered: 1) Most of the contents (at least from pg. 1 to pg. 7, out of 13 pages) replicate the book chapter of Kreibich et al. (2017) quoted in the paper; 2) the “new” part of the manuscript is simply limited to application of well-known analysis tools on HOWAS21 data, without supplying any additional knowledge to the state of the art, e.g. on flood damage explicative variables and their weight, on data interpretation tool (N.B., exceptions are represented by section 4.1 and 4.2.3 that however supply data of interests only for Germany). Of course, in the assumption that authors do not want to propose new models for the German context.

Given this premises, I suggest the rejection of the paper and supply some minor comments in the following.

General comments

Many repetitions are present (see minor comments); please, check and correct.

An unexplored aspect that may represent an additional value to the work is to show how information on data quality can be used for forensic investigation and damage modelling.

Minor comments

Section 1: Introduction

I found this section the most critical in terms of contents and structure. I suggest to re-organise the order of contents. In detail:

Pg. 1 line 17: “A transparent and standardized data collection procedure is required to ensure comparability of such data (Merz et al., 2004)”. This sentence is not linked with previous and following ones. I suggest moving after the discussion ending at pg. 2 line 61

Pg. 2 line 33: “Flood damage is usually classified into direct and indirect damage. Direct flood damage occurs when exposed objects (or humans) have physical contact with flood water, whereas indirect flood damage is induced by direct damage and may also occur outside of the flood event with respect to space and/or time (Merz et al., 2004). Further, both damage types can be distinguished into tangible damage, i.e. damage that can be adequately monetized, and intangible damage (Smith and Ward, 1998)” → discussion of damage types is out of the scope of the manuscript and, however, it is not linked here with previous and following paragraphs. I suggest removing

Pg. 2 line 37 – 58: I found discussion on damage assessment approaches and damage influencing factors misleading at this point of the paper. I suggest to anticipate, before the discussion, the objective of HOWAS21 as supporting forensic analysis and damage model developing.

Moreover:

Pg. 1 line 24: "Such analyses are performed e.g. to improve disaster management via quantification of the relative contribution of damage drivers such as exposure, vulnerability and coping capacity to the overall damage" → I would add hazard among damage drivers

Pg. 1 line 29: "For example, the development, calibration and validation of flood damage models requires detailed, object-specific damage data as well as comprehensive information about exposure and vulnerability characteristics" → and hazard

Section 2

Pg. 3 line 85: "An example for a continent-wide database" → I would say "continent-wide event database"

Pg.3 line: "In recent years, many initiatives were launched at national and European Union (EU) levels to improve the availability and usefulness of damage data. For example, an ongoing EU initiative aims at the standardization of damage databases. Based on a defined conceptual framework, this initiative provides technical recommendations for the development, of EU guidelines for recording disaster impacts with the central aim of translating the Sendai Framework for Disaster Risk Reduction into action (Corbane et al., 2015)" → This sentence is not linked with previous and following ones. I suggest removing.

Pg. 4 line 11: "The main objective of this database is the development of specific depth-damage curves for Italian contexts. For this, new procedures for data collection and storage were developed and applied at the local level for the residential and commercial sectors (Molinari et al., 2014)" → As to my knowledge, this is not correct. The main objective of the database (i.e. FloodCAT) is to address knowledge needs required by the Floods Directive. There are not standardised procedures for data collection linked to the database, and the database works at the event level (not object level). Please, amend.

Section 3

Pg. 5 line 148: "The data structure for HOWAS21 was derived from a multi-step online expert survey based on the Delphi-approach. The central idea of this approach is to reach a consensus among the respondents by having a questionnaire filled several times, after receiving feedback of earlier responses of all participants" → I think an extended description of the adopted Delphi methodology is required for readers who are not familiar with previous works of the authors' team.

Pg. 6 line 161: "The attributes of individual damage cases are grouped into three (partly sector-specific) database tables as shown exemplarily in Table 1" → I understand Table 1 refers only to sector 1 & 2. If this is the case, please specify.

Pg. 6 line 176: "In total, HOWAS21 incorporates a broad range of hazard variables (e.g. flow velocity, flood duration, and contamination), vulnerability parameters such as building characteristics (e.g. building shape, year of construction) and precautionary measures (e.g. warning time, type and effectiveness of measures), and flood consequences (e.g. absolute and relative damage of flood-affected objects, economic damage due to business interruption in the commercial sector" → REPETITION, see pg. 6 line 162-163

Pg. 6 line 188: "This interface is directly accessible using a standard web browser following the URL <http://howas21.gfz-potsdam.de> and can be used to visualize, analyze, and download HOWAS21 data" → authors should specify that the interface is only in German, this can be a big issue for the use of the database for international data

Pg. 6 line 189: "Users are provided query functionality in the database on selectable criteria, such as catchments, damage sectors, or year of event" → REPETITION, see pg. 5 line 136

Pg. 7 line 192: "A variety of attributes (e.g. river catchment, flood event year, damage sector) can be used to filter and analyze the data" → REPETITION, see previous comment

Pg. 7 line 198: "It was developed and maintained by the German Working Group on water issues of the Federal States and the Federal Government (LAWA) from 1978 to 1994 (Buck and Merkel, 1999; Merz et al., 2004). Damage data of HOWAS were collected via on-site expert surveys by damage surveyors 200 of insurance companies and used as a basis for financial compensation, wherefore these damage estimates are considered to be reliable" → REPETITION, see section 2

Pg. 7 line 213: "...in the City of Dresden affected during the Elbe river flood in 2002" → REPETITION, see the line above and line 219

Pg. 7 line 216: "Second, the magnitude of structural damage was quantified on a six-point scale, and the condition of the road before the flood was quantified on a five-point scale by experts from the city administration (Kreibich et al., 2009)" → this is not clear, neither are the motivation of this process. Please, explain

Section 4

Pg. 8 line 221: "HOWAS21 aims at compiling comprehensive flood damage data (i.e. including object-specific hazard, exposure, and vulnerability characteristics) to support forensic flood damage analyses as well as flood damage model derivation" → REPETITION, said many times; please, consider removing

Pg. 8 line 228: "Further, damage in the sectors public thoroughfare and water courses and hydraulic structures is by definition classified as building damage" → why? not clear; please, specify

Pg. 8 line 234: "Both in respect to the number of damage records and the level of detail of information, i.e. the number of different hazard, exposure, and vulnerability variables, HOWAS21 is the most comprehensive flood damage database for empirical data worldwide" → Have authors evidence on this?

Pg. 8 line 246: "in the variable space for the private households sector" → What does it mean? Please, specify

Pg. 8 line 247: "Generally, the availability of detailed flood damage data is often limited due to the facts that damage data collection in the aftermath of a flood is not mandatory, sufficient and properly trained personnel is mostly not available, and collection standards do not exist" → this is partly true for HOWAS21 as data were all collected by trained personnel, also data from the original HOWAS. Isn't it?

Pg. 9 line 252: "Damage data in the sectors public thoroughfare and watercourses and hydraulic structures are yet only available for the City of Dresden during the 2002 Elbe flood" → REPETITION, see comment above

Pg. 9 line 263: "More specifically, such analyses are performed e.g. to quantify the relative contribution of damage drivers such as exposure, vulnerability and coping capacity to the overall damage" → I would replace with "More specifically, such analyses are performed e.g. *to understand* the relative contribution of damage drivers such as *hazard*, exposure, vulnerability and coping capacity to the overall damage"; as most of forensic investigations are conducted in the social/economic domain, on the bases of qualitative data.

Pg. 9 line 265: "Other applications include the assessment of interdependencies of damage drivers, and the change of the correlation between a specific damage driver (e.g. water depth) and the resulting

consequence (damage) over time (e.g. between different events in the same region)" → I would not say these are typical applications in forensic investigation.

Section 4.2.1 → it is not clear to me what authors mean here with "interactions among damage-influencing variables" and how the performed analysis gives information on that; please, explain

Pg. 11 line 341: "the following exemplary analysis is aimed at identifying potential trends in the linear relation between water depth and absolute building damage to private households between different flood years using multilevel regression" → how such information can support decision-makers? Please, specify

Pg. 12 line 360-374 → check figure numbers

Pg. 12 line 363: "the high group variability of both regression parameters among the 13 flood years clearly confirms significant group effects as already suggested by the ICC" → not clear, please specify

Pg. 13 line 394: "An exception is, however, the public thoroughfare sector, for which the polynomial regression curve is noticeably undulating" → Could authors explain why?

Table and Figures

Figure 5 → please check caption; I guess on the right slope is depicted

Figure 6 is not comprehensible: too little and too blurry

Table 1 → I would add a column for damage attributes