A European database of resources on coastal storm impacts

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Reply to reviewers

Dear Referees,

Thank you very much for your time and thorough review that helped us improve the manuscript. We kept the structure of your comments. Please, find below the authors' responses labelled RC1.x or RC2.x for Reviewer 1 and Reviewer 2, respectively. Along with the responses, we provide the proposed corrections/additions included in the revised manuscript.

In addition to the revisions reported below, the track-changes version of the manuscript includes other minor corrections (e.g., typos and grammar).

REVIEWER 1

The manuscript presents a new database containing information on extreme storm events that impacted European coastlines from 2010 to 2020. The database is intended to support coastal flood risk assessment and protection measures by providing hydrodynamic, meteorological information, and their associated impacts. The paper details the structure of the database, data sources, and statistical analyses, and includes an example of the database's application to European-scale flood modeling.

My major concerns are presented as follows:

RC1.1 Insufficient application of the database: Currently, the database presented in the manuscript appears more like a collection of data rather than a tool actively used for future coastal flood protection in Europe. Although the data has potential value for flood risk mitigation, the manuscript does not clearly clarify how these datasets can effectively serve European-scale flood simulations. Specifically, while the manuscript claims that the database has been applied to European-scale flood modeling, the specific details and results of this application are not sufficiently demonstrated. This section should be expanded to clearly explain how the database has been utilized for flood protection and simulation, including practical examples and outcomes.

Reply to RC1.1

The DB has been used to build the ECFAS pan-EU flood database (Le Gal et al., 2023) and Impact Catalogue (Duo et al., 2023). Furthermore, Section 3.1 shows an example of the different types of resources that can be used for the analysis of a specific event. The following information has been added in Section 4.2:

"Le Gal et al. (2023) implemented a pan European catalogue of flood maps (water depth and velocities) in the framework of the ECFAS project, considering different storm scenarios. To build the catalogue, the flood model, and the simulated floods obtained using the LISFLOOD-FP model

(Bates and De Roo, 2000; Bates et al., 2010) forced with hindcasts of Total Water Levels (Melet et al., 2021), was validated using the information included in the ECFAS database, considering 12 test cases for which observations of the actual extent of storms impact was available, i.e., satellite-derived flood maps and in situ flood markers from the DBM (refer to Figure 1 and Table 1 of Le Gal et al., 2023). Depending on the availability of satellite imagery, satellite-based mapping in CEMS is carried out some times after the peak of the event and therefore it is not always able to capture the maximum extension of the flood. This limitation may produce a bias in the estimation of the accuracy of the model. However, a satisfactory agreement was found between the model results and the observed flooded areas and markers, showing the value of measured/observed flood information for model validation. For validation purposes, Le Gal et al. (2023) defined a "hit" when the model was able to flood the grid cell(s) enclosing the identified marker(s). The hit ratio was defined as "the number of markers that were hit compared to the total number of markers available for the test case". Among the analysed test cases, five have a marker hit ratio of 100%. For the other test cases, one has a hit ratio of 94.11% and the remaining show values of 50%, 25% and 0%. For only two test cases no flood markers could be obtained from the resources of the DB to perform the validation.

The DBM was also exploited to validate the impact assessment implemented in the ECFAS project on the basis of the flood catalogue by Le Gal et al. (2023). The impact assessment methodology combines object-based and probabilistic evaluations to give uncertainty estimates for damage assessment (Duo et al., 2023). The approach was applied to 16 test cases of the ECFAS DB representing 10 extreme events able to considerably affect 15 European coastal sites (refer to Table 1 and Figure 1 of Duo et al., 2023). Three reference cases were then selected for validation purposes, i.e., to compare the modelled impacts with reported damages (Xynthia in France, 2010; Xaver in UK, 2013, Emma in Spain, 2018). The findings demonstrate that the ECFAS DB provides valuable information to retrieve flood and impact markers for model's validation. Specifically, the information retrieved from the DB was georeferenced and characterised by analysing the different sources of each event and categorised according to several impact categories. The information contained in the DB also made it possible to assign quality indexes in relation to the type of resource. The type of information retrieved was flood and impact markers, local damage in euros and other additional information that could be significant for the validation of the models (Le Gal et al., 2023; Duo et al., 2023). These data supported the findings that the impact model from Duo et al. (2023) is more accurate compared to traditional grid-based approaches".

Lines 82-85 have been moved to the end of Section 2 to better structure the database description.

New references added in the References Section of the revised paper:

- Bates, P. and De Roo, A.: A Simple Raster-Based Model for Flood Inundation Simulation, J. Hydrol., 236, 54–77, https://doi.org/10.1016/S0022-1694(00)00278-X, 2000.
- Bates, P. D., Horritt, M. S., and Fewtrell, T. J.: A Simple Inertial Formulation of the Shallow Water Equations for Efficient Two-Dimensional Flood Inundation Modelling, J. Hydrol., 387, 33–45, https://doi.org/10.1016/j.jhydrol.2010.03.027, 2010.
- Duo, E., Montes, J., Le Gal, M., Fernández-Montblanc, T., Ciavola, P., and Armaroli, C.: Validated probabilistic approach to estimate flood direct impacts on the population and assets on European coastlines, Nat. Hazards Earth Syst. Sci. Discuss. [preprint], https://doi.org/10.5194/nhess-2023-197, in review, 2023

- Le Gal, M., Fernández-Montblanc, T., Montes Perez, J., Duo, E., Souto Ceccon, P., Ciavola, P., and Armaroli, C.: Influence of model configuration for coastal flooding across Europe, Coastal Engineering, 192, 104541, 1-17, https://doi.org/10.1016/j.coastaleng.2024.104541, 2024.
- Melet, A., Irazoqui Apecechea, M., Fernández-Montblanc, T., and Ciavola, P.: Report on the Calibration and Validation of Hindcasts and Forecasts of Total Water Level along European Coasts, Deliverable 4.1 – ECFAS project (GA 101004211), Zenodo, https://doi.org/10.5281/ZENODO.7488687, 2021.

RC1.2 Lack of detailed Analysis on meteorological and hydrodynamic data: The manuscript provides insufficient description of the meteorological and hydrodynamic data closely related to coastal storm surges. There is a need for a more thorough discussion on the reliability of this data and whether it can accurately reflect the processes and impacts of storm surges. I would suggest the authors enhance the analysis of these data types, including their sources, accuracy, and how they ensure the data can accurately capture the dynamics of storm surges.

Reply to RC1.2

The DB was conceptualised as a resource database, which can be analysed and used by different users. No data manipulation/interpretation has been carried out on the hydrodynamic data of each event. Approximately 82% of the events contained in the DB have information on maximum significant wave height (Hs) and total water level (TWL), and the sources from which the values were retrieved are identified in the DB with unique identifiers. This approach allows the DB user to know where the hydrodynamic data were reported and how they were generated (e.g., whether they are measured or modelled). The resources were carefully quality (cross-)checked and the hydrodynamic information of each event were taken by either scientific articles and/or technical reports/institutional websites of responsible entities (e.g., public or research institutions) and/or by reliable databases (e.g., RISC-KIT Database).

The following sentence has been added in Section 2.2: “The resources were carefully quality (cross-)checked and the hydrodynamic information of each event were retrieved only by institutional and reliable resources such as (peer-reviewed) scientific articles and/or technical reports/institutional websites of responsible entities (e.g., national or local public institutions) and/or by reliable databases (e.g., RISC-KIT Database)”.

RC1.3 Inadequate comparison with existing databases: The manuscript does not provide a detailed comparison between the proposed dataset and existing similar databases. It is recommended that the authors include a comparison to highlight the advantages of the presented database over existing ones. This could be achieved by comparing aspects such as data completeness, update frequency, coverage, and performance in flood risk assessments.

Reply to RC1.3

The comparison with the rationale and structure of existing similar datasets is already included in the introduction. We believe that a direct comparison across different databases is not appropriate because there is a significant difference in terms of rationale, structure, inclusion criteria and analysis of the information retrieved from the sources. However, the Discussion Section has been improved in order to better highlight the advantages of the present database and to focus on specific differences with those in the literature.

The following paragraph has been added:

"The ECFAS Database is a collection of resources. Currently the most similar database is the French Base de Données Historique sur les Inondations (BDHI). The BDHI lists and describes flood events from different sources (river, coastal, etc.), which have occurred on the French territory over the past centuries and up to the present day. The archived documents can be in the form of a press article, hydrological report, meteorological report, historical study, etc. However, the BDHI is a national tool and can only be accessed by authorised users. The ECFAS DB covers instead different European countries and is an open-access tool that can be exploited as it is by any user, updated or complemented with new events according to the interest of different users' communities and purposes (e.g., coastal flood risk management, EWS and emergency, model validation, etc.). Through labelling with unique identifiers, the ECFAS DB allows for a quick and consistent retrieval of all the resources associated with an event and with the test cases. Another relevant characteristic is that the ECFAS DB groups the resources per storm event, so that it is possible to immediately know if the same storm affected more than one country/location. This characteristic of the ECFAS DB is especially important if supranational/trans boundaries studies (e.g., at pan-EU level) have to be carried out".

Some other minor concerns:

RC1.4 It would be beneficial to discuss the accessibility of the database to a broader audience, particularly in terms of how user-friendly the database is for various stakeholders, such as policymakers, researchers, and coastal managers. Is there a need for additional tools or interfaces to enhance the usability of the database?

Reply to RC1.4

The database has been built using spreadsheets that represent a broadly used support for data integration and analysis. In addition, the database is accompanied by a guidelines document that is meant to help users understand how the entries are defined, how to add entries to update the database, and how to search for specific information, etc.

Given the importance of accessibility and usability, a sentence has been added in Section 2: "The guidelines were implemented to provide potential, even non-expert, users with clear information on key aspects of the database such as the rationale behind the product, the definitions of the different components and items (e.g., how a "storm" is defined as well as a "test case"), the sources of information and their characteristics, etc. This can support the proper and coherent use of the dataset. A future development could be the construction of a GUI to allow direct on-screen data addition through georeferencing and databasing online tools".

RC1.5 The manuscript could further explore the potential for future updates and expansions of the database. How adaptable is the database to include new storm events or incorporate additional types of data as they become available? A discussion on the sustainability of the database and its long-term utility would strengthen the manuscript.

Reply to RC1.5

The potential future exploitation and update of the database is a key aspect that was considered in the design and development of the DB. The objective of the database is to provide, in a way that is understandable and easily usable by different types of users, a source of information on extreme coastal events for locations that experienced coastal flooding. Therefore, the references included in the spreadsheets are assigned with unique identifiers to facilitate cross-referencing, reading and possible collection of new data. Moreover, the limited data interpretation allows the scalability and updatability with information from different countries and of events with different characteristics. The worksheet allows a quick compilation of relevant information for coastal flood risk management, and the guidelines will support the future update and use of the DB. Please refer also to the reply to RC2.5.

RC1.6 Another aspect that could be addressed is the validation process of the data included in the database. How do the authors ensure the accuracy and consistency of the data across different events and sources? Discussing any quality control mechanisms or peer-review processes for the data would add credibility to the database.

Reply to RC1.6

All the Resources of the database have been extensively checked to evaluate their quality and reliability in terms of consistency between different sources and level of details. Social media such as Twitter have not been used because they can include fake information that could bias the results. The YouTube videos and Blogs introduced in the database have been analysed in order to evaluate their temporal and spatial accuracy/consistency. In fact, the inclusion criteria, and especially criterion 3 (refer to the reply to RC2.4), ensure that there is agreement across resources to support the inclusion in the DB. Moreover, a quality and reliability evaluation were carried out when building the DBM (see Section 4.1). In this process, quality indexes were applied to describe the temporal and spatial accuracy of each marker, assigning different values for high, medium and low confidence. Spatial and temporal quality indexes are described in Table 6.

RC1.7 While the manuscript focuses on European coastal flood risk, it could also consider the broader implications of the database. For example, could this database be a model for other regions outside of Europe? A brief discussion on the scalability of the approach or its relevance to global coastal flood risk management might add an interesting dimension to the paper.

Reply to RC1.7

Please, refer to reply RC2.5 to Reviewer 2.

RC1.8 Overall, while the database introduced in this manuscript has potential value, there is a need to strengthen the discussion around practical application, data analysis, and comparison with existing databases to better highlight the contribution and significance of this research.

Reply to RC1.8

The concerns highlighted here have been addressed in previous comments, which have led to changes in the manuscript. Specifically, refer to RC1.1, RC1.3 and RC2.5.

REVIEWER 2

Synopsys

The article provides an overview of the European Coastal Flood Awareness System (ECFAS) Database of Resources (2010-2020), focusing on its design and utility for cataloging coastal flood events across Europe. The database includes details about the events, test cases, and relevant resources, with a structured spreadsheet linking various datasets for cross-referencing. The types of resources range from news articles, scientific papers, and institutional reports to blogs and videos, providing data on weather conditions, hydrodynamics, and the impacts of coastal floods. The article discusses potential biases in resource types and the importance of geographic and language factors in the quality and quantity of data collected. Finally, it highlights the practical applications of the database, such as validating coastal flood modelling simulations and assessing the socioeconomic impacts of coastal storms.

Recommendation

The idea behind the article is sound and very useful for the community. It is generally well-written and seems technically sound, however, some methodological details need to be improved or clarified, and the discussion relative to the application, potential scalability and expansion of the database needs to be substantiated. The article could also benefit from an in-depth discussion of the quality and limitations of the data sources, particularly regarding the potential biases of non-scientific resources like blogs and news. Further comparison with existing databases is also advised. The manuscript could be published after a major revision, especially focused on the inclusion of missing information and the clarification of methodological aspects. I suggest the authors pay especial attention to the following aspects described in “General comments” and “Detailed comments”.

General comments

RC2.1 There is insufficient detail regarding the reliability of the information sources, especially those from news, blogs, and social media, which could introduce bias. While biases are acknowledged, there is little discussion on how these biases might influence the overall dataset or how the authors mitigate them. It is my opinion that the authors should, at least, highlight the need for a more balanced set of resources (e.g., more institutional websites, scientific articles, and technical reports) in future updates of the database.

Reply to RC2.1

Please, refer also to reply RC1.6 to Reviewer 1.

The authors are aware that there are biases derived from the resources available in the database, although they cannot be avoided. These types of biases reflect a major problem in coastal risk management across Europe. There are countries where, in an institutional and structured way, storm impacts are analysed and detailed reports are generated, while in others this information is insufficient or even non-existent. On the other hand, it is often available scientific information focussed on high-impact events, at national or supra-national level, that generated interest in the

scientific community. This is typically limited to events that have occurred in regions where there are active research groups working on natural hazards. Lastly, the media are biased towards places of particular interest or on the impact to the population. This highlights the need to create a common approach to analyse coastal storm events and their impacts, especially in the context of climate change, where the effect of storms is expected to increase in terms of magnitude and frequency.

The ECFAS DB is designed to minimise biases, leaving the users the freedom to analyse the different resources according to their own objectives. In this sense, indexes can be applied to assign a "quality score" to the resources, as reflected in the application of the ECFAS DB for the identification of impacts (refer to Section 4.1). In addition, it is recommended to give priority to information included in the scientific literature, technical reports from responsible entities and institutional websites for future updates because of their reliability and consistency. In any case, other authors have analysed the influence of the use of non-technical resources to estimate the impacts of extreme events. All the above considerations are discussed in the Discussion Section.

Moreover, the following sentence has been added in Section 2.2: "Sancho-García et al. (2021) used news to assess extreme events damage at regional level in Spain and found that these resources, even if they could lead to some bias, offer a quick assessment of damage intensity and distribution, as well as provide essential information to identify the location of hotspots".

RC2.2 The issue of language as a barrier for collecting resources (e.g., fewer resources in Germany and Poland due to language) is raised, but no solution or adjustment is suggested. This might introduce biases against non-English-speaking regions, affecting the comparability of the data, especially in the context of future updates or scalability to other regions, or even the global coastlines. A recommendation to systematically address language barriers, perhaps through collaboration with local institutions or translation services, is at least required at this point.

Reply to RC2.2

We agree with the reviewer's comment that this is an important barrier that should be overcome. The following sentence has been added in the Discussion (Section 5): "This might introduce biases, affecting the geographical coverage and completeness of the DB. Language barriers could be addressed through collaboration with translation services or local institutions/research centres/universities working on coastal flood risk and that could support the identification and consequent translation of local information".

RC2.3 The process of defining polygons based on publicly available information is mentioned but not detailed. How were the boundaries determined in cases without clear CEMS activation, and what steps were taken to standardize this across countries?

Reply to RC2.3

The polygon boundaries identifying the Area of Interest (AoI) for each affected site were defined primarily using CEMS activation data. In cases where there were no CEMS activations, AoIs were defined according to the areas where flooding and impacts were reported by the resources included in the DB and were used for the validation of the flood (Le Gal et al., 2023) and impact (Duo et al., 2023) models. It should be noted that the resources included in the DB are not only limited to AoI areas. The DB contains information on extreme events, which typically affect larger areas than those defined by the AoI.

RC2.4 The authors describe the database as a living tool. However, it is unclear how the database could be improved by adding new events… would it require them to be added manually? If so, in which context would it occur? And how often? Finally, what processes are in place to ensure the addition of new data in a consistent and standardized manner (i.e., what would distinguish the events to be added from the ones not to be added)?

Reply to RC2.4
The following text has been added in Section 2:
"An event is defined as a (marine) storm that was able to cause considerable flooding and impacts along European coastal areas. Three inclusion criteria were defined to identify and select an event to be added in the DB, specifically:

1. f it is included in CEMS activations and/or
2. in relevant and already available databases;
3. it has to be reported in at least one official/reliable source of information (institutional websites, scientific articles, technical reports, etc.) and in other different types of resources.

The project's partners provided information on storms that generated floods and impacts in their countries. In some cases, the identified events were found to be part of a cluster of storms. In those cases, they were included as a single entry in the database, but a flag was added to take into account the nature of the storm. If necessary, any user can manually update the DB based on specific needs, following the standardised criteria described above, ensuring that the data is consistent and comparable".

RC2.5 In line with the previous comment, the article should include a discussion on how this database could be applied or scaled for future research projects, policy-making, or coastal risk management efforts across Europe, other regions, or even globally, in the future.

Reply to RC2.5
The ECFAS DB has been designed to exclude the majority of biases that affect databases in general (see Gall et al., 2009). Given the very limited data interpretation to avoid the subjectivity of the compilers, it can be easily scaled and updated by users. The process is time consuming because the resources have to be retrieved and quality checked, but then the use of a simple worksheet allows a quick compilation of the most relevant information required by coastal flood risk managers. Please, also refer to the reply to RC1.1 where reference is made to different applications for which the DB has already been successfully used. The same applications can be replicated and scaled in other countries.

In the Discussion the following sentence has been added in Section 5: "The ECFAS DB has been built to minimise the biases that could affect databases (Gall et al., 2009). Although intrinsic biases may be present in the sources, these are not amplified or newly introduced in the DB considering the method used for its implementation and the inclusion criteria. Therefore, given the very limited data interpretation, it can be easily scaled and updated using information from different countries (European and beyond) and storms with different extents. The process requires a certain amount of time because the resources have to be retrieved and quality checked. Additionally, the guidelines will support the future update and use of the DB".

RC2.6 The authors reference other databases (e.g., RISC-KIT), but there is no discussion on how cross-referencing was done or what insights were gained by comparing results across multiple datasets. This comparison could strengthen the paper.

Reply to RC2.6

Please, refer to Reply to RC1.3.

Detailed comments

RC2.7 What is the reason for the database to start in 2010 and not before?

Reply to RC2.7

The database has been created to cover the time frame of the different analyses performed in the ECFAS project (e.g., implementation of the flood and impact catalogues (Le Gal et al., 2023; Duo et al., 2023), identification of Total Water Level thresholds (Montes-Perez et al., 2022), hindcast of TWL at pan-EU scale (Melet et al., 2021), etc.) and because in recent years satellite derived information is available through the Copernicus Services (e.g., the Copernicus Emergency Management Service has been operational since April 2012*). In addition, because the DB is also designed to provide resources that can be used for flood risk management, early warnings and flood/impact models validation, it was important to consider the most recent configuration of EU coastlines.

References cited in the reply above:

- *https://emergency.copernicus.eu/mapping/sites/default/files/files/CopernicusEMS-Service_Overview_Brochure.pdf
- Montes-Pérez, J., Duo, E., & Fernández-Montblanc, T. (2022). Identification of local thresholds of TWL for triggering the European coastal flood awareness system, Deliverable 4.3 – Report on the identification of local thresholds of TWL for triggering coastal flooding - ECFAS project (GA 101004211). www.ecfas.eu (Version 2) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.7488717
- Melet, A., Irazoqui, M., Fernandez-Montblanc, T., & Ciavola, P. (2021). Report on the calibration and validation of hindcasts and forecasts of total water level along European coasts, Deliverable 4.1 - ECFAS project (GA 101004211), www.ecfas.eu (Version 2). Zenodo. https://doi.org/10.5281/zenodo.7488687

RC2.8 Page 1, Lines 13-14: unclear sentence. Please rephrase.

Reply to RC2.8

The sentence has been rephrased as follows: “The database collects items organised in worksheets and constitutes an inventory of resources with different types of information used to characterise a storm event (i.e., hydrodynamics, weather information) and its consequences (impacts, flood extent, etc.)”.

RC2.9 Page 2, Line 77: suggest rephrasing to “The only data actively handled by the operator (…)” or something similar.

Reply RC2.9

Done. The sentence has been rephrased as suggested: “The only data actively handled by the operator…”. In addition, in line 77 a reference to “beach erosion” has been added after the term “impacts” to highlight the fact that the DB also contains information related to beach response to storms, which represents important information for different stakeholders.

RC2.10 Page 3, Lines 127-128: what do the authors mean by “the highest number”?

Reply to RC2.10

It means that only areas with the majority of impacts were mapped to focus the analysis on the most affected sites. The sentence has been corrected as follows “the larger number of…”

RC2.11 Page 9, Lines 196-200: what is the difference between topics? For example, “flooding” and “hydrodynamic”. Are these exact keywords found in each resource? Needs clarification.

Reply to RC2.11

There was an error in Table 2. The topic “Flooding” has been added and its definition included as “Information regarding flood characteristics”. Thus, it has been removed from the topic “Hydrodynamics”. These topics, defined in the resources sheet, were added to help filtering the information based on the needs of the user of the database. More than one topic can be assigned to each resource.

RC2.12 Page 11, Line 248: please remove “.” before the opening parenthesis.

Reply to RC2.12

Done.

RC2.13 Page 12, Line 258: I believe the authors may be in fact referring to Figure 5.

Reply to RC2.13

The number of the figure has been corrected.

RC2.14 Page 12, Line 260: the authors state that “Each resource was deeply analysed in terms of contents and quality of the information.”. What does this mean exactly? Please provide a better description. How do you assess the quality of the information, in particular?

Reply to RC2.14

In the example of application of the DB (Section 4.1), quality indexes were defined for the impact markers and the extracted information to analyse the content and quality of the information. These quality indexes are explained in Table 6. Each marker was classified by spatial and temporal indicators with high-, medium- and low-confidence levels. The Spatial Quality Index was defined on the basis of the characteristics of the marker position, and the Temporal Quality Index was defined discriminating between single events, storm clusters or no temporal information.

Regarding the categories included in the “Extreme_events” sheet (population impacts, environmental impacts, economy impacts, buildings impacts, infrastructures impacts, and also the

start-end date and the hydrodynamic information), only information retrieved from reliable resources were used (i.e., technical reports, scientific articles, institutional websites, etc.).

RC2.15 Page 13, Lines 281-282: it should be mentioned if the damages (in euros) refer to values at the time of the event, or to a subsequent analysis (more recently). Accounting for inflation and other potential changes in value over time is extremely relevant for the precision of the database.

Reply to RC2.15

The economic damage data in the resource collection were introduced as it was found in the resource information. In the case of the DBM, the retrieved damage in euros is referred to the time of the event. Section 4.1 represents an example of application of the database. For specific applications the values can be modified by the user. In fact, Duo et al. (2023) modified the values to 2020 prices of the former EU-28, adjusted using Eurostat Real Gross Domestic Product (GPD) statistics 2000-2020, in order to make a comparison with the damage values obtained with the Impact Tool.

RC2.16 Page 14, Table 7: do the authors assume independence between each type of resource, i.e., if news contain videos are they identified as one or the other, or both?

Reply to RC2.16

Each category has been defined independently: a “video” is considered a “news” if it is included in a news item.

RC2.17 Page 16, Line 324: consider replacing “the objectives” by “this objective”.

Reply to RC2.17

Done

RC2.18 Page 16, Line 326: throughout the article, the authors do not specify how can the database be updated with new events or used in different areas of the globe. The whole process seems quite manual. Please provide a more detailed explanation on this subject.

Reply to RC2.18

The event inclusion criteria used in the development of the DB have been added to the revised paper. See the replies RC2.4 and RC2.5.

RC2.19 Page 16, Lines 330-332: please rephrase this sentence, as it is not clear and quite colloquial.

Reply to RC2.19

The sentence has been modified as follows: “The implementation of a comprehensive database could be challenging because it should include a large amount of information and be designed according to different purposes (e.g., insurance, risk assessment, emergency management, etc.)”.

RC2.20 Page 16, Lines 338-339: the authors should clarify that these were the countries in the considered European list with the lowest number of retrieved resources.

Reply to RC2.20

The sentence in Section 5 has been modified as follows: “The countries with the lowest number of retrieved resources are Greece, Germany, and Poland and this could be due to language-related issues or to the different name given locally to the same storm event”.

RC2.21 Page 16, Lines 339-340: it seems rather strange to me that a database like this should be limited by “language” issues, or even different naming of the storm events. It adds to my previous comment about the scalability of this database, and the possibility of further updates. In such a relevant database like the one presented here, a systematic way to address language barriers should be in place.

Reply to RC2.21

Please, refer to reply to RC2.2. To note that in the EU the practice of assigning official names to extreme events is not standardised as in the USA for hurricanes. This is the reason why different names can be assigned to the same storm depending on the country and why there can be storms without a name. However, as it is becoming common practice in Europe to name storms, it is important to associate events in the database with the given storm name to reduce as much as possible incorrect attributions or duplicate information. In fact, Gall et al. (2009) state that “Common naming conventions for similar phenomena and assigning unique identifiers to an event would streamline interagency record keeping and reduce the likelihood that a user looking for data on a particular hazard misses a source because they searched for their hazard of choice under a different name”.