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Comment on nhess-2021-75

Klaus Grosfeld (Referee)

Referee comment on "Still normal? Near-real-time evaluation of storm surge events in the context of climate change" by Xin Liu et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-75-RC2>, 2021

Review of Xin Liu, Insa Meinke, and Ralf Weisse "**Still normal? Contextualizing real-time data with long-term statistics to monitor anomalies and systematic changes in storm surge activity – Introduction of a prototype web tool storm surge monitor for the German coasts**"

General comments:

This manuscript describes the concept and implementation of a new online platform, the "Storm Surge Monitor" (www.stormsurge-monitor.eu / www.sturmflut-monitor.de), aiming to provide contextualized near-real-time data of storm surge activities along the German North Sea and Baltic Sea coasts. While the knowledge of storm surge activities, their occurrence rate, long-term evolution of maximum water levels as well as the return period of storm surge heights play a crucial role for coastal planners and authorities', general information of potential threats under climate change with respect to sea level rise and changed wind / storm activities for the general public and dedicated stakeholders with critical infrastructures (e.g. big companies, harbors, container terminals etc.) is needed. The confrontation with these kinds of risks in our daily life is important to rise awareness and acceptance and provoke support for mitigation and adaptation measures of climate change impacts.

A necessary precondition for this is a basic knowledge and process understanding on different levels which sets actual observations and events in a historical context. This is given by the Monitor, which combines near-real-time data of ten tide gauges (six of German North Sea and four of Baltic Sea) with long-term statistics of the available observational period (back to 70 – 120 years ago) providing contextualized information and daily updated graphs on height, frequency, intensity and duration of extreme events. This includes maximum water levels per season, the return period of an event at a local tide gauge, annual numbers of events exceeding a given threshold, and intensity and duration of a storm surge event allowing a critical consideration of its severity and threat.

In times of rising importance of climate change risks and induced political and societal measures on mitigation and adaptation such kind of tools are very helpful for the communication and exchange of knowledge between science and society. Therefore, I suggest publication of this manuscript with minor changes.

Specific comments:

The manuscript is well written and includes a clear description of the Monitor and used methods and statistics. Depending on the temporal resolution of the data not all graphs (duration and intensity) can be shown. This is mentioned in the manuscript but I couldn't find it in the Monitor. Chapter 3 describes five stations (two North Sea, three Baltic Sea) in detail. While this is in general interesting, it occurs a bit lengthy and redundant, especially where information / comparison to other stations is given but not shown. I wonder, if some information could also be summarized in a table (e.g. trends) which would make the description a bit more compact. Instead, I would like to see some emphasis on different evolutions and signals!

On page 16, line 407-409 the authors discuss the occurrences of events at stations Helgoland, Cuxhaven, Norderney (fewer) and more frequently at Husum, Hamburg and Bremen. I wonder, why Cuxhaven has fewer events while located at the estuarine tip between Weser and Elbe?

The authors emphasize that such online platforms "may provide substantial added value for professional stakeholders or the public discussion in general" (p.3, l. 96-99; p. 30-31, l. 775-781). I was wondering, if the authors have assessed the demand and need for such a Monitor and if they got into contact with key stakeholders to discuss the usefulness, the design and demand for the Monitor and the provided information? In times of modern knowledge exchange, we do know how important co-design of such processes is and the early involvement of potential users and stakeholders. A short additional paragraph on this aspect would be worthy for the readers and other scientist who plan similar services.

The title of the manuscript is really long? Is this really needed or could it be shortened to make it handier?

Technical corrections:

P 3, l 94: unusable -> unusual

P 4, l 121: putting -> put

Figure 2 and p 6, l 223: What is the reason for “four hours” de-cluster interval?

Table 2: NHN explain already here the meaning of NHN (German reference level, Normalhöhenull, NHN)

Figure 3 b: There is missing information on the right axis, which is also Water level in m relative to MThw

P 16, l 420-427 and p 19 l 490-500 and p 23, l 591-599: there is a mixture between abbreviated “hours” as h and a fully written hours when describing intensity and duration. I would suggest to unify this.

P 18, l 460-461: shift reference to Figure at correct position, since not all stations are shown there: A total of one or two events was observed at Helgoland, Cuxhaven (Fig. 4a), and Norderney, whereas six or eight events were observed at Husum, Hamburg (Fig. 7), and Bremen.

P 29, l 739: distinguisch -> distinguish

Figure captions: Some information is valid for many graphs, so it might be helpful to refer only to an extended description in a first graph (e. g.: The color of the bars denotes the degree of severity (green – minor; blue – severe; red – very severe). The trend (gray line) is shown with the 95 % confidence interval (light gray band) and as a solid line when it is significant at the level of 95 %.)

References (check bold marks):

Gönnert, G. and Buß, T.: Sturmfluten zur Bemessung von Hochwasserschutzanlagen, Landesbetrieb Straßen, Brücken und **Gewässer 2/2009**, ISSN 1867–7959, 2009.

Kodeih, S., et al.: Climate information needs from multi-sector stakeholders, Deliverable 1.B, Work Package 1, Project ECLISEA, http://www.ecliseaproject.eu/wpcontent/uploads/2019/2008/d2011.b_report_stakeholder-needs_final_20180629.pdf, 2018.

- Check weblink: page couldn't be found and add all co-authors

Schaper, J., Ulm, M., Arns, A., Jensen, J., Ratter, B., and Weisse, R.: Transdisziplinäres Risikomanagement im Umgang **mit extremen** Nordsee-Sturmfluten – Vom Modell **zur Wissenschafts**-Praxis-Kooperation, *Die Küste*, 87, doi: 10.18171/1.087112, 2020.