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Comment on nhess-2021-33

Anonymous Referee #1

Referee comment on "Invited perspectives: The ECMWF strategy 2021–2030 challenges in the area of natural hazards" by Florian Pappenberger et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-33-RC1>, 2021

The manuscript "Invited perspectives: The ECMWF strategy 2021-2030 Challenges in the area of natural hazards" provides a very interesting concise overview of the ECMWF strategy in respect to natural hazards. The description of the envisaged step changes necessary to tackle the identified key challenges for the future are interesting for the international scientific community also beyond Europe. The challenges are quite generic and relevant not only for ECMWF but for many organisations dealing with forecasting weather and resulting natural hazards, as well as with climate reanalyses and projections. The described step changes can inspire scientific studies and advancements in various domains related to natural hazards.

From my point of view, this manuscript is already valuable and well written, however, with a stronger harmonization of terms, an even more clear structure, particularly a closer link between the identified challenges and the envisaged solutions, this manuscript can become significantly more interesting for the scientific community. Thus, I suggest the following:

Abstract: I would find it more convincing if first the challenges are listed, and then afterwards the goals (which are set to tackle these challenges). When reading the goals, I would expect, that you/ECMWF see the additional challenges of designing user specific products and means of communication and decision support under high uncertainties (or similar).

I suggest to group the goals into the three pillars already in the abstract, this would prepare better for what is coming later. Additionally, I suggest to use harmonized terms, not all interchangeably "goals", "step changes", "vision".

I suggest to provide a closer link between the challenges and the envisaged solutions. E.g.

in the part 2 science and technology:

Line 43: "parts of the Earth system are inadequately observed (Beven et al 2020)." -> would be good to mention which ones, so that one has at least an idea without needing to read the paper by Beven.

Line 43: "However, finite computing and requirements to produce timely forecasts will only allow a limited number of ensemble members to represent these uncertainties." -> are there other means of representing uncertainties, considering uncertainties besides ensembles? What it's the suggestion or idea how to tackle this challenge?

Line 47: "Initialising the snowpack on a global scale which is important for flood forecasts is an example of such a challenge." -> would be great if first ideas of how to tackle this challenge can be presented.

Part 3 Impacts:

Line 63: "ECMWF will aim to provide detailed Earth system simulations of the past, present and future with a particular focus on extreme events for several weeks ahead" – This sentence is confusing. I guess that you have two separate tasks, one is rather long-term simulations of the earth system in the past and future, e.g. providing climate change projections for the future, also future scenarios of natural hazards, etc. The other one is early warning of natural hazards and for this the aim is to extend the lead time to more than two weeks. In case this is correct, it would be good to write this more clearly in the manuscript, and structure the impacts part accordingly.

In this respect, I also guess, that you have different user groups for these two activities? It would be good if you could write a sentence about who your user groups are (and maybe for which products).

The idea of a user-oriented evaluation seems interesting, it would be interesting to know how this could be realized and how it would influence your work/products. Is it meant to be further developed towards co-design of products together with the users?

Lines 77-86 seem to belong more to the technology part, or it needs to be more focused on the visualization and communication aspect.

Line 85 "model chain" not "model change"

The part 4 on people is limited to the identification of the challenge. Any ideas for the way forward?