Closing the circle: From data to hazard warnings, impact forecasts, and the verification thereof

Gabriela Espejo [a,b] *, Firdewsa Zukanovik [a,c] *, Evelyn Mühlhofer [d], Irina Mahlstein [d]

[a] *Mobiliar Lab for Natural Risks, Oeschger Centre for Climate Change Research (OCCR), University of Bern Switzerland– Gabriela Espejo - gabriela,espejogutierrez@unibe.ch, Firdewsa Zukanovik - firdewsa.zukanovic@unibe.ch*
[b] *Human-Environment-Systems Modelling Group, Institute of Geography, University of Bern, Switzerland, Gabriela Espejo - gabriela,espejogutierrez@unibe.ch*
[C] *Climate Impact Research Group, Institute of Geography, University of Bern, Switzerland, Firdewsa Zukanovik - firdewsa.zukanovic@unibe.ch*
[b] *Federal Office of Meteorology and Climatology MeteoSwiss, Switzerland, Evelyne Mühlhofer - evelyn.muehlhofer@meteoswiss.ch, Irina Mahlstein - irina.mahlstein@meteoswiss.ch*

* Corresponding author

Keywords: verification, impact-based forecasting,

Abstract:

Issuing warnings, be it hazard-based or impact-oriented, requires a data processing pipeline to generate a reliable warning product which can be distributed to the end-user. Each step along the chain, including both manual and automatic ones, offers its own challenges to refine the data.

Traditionally, hazard-based warnings are derived from initially complex, gridded weather forecast data and have to be simplified for easy understanding by the public. Yet, hazard warnings do not provide specific information regarding their consequences as, for example, physical damage to infrastructure, disruption of societal activities, or economic losses. Under the umbrella initiative *Early Warnings for All* (EW4A) the World Meteorological Organization advocates for the advancement of early warning systems, increasingly tailoring them to the needs of specific users, with a focus on impacts, informing actions to mitigate damage. Developing accurate and useful impact-based forecasts is challenged by limited data and information, lack of standardized technical protocols, issues sharing impact data and little knowledge on the needs of various user groups.

To ensure the quality of any warning system, verification is crucial. A dense network of measurements. Yet even if this is given, as simplifications are made to issue a pleasing product to the user, verifying warnings poses a number of challenges. Impact warnings are even more challenging to verify, and guidelines are needed to do so.

This session aims to unite scientists, natural catastrophe modelers, weather forecasters, tool developers, stakeholders, and policy professionals, and discuss advancements and challenges related to the entire warning chain. We welcome inputs on the identification of extreme weather and impacts, the generation of hazard or impact warnings and forecasts, their verification, visualization, uncertainty, and user needs. The session features expert presentations and a panel discussion to allow the community to collaborate on developing storylines, marking a significant step forward in weather and impact modeling.