

EGU22-2850, updated on 02 Oct 2022

<https://doi.org/10.5194/egusphere-egu22-2850>

EGU General Assembly 2022

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Making use of climate information for protecting cultural heritage from extreme weather events in a warming world

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The intensity and frequency of extreme weather events in Europe are one of the most dangerous consequences of a warming climate. Some regions suffer more under heat waves and droughts, while others are experiencing extreme rainfalls. Thus, for example, a severe flood in July 2021 in several European countries caused widespread damages particularly in Belgium and Germany.

Which extreme weather events are to be expected in the future? How can the damage of irretrievable historical sites be avoided or, at least, limited or dealt with? All these questions are addressed in the three-year research project KERES, which is funded by the German Federal Ministry of Education and Research (BMBF) and is coordinated by the Fraunhofer ISC together with the Fraunhofer EU Office in Brussels.

As first step the regional relevance of future extreme weather events in Germany will be investigated. This information will be further used to estimate the potential damages to buildings and outdoor facilities. The precautionary and responsive measures to manage potential or acute damage situations will be investigated as well. The designed methodologies will be tested for five case studies including World Heritage Sites (historical buildings and historical gardens) in Germany.

The major tools of KERES include building component and indoor climate simulations and high-resolution urban climate models. The necessary input will be taken from the most recent ensemble of regional climate change projections of the EURO-CORDEX Initiative (www.euro-cordex.net). As a result, an ontology-based information system will be designed for managing the expected damage situations.

We will present first results from the KERES project. The discussion will be focused on how to

access and visualize the robustness of projected changes of extreme weather events in a way oriented to individual cultural heritage sites.