Warning, press release under embargo until 27 January 2022 at 16:00 (London time), 27 January 2022 at 11:00 (US Eastern Time)

PRESS RELEASE

Grenoble, January 24, 2022

Climate and floods: an international study conducted in the European Alps sheds light on the links between warmer periods and floods

An international team has studied lake sediments and reconstructed flood records during the cold and warm periods of the Industrial Era, the last millennium and the Holocene. The results of this paleohydrological study, which will be published in Nature Geosciences on 27 January 2022, show that regionally the flood hazard could globally decrease with climate warming, except for some small mountain catchments where extreme floods could be more frequent. An important study to better understand the phenomenon of extreme floods in the Alps.

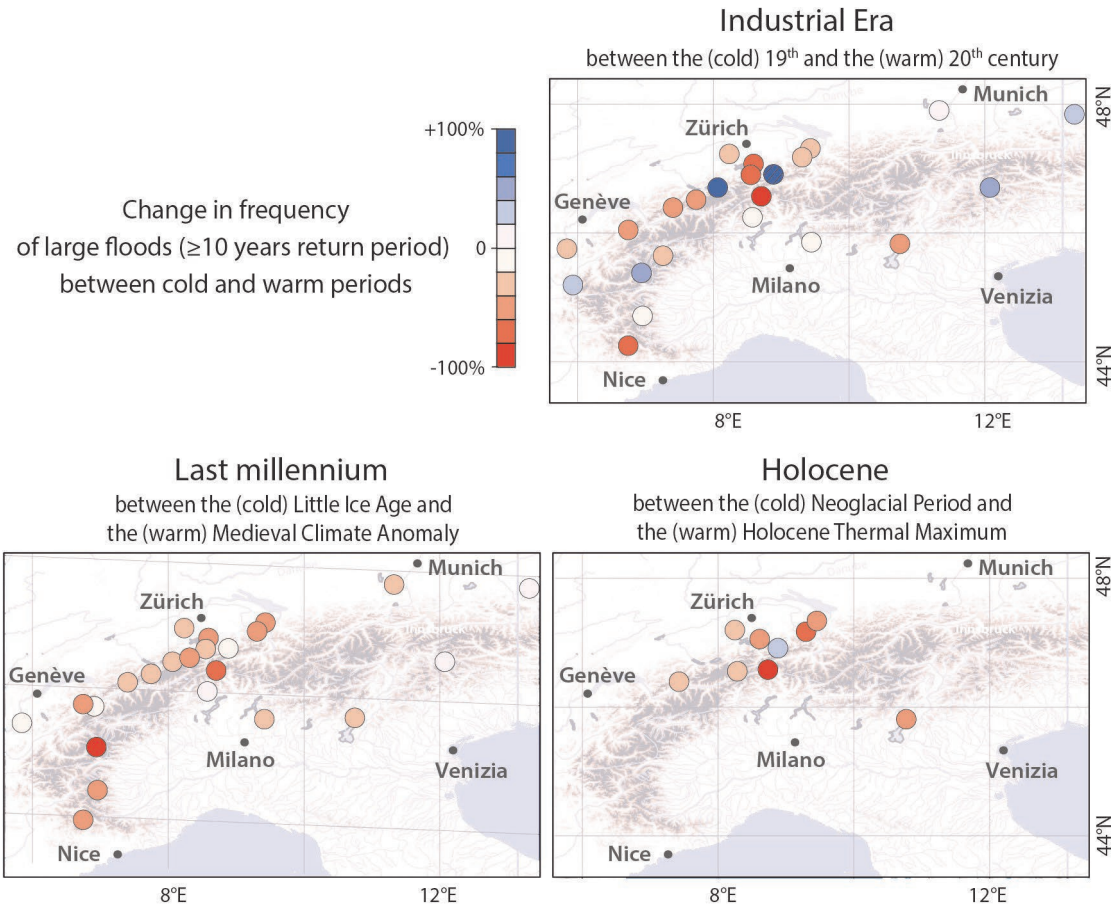
Flooding is a pervasive natural hazard - costly in human and economic terms - that climate change could exacerbate. This is of particular concern in mountainous areas such as the Alps, which are particularly sensitive to climate change as evidenced by their higher rate of warming than the northern hemisphere. Moreover, the flood risk is already high in these areas due to the high population density and the occurrence of flash floods favored by the hydrometeorological processes associated with the high topography.

To test the still uncertain impact that a warmer climate period might have on the frequency and magnitude of floods in the Alps, scientists from France, Switzerland, Germany and Italy studied lake sediments and reconstructed flood records during various past climatic conditions at 33 different sites in the Alps.

During a flood, the increase in discharge results in significant erosion of materials that are transported by the river. Further downstream, the material is trapped in lakes where it forms characteristic deposits, called "flood deposits". These deposits are perfectly preserved over millennia. By taking sediment core samples, scientists can collect, identify and date flood deposits to reconstruct changes in flood frequency and intensity through time.

No less than thirty-three flood records going back up to 10,000 years were thus produced, whose data have just been compiled in order to analyze the changes in the frequency of large floods (≥10 years return period) during the cold and warm periods of the Industrial Era, the last millennium and the Holocene. The results of this compilation demonstrate that a warming of +0.5-1.2°C, whether natural or anthropogenically-forced, led to a 25-50% decrease in the frequency of large floods. This decreasing trend is not conclusive in the records covering less than 200 years, but it appears persistent in those covering 200 to 9000 years. The same analysis was conducted on extreme floods (≥100 years return period). In contrast to the generalized decrease in large floods during warm periods, the evolution of extreme floods reveals different trends depending on the catchments. In particular, it appears that extreme floods are more frequent in some small mountain catchments during warm periods.

Therefore, the results show that regionally the flood hazard could decrease overall with climate change, with the exception of certain small mountain catchments where extreme floods could be more frequent. It will therefore be necessary to further study the evolution of hazard in these small catchment areas, which have not been given much consideration to date. More generally, this work shows how paleohydrological reconstructions can be used to unravel the complex relationships between climate and flooding and to improve risk assessment and management at the local and regional scales.



Reference: 10.1038/s41561-021-00878-y

Wilhelm B., Rapuc W., Amann B., Anselmetti F.S., Arnaud F., Blanchet J., Brauer A., Czymzik M., Giguet-Covex C., Gilli A., Glur L., Grosjean M., Irmler R., Nicolle M., Sabatier P., Swierczynski T., Wirth S.B. Impact of warmer climate periods on flood hazard in the European Alps. Nature Geoscience

Link to the publication: https://www.nature.com/articles/s41561-021-00878-y

Flooding of the Vorz torrent, August 23, 2005, Belledonne, France (photo: Dominique Thillet)

Contact

Bruno Wilhelm
Associate Professor UGA - IGE
bruno.wilhelm@univ-grenoble-alpes.fr

Contact presse

Muriel Jakobiak-Fontana
Directrice adjointe communication - Université Grenoble Alpes
muriel.jakobiak@univ-grenoble-alpes.fr
Tél : 06 71 06 92 26