Warm summers coincide with less frequent flooding

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Over the past 2,500 years, flooding in the Alps has been less frequent during warm summers than during cool summers. This is the finding of a study supported by the Swiss National Science Foundation (SNSF) and carried out by researchers at the Swiss Federal Institute of Aquatic Science and Technology (Eawag), the WSL, the University of Bern and the ETH Zurich. Their look into the past suggests that the frequency of flooding can be expected to wane in the central Alps.

Flooding represents a major natural hazard facing the people and infra-structures of the Alpine region. How is the frequency of such extreme events likely to change over coming decades with the climatic scenarios pointing to warmer summers and lower mean precipitation levels? The study of geological archives (lake sediments), as well as a comparison with periods of higher temperatures, can help to provide a response to this question. However, both instrumental data and historical documents only allow us to look back over the last few centuries.

Continuous data at regional level

For the first time, a team of researchers from Eawag, the University of Bern and the ETH Zurich, led by Flavio Anselmetti and Adrian Gilli, has studied the full history of flooding in the northern Alps over the past 2,500 years (*). This involved analysing sedimentary flood deposits taken from ten lakes in the northern Alps and dating the deposits that were characteristic of flooding episodes. “These lakes are distributed across a wide area and are located at different altitudes. This enables us to reduce local effects and events, and to obtain an overall picture of the climate in the central Alps,” explains Lukas Glur, the first author of the study. “We were able to identify thirteen periods with high flood frequency but we are unable to say anything about how intense they were.”

The role of subtropical high-pressure zones

Combining this data with the summer temperature curve for central Europe – from the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) - reveals a positive correlation between the periods with most frequent flooding and cool summers. The researchers’ interpretation of this correlation is based on a change in North Atlantic atmospheric circulation patterns. Warm and dry summers in the northern Alps are characterised by a northward movement of the subtropical high-pressure zone, which deflects the humid air towards northern Europe. Conversely, when this zone is less extensive, bad weather systems are located further south and push up against the north side of the Alps, triggering major precipitation events.

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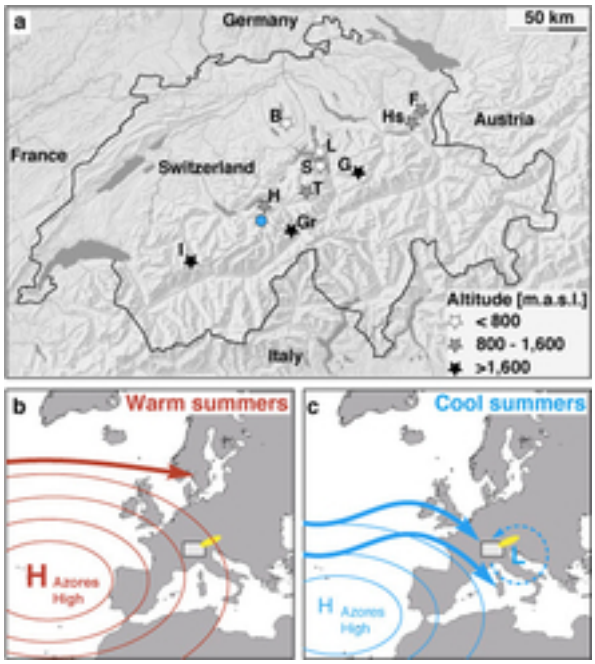
Video-Interview with Lukas Glur (german)



Based on current knowledge, climate change can be expected to favour an expansion of this high-pressure zone. Consequently, researchers believe that the frequency of flooding can be expected to decline in the central Al-pine region. However, the study does not enable them to draw conclusions as to the intensity of individual floods.

Related Files

Media Release (german) [pdf, 82 KB]

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