

Using Archives of Past Floods to Estimate Future Flood Hazards

Cross Community Workshop on Past Flood Variability; Grenoble, France, 27–30 June 2016

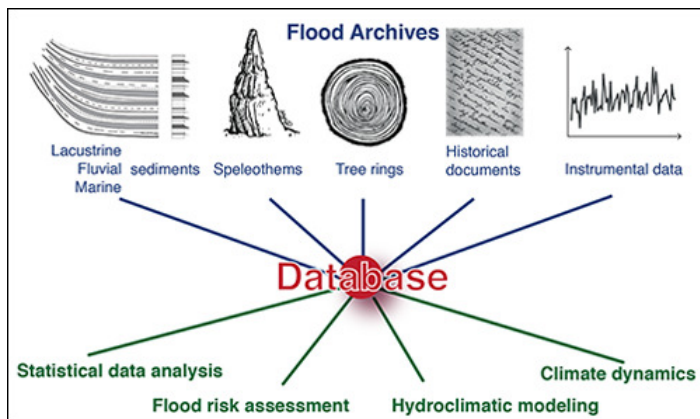


Floodwaters in the Elbe River reached an all-time high in August 2002, inundating this street in Dresden and requiring the evacuation of as many as 33,000 Dresden residents from their homes. Last June, the Floods Working Group of the Past Global Changes project hosted a workshop to address the urgent need for better assessments of flood hazards by systematically using evidence from past floods. Credit: Uta Löser

By [Tina Swierczynski](#), [Monica Ionita](#), and [David Pino](#) © 13 January 2017

Worldwide, floods cause greater economic damage and [loss of human life](https://www.munichre.com/site/corporate/get/documents_E-111857635/mr/assetpool.shared/Documents/5_Touch/_NatCatService/Significant-Natural-Catastrophes/2015/1980_2015_Ueberschwemmungen_eco_e.pdf) (https://www.munichre.com/site/corporate/get/documents_E-111857635/mr/assetpool.shared/Documents/5_Touch/_NatCatService/Significant-Natural-Catastrophes/2015/1980_2015_Ueberschwemmungen_eco_e.pdf) than any other type of natural disaster. We urgently need better assessments of flood hazards to reduce the societal impact of extreme floods caused by Earth's rapidly changing climate, among other factors.

One way of assessing flood hazards is to examine past floods using the records provided by hydrological instruments. We can extend this knowledge back through the Holocene period or beyond using [historical documents](https://eos.org/research-spotlights/how-vague-historical-writings-help-scientists-predict-floods) (<https://eos.org/research-spotlights/how-vague-historical-writings-help-scientists-predict-floods>) and natural archives (including alluvial, marine, and lake sediments; tree rings; and [cave formations](https://eos.org/research-spotlights/dearth-hurricanes-explain-maya-collapse) (<https://eos.org/research-spotlights/dearth-hurricanes-explain-maya-collapse>)). These extended records can provide valuable information about long-term flood trends.



The PAGES Floods Working Group brings together experts studying paleofloods through a range of natural and human hydrological archives to produce improved estimates of flood hazards globally.

To promote the systematic use of paleoflood evidence, the [Floods Working Group](http://pastglobalchanges.org/ini/wg/floods/intro) of the Past Global Changes (PAGES) project organized the first interdisciplinary workshop on past flood variability. The meeting brought together geologists, geographers, historians, meteorologists, climatologists, statisticians, and hydrologists who investigate [past flood events](https://eos.org/articles/evidence-found-for-chinas-ancient-origin-story) globally. The workshop aimed to coordinate further efforts to share disciplinary experiences, promote interdisciplinary collaborations, and integrate results and analysis. In all, 46 researchers from 16 countries attended.

The workshop held three sessions that focused on a review of available flood archives for the reconstruction of flood occurrence and magnitude, an assessment of multiarchive flood approaches for more precise and complete regional flood assessments, and a consideration of statistical and modeling tools that can be applied to flood reconstruction and identifying potential forcing mechanisms that include climate and land use change.

Despite the wealth of flood archive data, it is still challenging to compare different data sets or integrate these data into risk assessments. The workshop highlighted the wealth of existing flood archive data, which spans daily to millennial timescales. Despite the wealth of data, it is still challenging to compare different flood archive data sets or integrate these data into risk assessments. Some geographic areas, particularly Africa, Central and South America, and southern Asia, are underrepresented.

At the meeting, the PAGES Floods Working Group agreed to create a joint database collecting all flood archive information to encourage systematic use of paleoflood indicators. A joint database will help handle different flood archives with different resolutions. It will also facilitate the development of hydrological and statistical tools to analyze floods from a multiarchive data set.

Additionally, the Floods Working Group identified the need to further involve climate modelers, hydrologists, and risk managers to improve the understanding of the physical processes controlling the occurrence and magnitude of floods. Attendees agreed that these scientific collaborations and synergies could help contribute to the present debate about climate drivers and the [human impact](http://onlinelibrary.wiley.com/doi/10.1002/2014WR016416/full) on flood generation. The use of climate and [hydrological modeling](https://eos.org/research-spotlights/reimagining-a-fatal-flood) is critical to test climate-flood relationships suggested by interpretations derived from paleoflood archives.

Climate and hydrological modeling are critical to test climate-flood relationships suggested by interpretations derived from paleoflood archives. Within the next 3 years, the PAGES Floods Working Group will foster further collaborations among scientists from different archive communities and identify key questions for the broader flood community. The focus will emphasize the exchange of experiences with the use of data about past floods; archive-specific methodological aspects; and the advantages, challenges, and limitations of each archive.

Researchers interested in joining the Floods Working Group are encouraged to visit the [group website](http://pastglobalchanges.org/ini/wg/floods/intro). Video recordings of the workshop presentations are available online at the [meeting website](http://pastglobalchanges.org/ini/wg/floods/meetings/127-pages/1553-cross-community-workshop-on-past-flood-variability).

—Tina Swierczynski (email: tina.swierczynski@awi.de), Alfred Wegener Institute, Bremerhaven, Germany; and European Climate Research Alliance, Brussels, Belgium; Monica Ionita, Alfred Wegener Institute, Bremerhaven, Germany; and David Pino, Department of Physics, Universitat Politècnica de Catalunya and Institute for Space Studies of Catalonia, Barcelona, Spain

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