



A 1500-year flood history in Romania using multi-archive reconstructions

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This study integrates documentary, instrumental, archaeological and sedimentological data to reconstruct periods of increased flooding in present-day Romania over the last 1500 years.

We identified 22 flood-rich periods between AD 600-650, 830-930, 990 – 1020, 1060 – 1110, 1136 – 1165, 1195 – 1245, 1304 – 1317 and 1340 – 1373, 1400 – 1440, 1460 – 1470, 1490 – 1540, 1560 – 1580, 1592 – 1622, 1635 – 1657, 1667 – 1675, 1699 – 1731, 1771 – 1793, 1831 – 1864, 1890 – 1920, 1930s, 1970s – 1980s, 1990s – present. Our reconstructions show an increase in the incidence of floods during the Medieval Climate Anomaly and towards the end of the Little Ice Age.

In order to understand the potential causes behind these flooding events, we have used reconstructions of seasonally-distinct air temperature, precipitation amount and atmospheric circulation patterns based on an array of proxy records (e.g., cave ice and speleothem stable isotopes, tree ring-based proxies).

The most extensive floods were recorded between AD 1050-1250, mostly in the extra-Carpathian region, attributed to the advance of humid Eastern Mediterranean air masses. Currently, there is no conclusive information about their magnitude during the Migration Period, although the limited information of fluvial origin supports a reduced flood magnitude compared to the Medieval Climate Anomaly. Over the last 500 years, floods with maximum geomorphological effects occurred at the end of the 18th and 19th centuries (1770 – 1800 and 1880 – 1920) across the entire study area, against the background of an unstable climate, marked by the intensification of westerly Atlantic circulation and frequent northward incursions of Eastern Mediterranean cyclones. These were followed in magnitude by recent events (1990 – present), favored predominantly by warm and humid Eastern Mediterranean air masses, and the intensification of the westerly circulation of Atlantic origin at the onset of the Little Ice Age (1460 – 1470 and 1490 – 1530).

Alongside the climate signal, floods in the last 500 years also exhibit a strong anthropogenic component, accentuated in the last 250 years.