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A critical evaluation of present flood hazard maps in Southwest Germany using epigraphic marks and historical written data

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Engraved in stone or attached as metal plates to bridges or house walls, flood marks are mostly publicly accessible symbols of high-water level and form part of the cultural heritage. They serve as tangible representations of the extent of past floods and are thus regarded a medium which can raise public risk awareness and contribute to a collective risk memory. Moreover, epigraphic marks are often regarded a valuable source of information on the frequency and magnitude of historical extreme events. However, a flood mark's informational value may be considered too rudimentary, and the large number of potential error sources is a challenge that often cannot be fully resolved. We therefore conducted a multi-temporal study in the Kinzig catchment, Southwest Germany, in order to, firstly, test for the credibility and the temporal continuity of flood marks. Secondly, we used the knowledge gathered to verify the current flood hazard maps (FHM). For this study, more than 60 flood marks corresponding to 14 events since the beginning of the 19th century were checked and/or mapped in three communities in the upper and middle catchment. A detailed historical survey of flood marks dating back to the early 20th century provided a unique opportunity to assess the preservation of marks as well as the extent of relocation since that time. The flood mark heights were then compared with the flooding depths of the modelled FHM for floods between HQ10 and HQextreme at the respective locations. The gauge record was additionally included to assign return periods to the more recent events. Altogether, a high relative agreement between flood marks and the FHM was found in this systematic study, particularly for events during the 20th century. The extreme extents of some events within headwater catchments documented both by epigraphic marks and further documentary sources however appear to be underestimated by the FHM.