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Recent changes in extreme floods across multiple continents

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Analyses of trends in observed floods often focus on relatively frequent events, whereas changes in rare floods are only studied for a small number of locations that have exceptionally long observational records. Understanding changes in rare floods is especially relevant as these events are often most damaging and influence the design of major structures. Here we provide an assessment of changes in the largest flood events (~ 0.033 annual exceedance probability) observed during the period 1980-2009 for 1744 catchments located in Australia, Brazil, Europe and the United States. The occurrence of rare floods in spatial aggregate shows strong decadal variability and peaked around 1995. During the 30-year period there are overall increases in both the frequency and magnitude of extreme floods. These currently unattributed increases are strongest in Europe and the United States, and weakest in Brazil and Australia.