



The 2011 Thailand flood: climate causes and return periods

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Thailand is one of the most developed and wealthiest countries in Southeast Asia. However, its tropical location and the influence of seasonal monsoon rains and local topography make it prone to floods. The Thailand floods in 2011 were especially severe causing estimated losses of US \$ 30 billion (economic) and US \$ 12 billion (insured) (Swiss Re, 2012). This insured loss ranks easily as the highest ever worldwide from a freshwater flood disaster (Swiss Re, 2012).

We review the nature, impacts and historical ranking of the 2011 Thailand flood, and then discuss the climate causes for the exceptional rainfall which triggered the flood – annual rainfall in 2011 was the highest in Thailand's 61-year precipitation record (Thai Meteorological Department, 2011). Thai precipitation data from 100 stations for the period 1992-2011, NCEP/NCAR mean sea level pressure (MSLP) data and best-track data from the Joint Typhoon Warning Center for the period 1992-2011 are used in this study. We find that the floods were caused by a combination of a strong Southeast Asian summer monsoon that brought high rainfall across the country between May and October, and by the remnants of four tropical storms that brought high rainfall to northern Thailand between June and October. During the monsoon season the Southern Oscillation was moderately positive and, as a result, likely contributed to the high monsoonal rains.

We estimate the return periods for the 2011 Thai rains and compare these to satellite-derived return periods for 2011 Thai river flow. The rainfall return period varies from 8-20 years in the north and south of the country to 1-8 years in the east and centre of Thailand. Satellite-derived river flows at two locations on the Chao Phraya River suggest a return period of 10-20 years. The return period is also estimated using historical flood records (Brakenridge, 2012) which suggest a return period of 5-6 years. A 'consensus' return period for the 2011 Thai flood is estimated to be 10-20 years. However, these estimates may be biased low due to the limited 20-30 year extent of the historical data used for model building and because of recent improvements in Thai flood defences.

We conclude that another Thailand flood as devastating as in 2011 will likely occur within the next two to three decades unless flood defences and flood management practices are further improved.

References

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