# Effects of sea surface temperature anomaly on flooding events in Hunan province

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This study investigated the effect of sea surface temperature anomaly (SSTA) on flood-season precipitation in Hunan Province (the main grain-producing area in China) and change trend of the related flooding events. Based on the observation data of flood seasons in 44 stations of Hunan province from 1970-2013 and the sea surface temperature (SST) dataset from the Met Office Hadley Center, the empirical orthogonal function (EOF) analysis, power spectrum analysis and correlation analytical method have been conducted to identify the key time and marine regions which influence flood-season rainfall distribution. According to these analyses, two main spatial patterns of precipitation have been observed. The first and remarkable pattern is generally distributed uniformly throughout the region and is characterized by a 2-3-year and 20-23-year periods. The decadal variability has a negative correlation with the summer SSTA in the Indian Ocean near the equator, while the interannual variability is associated with the previous autumn and winter SSTA in the eastern Pacific. The second pattern illustrates dry-wet difference, indicating a north-to-south opposite, in a 3-year periods. The key area for influencing this mode is distributed in the Equator Pacific especially in the previous autumn and winter (known as ENSO). Furthermore, based on the EOF results of precipitation, we introduced the historical flooding event records of Hunan province and developed the spatial distribution maps and probability density curves for the direct economic losses in the years of anomaly and normal rainfall. The results reveal that the anomaly years suffer more serious losses and there is a corresponding relationship between north-to-south opposite precipitation mode and regional economic loss differences. With the function of illustrating the variation trend of hazards and the critical influence factor, these results are the data foundation for flood risk assessment. It can be used as a potential reference for policy-makers to formulate effective flood risk management plan.