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Extreme monthly precipitation pattern in China and its dependence on Southern Oscillation

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Using the generalized Pareto distribution (GPD) and a spatial scheme of parameter estimation, spatial patterns of extreme monthly precipitation (EMP) in China were studied using 740 stations' data from 1960 to 2007. The spatial patterns of EMP are described by the GPD's scale and shape parameters, whose regional features depend on ENSO activities. The results show that the scale parameter (representing variability) in monsoon areas, such as southern China, is greater than that of non-monsoon areas, such as northern China, and that it is greater in summer than that in autumn. The shape parameter (representing record-breaking probability) reaches a maximum in non-monsoon areas and a minimum in monsoon areas. For the time scale, record-breaking events would occur more easily in the seasons other than summer. The regional difference in terms of dependence of EMP's variability on Southern Oscillation (SO) was also related to the monsoon transition zone. The variability with great dependence on SO was in the Qinghai–Tibet Plateau and in the region between the Yangtze and Yellow rivers, which are dry–wet transition zones. The response of EMP's record-breaking probability to SO is apparent in most regions of China, and its spatial pattern becomes the largest in summer and much smaller in spring and autumn.