

## Anomalous Weather Patterns in Relation to Heavy Precipitation Events in Japan during the Baiu season

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Anomalous weather patterns (WPs) in relation to heavy precipitation events during the Baiu season in Japan are investigated using a nonlinear classification technique known as the self-organizing map (SOM). The analysis is performed on daily timescales using the JRA-55 reanalysis to determine the role of circulation and atmospheric moisture on extreme events, and to investigate interannual and interdecadal variations for possible linkages with global-scale climate variability. SOM is simultaneously employed on four atmospheric variables over East Asia that are related to Baiu front variability, whereby anomalous WPs that dominated during the 1958-2011 period are obtained. Our analysis extracts seven typical WPs, which are linked to frequent occurrences of heavy-precipitation events. Each WP is associated with regional variations in the probability of extreme precipitation events.

On interannual timescales, the El Niño/Southern Oscillation (ENSO) affects the frequency of the WPs in relation to the heavy rainfall events. The warm phase of ENSO results in an increased frequency of a WP that provides a southwesterly intrusion of high equivalent potential temperature at low levels, while the cold phase provides southeastern intrusion. In addition, the results of this analysis suggest that interdecadal variability of frequency for heavy rainfall events corresponds to changes in frequency distributions of WPs, and are not due to one particular WP.

Keywords: Self-organizing maps, Baiu, Extreme rainfall, Climate variability, El Niño/Southern Oscillation