

A recipe for extreme rainfall over eastern Asia

During boreal summer strong rainfall occurs over parts of East Asia. Two factors contribute to the development of monsoon precipitation: 1) the availability of moisture in the atmosphere and, 2) converging winds. Whereas moisture levels in the atmosphere can be controlled by the prevailing temperatures (referred to as the thermodynamic effect), the wind convergence is controlled by large-scale atmospheric flow associated for instance with the development of the western North Pacific subtropical high (dynamic effect). If both effects conspire, extreme rainfall can occur, which can lead to massive flooding (Fig. 3). Investigating the co-variability of dynamic and thermodynamic factors on interannual timescales, ICCP researcher Hyo-Eun Oh and ICCP-affiliate professor Dr. Kyung-ja Ha found that the thermodynamic effect plays a key role in the generation of extreme rainfall over Asia. With increasing temperatures and humidity, global warming is expected to boost the thermodynamic effect, leading to extreme precipitation with potential impacts on agriculture, erosion and human livelihood.

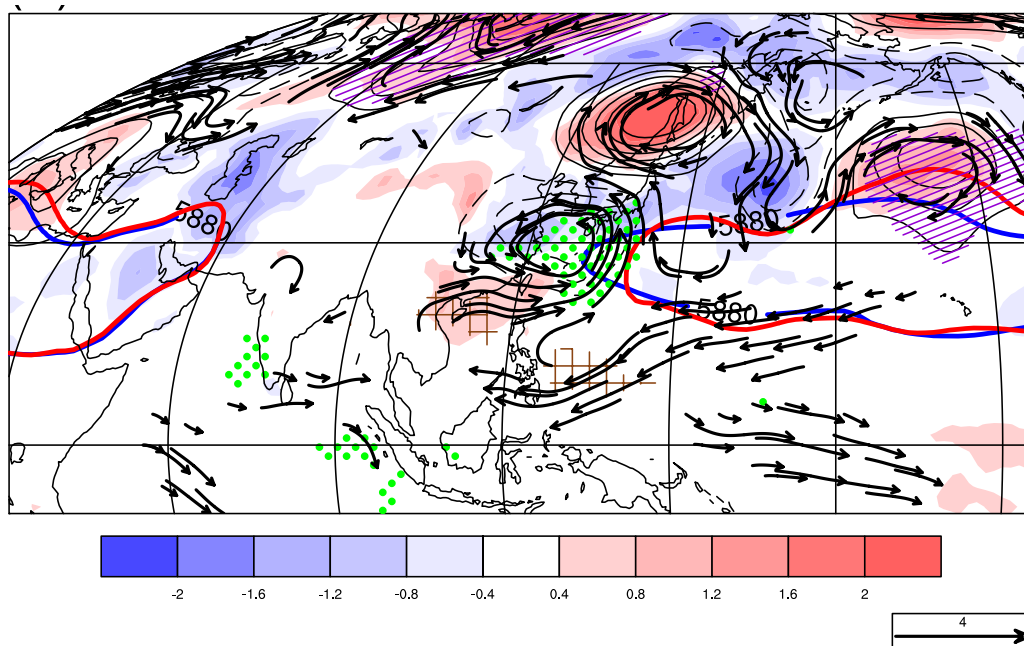


Fig. 3. Anomalous air temperature and wind at 850 hPa (shading, streamlines), geopotential height at 500 hPa (contour), and precipitation (dot symbols) for eight extreme pentads, when both the dynamic and thermodynamic components are operating in unison. The red (blue) line indicates the mean geopotential height (5,880 gpm) for the eight extreme pentads (late summer).

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