

Extreme rainfall and heat wave over Japan in 2018 summer: A series of extreme events and underlying global warming

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In early July extreme rainfall occurred particularly over western Japan and the Tokai region, named “the Heavy Rain Event of July 2018”, which caused widespread havoc. It was followed by heat wave that persisted over most of Japan in setting the highest temperature on record in late July.

The rain event can be attributed to two extremely moist airflows from the Tropics confluent persistently into western Japan in addition to large-scale ascent along the stationary Baiu front. The heat wave is attributable to the enhanced surface North Pacific Subtropical High with a prominent barotropic anticyclonic anomaly just north of western Japan. The consecutive occurrence of these extreme events was related to persistent meandering of the upper-level subtropical jet, indicative of remote influence from the upstream. The heat wave can also be influenced by enhanced convective activity under the above-normal warmness over the tropical North Pacific. The global warming can influence not only the heat wave but also the rain event, as suggested from long-term increasing trends observed over Japan in intensity of extreme precipitation and water vapor amount. Another contribution was possible from anomalous warmth over the midlatitude Northern Hemisphere observed since March 2018.

Keywords: heavy rainfall event over western Japan in July 2018, heat wave over Japan, extreme climate events, jetstream meanders, global warming