Liu, B., C. Zhu, J. Su, S. Ma, and K. Xu, 2019: Record-breaking northward shift of the western North Pacific Subtropical High in July 2018. *J. Meteor. Soc. Japan*, **97**, 913-925.
Special Edition on Extreme Rainfall Events in 2017 and 2018
https://doi.org/10.2151/jmsj.2019-047

Plain Language Summary: The northward shift of the western North Pacific Subtropical High (WNPSH) in July 2018 broke the historical record since 1958. The present work attributes the extreme WNPSH anomaly to the strongest positive tri-pole pattern of sea surface temperature anomaly (SSTA) in the North Atlantic. This SSTA could induce an eastward propagating wave-train over the Eurasian Continent and enhance the atmospheric diabatic heating over the eastern Tibetan Plateau to cause the extreme northward shift of the WNPSH, finally leading to the extreme heat waves and casualties across Northeast Asia (NEA), especially over the southern Japan.

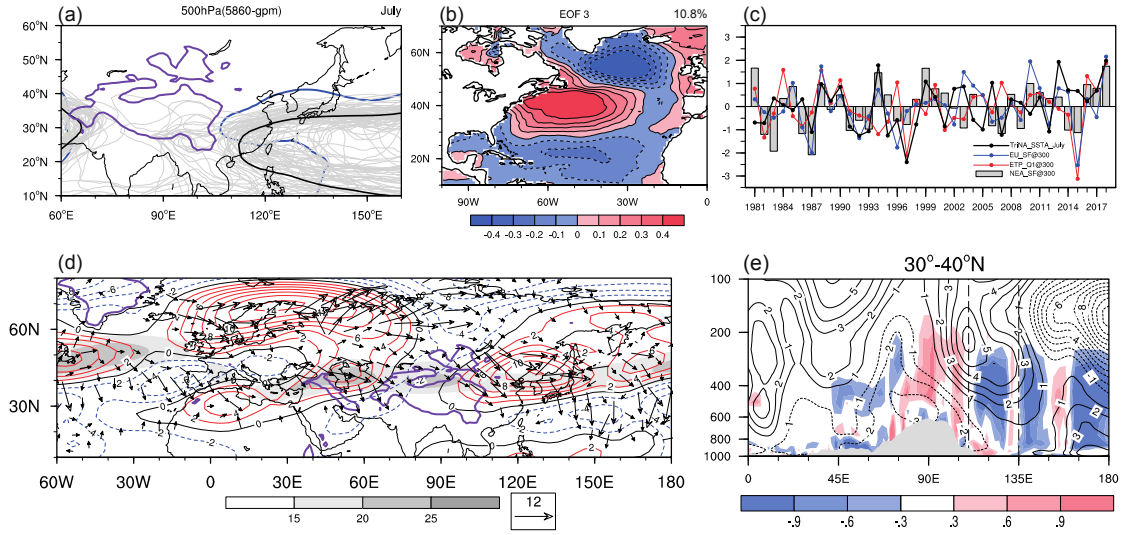

Figure 1. (a) The position of the WNPSH at 500 hPa (bold black lines: climatological status, blue lines: situation in 2018, light gray lines: cases in other years). (b) The Tri-pole SSTA in the North Atlantic in July and (c) its principle component (black line) with the time series of anomalous 300-hPa stream function over NEA (gray bars) and Europe (blue line) as well as the 300-hPa anomalous diabatic heating over the eastern TP (red line). (d) the 300-hPa anomalous stream function (contours) and wave activity flux (vectors). (e) Pressure–longitude cross section of the anomalous stream function (contours) and diabatic heating (shading) averaged over the southern TP.

- The poleward shift of WNPSH reached 40°N in July 2018 and broke the historical records since 1958.
- The extreme WNPSH anomaly was linked to the strongest positive tri-pole pattern of SSTA in the North Atlantic.
- The SSTA in the North Atlantic induced a wave-source over Europe, enhanced the diabatic heating over the eastern Tibetan Plateau, and finally resulted in the extreme WNPSH anomaly.