S7. WAS THE EXTREME STORM SEASON IN WINTER 2013/14 OVER THE NORTH ATLANTIC AND THE UNITED KINGDOM TRIGGERED BY CHANGES IN THE WEST PACIFIC WARM POOL?

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Data: In our analyses we make use of the following data sets: 6-hourly ERA Interim reanalysis (Dee et al. 2011) in its original T255 spatial resolution is used for wind speeds, 2-m temperature, and mean sea level pressure (MSLP). Absolute wind speeds are calculated from the zonal and meridional components at 10-m height and used as input for an objective wind-tracking algorithm (Leckebusch et al. 2008). Two-meter temperature data is normalized by its standard deviation with respect to the long-term climatology mean of each 6-hourly time step to remove daily and seasonal cycles. The seasonal anomaly mean is calculated from these normalized values. Additionally, we use MSLP data to identify cyclones in the North Pacific.

For the analysis of convective activity over the tropical Pacific, NOAA/NCAR gridded monthly outgoing longwave radiation (OLR) data is used (Liebmann and Smith 1996). Sea surface temperatures are taken from the 4th version of the ERSST data (Huang et al. 2014). The seasonal cycle is removed from both these data sets. We further use of the winter mean of the monthly Pacific–North America pattern index (PNA) provided by NOAA Climate Prediction Center (e.g., Barnston and Livezey 1997).

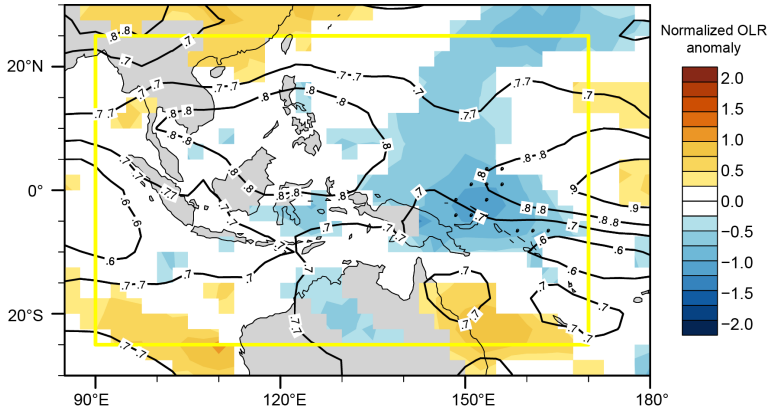

Fig. S7.1. Seasonal normalized anomaly mean of OLR for December 2013–February 2014 compared to long-term climatology (1979–2014) in shadings; interannual standard deviation in contours; black dots indicate a minimum in winter 2013/14. Negative OLR values indicate high convective activity. Yellow box marks regions used for the calculation of correlation coefficients in Table 7.1 in main text.

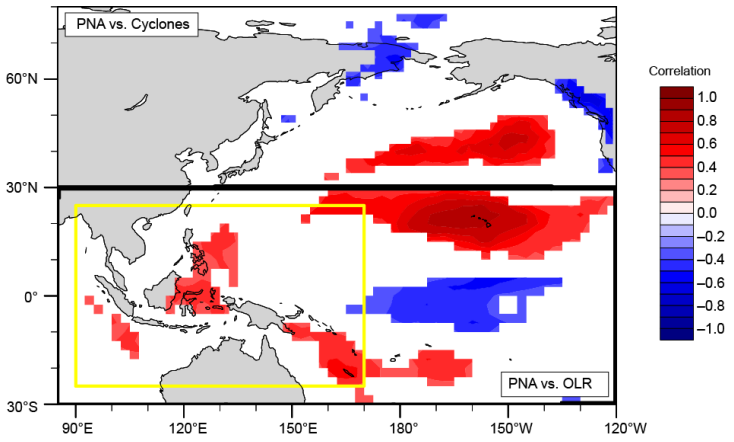

Fig. S7.2. Interannual correlation coefficient (Pearson) of seasonal mean (December–February) values from 1979/80 to 2013/14: (top, north of 30°N) PNA index and cyclone events; (bottom, south of 30°N) PNA index and OLR. Correlations below the 95% significance level are omitted.

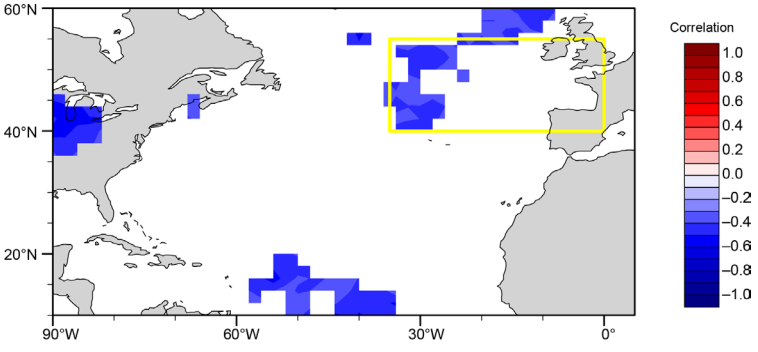

Fig. S7.3. Interannual correlation coefficient (Pearson) between seasonal mean (December–February) values of PNA index and wind storm events from 1979/80 to 2013/14. Correlations below the 95% significance level are omitted.

The role of the PNA: The PNA correlates positively with the cyclone track density in the central and eastern North Pacific around 40°N (Fig. S7.2, top). The maximum correlation of about 0.75 is located in the region of the climatological Aleutian low, which is slightly shifted to the west, compared to the location of the 2013–14 most negative cyclone track density anomaly (main text Fig. 7.1, left). The correlation between PNA and OLR shows an El Niño–Southern Oscillation-like pattern with highest values at the northern edge of the tropical Pacific (Fig. S7.2, bottom). The PNA is significantly linked to the OLR and thus convective activity over about half of the west Pacific warm pool.

However, the PNA and North Pacific sea surface temperatures show only weak and no significant correlation to wind storms in most parts of the considered North Atlantic region (Table 7.1 in main text; Fig. S7.3).

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