CORRECTIONS & AMENDMENTS

CORRECTION

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Author Correction: A global slowdown of tropical–cyclone translation speed

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Correction to: Nature <https://doi.org/10.1038/s41586-018-0158-3>, published online 6 June 2018.

In this Letter, there are two errors in the methodology. These corrections revise regional values; they do not affect the conclusions and none of the global numbers (trend and statistics) change.

In the first error, data were inadvertently omitted just prior to and subsequent to reporting times that were synoptic (that is, when data were not provided on the synoptic times of 00, 06, 12 and 18 hours UTC). These data have now been included.

In the second error, the ‘non-main’ track types (unusual tracks identified as ‘merge’, ‘split’ or ‘other’ by the IBTrACS algorithm (see ref. 32 of the original Letter) in the data were not adequately screened. Such screening is important when counting storms to obtain annual storm frequency (see ref. 32 of the original Letter) but less so for calculating metrics such as translation speed; however, a correction is nevertheless warranted here. The non-main track types can represent physical cases where two storms formed near each other or cases of vortex merger, but they can also be spurious. To remove the spurious cases while retaining the physical cases, I have now set a duration threshold of a minimum of 3 days because it is unlikely that a spurious track would exceed 2–3 days.

The revised numbers, after inclusion of the data that were inadvertently removed and additional screening for track type by setting a conservative track duration threshold of 3 days, are tabulated

in Figs. 6 and 7, along with the original numbers from Extended Data Tables 1 and 2 for comparison. Globally, as noted above, the translation speed trend, percentage change and 95% confidence interval do not change. The slowing trend in the Northern Hemisphere increases slightly and the trend in the Southern Hemisphere becomes statistically significant. That is, the correction strengthens the trends on a hemispheric scale in each hemisphere. The statement that slowing is observed in every basin except the Northern Indian Ocean remains true.

On finer regional scales, the correction has a number of varying effects. For example, the slowing trend in the western North Pacific is reduced from 20% to 16% in the basin as a whole and from 30% to 21% over land in that region, but both trends remain highly significant. The slowing trends in the global latitude bands north of 25° N are reduced and are no longer significant with 95% confidence, whereas the slowing trends from 0–15° N and 15–25° N both increase and the latter trend becomes statistically significant. Slowing over land in the Atlantic region is reduced from 20% to 16% and the confidence level of the trend drops below 95% (but remains above 90%). Slowing over land in the Australia region increases from 18% to 22%. The speed-up over land in the Northern Indian Ocean region increases from 26% to 29% and becomes significant. All of these changes have been made to the text of the original Letter.

All relevant original figures and tables (Figs. 1–3 and Extended Data Figs. 1 and 2 and Extended Data Tables 1 and 2) have been corrected and are shown below alongside the original figures for comparison and transparency (see Figs. 1–7 of this Amendment). All corrections provided here have been peer-reviewed. I thank K. T. F. Chan of the Guangdong Province Key Laboratory for Climate Change and Natural Disaster Studies, School of Atmospheric Sciences, Sun Yat-sen University, China, for pointing out the methodology errors in the original paper. The original Letter has been corrected online.

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Fig. 1 | This figure comprises the original Fig. 1 (left panels a and b) and the revised Fig. 1 (right panels a and b). The figure shows the global and hemispheric time series of annual-mean tropical cyclone translation speed and their linear trends. The trend in the Southern Hemisphere is

not significant at the two-sided 95% confidence level using the original data, and becomes significant with greater than 99% confidence using the revised data.

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Fig. 2 | This figure comprises the original Fig. 2 (left panel) and the revised Fig. 2 (right panel). The figure shows the change in the global distribution of tropical-cyclone translation speed.

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Fig. 3 | This figure comprises the original Fig. 3 (left panels a–f) and the revised Fig. 3 (right panels a–f). The figure shows the time series of annual-mean tropical-cyclone translation speed and their linear trends over land and water.

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Fig. 4 | This figure comprises the original Extended Data Fig. 1 (left panel) and the revised Extended Data Fig. 1 (right panel). The figure shows the time series of annual-mean tropical-cyclone translation speed and their linear trends in varying ocean basins.

Fig. 5 | This figure comprises the original Extended Data Fig. 2 (left panels a and b) and the revised Extended Data Fig. 2 (right panels a and b). The figure shows the time series of annual-mean tropical-cyclone translation speed and their linear trends in varying latitude belts.

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	Trend (km h ⁻¹ yr ⁻¹)	Change (%)	P-value (uncorrected)	95% confidence interval
Global	-0.03, -0.03	-10, -10	<10 ⁻⁷ , <10 ⁻⁷	[-0.04, -0.02]*, [-0.04, -0.02]*
Northern Hemisphere	-0.03, -0.04	-11, -12	<10 ⁻⁶ , <10 ⁻⁷	[-0.05, -0.02], [-0.05, -0.02]*
Southern Hemisphere	-0.02, -0.02	-9, -10	0.02, 0.006	[-0.05, 0.002]*, [-0.04, -0.008]
North Atlantic Ocean	-0.02, -0.02	-6, -6	0.16, 0.20	[-0.05, 0.008], [-0.05, 0.011]
Western North Pacific Ocean	-0.07, -0.05	-20, -16	<10 ⁻⁸ , <10 ⁻⁷	[-0.08, -0.05], [-0.07, -0.03]
Eastern North Pacific Ocean	-0.01, -0.01	-4, -3	0.39, 0.57	[-0.03, 0.01], [-0.03, 0.02]
Northern Indian Ocean	+0.01, +0.01	+4, +8	0.55, 0.21	[-0.02, 0.04]*, [-0.01, 0.04]
Southern Hemisphere (<100° E)	-0.01, -0.01	-4, -4	0.41, 0.49	[-0.03, 0.01], [-0.03, 0.02]
Southern Hemisphere (≥100° E)	-0.04, -0.04	-15, -14	0.005, <10 ⁻³	[-0.06, -0.01], [-0.06, -0.02]
>35° N	-0.09, -0.06	-15, -11	0.02, 0.09	[-0.16, -0.02], [-0.14, 0.008]
25–35° N	-0.04, -0.02	-13, -7	0.0025, 0.10	[-0.07, -0.02], [-0.05, 0.004]
15–25° N	-0.01, -0.01	-4, -6	0.10, 0.02	[-0.02, 0.002], [-0.03, -0.003]
0–15° N	0.00, -0.01	0, -3	0.90, 0.43	[-0.02, 0.02], [-0.02, 0.01]
0–30° S	-0.02, -0.02	-8, -9	0.03, 0.01	[-0.04, -0.003], [-0.04, -0.006]
≥ 30° S	+0.10, +0.09	+23, +21	0.09, 0.11	[-0.01, 0.21], [-0.02, 0.20]
Global (water)	-0.03, -0.03	-11, -11	<10 ⁻⁷ , <10 ⁻⁷	[-0.04, -0.02]*, [-0.04, -0.02]
Global (land)	-0.01, 0.00	-4, +2	0.41, 0.76	[-0.05, 0.03]*, [-0.04, 0.05]*
North Atlantic (land)	-0.07, -0.06	-20, -16	0.03, 0.08	[-0.14, -0.01], [-0.12, 0.006]
Western North Pacific (land)	-0.12, -0.08	-30, -21	<10 ⁻⁷ , 0.001	[-0.16, -0.08], [-0.13, -0.03]
Eastern North Pacific (land)	+0.02, +0.01	+6, +2	0.75, 0.90	[-0.14, 0.17]*, [-0.17, 0.18]*
Northern Indian (land)	+0.06, +0.06	+26, +29	0.04, 0.01	[-0.01, 0.12]*, [0.01, 0.11]
Southern Hemisphere (<100° E, land)	+0.02, +0.01	+7, +3	0.53, 0.80	[-0.04, 0.07], [-0.04, 0.06]
Madagascar				
Southern Hemisphere (≥100° E, land)	-0.05, -0.06	-18, -22	0.05, 0.01	[-0.11, 0.00], [-0.11, -0.02]
Australia				

Fig. 6 | This figure is a comparison of the original and revised trends and their statistics from Extended Data Table 1. In each of the three columns, the value on the left (right) is the original (revised) value. Where identified by an asterisk, confidence intervals are based on effective

degrees of freedom adjusted for the presence of serial correlation. Significant trends, determined on the basis of the confidence interval, after correcting for serial correlation when required, are shown in bold.

	Trend (km h ⁻¹ yr ⁻¹)	Change (%)	95% confidence interval
Global	-0.03, -0.03	-9, -10	[-0.04, -0.02]*, [-0.04, -0.02]*
Northern Hemisphere	-0.03, -0.03	-10, -10	[-0.04, -0.02], [-0.05, -0.02]*
Southern Hemisphere	-0.04, -0.03	-14, -13	[-0.06, -0.01]*, [-0.05, -0.01]*
North Atlantic Ocean	-0.01, -0.03	-4, -7	[-0.04, 0.02], [-0.06, 0.007]
Western North Pacific Ocean	-0.08, -0.06	-22, -17	[-0.09, -0.06], [-0.07, -0.04]
Eastern North Pacific Ocean	-0.02, -0.03	-7, -13	[-0.04, 0.006], [-0.06, -0.007]
Northern Indian Ocean	+0.03, +0.02	+18, +13	[-0.00, 0.06]*, [+0.002, 0.04]
Southern Hemisphere (<100° E)	-0.02, -0.02	-9, -8	[-0.04, 0.003], [-0.04, 0.007]
Southern Hemisphere (≥100° E)	-0.05, -0.03	-17, -10	[-0.08, -0.02]*, [-0.04, -0.006]
>35° N	-0.06, -0.05	-9, -9	[-0.13, 0.02], [-0.13, 0.02]
25–35° N	-0.06, -0.04	-17, -13	[-0.08, -0.03], [-0.07, -0.01]
15–25° N	-0.01, -0.02	-4, -8	[-0.02, 0.001], [-0.03, -0.008]
0–15° N	0.00, 0.00	0, -1	[-0.01, 0.02], [-0.02, 0.01]
0–30° S	-0.03, -0.03	-11, -12	[-0.04, -0.008]*, [-0.04, -0.01]
≥ 30° S	+0.10, +0.10	+24, +25	[-0.01, 0.21], [-0.003, 0.21]
Global (water)	-0.03, -0.03	-10, -12	[-0.04, -0.02]*, [-0.04, -0.02]*
Global (land)	0.00, +0.01	-1, +3	[-0.04, 0.04]*, [-0.03, 0.05]*
North Atlantic (land)	-0.06, -0.04	-19, -11	[-0.13, -0.001], [-0.10, 0.03]
Western North Pacific (land)	-0.10, -0.07	-27, -19	[-0.15, -0.06]*, [-0.13, -0.02]*
Eastern North Pacific (land)	0.00, -0.03	-1, -11	[-0.16, 0.15]*, [-0.21, 0.15]*
Northern Indian (land)	+0.03, +0.05	+14, +22	[-0.04, 0.10]*, [-0.001, 0.10]*
Southern Hemisphere (<100° E, land)	-0.01, -0.01	-3, -3	[-0.06, 0.04], [-0.06, 0.04]
Madagascar			
Southern Hemisphere (≥100° E, land)	-0.05, -0.06	-18, -19	[-0.10, 0.00], [-0.11, -0.01]
Australia			

Fig. 7 | This figure is a comparison of the original and revised trends and their statistics from Extended Data Table 2. In each of the three columns, the value on the left (right) is the original (revised) value. Where identified by an asterisk, confidence intervals are based on effective

degrees of freedom adjusted for the presence of serial correlation. Significant trends, determined on the basis of the confidence interval, after correcting for serial correlation when required, are shown in bold.