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Corrigendum to "Multiyear Predictions of North Atlantic Hurricane Frequency: Promise and Limitations"

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Abstract:	An error in the calculation of the effective number of degrees of freedom was identified. The impact of correcting that error is to make the error bars in the manuscript smaller, and does not alter the conclusions or principal findings in the manuscript.
Suggested Reviewers:	

Corrigendum to "Multiyear Predictions of North Atlantic Hurricane Frequency: Promise and Limitations"

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An error in the calculation of the effective number of degrees of freedom was identified. The impact of correcting that error is to make the error bars in the manuscript smaller, and does not alter the conclusions or principal findings in the manuscript.

In the original manuscript Vecchi *et al.* (2013), Equation 6, which is used to quantify the effective number of degrees of freedom in two autocorrelated time series (N_{eff}), was incorrectly transcribed from Bretherton *et al.* (1999). It should have been:

$$N_{eff} = \frac{N}{\sum_{\tau=-(N-1)}^{N-1}[(1-|\tau|/N)]r_\tau^X r_\tau^Y}$$

where N is the number of samples in each time series, and r_τ^X and r_τ^Y are the biased estimates of the autocorrelation of each time series at lag τ. We evaluated whether the equation was incorrectly transcribed in the text of Vecchi *et al.* (2013), or whether the incorrect equation in the published paper was implemented in the calculations for the manuscript (which would have led to a substantial overestimate of the effective degrees of freedom). We found that the equation had been incorrectly transcribed.

However, in reviewing the implementation of the Equation an error was found. This error stemmed from an indexing mistake when referencing an array, in which the lag-1 autocorrelation term in the summation in the denominator (which is always less than 1) was summed once instead of twice, while the lag-0 autocorrelation term (which is exactly 1) was summed twice. Therefore, the degrees of freedom were *underestimated* in the original Vecchi *et al.* (2013) manuscript; this led to an overestimation in the size of the error bars in Figures 2, 4 and 9.

For Figures 2 and 4, because the lag-1 autocorrelation of both the time series was close to 1, the underestimation in N_{eff} was generally between 1 and 2, and resulted in only minor changes to the error bars, without impacting the validity of the statements about statistical significance.

For, Figure 9, however, because the lag-1 autocorrelation of the time series once the 1994-95 shift had been removed was small, N_{eff} was sometimes underestimated by a factor of two. However, since the underlying correlations between the most of the time series was low, most of the statements about statistical significance was impacted. However, with the correct error bars, there is now statistically significant evidence (at the $p<0.1$ level) that the Lead 2-6 year initialized predictions with CM2.1 outperform the various other when the target is the number of hurricane counts in the Atlantic after removing the changepoint across 1994-1995.
The corrected versions of the error bars originally shown in Figures 2, 4 and 9 are shown in the supplementary material online. The principal conclusions of the manuscript are unchanged by this error.

References:

Bretherton, C.S., M. Widmann, V.P. Dymnikov, J.M. Wallace, and I. Bladé, 1999: The effective number of spatial degrees of freedom of a time-varying field. *J. Climate*, **12**, 1990–2009.

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