Errata for Lenssen et al. (2019)

Correction 1 [Abstract]

Old Text: We use the total uncertainties to estimate the probability for each record year in the GISTEMP to actually be the true record year (to that date) and conclude with 86% likelihood that 2016 was indeed the hottest year of the instrumental period (so far).

New Text: We use the total uncertainties to estimate the probability for each record year in the GISTEMP to actually be the true record year (to that date) and conclude with 85% likelihood that 2016 was indeed the hottest year of the instrumental period (so far).

Correction 2 [6.1, Paragraph 3]

Old Text: The ERA5 analysis shows that the uncertainties in Hansen et al. (2010) were quite good for the early record but overestimate the sampling uncertainty post-1950. In particular, we find nearly exact agreement over 1880–1900.

New Text: The ERA5 analysis shows that the uncertainties in Hansen et al. (2010) were quite good with a slight overestimation of the 1960-present sampling uncertainty.

Correction 3 [6.1, Paragraph 4]

Old Text: Separating the land uncertainty by hemisphere, we find that the Southern Hemisphere has greater sampling uncertainty post-1920 coinciding with improved Northern Hemispheric coverage of the Arctic land and sea ice region (Figure 4).

New Text: Separating the land uncertainty by hemisphere, we find that the Southern Hemisphere has greater sampling uncertainty due to the smaller proportion of land with station coverage (Figure 4).

Correction 4 [6.2.1, Paragraph 1]

Old Text: We find no evidence for sampling bias for the in-sample 1980 to present time period when using the ERA analysis.

New Text #1: We find weak evidence for a warm bias due to sampling for the in-sample 1980 to present time period when using the ERA analysis.

Correction 5 [6.2.1, Paragraph 3]

Old Text: The robust large and significant cool biases in the early record describe how undersampling the observed 1979 to present temperature change would lead to a biased calculation in the global mean. The approach of the estimates to unbiased mirrors the global coverage shown in Figure 2. The relationship between coverage and bias in estimating the 1979 to present warming makes sense, particularly because we know that station coverage in polar regions was limited or nonexistent in the early record and arctic temperature changed more rapidly over the past few decades.

New Text: <Removed>

Correction 6 [6.2.2, Paragraph 1]

Old Text: Running the sampling uncertainty analysis assuming perfect coverage suggests that 0.034 C is the limiting sampling 95% confidence interval for the annual mean temperature anomaly in the GISTEMP method.

New Text: Running the sampling uncertainty analysis assuming perfect coverage suggests that 0.041 C is the limiting sampling 95% confidence interval for the annual mean LSAT anomaly in the GISTEMP method.

Correction 7 [6.2.2, Paragraph 2]

Old Text: We find that the GISTEMP procedure overestimates the true global mean LSAT over the ERA5 record by 1.2% with a 95% confidence interval of (0.7%, 1.7%).

New Text: We find that the GISTEMP procedure overestimates the true global mean LSAT over the ERA5 record by 1.1% with a 95% confidence interval of (0.7%, 1.5%).

Correction 8 [6.2.3]

Old Text: Figure 8 compares the LSAT sampling uncertainty from the simple latitude-weighted mean and GISTEMP band mean methods. We find that the GISTEMP method almost always outperforms the simple method with the 1890s and 1900s being the only exceptions. Furthermore, we see that the GISTEMP method outperforms the simple method by up to 50% in the 1930s and 1940s, primarily due to the added arctic coverage providing better NH polar band estimates. The results demonstrate the value added by the GISTEMP averaging scheme leveraging the zonal correlation of temperature anomalies.

New Text: Figure 8 compares the LSAT sampling uncertainty from the simple latitude-weighted mean and GISTEMP band mean methods. The simple mean obtains comparable sampling error over the global land surface than the GISTEMP method from the 1870s onward. Both methods approach the liming LSAT uncertainty post-1960 as nearly global coverage is achieved. The result compares the performance of the GISTEMP averaging to the simple method over the land surface, but does not account for the difference in total uncertainty when large portions of SST data are missing such as much of the record in the rapidly warming arctic region.

Correction 9 [7.1, Paragraph 4]

Old Text: We now find that this was conservative and that 2014 actually had a 79% chance of truly being the warmest year in the instrumental period. Assuming autocorrelated uncertainties, this reduces slightly to 75% since the next most probable warmest years were nonconsecutive (2010 and 2005). The following year, NASA reported a likelihood that 2015 was the new record warmest year was 96%, which compares to a 99.99% probability calculated now (regardless of whether we use independent or autocorrelated uncertainties).

New Text: We now find that this was conservative and that 2014 actually had a 78% chance of truly being the warmest year in the instrumental period. Assuming autocorrelated uncertainties, this reduces slightly to 74% since the next most probable warmest years were nonconsecutive (2010 and 2005). The following year, NASA reported a likelihood that 2015 was the new record warmest year was 96%, which compares to a 99.98% probability calculated now (regardless of whether we use independent or autocorrelated uncertainties).

Correction 10 [7.1, Paragraph 5]

Old Text: Assuming that uncertainties in the annual mean are independent from year to year, we find that 2016 is likely the warmest year in the last 139 (1880–2018) years with 86.2% certainty. The other years that could plausibly have been the warmest were 2017 (12.5% probability), 2018 (1.2% probability), and 2015 (<0.1% probability).

New Text #2: Assuming that uncertainties in the annual mean are independent from year to year, we find that 2016 is likely the warmest year in the last 139 (1880–2018) years with 85.1% certainty. The other years that could plausibly have been the warmest were 2017 (13.3% probability), 2018 (1.6% probability), and 2015 (<0.1% probability).

Correction 11 [7.1, Paragraph 6]

Old Text: Unlike the uncertainty in temperature change, autoregressive uncertainties give more certainty to 2016 being the warmest year with a simulated 87.2% certainty.

New Text: Unlike the uncertainty in temperature change, autoregressive uncertainties give more certainty to 2016 being the warmest year with a simulated 86.3% certainty.

Figures Corrected (all that include SH sampling uncertainty):
3, 4, 6, 7, 8, 11, 12, 13