IEAGHG Information Paper: 2017-IP35; New Analysis Suggests Warming Has Been Much Faster Than Previously Predicted

A new paper published in the Journal of Climate reveals that the lower part of the Earth's atmosphere has warmed much faster since 1979 than scientists relying on satellite data had previously thought. See: http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-16-0768.1. In the paper researchers from Remote Sensing Systems (RSS)[1], based in California, have released a substantially revised version of their earlier lower tropospheric temperature record.

After correcting for problems caused by the decaying orbit of satellites, as well as other factors, RSS have produced a new record showing 36% faster warming since 1979 and nearly 140% faster (i.e. 2.4 times larger) warming since 1998. This is in comparison to the previous version 3 of the lower tropospheric temperature (TLT) data published in 2009 (RSSv3).

It is noted that climate sceptics have long claimed that satellite data shows global warming to be less pronounced than observational data collected on the Earth's surface. This new correction to the RSS data substantially undermines that argument. The new data actually shows more warming than has been observed on the surface, though still slightly less than projected in most climate models.

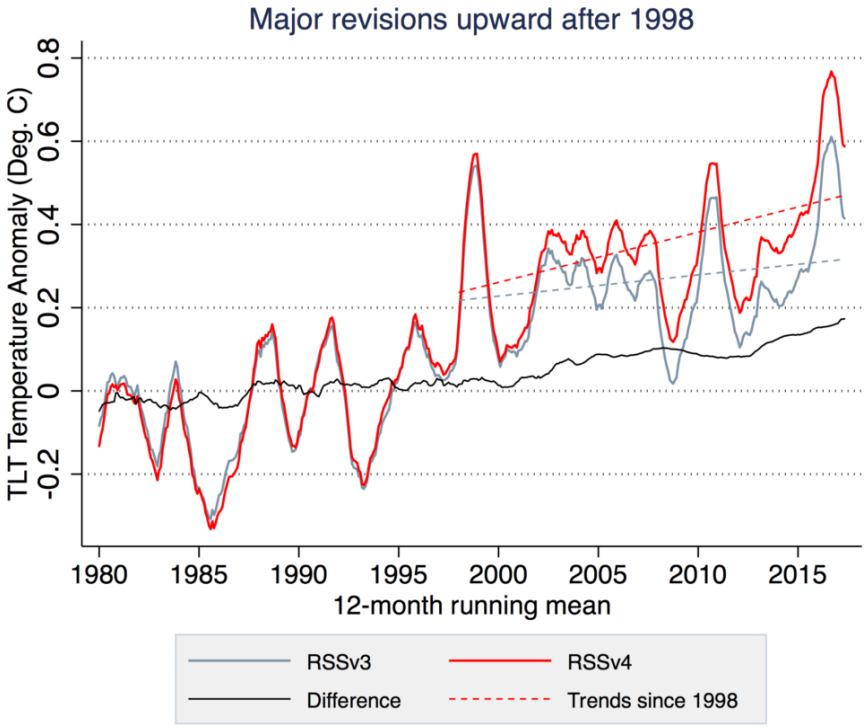
Carbon Brief[2] has published a summary of the research by RSS, their full analysis can be found at https://www.carbonbrief.org/major-correction-to-satellite-data-shows-140-faster-warming-since-1998.

The main results of the Carbon Brief synthesis are presented in the following text.

Both the old record, RSSv3 in grey, and new record, RSSv 4 in red, are shown in the figure below, along with the difference between the two, in black. Note: The trends since 1998 for both are shown by dashed lines.

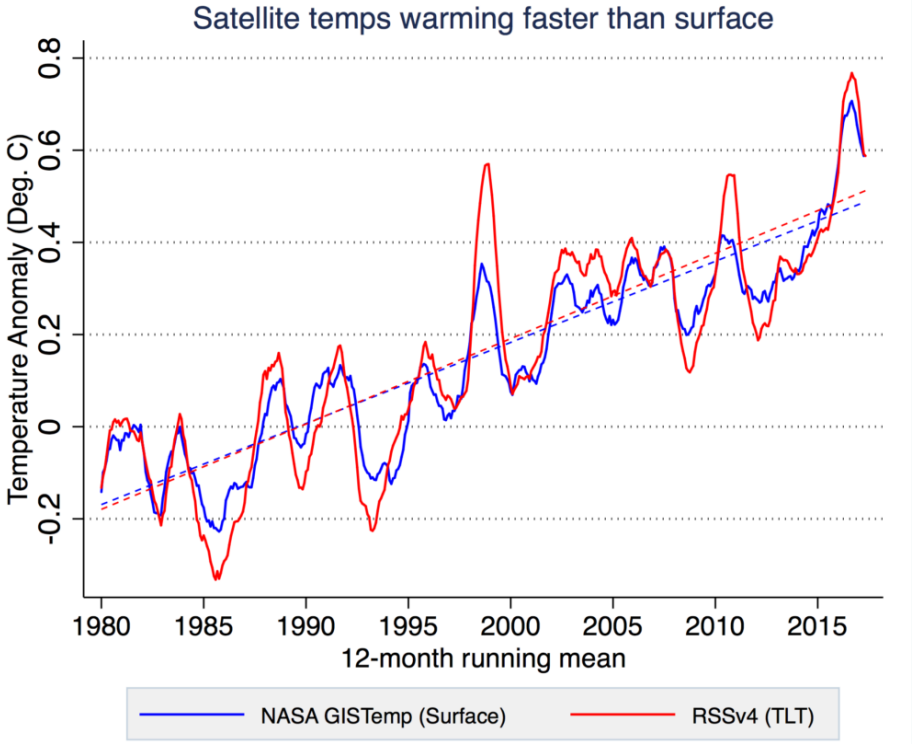
1 http://www.remss.com/

2 Carbon Brief is a UK-based website covering the latest developments in climate science, climate policy and energy policy. see https://www.carbonbrief.org/about-us



Most of the difference between the old and new record occurs after the year 2000. While the old record showed relatively little warming during the oft-debated post-1998 “hiatus” period, the new record shows warming continuing unabated through to present. Similarly, while the old RSS v3 record showed 2016 only barely edging out 1998 as the warmest year in the satellite record, the new v4 record shows 2016 as exceeding 1998 by a large margin.

The figure below shows a comparison between the new RSS record and the global surface temperature record produced by NASA. RSS v4 shows about 5% more warming than the NASA record since 1979, when satellite observations began.



While the new RSS v4 record shows about 5% more warming than surface records since 1979, this behaviour could be expected according to Carbon Brief. Climate models on average project around 18% amplification over the 1979-2016 period, though this value ranges from as low as 6% to as high as 40% in individual climate models. Even with these new corrections, there is evidence that the rate of warming of the troposphere is a bit lower than expected by climate models in recent years.

Surface temperature records, on the other hand, all tend to agree quite closely with each other, despite different groups using different datasets. Unlike the satellite temperature record, where only a few satellites are measuring temperatures at any given point of time, there is a large amount of redundancy in surface temperature observations, with multiple independent sets of data producing consistent results. Therefore, it is not too surprising that corrections to problems with satellite data would move them closer to surface records.

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