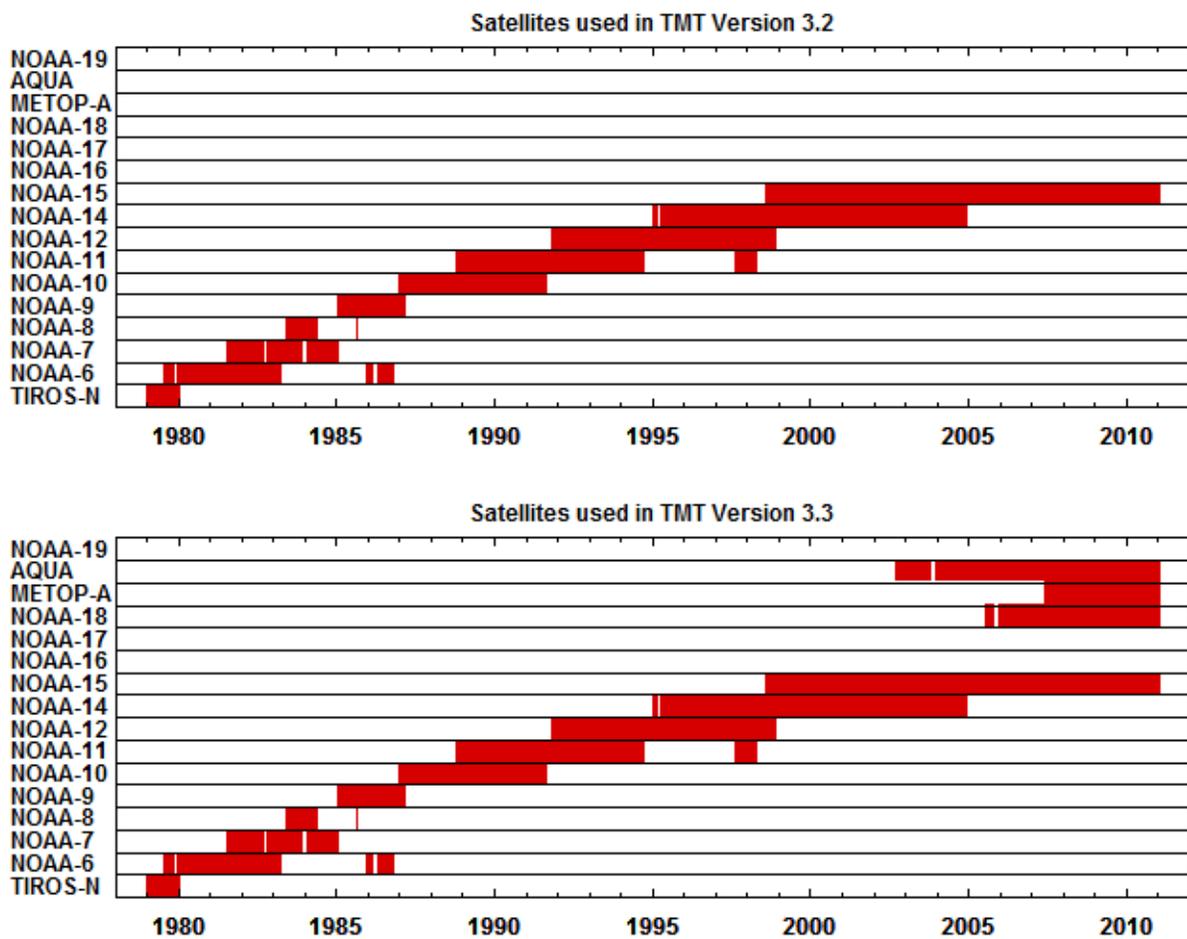


## Version 3.2 to Version 3.3 Differences

*Carl Mears, February 7, 2010*

This document describes the changes that occurred between version 3.2 and version 3.3 of the RSS MSU/AMSU atmospheric temperature datasets.

The purpose of making the version change is to include data from the AMSU instruments on AQUA, NOAA-18, and MetOP-A. Version 3.2 only used AMSU data from NOAA-15, which is now in its 13<sup>th</sup> year of operation. Figure 1 shows the satellites used during each month for the two versions.



*Fig. 1. Time series plots of the satellites used in versions 3.2 and 3.3. Red means that a given satellite is used in the merged product, and white means that it is not used or not present. These plots are for the middle tropospheric channel. Other channels are similar.*

The addition of the newer AMSU data has several effects on the final product.

- A small reduction in globally averaged warming after 2002 for channels TLT and TMT

- A small increase in warming in land regions, particularly in the subtropics
- A reduction of sampling noise in monthly averaged map, particularly for TTS and TLS, during times when more than one AMSU is operating.

The first effect is due to a combination of two causes. First, the addition of the AMSU data tends to de-emphasize the effect of the warm bias in NOAA-14 relative to NOAA-15 (and AQUA) during its last years of operation. Second, the addition of the newer satellites increases the number of different local times that are sampled by the satellite system. This reduces the importance of the adjustment for the diurnal cycle after mid 2002, and reduces the effect of any errors in the diurnal cycle model we use to adjust for changing local measurement times. This is also the cause of the relative changes in land and ocean trends, the second effect from above. A third possible cause, the changes in the target factors due to the addition of the new data, is less important.

The third effect is simply a result of having more data. The effects can be seen as a reduction in “orbital striping” in the individual monthly anomaly maps available on this website, as well as in the trend maps presented below.

We would like to emphasize that these changes are well within the estimated uncertainty in our dataset. A detailed error analysis for all 4 channels has been submitted to the Journal of Geophysical Research, and is in the late stages of peer review. A preprint and other explanatory material will be posted to this website after the paper is accepted.

Other the following pages, we present time series and trend maps to show the differences between the two datasets explicitly.

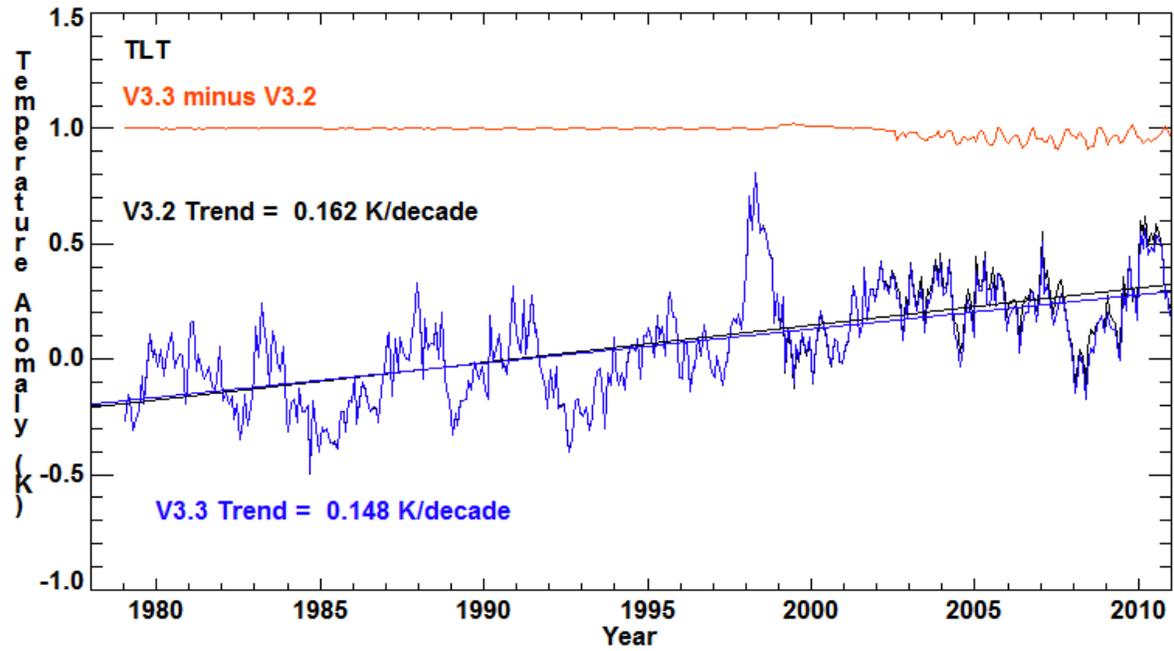


Fig. 2. Global TLT Time Series.

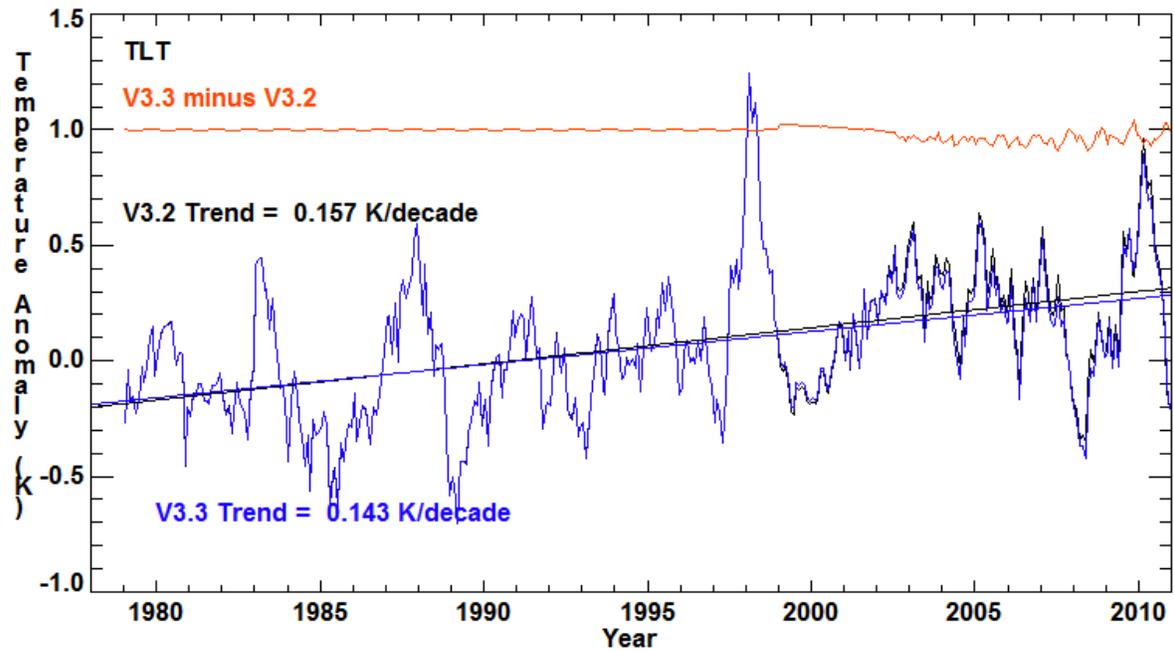


Fig. 3. Tropical (25S to 25N) TLT Time series. Trends are 1979-2010. Base period is 1979-2004

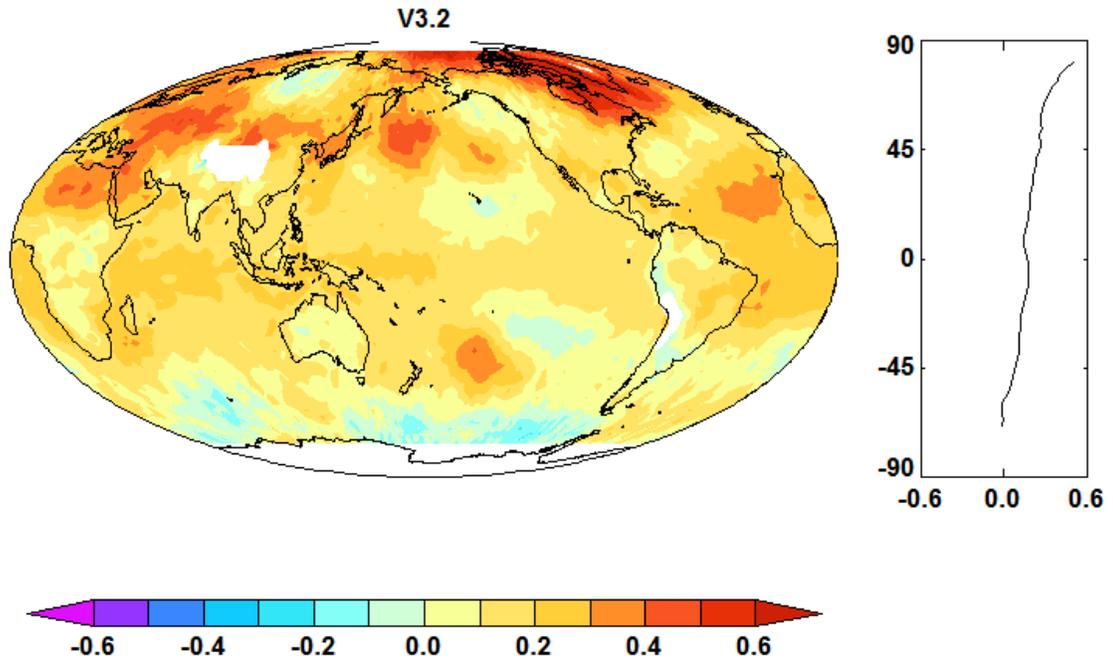


Fig. 4. V3.2 TLT Trends

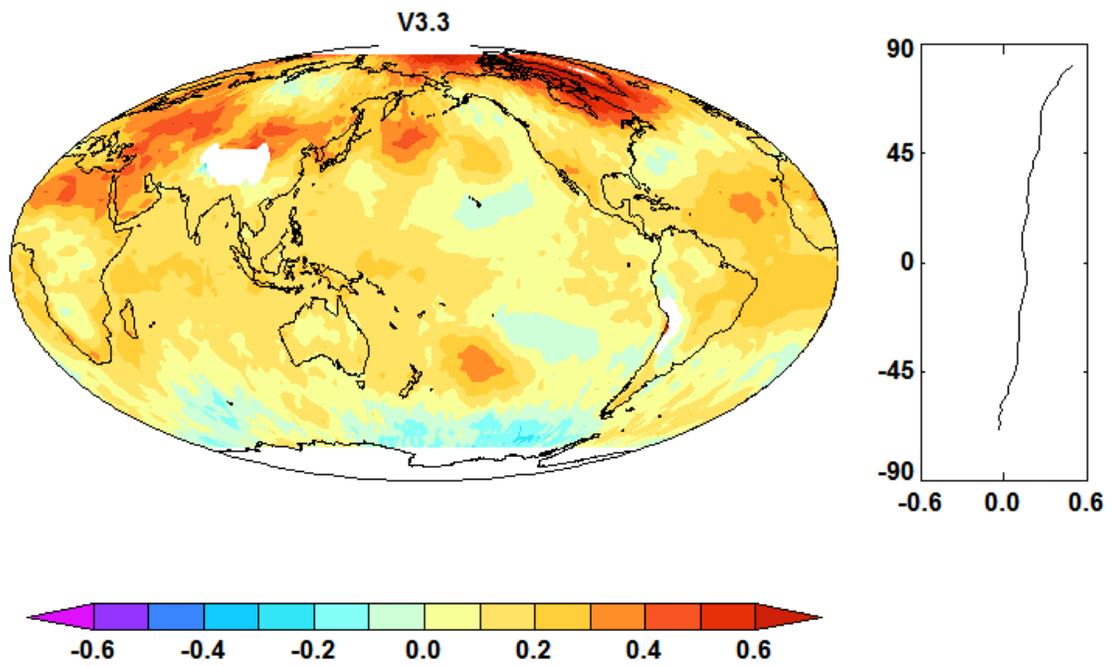


Fig. 5. V3.3 TLT Trends

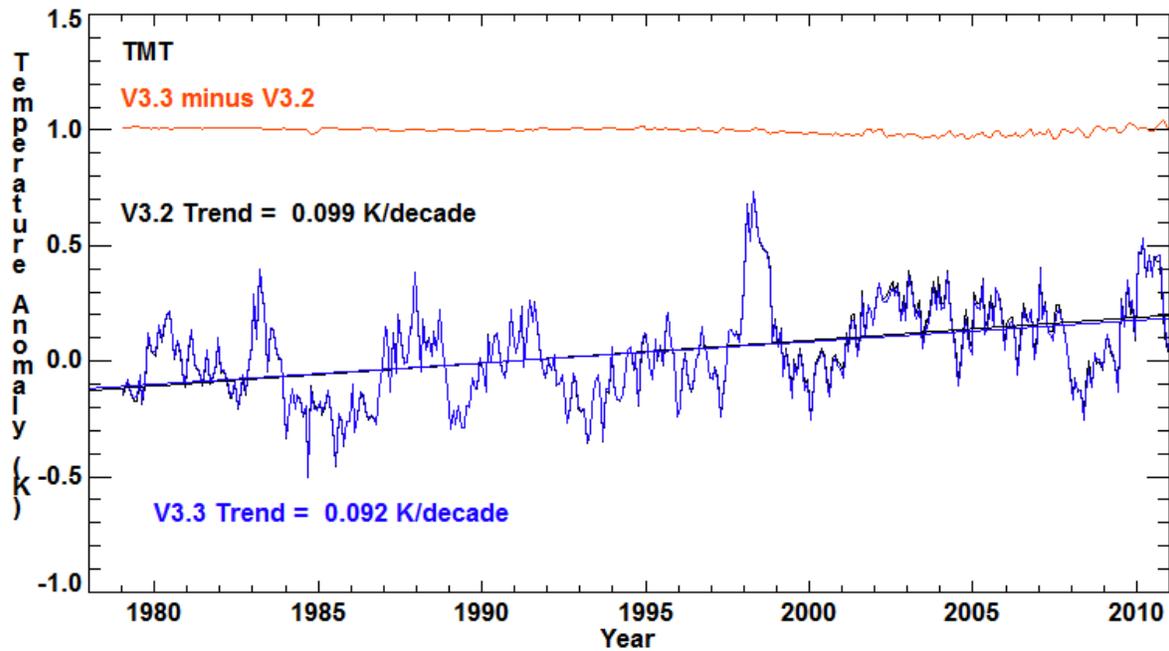


Fig. 6. Global Times TMT Time Series.

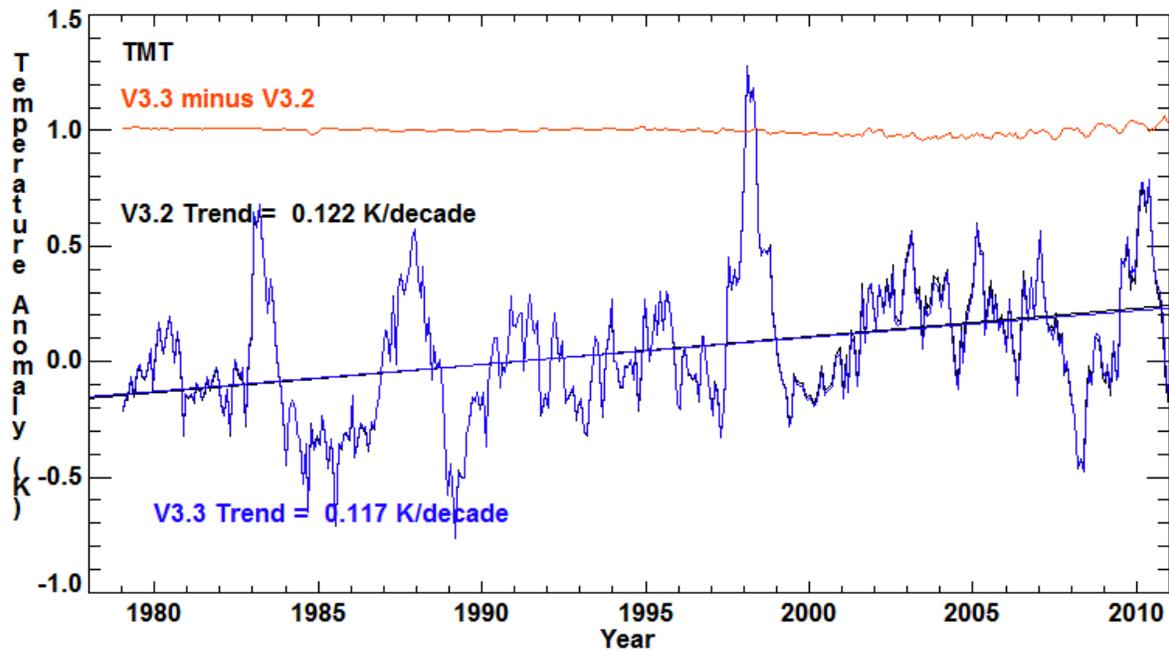


Fig. 7. Tropical (25S to 25N) time series, 1979-2010. Note that despite the reduction in overall trend, by the end of the current time period, V3.3 is warmer than 3.2. This suggests that the trends would become closer together as time goes on, if we chose to continue processing the data using V3.2 methods.

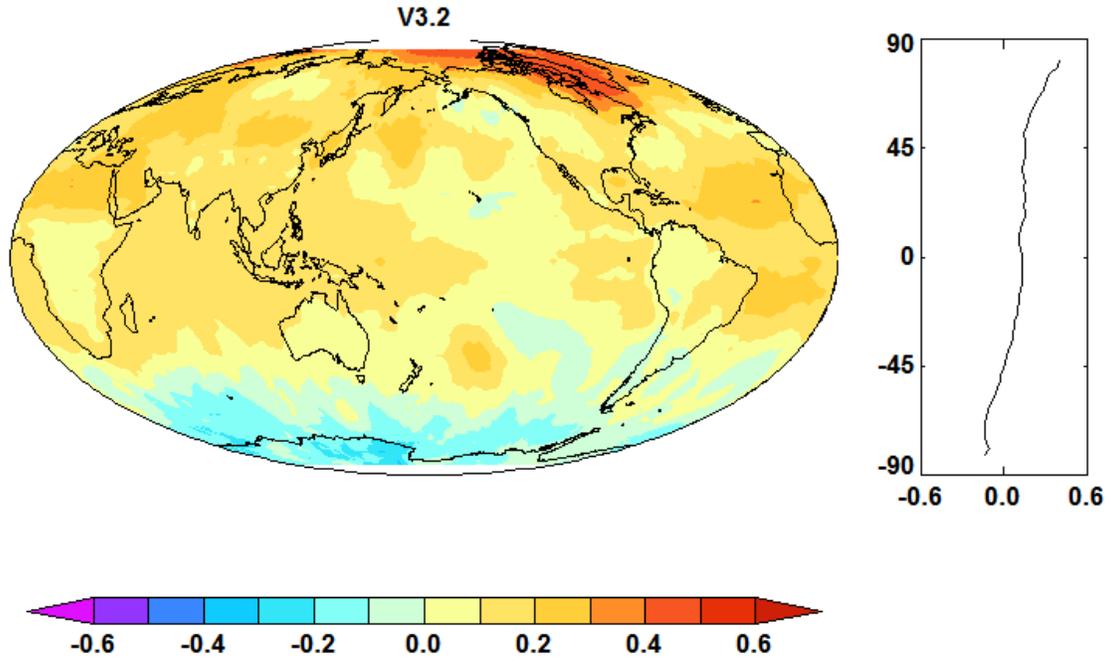


Fig 8. V3.2 TMT Trends.

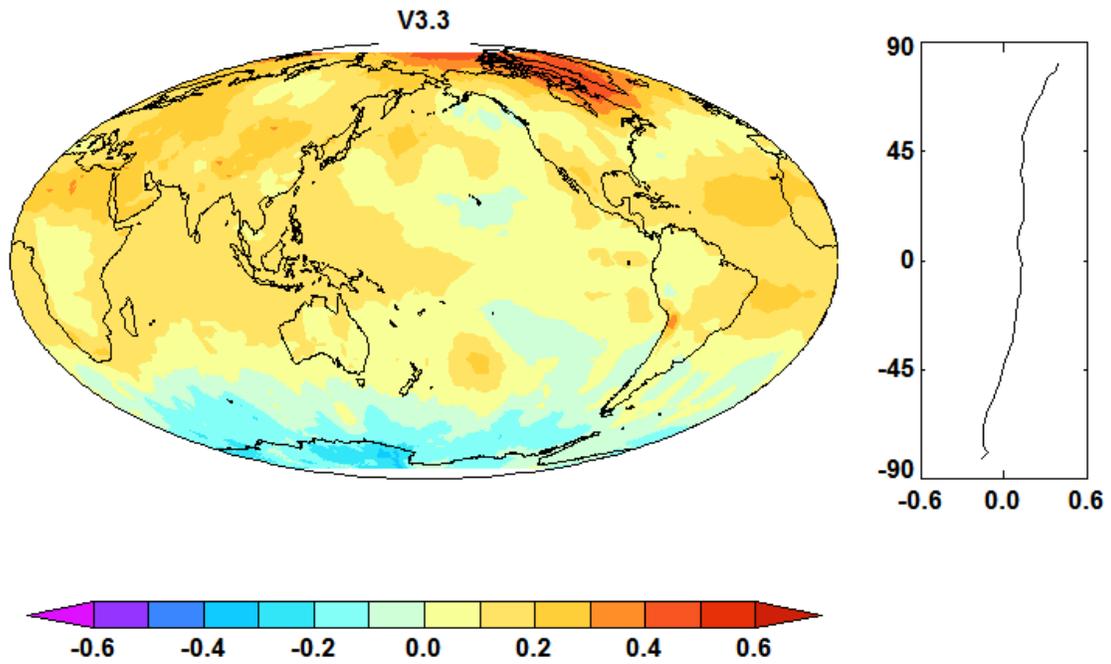


Fig. 9. V3.3 TMT Trends. Note the small increase in land trends , most visible in Africa.

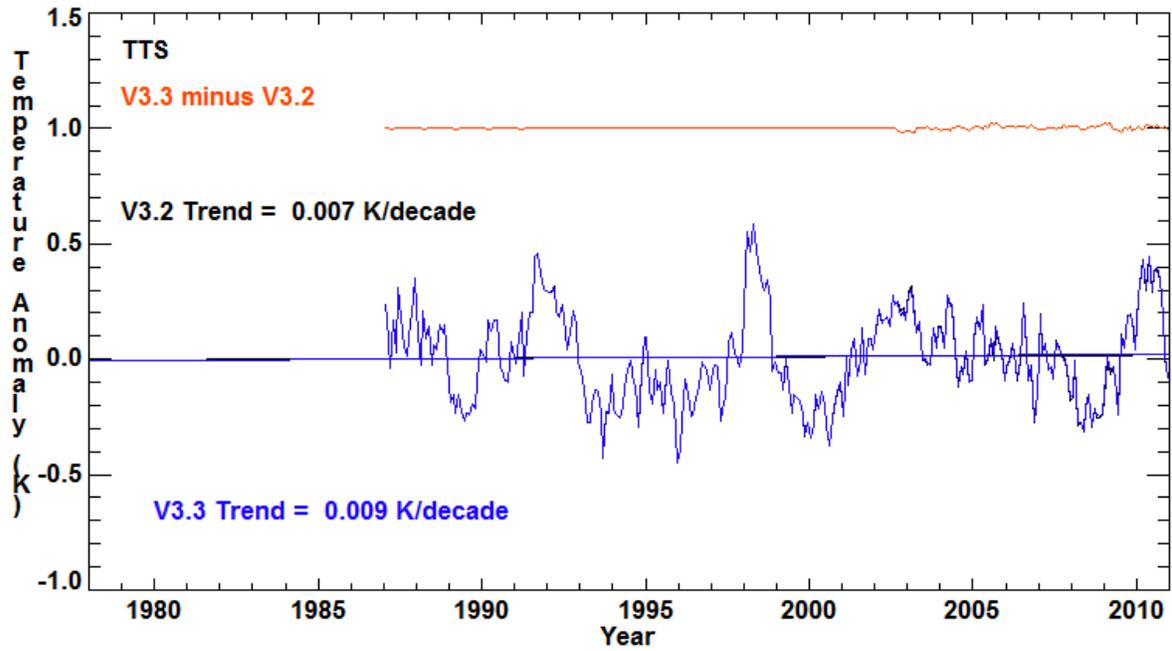


Fig. 10. Global TTS Time Series

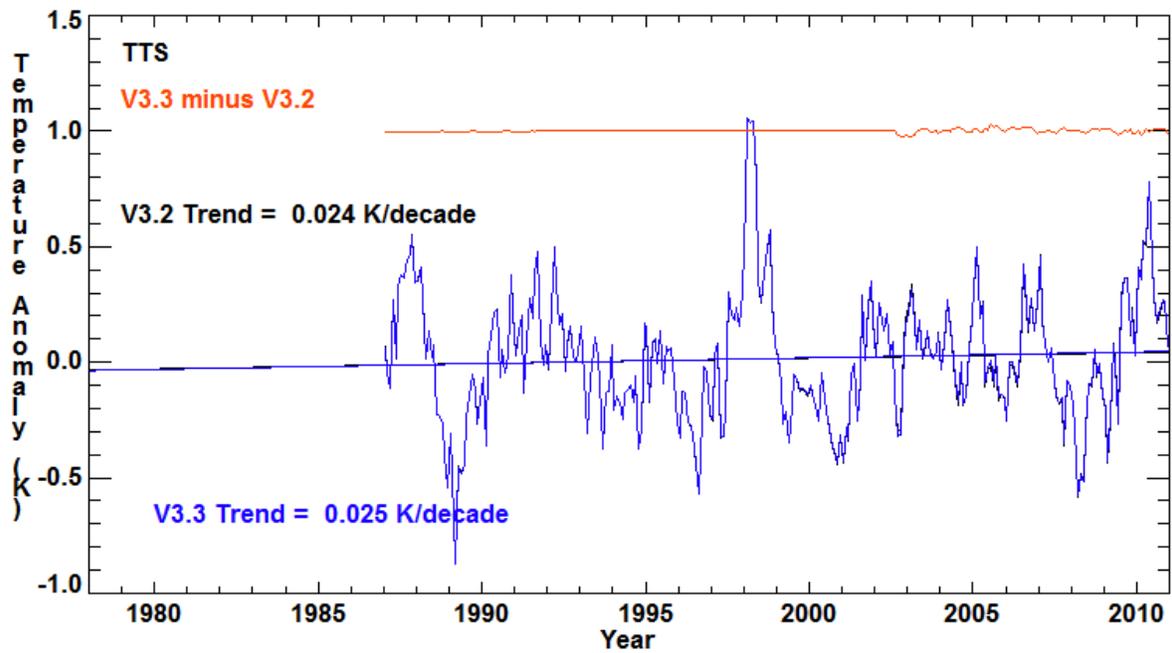


Fig. 11 Tropical (25S-25N) time series

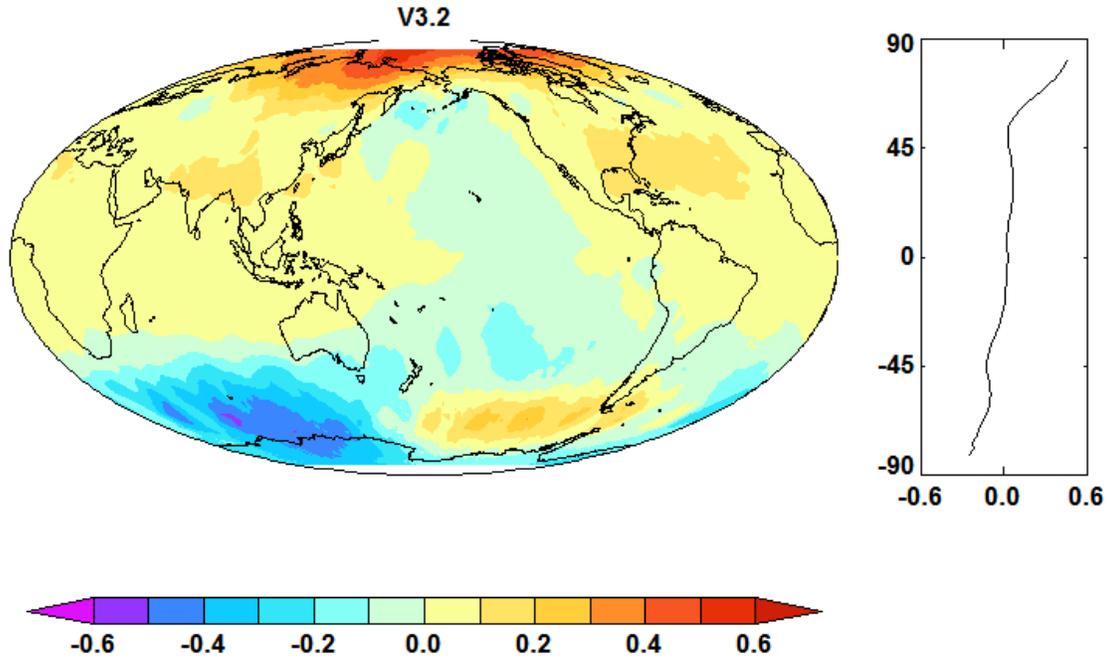


Fig 12. V3.2 TTS trends

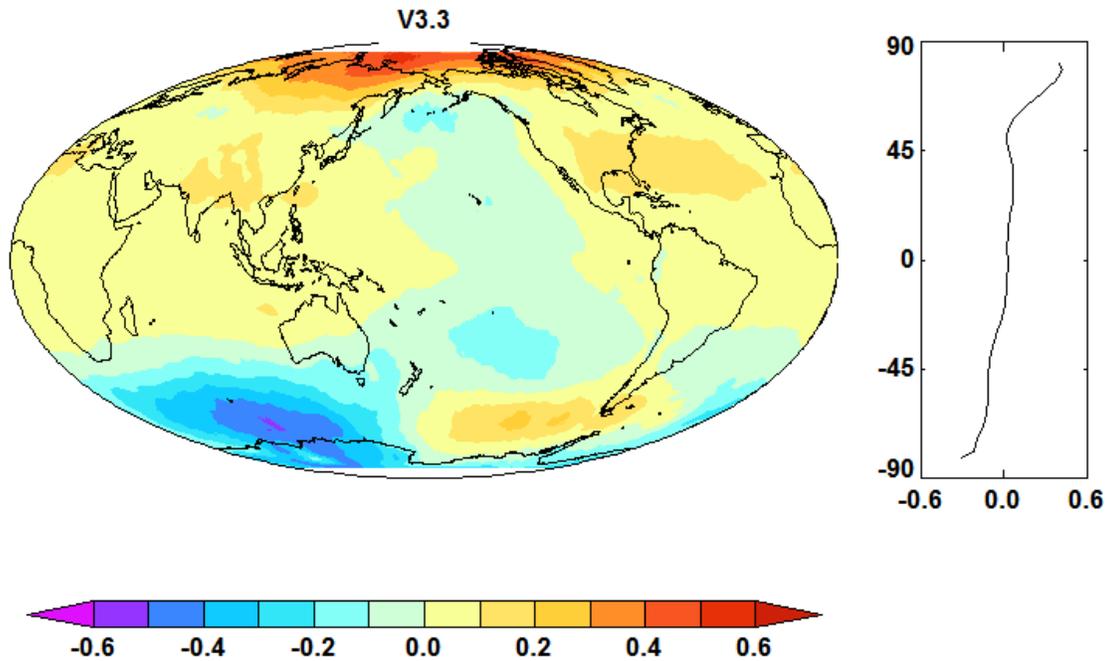


Fig 13. V3.3 TTS Trends. Note reduction in "orbital striping", most visible in the southern ocean. This is due to a reduction in sampling noise for time periods where more AMSUs are available.

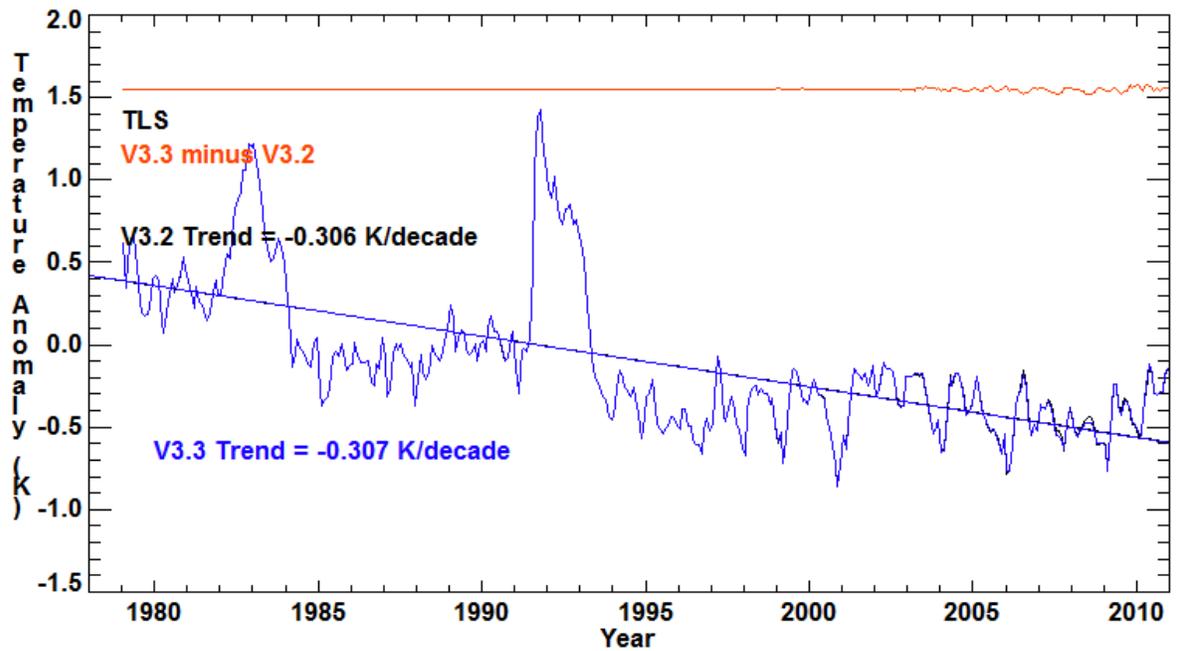


Fig. 14. Global TLS Time Series.

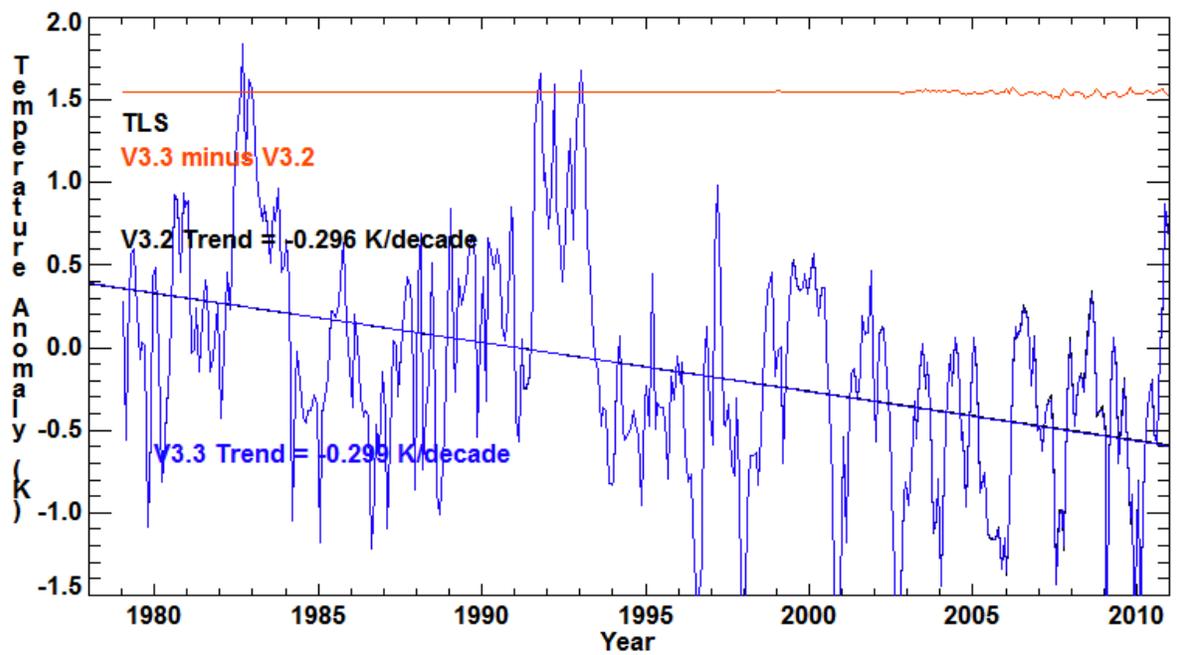


Fig. 15. Tropical TLS Time Series

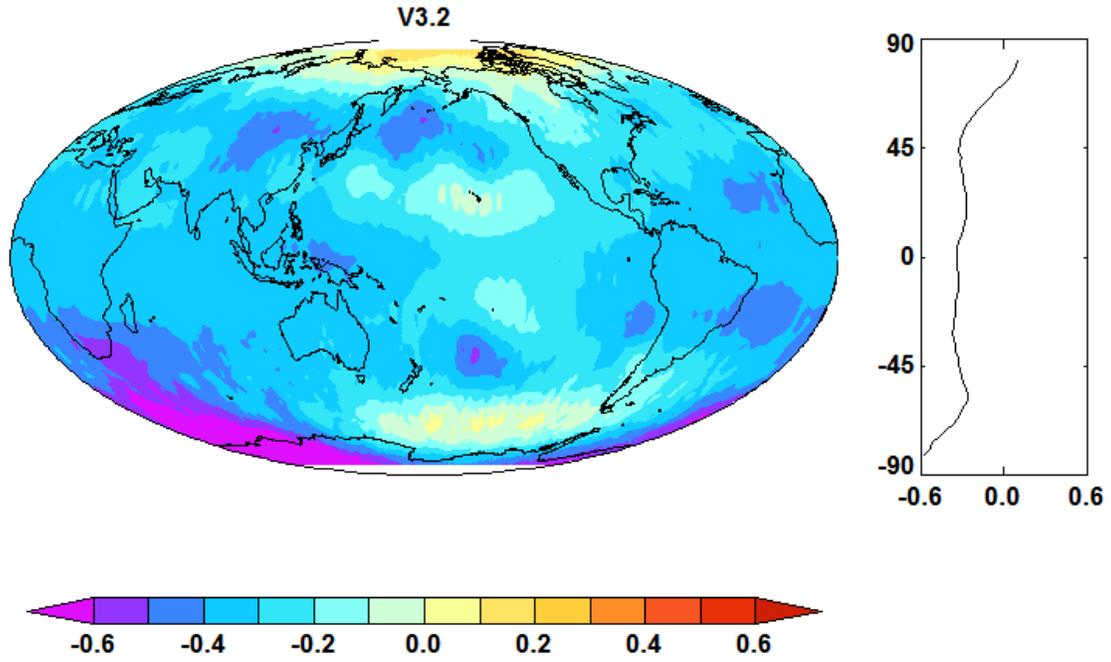


Fig. 16. V3.2 TLS Trends

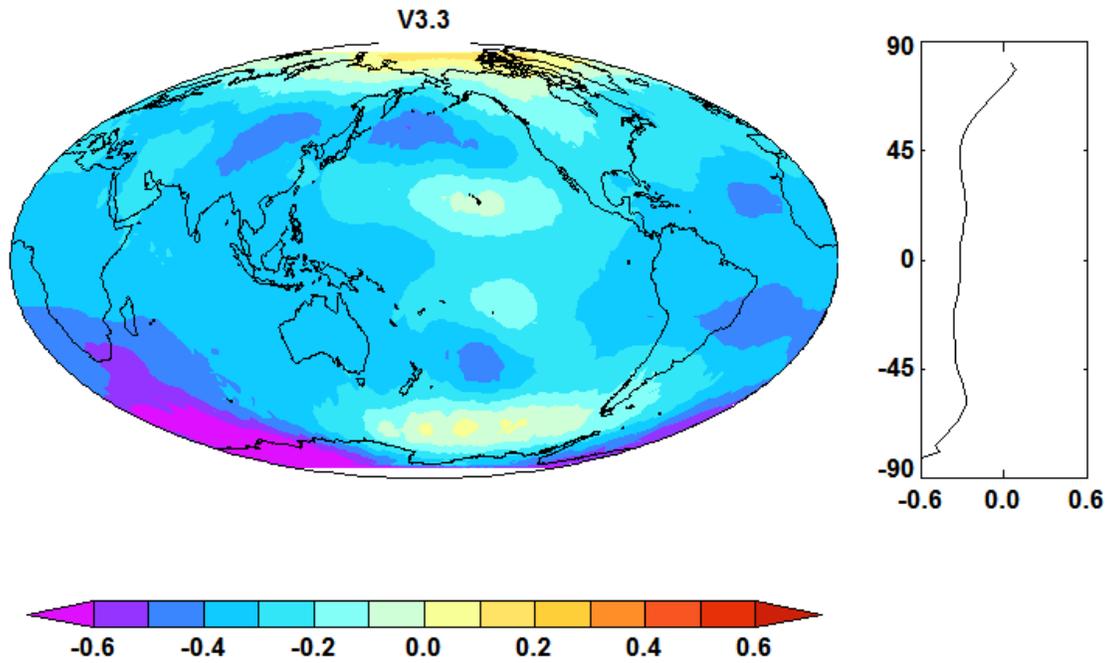


Fig. 17. V3.3 TLS Trends. Again, note reduction in orbital striping and overall increase in smoothness in the trend maps.