# MSU/AMSU lower tropospheric temperature products Changes from RSS Version 3.1 to RSS Version 3.2

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## I. Introduction and Brief Summary

In changing from Version 3.1 to Version 3.2 of our MSU/AMSU lower tropospheric (TLT) temperature product, we made a number of small changes and improvements to our quality control and merging methods. The most important of these are informally described in this document. A paper describing the methods we use to construct the V3.2 products "Construction of the RSS V3.2 lower tropospheric temperature dataset from the MSU and AMSU microwave sounders"**,** has been submitted for publication. A preprint version of this paper is available on this website. This paper also includes a series of comparison of both RSS and UAH TLT datasets with current versions of 4 different homogenized radiosonde datasets.

***The most important changes:***

- Target Factors and Scene Temperature Factors are determined entirely during the merging process using monthly gridded data . In V3.0, the target factors were determined offline using monthly global averages, and then applied to the monthly gridded data. The new methods streamline the data processing, and result in very small changes in long-term trends.
- A more comprehensive analysis of the intersatellite differences has been performed. As a result of this study, we have identified several satellite-months of data that appear to be inconsistent with measurements from other satellites during the same time period. These typically occur near the beginning or end of a satellites life. These data have been removed from processing.
- We reduced the systematic bias that occurs due to spatial-derivative effects in the TLT extrapolation process that can be large at high latitudes. The effects of this bias are particularly large near Antarctica. (see Section 2c in the preprint for a discussion)
- Quality control for individual TLT measurements has been improved, which results in less radio frequency interference (RFI). RFI induced artifacts were previously visible in our TLT monthly maps, particularly near Ascension Island in the tropical Atlantic Ocean.

## II. Global-scale differences between V3.1 and V3.2

The processing changes resulted in small, insignificant changes in the long-term global trends. In Fig. 1, we plot global 70.0S to 82.5N) and tropical (20S to 20N) time series for both V3.2 and V3.1. The differences in long-term trend are less than one hudredth of a

degree per decade.. The small "spikes" in the difference time series occur when a month was removed from the V3.2 dataset, while seasonal scale fluctuations are causes by small changes in the target factors.

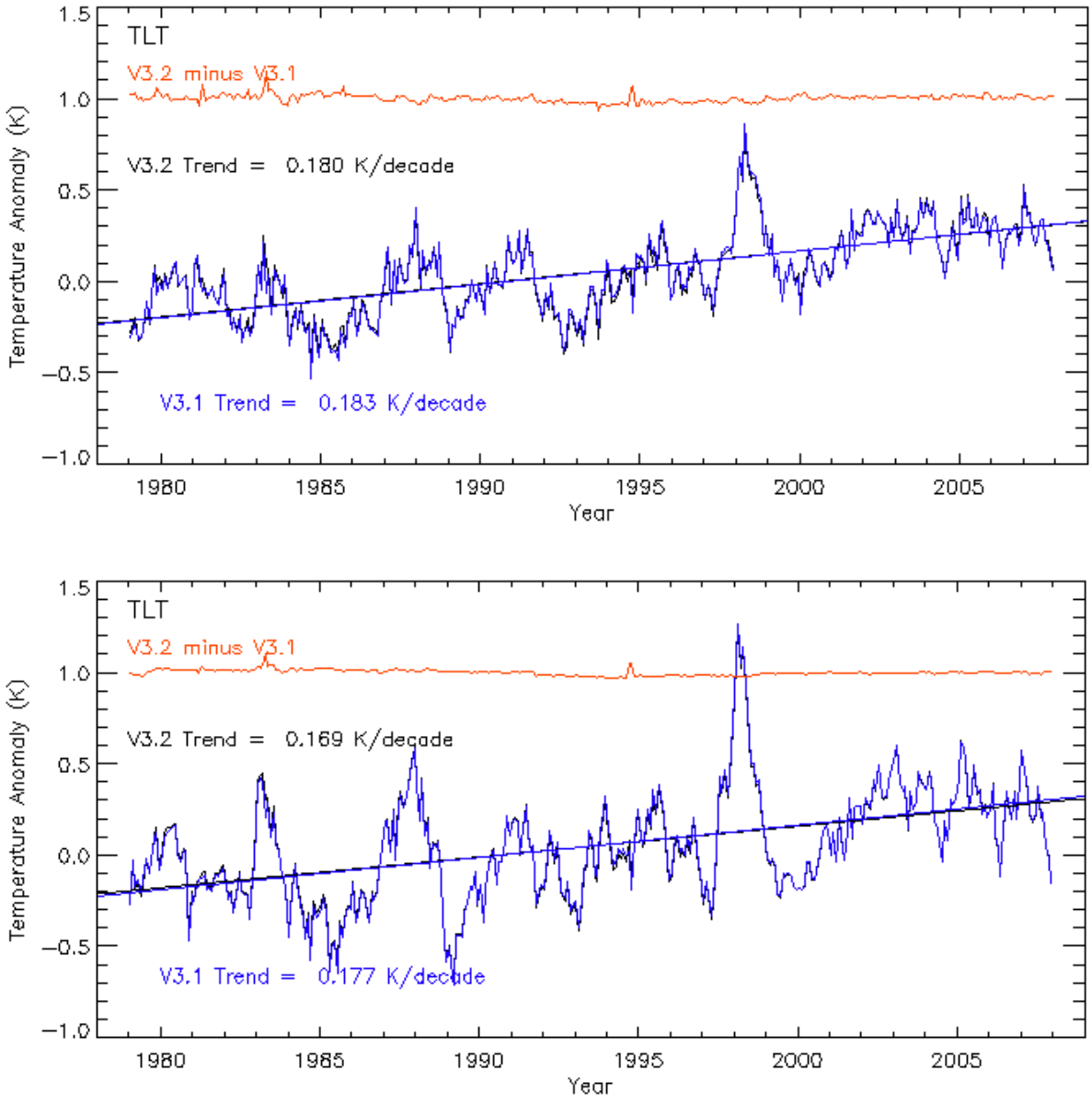


*Fig. 1. Comparison between V3.1 and V3.2 of global-averaged (70.0S to 82.5N, top panel) and tropical-averaged (20S to 20N, bottom panel) time series. Each time series is shown along with the difference time series. Trends are calculated for the 1979-2007 period (which is different than the 1979-current month period shown on the website, and thus the trends values are likely to be different).*

In Fig. 2, we plot a color-coded map of the trend differences (V3.2 minus V3.1). The largest trend differences are near the poles, where we reduced the effects of the extrapolation induced bias in the results by restricting the use of data from one side of the satellite (see paper for details). The cooling trends near the Antarctic continent were reduced by over a tenth of Kelvin per decade. Changes in trends in the tropics and mid-latitudes are very small.

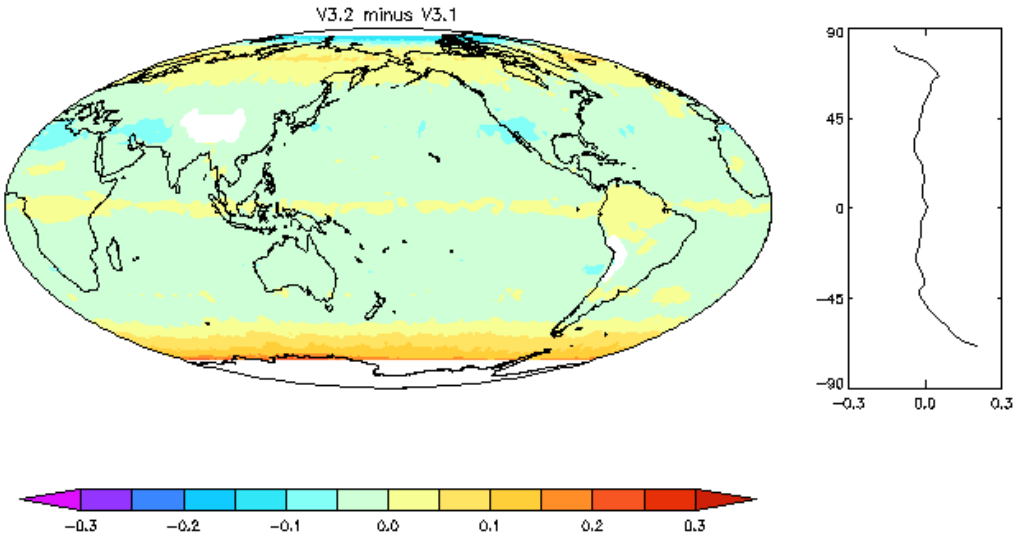


*Fig.2 Color coded map of the trend differences (V3.2 minus V3.1).*