

A Monte-Carlo Approach to Estimating Uncertainty in MSU/AMSU Climate Data

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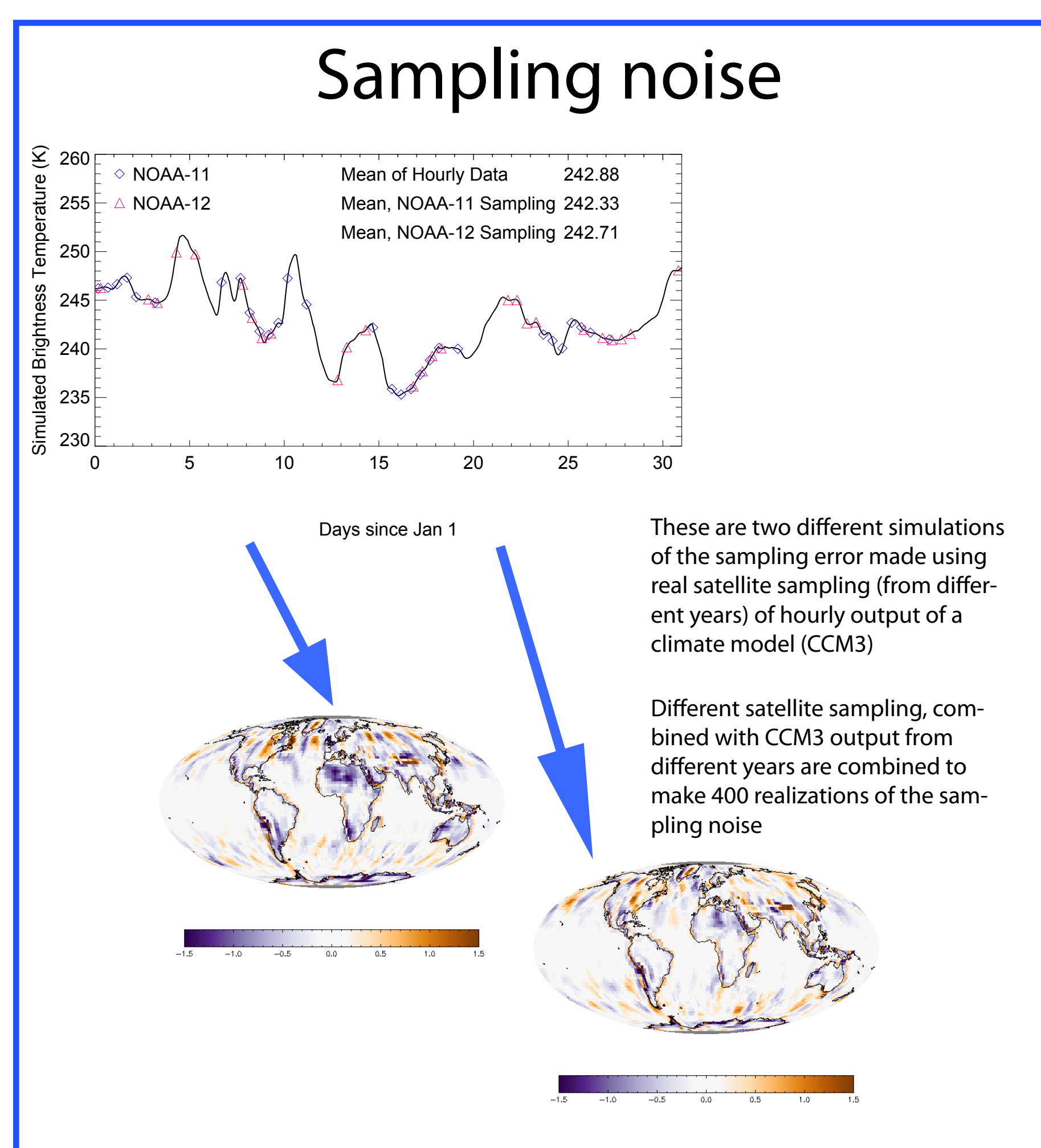
Merged Climate Data Records for the MSU/AMSU series of microwave sounders are used extensively in climate research.

Data have been used in global, regional, and even local studies. Both short time scale (e.g. ENSO) and long time scale (e.g. decadal trends) phenomena have been investigated.

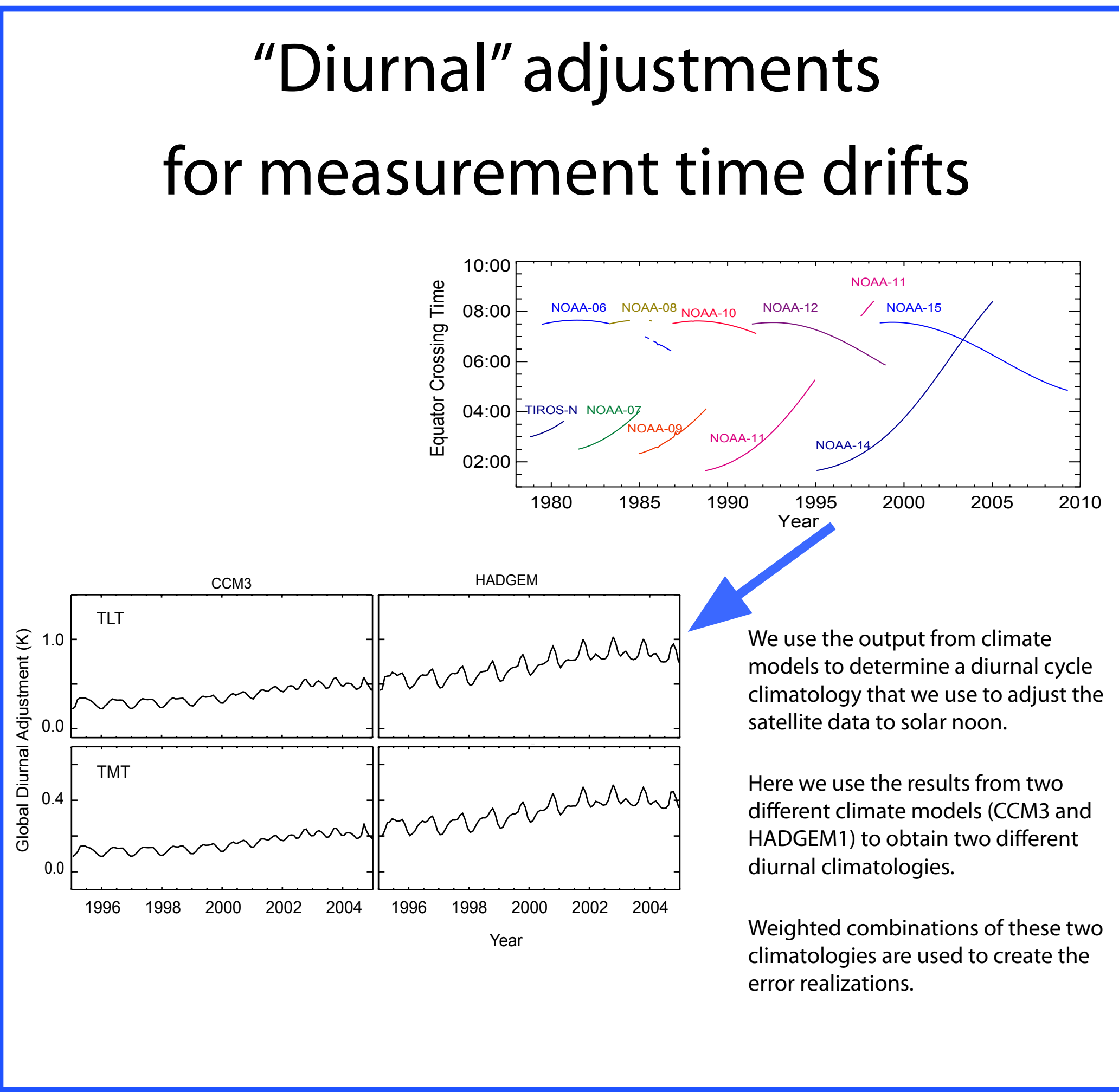
WE NEED TO KNOW ABOUT UNCERTAINTY ON DIFFERENT SPATIAL AND TEMPORAL SCALES!

Error structure is complicated due to spatial and temporal correlation in the error sources -- too hard to do analytically -

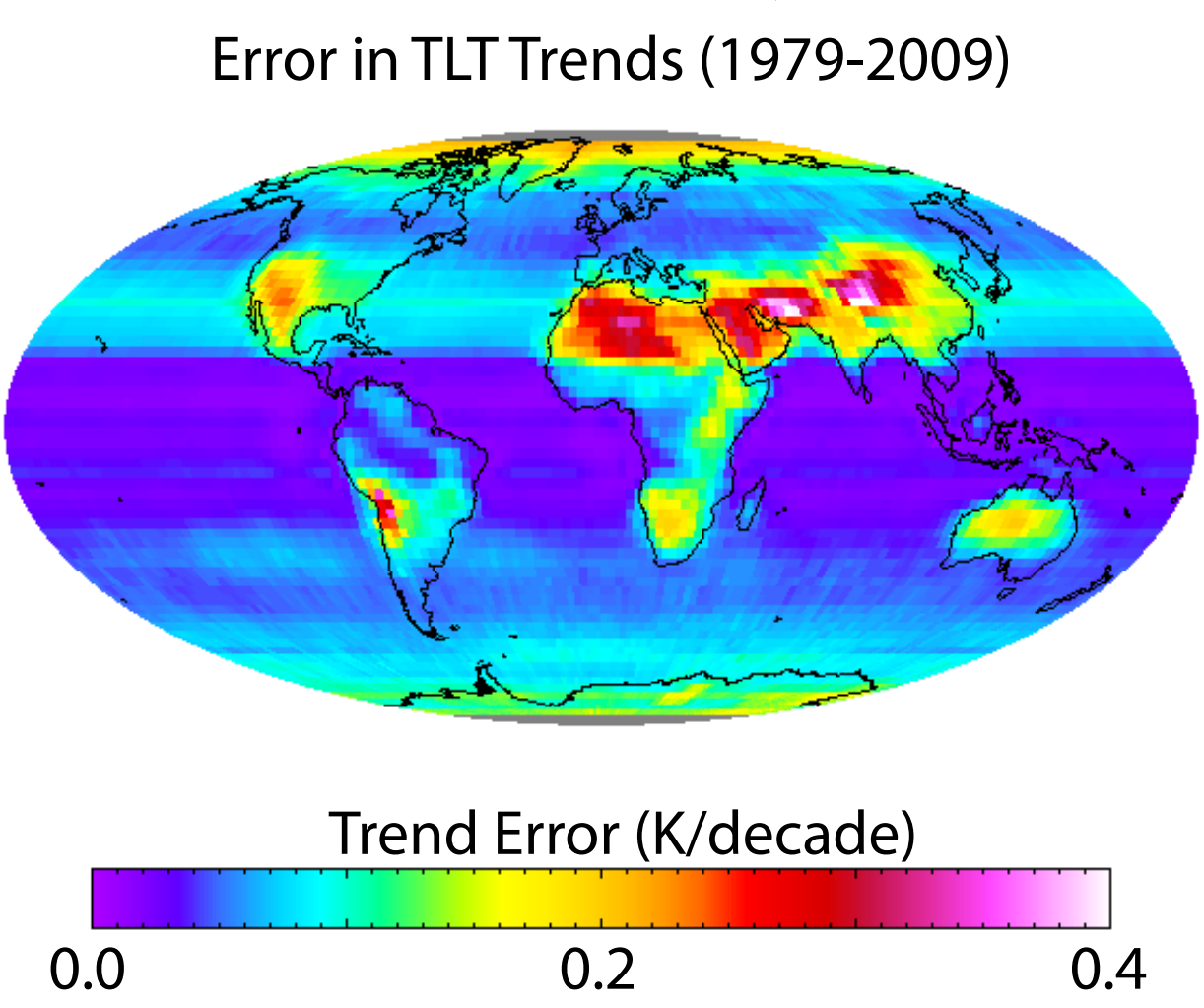
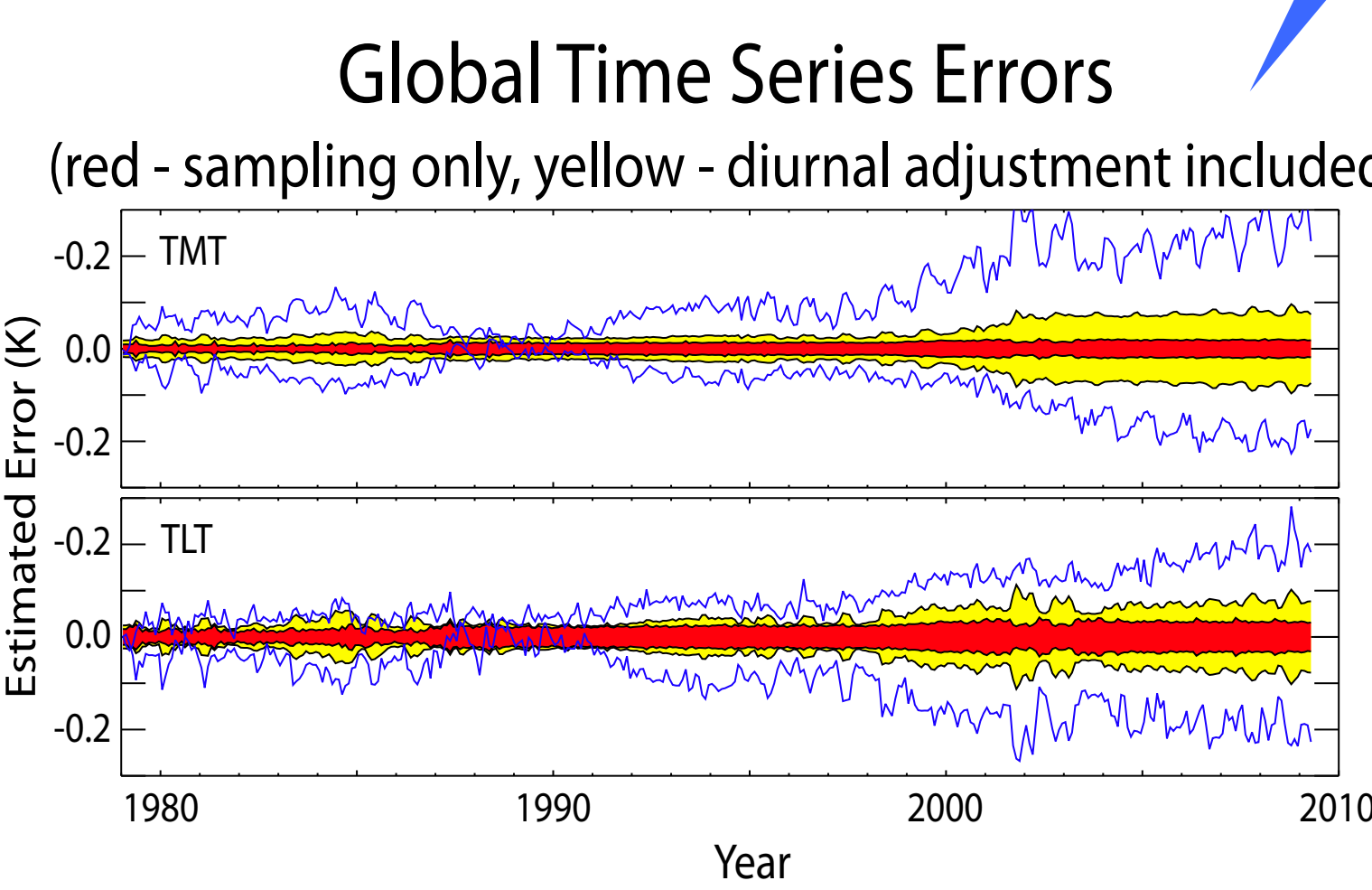
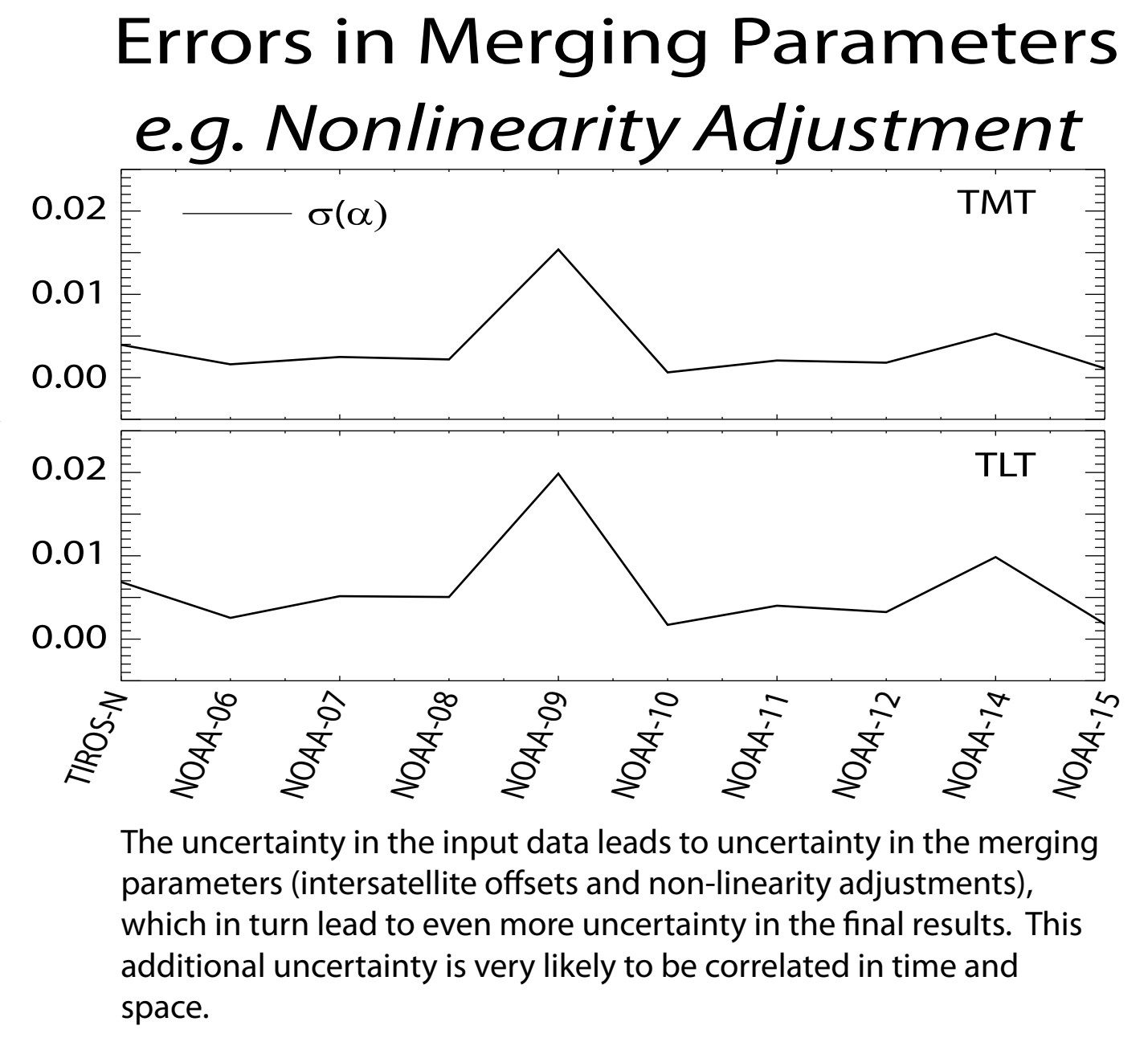
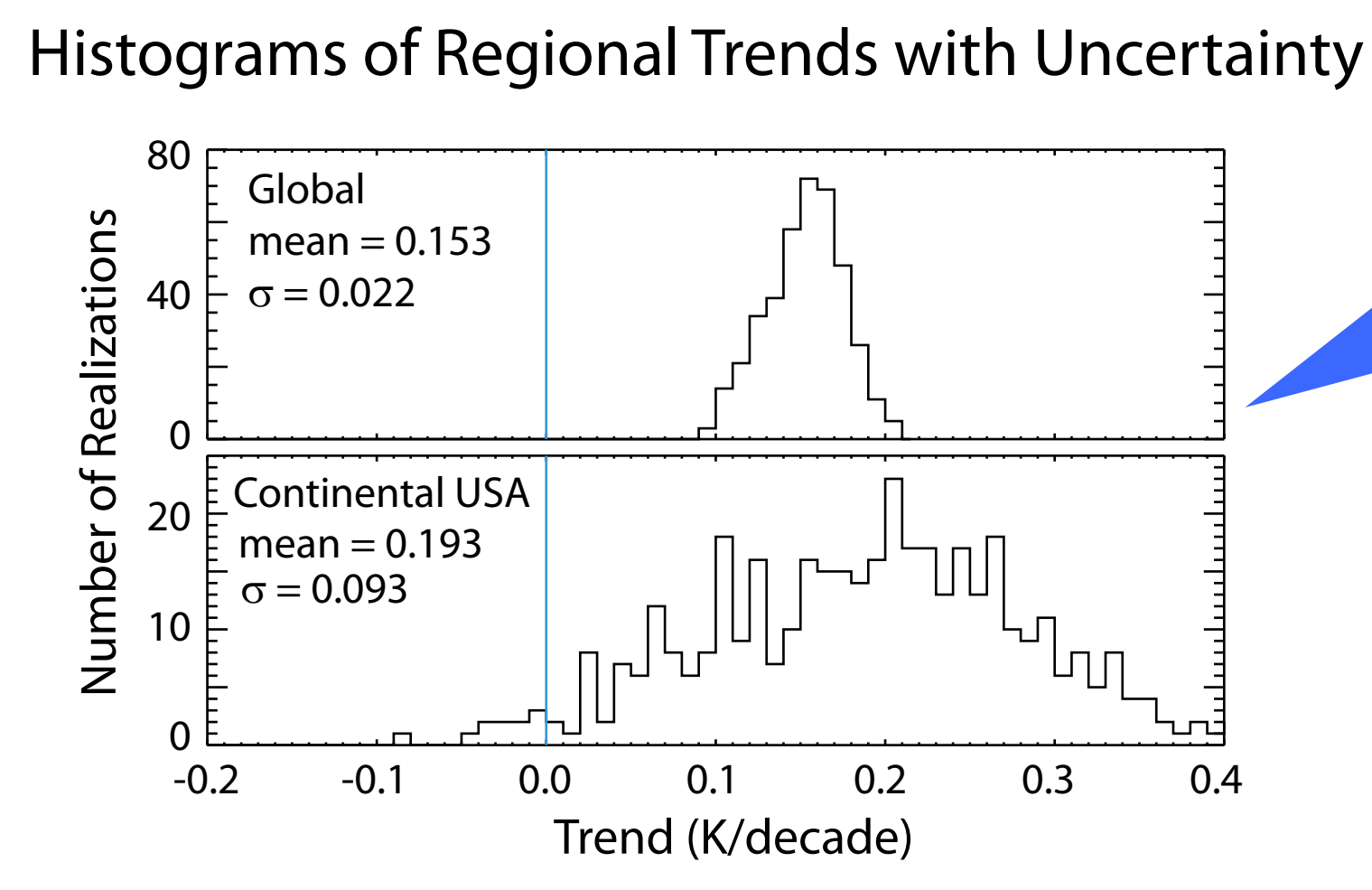
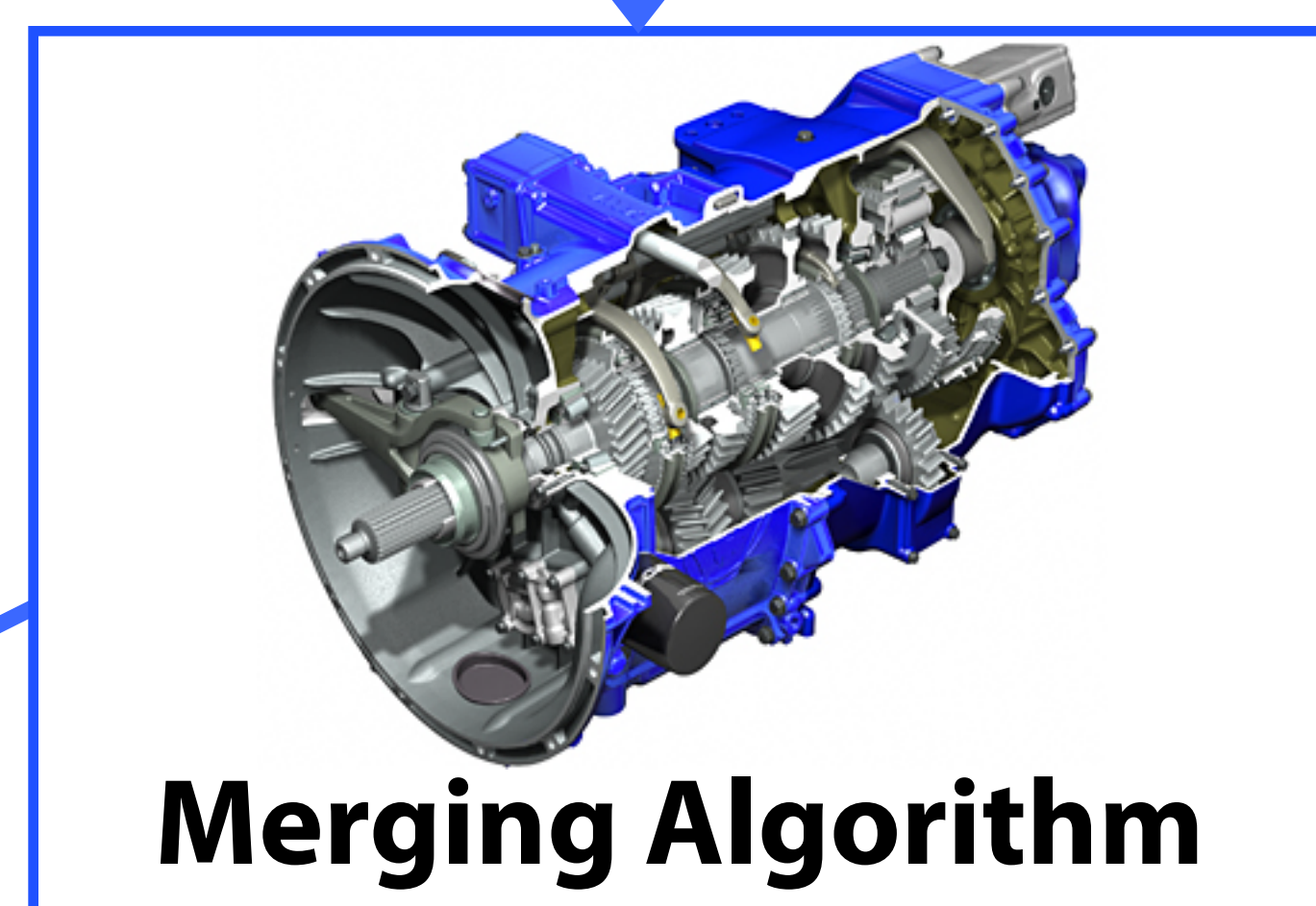
USE MONTE CARLO!



ERROR INPUTS



400 realizations of estimated error



Estimates of Trend Errors

Channel	Global (80S to 80N)	Tropics (20S to 20N)
TLT (lower troposphere)	0.153 +/- 0.044	0.147 +/- 0.034
TMT (middle troposphere)	0.093 +/- 0.042	0.114 +/- 0.038

Fine Print:
The results of this study consist of a set of 400 realizations of the possible error in for each RSS MSU/AMSU dataset. Each error realization has the same temporal and spatial resolution of our dataset (144 x 72 x 396) (Longitude x Latitude x Number of Months) Each error realization can be added to our MSU/AMSU dataset to obtain a realization of the measured data with possible error. These can (and should) then be used to propagate the uncertainty through whatever subsequent analysis is planned. We have performed this analysis for our 4 MSU/AMSU products: TLT (lower trop), TMT (mid trop), TTS (tropopause), TLS (lower strat.)

Note that this error is different (and perhaps in addition to) the errors they have been calculated in climate assessments such as IPCC and CCSP. In these reports, the errors for MSU/AMSU have been determined by a "goodness of fit to a line" criteria.

References:
Mears, CA, FJ Wentz, 2009, Construction of the RSS V3.2 lower tropospheric dataset from the MSU and AMSU microwave sounders, Journal of Atmospheric and Oceanic Technology, 26, 1493-1509.
Mears, CA, FJ Wentz, 2009, Construction of the Remote Sensing Systems V3.2 atmospheric temperature records from the MSU and AMSU microwave sounders, Journal of Atmospheric and Oceanic Technology, 26, 1040-1056.