Reality of the trends

I wish to thank the referee for pointing out the recently published paper by Davis and Rosenlof. The monthly average data sets used by Davis and Rosenlof, and many of the previous studies, are obtained by averaging the data on a pixel by pixel basis. The attached figure compares a TOMS image for March 11, 1990, and the monthly average for March 1990. It is obvious that most of the structure seen in the dally data has been averaged out in the monthly. This because the Rossby waves in the daily data move eastward with time, and in the course of a month the value at a particular pixel varies quite considerably.

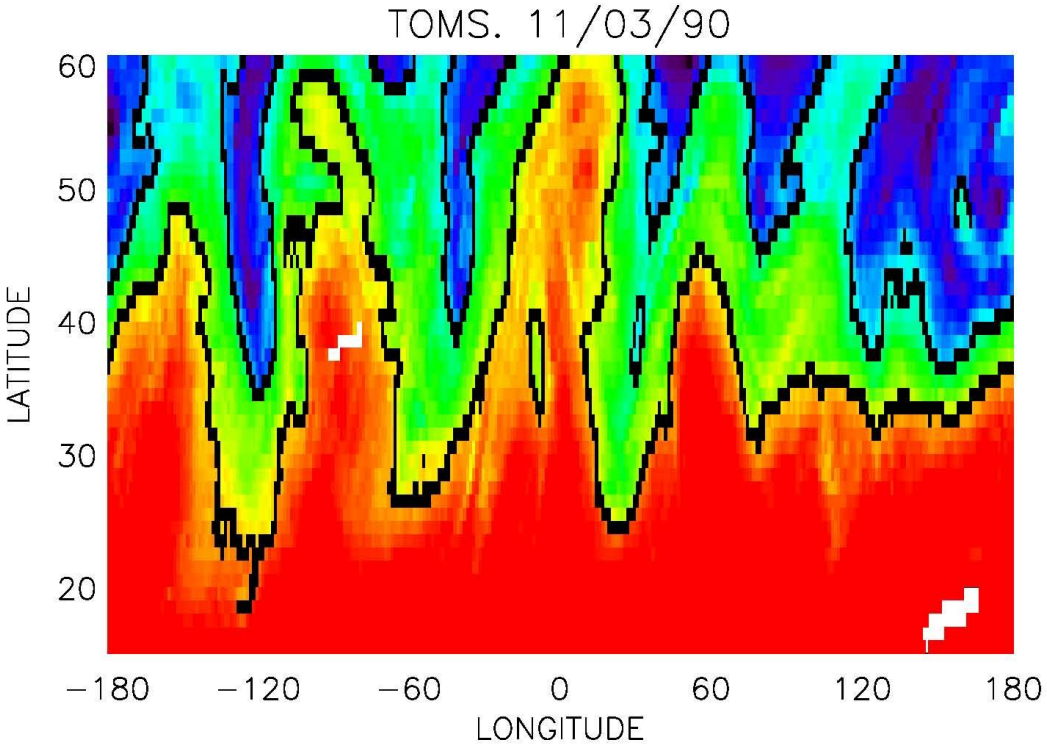
The equivalent latitude that I generate from the data is the mean latitude for a single day. I then average these daily measurements to obtain the monthly mean. Hence the value I obtain is not the same as those obtained for the Tropical belt. I will replace Figure 1 with the new figure attached, and explain the relationship of my results to those of the tropical belt. It should be noted that the results of Seidel and Randel, using the daily tropopause measurement from the rawinsonde, are in close agreement with mine.

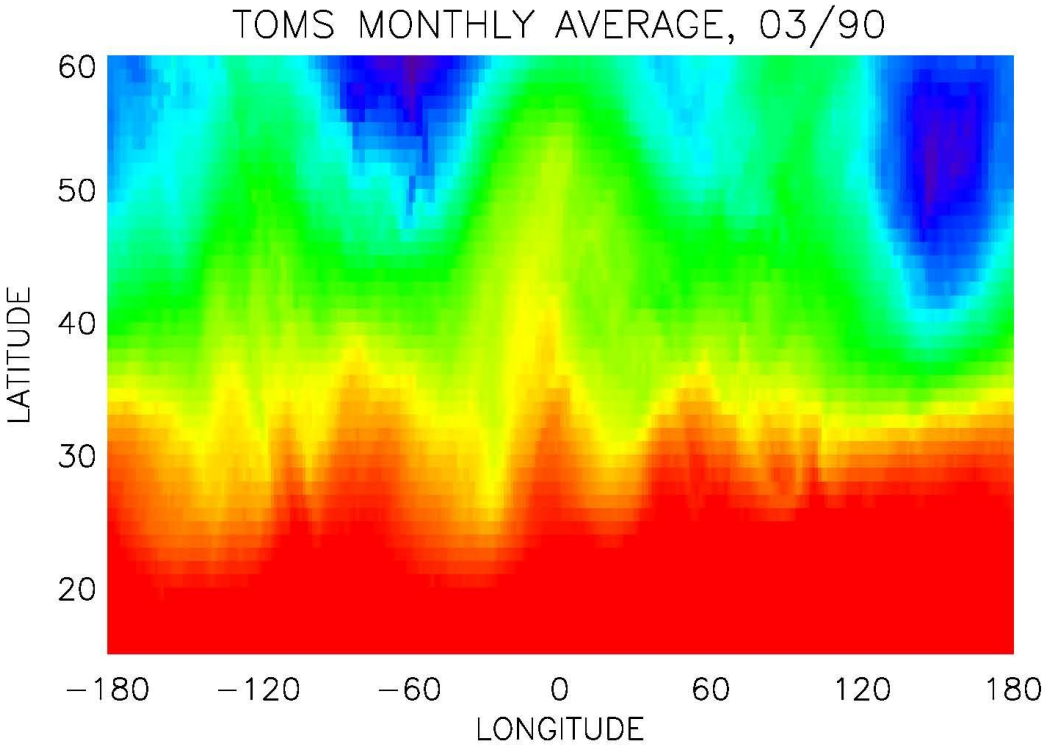
The total ozone data sets are used to define the geographic location of the fronts. As such the requirement for absolute accuracy can be relaxed. However, the total ozone data sets that I use are closely intertwined, and have been studied exhaustively for trend assessments. The training set used for the Neural TOVS data set consists of ground based data sets from the Dobson network, and TOMS data. The data should and do agree closely (to within 2%) with the TOMS data. Where overlap exists the data agree to within 2%.

I see now that I have caused confusion by putting in Figure 2, where I compare the boundary values for three instruments. I did indeed normalize the data for those days, but only for the days plotted. I do not do it for the actual analysis. The geographic location of the boundary for each data set is considered separately.

Details of Regression Analysis

When I investigated the seasonal cycle for the southern hemisphere as a function of year, I found that the amplitude of the seasonal cycle increased with time. The increase was almost linear with time, and I used the Radiative forcing as a surrogate. I should point out that putting the radiative forcing term in the linear regression does not achieve the same result. This term raises the whole seasonal cycle, but does not change the amplitude of the cycle. I agree however that I have no reason to assert that the increase in amplitude is due to radiative forcing, so I will use just a linear term and let the reader speculate.


TOMS. 11/03/90
60
50
40
30
20
LATITUDE
−180
−120
−60
0
60
120
180
LONGITUDE


TOMS MONTHLY AVERAGE, 03/90
60
50
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30
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LATITUDE
−180
−120
−60
0
60
120
180
LONGITUDE