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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements of the movement of the jet streams at mid-latitudes, in the Northern and Southern Hemispheres, 1979 to 2010" *by* R. D. Hudson

Anonymous Referee #2

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Hudson et al. (2006) examined the ozone trends within distinct meteorological regimes and concluded that the area of the Tropical regime had increased over the period 1979 to 2003, equivalent to a poleward shift of the subtropical jet by ∼3 degrees latitude. This study extends the analysis performed by Hudson et al. (2006) to both hemispheres for the time period 1979 to 2010. It is found that over the period of study the poleward shifts of the subtropical jets were 3.7 and 6.5 degrees latitude, respectively, in the Northern and Southern hemispheres, with a net expansion of the tropical belt of 10.2 degrees. A linear regression analysis was performed to identify the major factors associated with the movements of the subtropical jets. I recommend the paper be accepted after some revisions. Major comments: 1) The tropical expansion from the

present work is much larger than those from previous studies [the only exception is the study by Seidel and Randel (2007) but recent studies (e.g., Birner 2010) showed that their large value was caused by the inappropriate use of absolute thresholds to define the tropical boundaries]. By carefully reading Hudson et al. (2003; 2006), I was convinced that the methodology developed to define the position of subtropical jets is appropriate. But I am a little bit concerned about the quality of the data used for the trend analysis. Some more detailed information on how the ozone data was homogenized, what is the uncertainty for the trend analysis, and how this uncertainty affects the derived expansion, is necessary to justify the result presented in the paper. 2) The tropical surface temperature may not be a good index in the linear regression analysis for the following reasons. First it is not independent of the second index, i.e., radiative forcing in the troposphere. More importantly, the interannual variability in tropical surface temperature is dominated by the ENSO: The negative correlation between the tropical width and SST, which indicates that La Nina favors a wider tropics, does not necessary mean that the SST increase in last thirty years would lead to a tropical contraction. 3) The trend in the lower-stratospheric temperature from radiosonde may not be reliable. The author may consider the use the MSU/AMSU lower-stratospheric temperature in the regression analysis. Minor comments: 1) I don't quite understand Fig.5. Is the red line residual? If so, how is it defined? 2) Are the values presented in Table 1 based on the fitting of the jet position to individual index? Please clarify it. 3) In Fig.4 caption, change "fir" to "fit".

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