Do Stratospheric Ozone Measurements Show Large Tropical Width Changes?

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The total column ozone amount varies with latitude, in part due to the difference in tropopause height between the tropics and midlatitudes. This dependency of column ozone on latitude has been exploited by several studies to identify tropical edge latitudes and to compute their trends. The tropical widening trend over the past several decades from this method is greater than 3° latitude decade^{-1}, a rate which is significantly larger than most other tropical widening estimates.

We assess the robustness of the previously used methodology by comparing it to a new objective gradient-based method of total column ozone. The total column ozone methodologies are then compared to a diagnostic based on vertically resolved satellite ozone data from the Stratospheric Water and OzOne Satellite Homogenized (SWOOSH) data set. Our results indicate a general lack of robustness of the previous estimates, and are more in line with other tropical widening estimates indicating poleward expansion rates of < 1° latitude decade^{-1}.

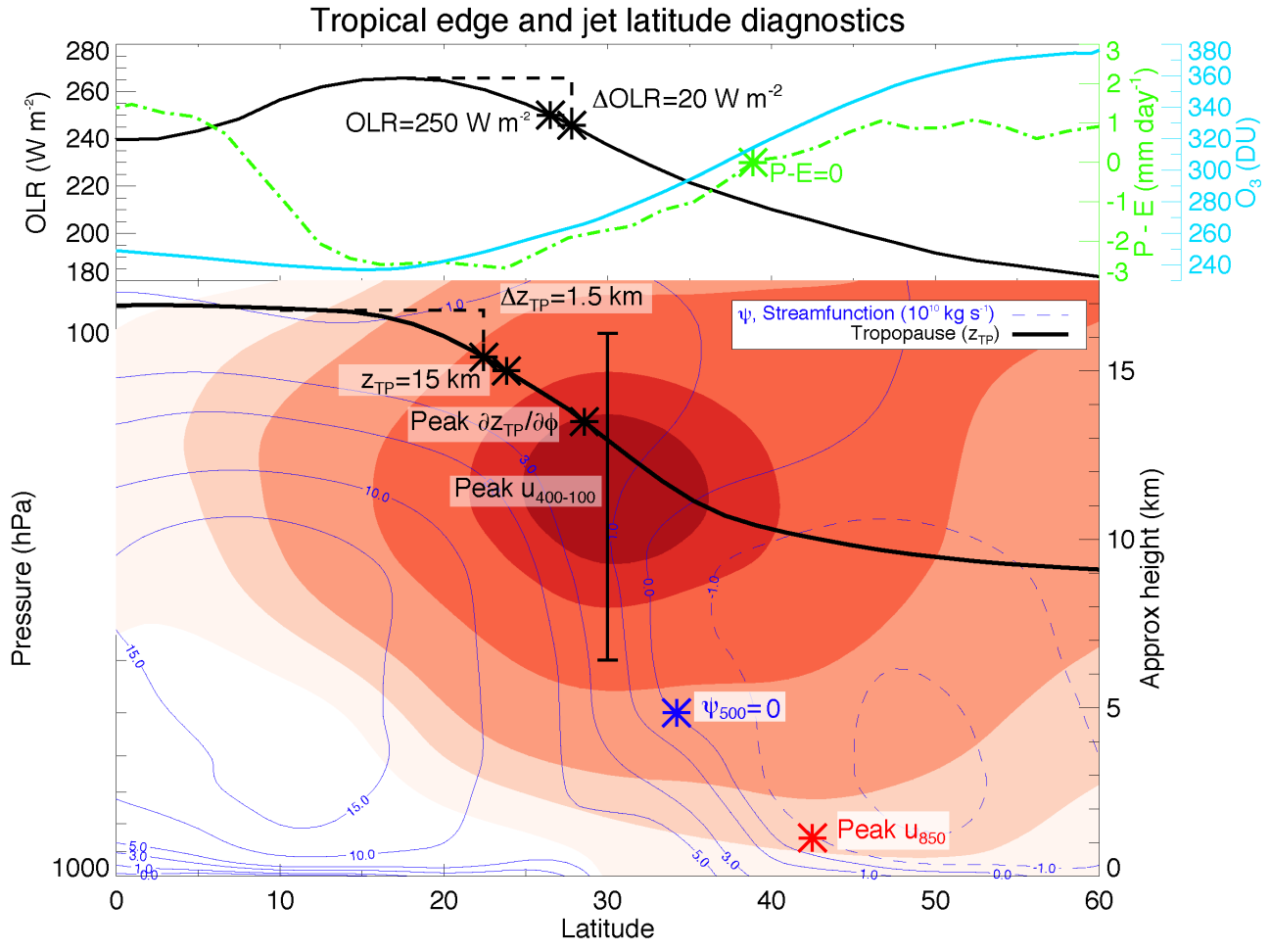

Figure 1. Some of the myriad diagnostics used for identifying the tropical edge latitude, including the total column ozone as a function of latitude used in this study (figure adapted from Davis and Rosenlof, J. Clim., 2012)