**Atmospheric
Chemistry
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Discussions**

Interactive comment on "Sensing Hadley cell with space lidar" *by* W. Sun and B. Lin

Anonymous Referee #3

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The authors propose that optically thin cirrus can be used as a reliable measure of the edge of the tropics. There is a great need for new observational characterizations of the width of the tropics, so the conclusions of this paper are potentially very important. However there is not enough evidence given to back up this conclusion in the paper.

I don't agree with the authors' basic expectation that the mean motions of the Hadley cell carries high humidity air that causes enhanced cloud formation throughout the upper branch. Instead, the rising air in the deep tropics reaches extremely cold temperatures and thus is very dry. It's not clear to me that the cloud heights measured by CALIPSO would be a robust indicator of the tropospheric Hadley cell boundaries which mark the subtropical dry zone locations.

I would suggest that the authors make some comparisons of tropical widths estimated from the CALIPSO data with some standard tropical width metrics, e.g.,

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tropopause height from reanalyses or radiosondes. I suggest, for instance, comparing their Fig 3 plot with the same year in other datasets to confirm that the calculated widths are indeed similar. I would also suggest examining a seasonal cycle (e.g., DJF/MAM/JJA/SON averages for their year or more of data) to confirm that the basic seasonal shifts are captured by this metric. I would be substantially more convinced of the reliability of this metric if this kind of basic test were shown.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 16599, 2011.

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