Neil Lareau

MWR response to reviewer #2

1. The ascent maximum C over Oklahoma is in fact less clearly related to the 500 hPa geopotential height. We believe that this feature is largely associated with a subset of lee cyclones, which mature to full depth baroclinic disturbances downstream from the Rocky Mountains (Hobbs et al. 2000). However, it may also relate more broadly to the impact of the Rocky Mountains on the orientation of the jet stream, mean flow ascent anomalies, and near surface baroclinicity as shown by Brayshaw et al. (2009). This insight follows from recommendations of another reviewer. To address both possible factors we have added the following text to the manuscript (lines 326-331),” This tertiary maximum is less well associated with the mid-tropospheric geopotential, and is likely related to deepening lee cyclones (Hobbs et al. 2000). The general northeasterly orientation and intensification of the downstream storm track may also arise due to the impact of the Rocky Mountains on jet stream orientation, mean-flow ascent anomalies, and near surface baroclinicity (Brayshaw et al. 2009).”
2. The Canadian storm track is almost certainly a signal of the Alberta Clipper storm track of Thomas and Martin (2007). We believe that we address this association in lines 370-372 and again in line 566.
3. We agree that the composite AZ storm is likely associated with strong upper level fronts in northwesterly flow. These troughs often fracture from the polar reservoir of as the upper level front, or cyclonic PV anomaly, elongates.

1. This sentence is meant to indicate that storm track pattern shown in Figs. 4 and 5 is the superposition of distinct planetary and synoptic-scale wave pattern that do not necessarily occur simultaneously. In other words, as we state in lines 310-312, our primary storm track should not be interpreted as the mean Lagrangian pathway of individual storms, but rather the Eulerian propensity for storm activity. We have slightly modified to wording to try to make this point more clear.
2. We have somewhat simplified the wording in this section in the hopes of improving interpretability. For example, we remove the statement about using monthly anomalies as it does not significantly add to the interpretation. In general our method may be summarized as: 1.) at each grid point remove the 21-year mean ascent and then divide by the standard deviation, yielding the standardized anomaly time series. 2.) correlate the time series at each grid point with all other possible grid points, which results in a correlation matrix. 3.) Perform a principal component analysis on this matrix, wherein the resulting spatial patterns represent regions of shared temporal variability in ascent and may be used to infer “modes” of interannual variability in the data. This process is actually repeated 1000 times using a random sampling of 21 years each time. The results of all iterations are then averaged to provide a more robust statistical assessment.
3. We have corrected the erroneous figure numbering in this section.
4. We have adjusted the line styles and colors to make this image more readily deciphered.
5. We have added the proposed labels.
6. The figure caption has been adjusted to reflect to appropriate contour interval.
7. We have added the proposed labels to this figure.