

Interactive comment on “The Nonequilibrium Thermodynamics of Atmospheric Blocking” by Andrew Jensen

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The application of thermodynamics in this context is interesting, but I have several questions which might be addressed by the author.

1) It's unclear what additional insight the study provides, beyond an indication of the importance of sensible heating to the maintenance of the blocking events. What does "added value" does the thermodynamic interpretation bring, for example over the use of the Bowen ratio?

2) The framework here closely follows that of Li and Chylek (2012). However, lateral fluxes are neglected here. As noted by Li and Chylek, these are zero when integrated globally, but lateral fluxes are likely to be important in a regional application like this. How do you rationalize neglecting them?

3) It would have been more convincing had the author examined more than just the two cases considered here. Since the results for these two events aren't fully consistent, we don't know to what extent they carry over to similar episodes. Are there really only two episodes of this type of blocking available?

4) The author notes in several places that entropy production increases disorder in the system. Yet a quasi-stationary blocking situation seems to be a more ordered state than one dominated by storms. You state that "blocking tends to dissipate the orderly structure in a region" when it seems to do the opposite. There is also the claim that the "blocking state was in part maintained by adding large amounts of entropy...when entropy production was decreasing, the exact opposite of the negative entropy flows in highly organized phenomena...". Again, a stationary high seems like an organized phenomenon.

5) Does using a fixed geographical region matter? In episode 2, the Blob migrates southward, and I wonder to what extent this affects the results.

Minor points:

The writing needs some work. You state in many places that the results are "derived below" or "as will be shown below", sometimes in subsequent sentences. The line "However, less so for the 2015 event..." on page 7 isn't a sentence.

Page 4, and again on Page 5—You claim the blocking episode formed out of a strong drought-associated ridge. But certainly the ridge was associated with the block, ie. they occurred simultaneously?

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Discussion paper

