

Interactive comment on “Convective suppression before and during the United States Northern Great Plains Flash Drought of 2017” by Tobias Gerken et al.

Anonymous Referee #2

Received and published: 12 June 2018

General Comments: This work demonstrates the relevance of convective inhibition and convection suppression for rapid drought intensification in the NGP region. This work is particularly relevant given the heightened awareness of flash drought and the knowledge gap in our understanding of its drivers. Overall the analysis, writing, and presentation are of high quality. Therefore I recommend acceptance of this manuscript for publication after consideration of the following (minor) suggestions.

Specific Comments: 1) Because of the importance of high quality ET_p estimates to the manuscript results, it would be nice to get an understanding of any error or bias in the R_n estimates (based on daily temperature range). The Bismarck airport ASOS

C1

station does have solar radiation observations - as part of the National Solar Radiation Database (http://rredc.nrel.gov/solar/old_data/nsrdb/) - spanning 1961 to 2010. These direct observations can be used to get an idea for error or bias in your R_n estimates, and perhaps even some analysis of how these errors propagate when computing ET_p.

2) Figure 5: I like the comparison of 2017 ET_p to the climatology at each station; however, the daily ET_p line is quite noisy, and it makes it difficult to see the 2017 absolute deviation from "normal". Could you perhaps show cumulative ET_p over the course of the year instead? I think this would provide more insight as to how much larger evaporative demand was in 2017.

3) It is mentioned in multiple places throughout the manuscript that convective inhibition or convection suppression is important for flash drought monitoring or can be useful for drought early warning. This is supported by the results of this manuscript; however, these statements come with the significant caveat of a sample size of 1 (2 if you count the related Myoung and N-G studies). Any broader conclusions regarding the importance of convection suppression for rapidly intensifying drought cannot be made without more analysis of historical drought events. I don't think that this analysis is necessary for this manuscript, but any inference of the ability of convective inhibition (or Hllow) to improve flash drought forecasts based on this work should be made with this caveat in mind. I would like to see this limitation mentioned explicitly in either the discussion or conclusions section (preferably both).

Technical Comments: 1) Page 2, line 3: I think you should replace "consequences" here with "impacts"

2) Page 3, line 4: add "land-atmosphere" in front of coupling

3) Page 3, equation 1: although not as important here as Hllow, it would be nice to include the CTP equation as well.

4) Page 4, line 8: do you mean "Table 1" instead of "Tab 1"?

C2

5) Page 4, line 10: I think you can delete "for data" here

6) Page 5, line 7: perhaps "boundary layer perspective" would be more precise than "atmospheric perspective"?

7) Page 8, line 1: replace "tall" with "deep"

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-211>, 2018.