Interactive comment on "CFSv2-based sub-seasonal precipitation and temperature forecast skill over the contiguous United States" *by* Di Tian et al.

Anonymous Referee #3

General Comments and Suggestions:

The work presented here is interesting, and presents an opportunity for researchers to utilize sub-seasonal forecasts from the CFSv2 model. However, this manuscript would benefit from a thorough proofreading, as the authors' writing is difficult to follow throughout much of the paper. Overall, I believe the manuscript can be made more concise and direct, which I believe will improve the readability of the paper. I have noted some specific instances below, but I am sure it is not a comprehensive list of all the improvements that could be made to the manuscript.

On page 2, the authors state that, ". . .many extreme events and management decisions fall into sub-seasonal timescales. . ." I suppose I could use some examples. As the

paper is currently, "sub-seasonal timescales" are on the order of 3-4 weeks. When I think of extreme events, I think of shorter term events such as flash flooding, tornadoes, extreme hail, wind, etc. . ., or I think of more persistent events such as drought or persistent floods. Many of the examples the authors provide in the second paragraph tend to be on the order of the seasonal timescale as defined by the authors on page 1. It would be beneficial if the authors could state what extreme events they specifically have in mind to be addressed by this research. Some of this is touched on near the end of the Discussion section by the authors, but could be more succinctly stated earlier.

At the end of the second paragraph on page 2, the authors state that the, ". . .derivitives or indices are directly associated with important events and decision making. . .". Similar to the previous comment, I do not believe the manuscript currently addresses this point.

Beginning on page 3 and continuing to page 4, the first paragraph of the Data and Methodology section is very confusing. A table comparing the differences between the 9-month, 45-day, and season runs would be beneficial. As it stands now, I believe this section assumes too much of the reader to interpret how NCEP runs the CFSv2 model.

On page 4, the authors discuss an example and reference a "lead one" forecast. It appears they are referencing the 14-day forecast, but it's not clear.

Equation 1 is not clear. The variable E is described as 1/3 the total number of forecasts, T. Why wouldn't the denominator simply be $(T - T/3)$? It sounds as if there is more to the variable E than is described.

With regards to the discussion of Figure 2 that starts near the end of page 6 and continues on to page 7, I am not sure why the authors do not include similar figures for MAM or SON, but do discuss the results. Wouldn't it be beneficial to include those figures? This comment applies to Figure 4 as well.

Similarly, I'm not sure why the authors stress emphasizing the month of July in Figure

3. The authors state there is some difference in monthly spatial patterns, but without the other months, I do not have the proper context for the figure.

With regards to section 3.3, it would be useful to have some sort of table or reference to see what periods of MJO and/or ENSO activity are being analyzed. The number of events considered could be limited enough that the HSS could be somewhat skewed. It would also be helpful if the authors discussed more clearly the impacts of active MJO and ENSO compared to the combined impacts of MJO and ENSO events. I think the authors begin to discuss this in the second paragraph on page 9, but do not offer enough insight on the particular point.

The first full paragraph on page 10, describing the role of the BM method is not clear. I would recommend the authors explain this conclusion more clearly, or simply remove the paragraph.

On page 11, the authors state that forecast skill could be improved by simply having a larger ensemble. I am not convinced of that; a larger ensemble may not necessarily add useful information. It may be more appropriate to state that a sensitivity study on ensemble size could be performed to see if a larger ensemble does improve forecast skill.

Page 1, lines 27-28: I'm not sure what is meant by, "...sub-seasonal timescale is beyond the memory of the atmospheric initial conditions..."

Page 5, the NCDC has since been renamed the National Centers for Environmental Information (NCEI)

Page 6, line 26 should read "Figure 2 shows"

There is no legend for Figure 5, so I am unsure which regions match to each particular color.

Page 8, line 10: "temperally" should be "temporally"

Page 8, line 17: "reasonaly" should be "reasonably"

Page 9, line 23: "depending" should be "dependent"

Page 10, line 4, "spatial" and "temporal" should be "spatially" and "temporally"

Page 10, line 5: "to note" should be "noting"

Page 10, line 23: There is no Figure 13 included in the manuscript. To this point, referencing a figure in another article (Jones et al. 2011) is a bit confusing. I think I would just note how the results of this study compare to Jones et al., rather than to a specific figure.

Page 11, line 8, "highlighted" should be "highlight"

Page 11, line 9, "subeasonal" should be "subseasonal"