Review of manuscript: JCLI-D-12-00128

After reading the manuscript carefully, as well as the reviews that were done in a previous version of this paper, I was stunned and dismayed. The authors basically ignored all comments and suggestions done by reviewer 2. I consider that the comments done by reviewer 2 are extremely important, basic to the conclusions of the paper and very relevant and definitely need to be taken into account by the authors in order for this paper to be considered for publication in Journal of Climate. Without taking these important issues into account, I can only recommend the rejection of this paper.

We thank new reviewer #1 for his/her careful review and helpful comments. We would like to appeal to new reviewer #1 that we have no intention to refuse to show additional results suggested by old reviewer #2. We and old reviewer #2 have different opinion about how useful those additional materials may contribute to the manuscript.

Thanks to you and the editor, we are now convinced that adding some of those additional materials could be useful for readers to better understand the overall weak correlation between the TNI and the number of intense tornadoes. On that very point, we performed ranking correlation analysis using Spearman's rho method as you suggested in your comment #2. We also performed Pearson correlation analysis after removing 1974 as suggested by old reviewer #2. These additional correlation analyses suggest an overall weak correlation between the TNI and the number of intense U.S. tornadoes. These are discussed in the beginning of the section 3 (page 5, line 21 – page 6, line 23). After that, we analyzed further and found that although the overall correlation between the TNI and the number of intense U.S. tornadoes is not strong, extremely active years are frequently linked to a positive phase TNI.

As requested, a scatter plot of the TNI versus the number of intense tornadoes is also added in the revised manuscript (new Figure 3). Additionally, a sentence is added to indicate that the overall correlation between the TNI and tornadic environments is weak.

We hope that new reviewer #1's major concern is adequately addressed in our revised manuscript.

I would stress the following important issues that need to be done by the authors:

1. Show a scatter plot of TNI and AM tornadoes - this is basic, show the data and how the relationship you are discussing appears in the data. It's not acceptable to refuse to show the data. The arguments based on a discussion Table 2 need be backed up by the complete datasets.

As requested, a scatter plot of TNI and the number of intense U.S. tornadoes in AM is shown below.
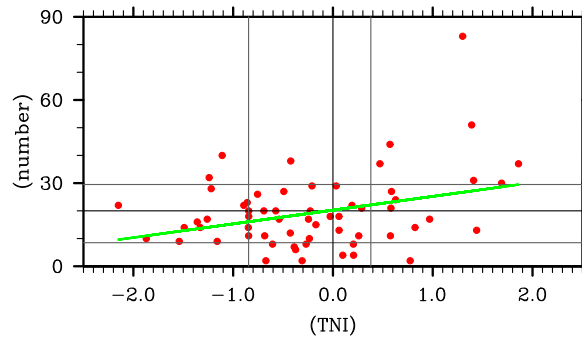
The green line shows the least-squares regression fit with its slope (α = 4.96) exceeding 99% confidence limit (i.e. the null hypothesis that α is not different from 0 is rejected at the two tailed 99% significance level). The vertical lines to the left and right of the zero line show the lower and upper quartiles of the TNI index, respectively. The horizontal lines above and below the mean separate normal activity years from the 10 most active and 10 least active years. This plot basically shows that the TNI and the number of intense tornadoes have an overall weak and positive relationship. This plot also shows that 7 out of the 10 most active years occurred during positive phase TNI years, whereas 10 least active years occurred largely during neutral TNI years, in agreement with Table 1, 2 and 3. This plot is now added as Figure 3 in the revised manuscript.

2. I agree with reviewer #2 that the Pearson correlation is inappropriate here. If the authors want to keep the Pearson correlation in the paper, they need to add other non-parametric measures in the paper: Kendall's tau and Spearman's who. I think it's not acceptable to refuse to show these results and just change the language used for significance in the paper.

As mentioned above, we performed ranking correlation analysis using Spearman's rho method as requested. We also performed Pearson correlation analysis after removing 1974 as suggested by old reviewer #2. These additional correlation analyses suggest an overall weak correlation between the TNI and the number of intense U.S. tornadoes. These are discussed in the beginning of the section 3 (page 5, line 21 – page 6, line 16) of the revised manuscript.

3. Tornadoes time-series F2-F5 vs. F3-F5. I would like to see a comparison of both time-series and a discussion on how the results, i.e. correlations (including Kendall's and Sperman's - see item 2) change if F2-F5 tornadoes are considered. The robustness of the results should be discussed here.

As requested, the Pearson and ranking correlation (Spearman's rho) coefficients of TNI with the number of F0-F5, F1-F5, F2-F3 and F3-F5 tornadoes are shown in the following table.

Fujita-Scales	Pearson	Spearman's rho
F3-F5	**0.33** (**0.29**)	0.16 (**0.25**)
F2-F5	0.22 (0.21)	0.09 (0.15)
F1-F5	0.18 (0.15)	0.09 (0.08)
F0-F5	0.02 (0.05)	0.02 (0.00)

The correlation coefficients generally decrease as weaker tornadoes are included. This result can be interpreted in multiple ways. It may suggest that TNI is associated more with stronger

tornadoes than weaker tornadoes. One can also argue that the TNI and U.S tornado activity are not strongly correlated because the results are not consistent when different Fujita scales are used as new reviewer #1 implied here. This result may also reflect that there are more uncertainties in weaker tornadoes counts in the NOAA's severe weather database. Therefore, this result shown in the above table does not necessarily indicate that our results shown in Table 1 are not robust. Since this result can be interpreted in multiple ways and thus confusing, we prefer not to add this result in the revised manuscript.

Additionally, since we have already concluded in the revised manuscript that the overall correlation between the TNI and the number of U.S. tornadoes is weak, we feel that it is not necessary to add more correlation analysis to strengthen that conclusion.

4. Please do show the correlation of TNI with vertical shear and moisture. If your results are significant, the connection should be appear in these results.

The correlation between the TNI and moisture transport is positive, but very weak ($r = 0.03$). The correlation of the TNI with the lower-level wind shear is also positive and weak ($r = 0.11$). This result is consistent with our finding that the overall correlation between the TNI and U.S. tornado activity is weak as we discussed in the revised manuscript (page 5, line 21 – page 6, line 16). This point is now added in the revised manuscript (Page 6, line 16): "Similarly, the TNI is only weakly correlated with tornadic environments (not shown)".

Finally, we would like to point out that the Gulf-to-U.S. moisture transport and the lower-level wind shear east of the Rockies are significantly (at the 90% confidence level) increased during the ten positive TNI years (Figure 5b and c).