Interactive comment on "Climatological study of a new air stagnation index (ASI) for China and its relationship with air pollution" *by* Qianqian Huang et al.

Anonymous Referee #2

Received and published: 4 February 2018

Synopsis: The authors design an atmospheric stagnation index for use in China, contrast it with the U.S. NCDC ASI, and suggest that theirs better captures the meteorological conditions conducive to poor AQ.

Recommendation: This is an interesting and needed study. The disconnect between AQ observations and the NCDC ASI over China has been shown in many previous publication. This, of course, has motivated many to design a better approach. In this attempt the authors propose meteorological factors that integrate scavenging, dispersal, and ventilation effects. I find the meteorological basis of the index design to be sound. However, I think its application and assessment require greater rigor, while the

manuscript itself could be better organized and written.

My editorial and scientific suggestions follow:

From a communication standpoint, I would advise the authors to clearly establish a new metric, i.e., do not call your index the "new ASI." The author's should look at this as an opportunity...an opportunity that will assist them in improving the clarity of the manuscript.

The creation of this index is ripe for multiple linear regression analysis. The authors suggest the ASI is overly reliant on 500mb winds. It seems likely that this new index may have similar issues. For example, if the CAPE/CIN is often zero, perhaps it provides little value to the calculation. With multiple linear regression analysis, one could quantitatively learn the value each new component adds to the overall result. I would advise this analysis for both monthly and daily data, where available.

From a fine temporal resolution perspective, I appreciate the focused analysis on Beijing, however I wonder why this portion of the analysis wasn't extended into other seasons and time periods. Does the "new ASI" perform as well during poor AQ events in the summer/spring/fall seasons? If daily Embassy data is sufficient to analyze in January of 2013, surely you could test your metric on other time periods.

Annual map plots, while instructive, are not particularly useful when discussing seasonally dependent meteorology. I would suggest presenting seasonal panels of your index components and discussing the seasonal variance in controlling drivers (multiple linear regression analysis would be helpful for this).