Review of

"Long Island Sound Temperature Variability and its Associations with the Ridge-trough Dipole and Tropical Modes of Sea Surface Temperature Variability"

by Justin A. Schulte and Sukyoung Lee

General comments:

The present study examines the variability of surface water temperatures at Long Island Sound (LIS) and how cold and warm events in this region are related to a dipole of atmospheric ridge and trough in the North Pacific, and to sea surface temperatures (SST) in the tropical Pacific Ocean.

The article addresses a relevant topic with important implications for the climate forecast and impacts community and overall appears to be technically sound. It makes interesting use of quite novel methods (e.g. statistical significance testing of event decomposition or wavelet analyses) to examine the variability and potential predictability of the LIS thermal system. However, the authors do not discuss any possible physical mechanism that could be responsible for these statistical associations (as stated in the Abstract). The choice of season for each analysis is not always clear and well justified which makes it quite difficult for the reader to understand the (lagged) relationship between LIS water temperatures, the atmospheric dipole and tropical SST variability. I think the overall structure of the manuscript could be improved, by being more succinct, by being careful not to over interpret results but rather highlighting how these results are new compared to the previous literature.

Specific comments:

Abstract:

The physical mechanisms are not (or poorly) discussed in the text. The 2012 ocean heat wave across the mid-Atlantic Bight to my knowledge has not been discussed in detail either.

1. Introduction:

It would be useful to explain why the LIS is an important region to study (in terms of impacts), and perhaps to describe in more detail previous results on the importance of the EP/NP pattern.
If possible, please also add a reference discussing the lack of relationship with the Gulf Stream and NAO.

3. Methods:

Page 5 line 7: How many adjacent points are required to be considered an event?

4. Results:

Fig. 2: Where are the vertical dotted lines representing the occurrence of canonical and East Pacific El Nino? Perhaps it would be useful to highlight the most intense warm and cold LIS events in red and blue (just a suggestion).

Section 4.1:
It would be nice to clearly explain the added value of the event spectrum compared to the simple time series. The paragraph could also be shortened here.
In what seasons are these extreme temperature anomalies more likely to occur? How long do they last? More discussion of Table 1 would be helpful here.

Section 4.2:
Fig 3: How different do patterns look in each season? How coherent is this atmospheric dipole on different vertical levels? It would be worth detailing the possible physical mechanisms operating behind this forcing from the atmospheric dipole onto LIS water temperature variability.
Fig. 4: I wonder how useful this figure is. It is very noisy and difficult to discern the 2012 event.

Section 4.3:
The composite analyses are interesting (particularly the discussion of specific LIS events and El Nino years), with potentially important implications for the forecasting of LIS temperatures. However it is not clear how many events compose each of the LIS composites (counted in months, seasons?), which makes it difficult to really interpret in the context of ENSO and predictability.
Perhaps it would be useful to show the correlation between the dipole index and SST anomalies (page 12, line 21). It might also be important to discuss the overall added value of the dipole index compared to the EP/NP index used in previous work.

Finally, while the references to extreme LIS events are insightful, I think it might be helpful to consider the 2012 warm event more clearly as a case study throughout the text. It would help with the readability of the text and our understanding of the climate teleconnections mentioned.