In this paper, the authors performed a statistical analysis to show that Long Island Sound (LIS) surface temperature is linked to mid-tropospheric geopotential height difference between the US east coast and Alaska, which is referred to as ridge-trough dipole in this study. By performing composite analysis, they further argue that the dipole is forced by sea surface temperature anomalies in the central equatorial Pacific. From Figure 2, it is quite clear that LIS surface temperature is determined by the meridional shift of the atmospheric jet and the associated winter storm track across the US east coast. For instance, a northward shift of the storm track will warm up the subtropical North Atlantic and the mid-Atlantic bight, and cool the subpolar North Atlantic. The associated increase in the subtropical high will further increase the trade wind cooling the tropical North Atlantic. This is a well-known process, also known as North Atlantic tripole SST mode, which can be well observed in Figures 7 and 8. The North Atlantic tripole SST mode can be triggered by NAO, ENSO teleconnection and PNA, which is also very well known (e.g., Deser & Blackmon, 1993). Therefore, it is difficult for me to justify the publication of this manuscript in Ocean Science.

The authors the appreciate the comments provided and many changes have been to the original manuscript. Our responses to the comments are in plain text and the original comments are in bold text (bold text). Changes to the manuscript include the addition of a March 2012 case study, the inclusion of motivation for constructing the dipole index, and the addition of text describing the physical mechanism behind the dipole relationship with Long Island Sound temperature variability. Specific changes are described below.

Although the authors do see some evidence for the tripole mode in Figures 7 and 8, the signal is not particularly robust because the composite means are mainly statistically significant along the east coast of the United States. The lack of relationship with the tripole mode is consistent with how LIS temperature anomalies are not strongly linked to the NAO and PNA patterns that have been identified in previous work as excitation mechanisms for the tripole mode. That lack of relationship between LIS temperature anomalies and the tripole SST mode were confirmed by correlating LIS temperature anomalies with SSTs across the North Atlantic. It was found that LIS temperature anomalies are only significantly correlated with Atlantic SSTs along the east coast US and not across other regions where the tripole mode centers are located. Thus, the LIS mode is new and largely different from the tripole mode identified in previous work.

I also feel that it is not well justified in the introduction why we need to study LIS surface temperature variability. Additionally, I am not convinced that the geopotential anomaly over Alaska is anything to do with LIS surface temperature.

The authors agree that the physical mechanism behind the dipole pattern-LIS temperature relationship is not well-described in the original manuscript. As such, in the revised manuscript, a physical mechanism behind the connection between the Alaskan height anomaly and LIS temperature anomalies is now described. We have also included a schematic. The importance of the geopotential height anomaly over Alaska is now described using fundamental principles in meteorology. During a negative phase of the dipole pattern (ridge over Alaska and trough over the eastern US), the ridge over Alaska supports a surface anticyclone just upstream from the upper-level trough over the eastern US. The surface anticyclonic flow then is responsible for the advection of cold continental air across the Northeast US region, amplifying the trough over the eastern US.

The atmospheric circulation anomalies linked to LIS surface temperature anomalies shown in Figure 3 does not appear to be one of the leading modes of NH atmospheric variability (Wallace & Gutzler, 1981) or typical ENSO teleconnection patterns. The East Pacific - North Pacific (EP- NP) pattern, which is inactive in boreal winter, does not look like Figure 3 either.

While the authors agree that the dipole pattern does not resemble many of the well-known leading modes of variability (e.g NAO, PNA, and WP patterns), the dipole pattern is very important to LIS temperature variability. EOF patterns are modes that are extracted from an analysis that seeks patterns that explain the most variance within a data set. These patterns need not be relevant to climate variability across a given region. In fact, Schulte et al. (2016), Schulte et al. (2017a,b) and Schulte et al. (2018) found that the common leading modes do not explain much of the temperature and precipitation variability across the Northeast US. Thus, new patterns most be identified, and corresponding indices need to be constructed that can explain the temperature and precipitation variability. One alternative approach to EOF analysis is the continuum approach (Frankze and Feldstein, 2005; Johnson et al. 2008) in which atmospheric patterns are viewed as falling on a continuum, contrasting with EOF analysis that statistically partitions the atmosphere into a discrete finite set of patterns. Each location of the globe has a teleconnection pattern associated with it and the pattern may or may not resemble the leading modes extracted from an EOF analysis, much like how an arbitrary vector may not resemble any of the standard Cartesian basis vectors. To find a relevant teleconnection in the continuum, we adopted an one point correlation map approach, which resulted in our dipole pattern explaining 64% LIS temperature variability. This pattern is very similar to the EP/NP pattern, which we found to be a leading mode of variability, as determined by an EOF analysis (Table 4). In the introduction section of the revised manuscript, we motivate our construction of the dipole pattern by explaining how EOF patterns cannot capture precipitation and temperature variability across the Northeast US very well. We then discuss the added value of using the dipole index in the results section.

The authors disagree with the idea that the EP/NP is inactive in winter. The January and February EP/NP pattern very closely look like our dipole pattern for the same months, as can be confirmed by correlating indices for the EP/NP and dipole patterns during those months (Table 3). In fact, we found that correlation between the dipole index and the EP/NP index is strongest during the months of November, January, and February. These correlations are shown in Table 3 of the original manuscript and confirm that the EP/NP resembles the dipole pattern. Moreover, the relationship strength between the EP/NP and dipole indices increases from summer to winter, suggesting that the December dipole pattern is the EP/NP pattern and that the EOF analysis is unable to capture the EP/NP pattern in December. In fact, a comparison of the November and January EP/NP patterns with the December dipole pattern reveals a strong similarity among the patterns, providing more evidence that the EP/NP pattern is active in winter and that the dipole pattern is an important driver of LIS temperature variability. In the revised manuscript, we use these findings to motivative the construction of our dipole index that can be unambiguously defined for all calendar months.

I am also confused why the authors use a numerical model data instead of observations for the LIS surface temperature. And, it is not clear what depth is at "the first vertical level".

The authors agree that it is important to mention why numerical model data are used. For the Long Island Sound, observations are temporally and spatially sparse so that the output from a numerical model is better suited for the event spectrum analysis that requires continuous data. The data quality has been evaluated and shown to agree well with observations in previous work (Georgas et al., 2016).

There are also many statements that do not match with the corresponding figures.

In the revised manuscript, inconsistences between the text and figures have been remedied throughout.

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