Reviewer #1

With 13-year high-resolution observations and reanalysis data, this study investigated the characteristics and spatiotemporal patterns of different types of convective systems over southeast Texas, and it found that mesoscale convective systems (MCSs) are essential to both mean and extreme precipitation in all seasons, while isolated deep convection (IDC) is more important for the intense precipitation during summer and fall. And with the help of self-organizing maps (SOMs), it demonstrated frontal-related and anticyclones large-scale meteorological patterns (LSMPs) for convection. Then it discussed the lifecycle of MCSs and IDC over southeastern Texas. Generally, the manuscript is well written, and the results are reasonable. My concerns are listed in the following.

We thank the reviewer for their thoughtful and constructive comments and suggestions, which has substantially improved the quality of the manuscript. We have addressed all the reviewer's concerns and revised the manuscript accordingly. Our point-by-point responses are in blue and the modifications to the manuscript are quoted in green.

1. Line 113-114: How many leading empirical orthogonal functions of the input vector are used for the initial nodes for SOM clustering?

   The initial nodes are the first guess of the four SOM nodes, therefore, four leading EOF modes are used. It has been clarified in the revision.

2. Line 149: What are the baroclinic waves observed in Fig. 3a, c, d?

   We agree with the reviewer that the baroclinic waves cannot directly be observed in Figure 3a, c, d. Therefore, this statement has been removed in the revision.

3. Line 215-216: I cannot see the weak westerly winds prevails east of the Rocky Mountains (Fig. 6a).

   Thanks for pointing this out. It should be weak anomalous winds east of the Rocky Mountains. We have modified the manuscript.

4. Line 223-224: If the three frontal LSMPs depict different stages of a frontal passages, they should be continuous in time, any evidences to show it? According to the different explanation ratios of 27%, 23% and 22% of MCS occurrences by the three LSMPs, it seems that some of them do not appear successively.

   The reviewer has highlighted an important consideration. The three frontal LSMPs are expected to reflect the large-scale atmospheric conditions that could be associated with a surface front, which propagate from west to east and exhibit a clockwise tilt. However, this may not always hold true. For example, a front situated to the west of the study area, indicative of a pre-frontal condition, may dissipate before it traverses the region. As a contrast, a front located to the east of the study area, representative of a post-frontal situation, may materialize without having visibly moved in from the west. To avoid confusion, we have revised this sentence as following (Line 256-257):

   The three frontal LSMPs depict different locations of front and dryline. The baroclinic forcing near the front lifts moist parcels and favors convection initiation.

5. Line 237-238: As for the statement that there are no significant moisture anomalies and air stacking in summer than in spring, it's a little strange that summer environment should be more moist and warmer as mentioned by the authors.

With relatively dry condition in spring, the development of convection requires extra moisture transported from the east where is relatively wet. This indicates an anomalous moisture transport as depicted in Figure 7d. As a contrast, the summer environment is moister, the convection initiation is not strongly linked to anomalous moisture transport (Figure 7h).

6. Line 322-323: How to conclude that the convection is primarily triggered by the sea-breeze circulation when an anticyclone dominates the area? Does the convection usually occur in the daytime due to the land-sea thermal contrast? It seems to be true according to Fig. 12. However, on the other hand, since the sea-breeze circulation can appear in all the four seasons, why are more IDC triggered in the nocturnal and early morning especially in spring and winter (Line 340)?

Under anticyclone conditions, the initiation of convection is associated with enhanced land-sea thermal contrast (Fig. R1 b and d), suggesting a strong sea-breeze circulation.

It is true that the convection usually occur in the daytime, frequency peaking in the early afternoon when the land-sea thermal contrast reaches its maximum. However, the peaking hour of convective occurence is modulated by both the intensity of the sea-breeze circulation and the large-scale atmospheric conditions. In summertime anticyclone conditions, the sea-breeze circulation emerges as the major trigger mechanism, leading to a peak in the afternoon. In other seasons, large-scale dynamical forcing plays a major role in triggering the convection, while the diurnally varying thermodynamic forcing still exerts a modest influence, slightly increases convection occurrence in the early afternoon.

The main confuse arises from the sentence in the original version of the manuscript: *"Relatively more IDC are trigged in the nocturnal and early morning especially in spring and winter"*. We have rewritten it in Line 378-380 as:

While IDC also frequently initiate in the afternoon during spring and winter, there are more IDC occur in the nocturnal and early morning compared to summer.

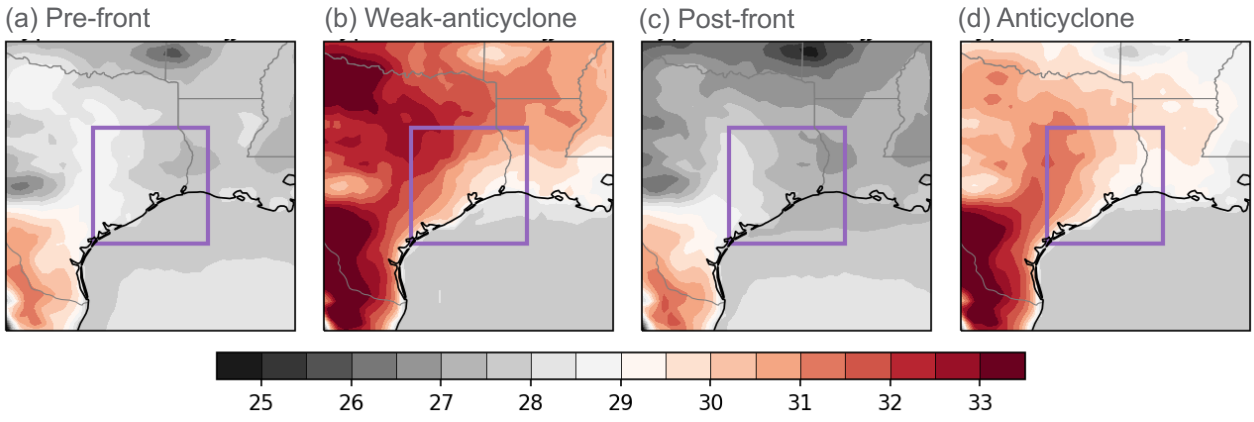

Figure R1 Summertime 2-m temperature (°C) for each LSMP associated with IDC initiation.

7. Line 361-363: is the orographic lifting mechanism unfavorable large-scale condition for the deep convection?

Thanks for pointing this out. We have revised this sentence in Line 400-402 as:

Additionally, we find that deep convection can occur even under unfavorable large-scale ***meteorological*** *conditions. The northeasterly anomalies associated with the anticyclone push moist air towards the eastern slope of the Rocky Mountains, creating an orographic lifting mechanism.*

8. Line 149: (Fig. 3a, b, d) should be (Fig. 3a, c, d); Line 214: (Fig. 6a-6c) should be (Fig. 6a-6c, Fig. 7a-7c).

Corrected. Thank you.