

Supporting Information for

Classifying synoptic patterns driving tornadic storms and associated spatial trends in the United States

Qin Jiang, Daniel T. Dawson II, Funing Li, and Daniel R. Chavas

Corresponding Author: Qin Jiang
drqinjiang@gmail.com

This PDF file includes:

Figs. S1 to S6

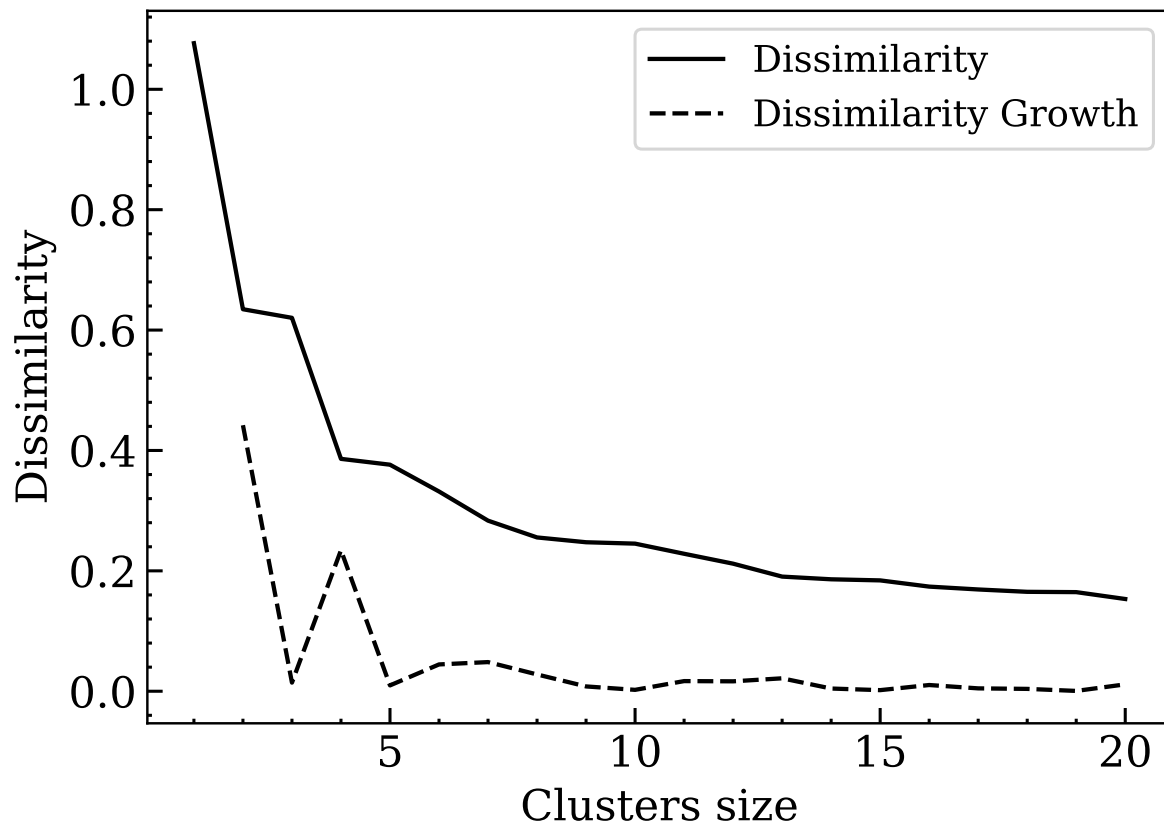


Fig. S1. The variation of dissimilarity (solid line) and dissimilarity growth (dashed line) in a function of cluster size, respectively. These metrics are used to select the optimal output cluster size: the output cluster size is determined by an abrupt increase in dissimilarity growth (dashed line), resulting in four final clusters.

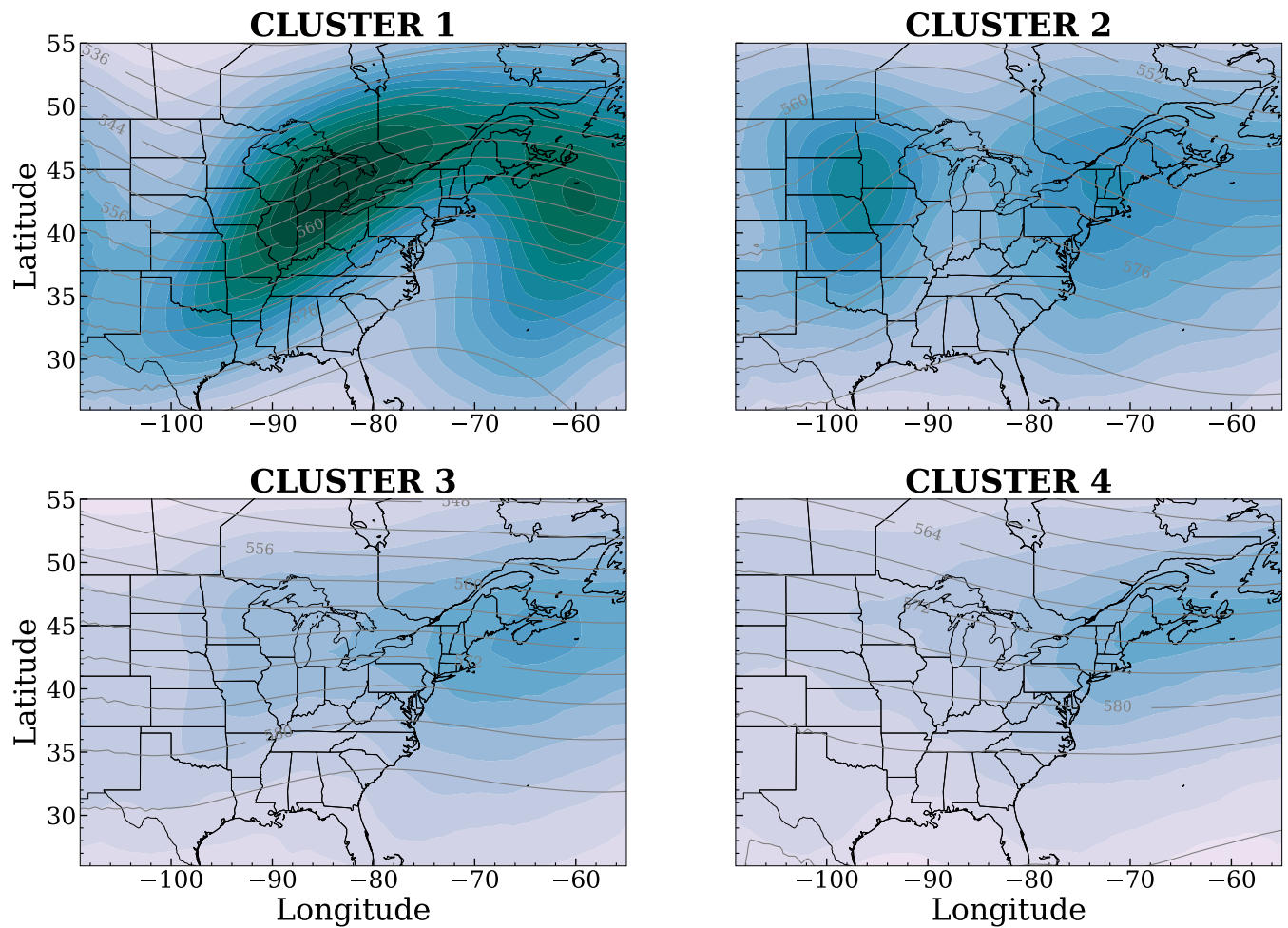


Fig. S2. The composite eddy kinetic energy (EKE) at 200 hPa (color fills; $\text{m}^2 \text{s}^{-2}$) and Z500 (contours; m), for each cluster, respectively.

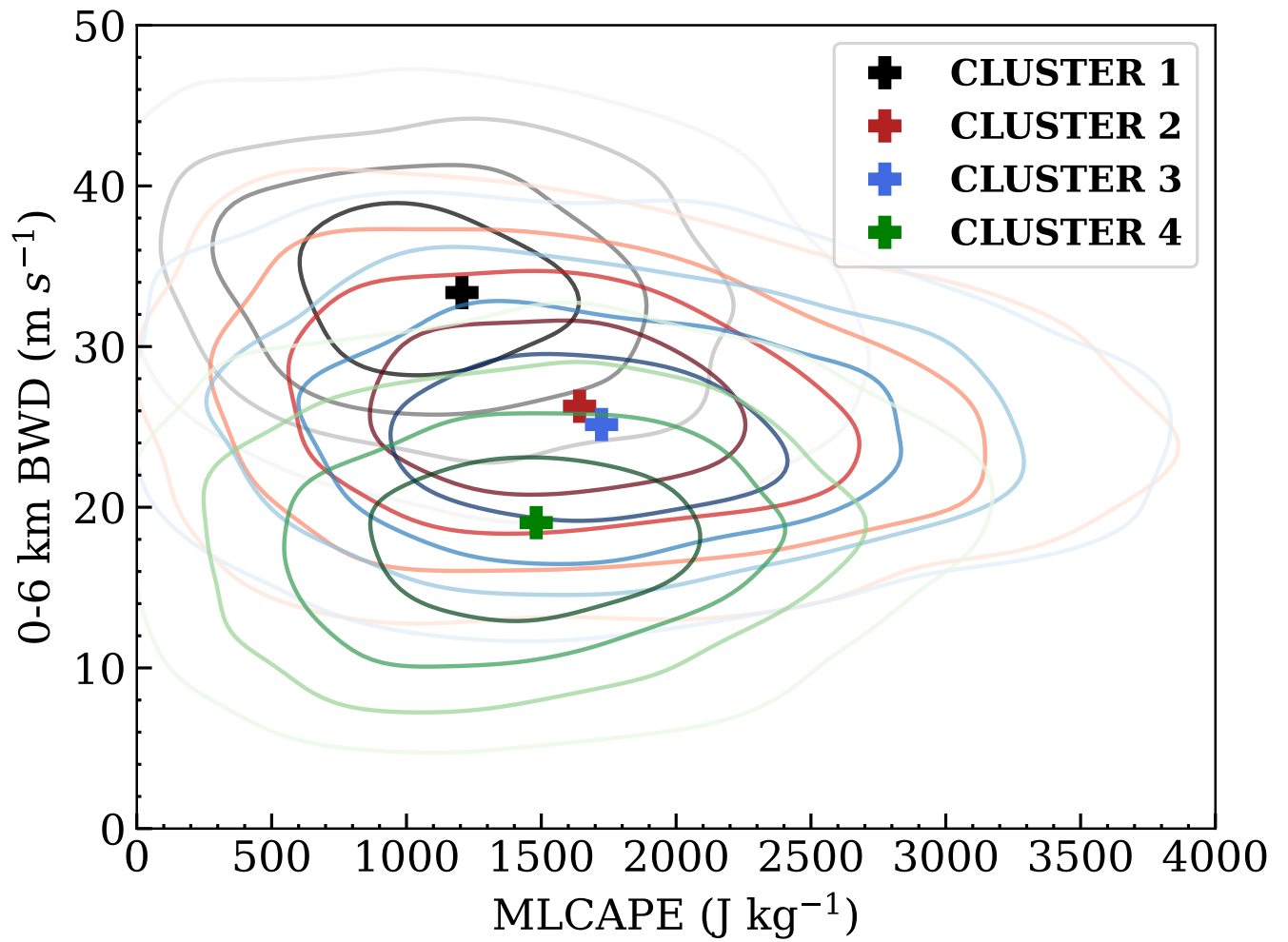


Fig. S3. The kernel density distribution of near-storm MLCAPE vs. BWD06 in each cluster, respectively. Each set of contours is centered on the region with the highest density of occurrences, with the innermost contour enclosing 15% of the data, and outward contours are in 15% intervals. The near-storm variables are defined as the maximum values in a $5^\circ \times 5^\circ$ area centered on tornadogenesis location.

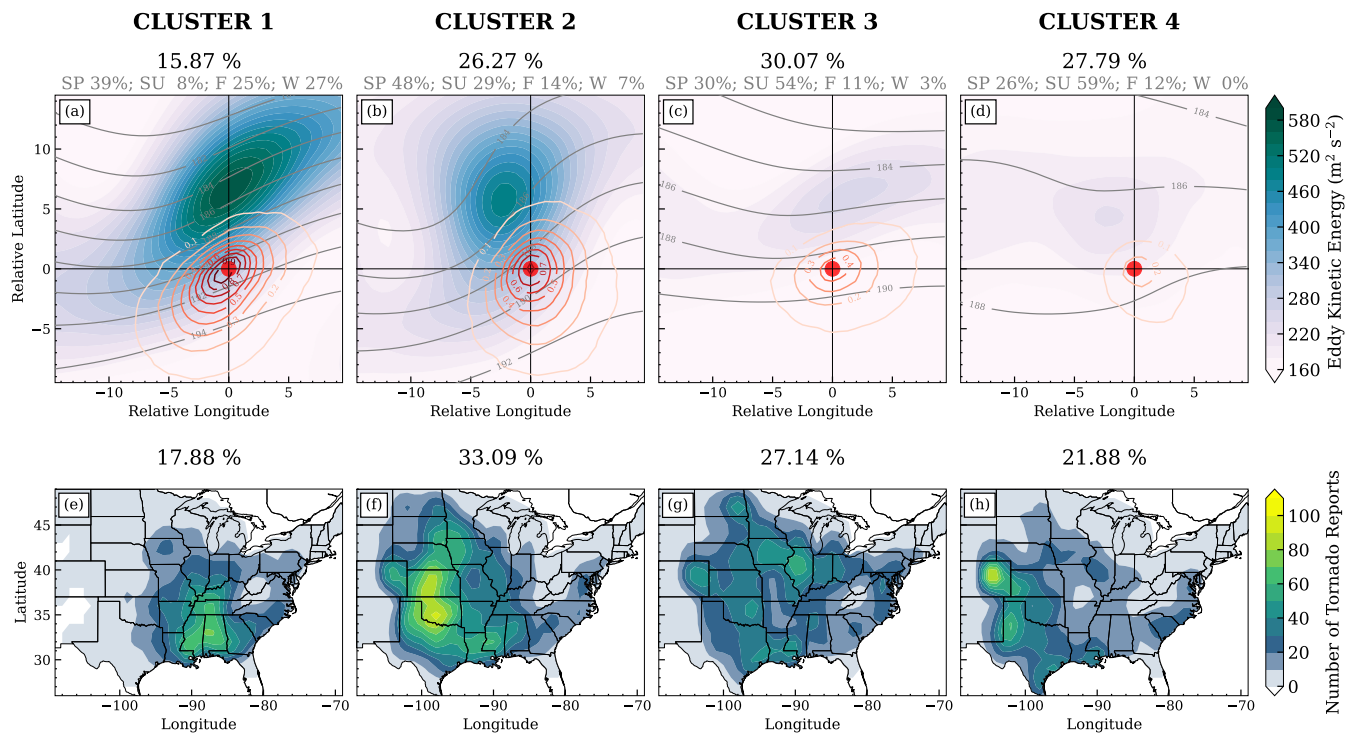


Fig. S4. As in Fig. 2 but using K-Mean clustering method.

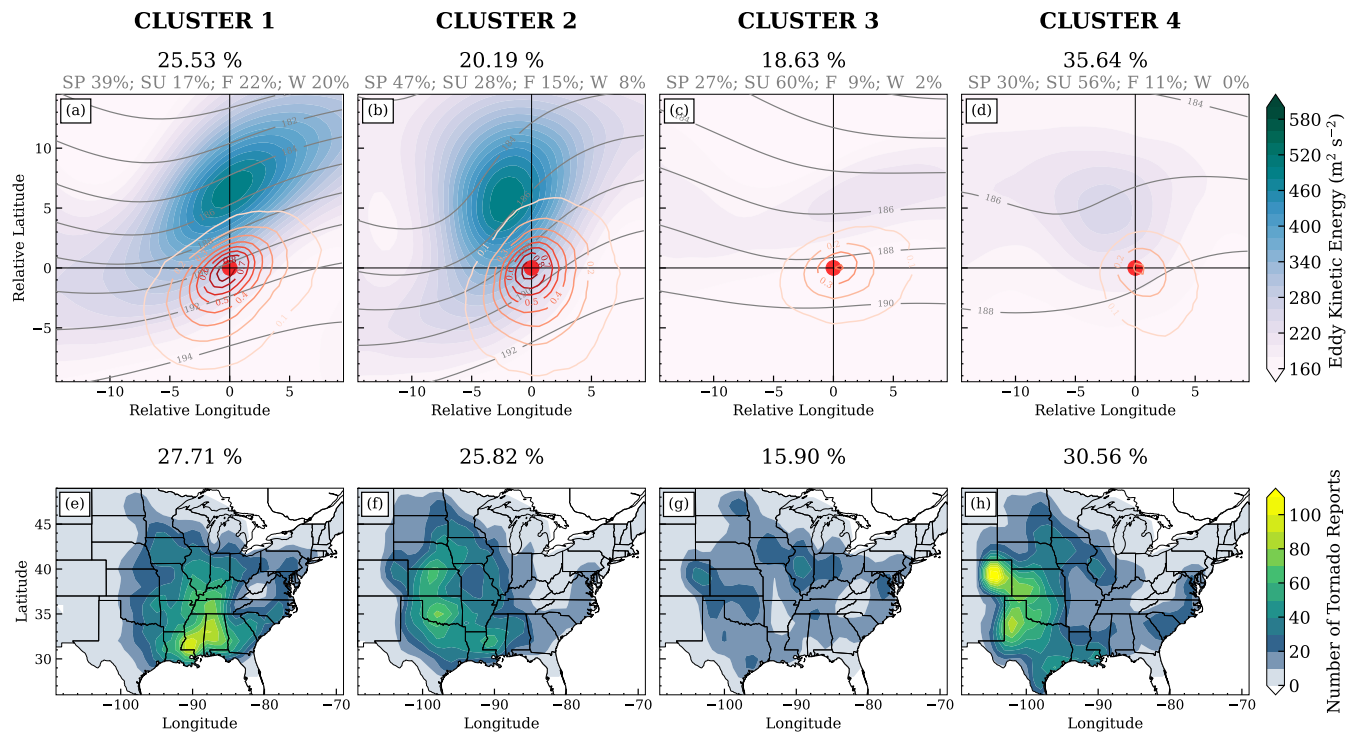


Fig. S5. As in Fig. 2 but using Self-Organization Map (SOM) clustering method. SOM is a neuron-network-based unsupervised machine learning algorithm that chooses samples at random at each iteration of training. Therefore, the results are also affected by sampling variability (e.g. different random seeds used in computation). Nevertheless, the overall resulting synoptic patterns are similar.

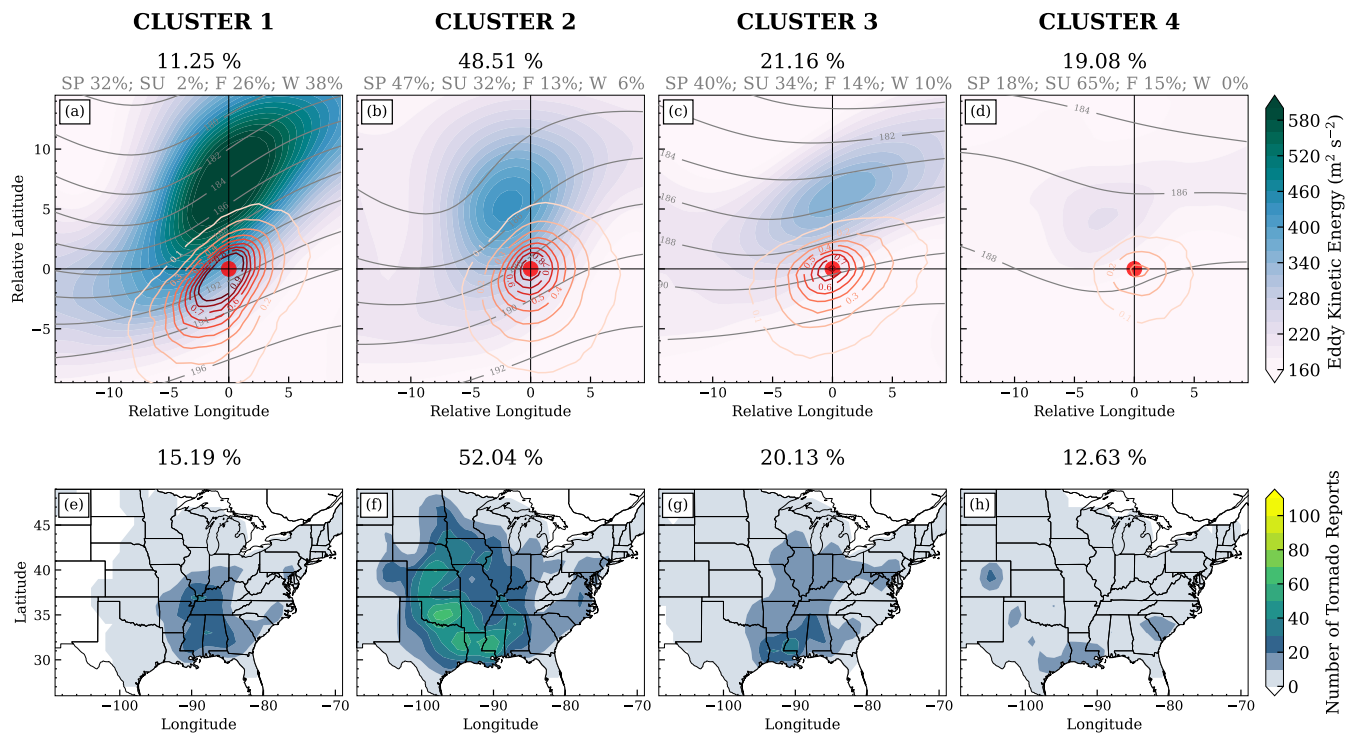


Fig. S6. As in Fig. 2 but using EF1+ tornado reports only. A total of 21153 EF1+ tornado reports are used associated with 8728 3-hourly weather maps.