Interactive comment on "TempestExtremes v1.0: A Framework for Scale-Insensitive Pointwise Feature Tracking on Unstructured Grids" by Paul A. Ullrich and Colin M. Zarzycki

Anonymous Referee #2

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This manuscript is a valuable contribution to storm tracking methodology, with several innovative approaches: tracking on unstructured grids, the use of great-circle distance calculations, and the implementation of a k-d tree algorithm to improve computational efficiency. The article is very well written and researched. I recommend publication with only very minor suggestions.

One of the issues that should be investigated is how well the authors' storm tracking software works on numerical model output with higher horizontal resolution, such as ECMWF 9 km forecasts, which are relied on at many operational weather forecasting centers. In particular, currently deployed storm tracking software often fails to find the center locations of weak, shallow, or highly-sheared tropical cyclones. This presents

a unique opportunity for TempestExtremes. If it proves capable of generating well-behaved, consistent storm tracks for these weak cyclones when other trackers fail, it would be an invaluable tool for the tropical forecasting community.

A question for the authors: Could TempestExtremes be extended to multiple dimensions and used as a coherent feature recognition/object tracking tool? Forecasters sometimes want to track an area of high winds, energy or moisture that rotates around a weather system as the entire system is moving in a general direction. If a contour (closed group of edge points) could be tracked, then this would greatly improve temporally interpolated positions of vortex features, for example.

The authors should be commended for making their tracker software available through GitHub. I agree with other reviewers that a nice step-by-step example with documentation would be a valuable addition to the package and would encourage its use.