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Discussions

Interactive comment on "Response of near-inertial energy to a supercritical tropical cyclone and jet stream in the South China Sea: modeling study" *by* Hiu Suet Kung and Jianping Gan

Anonymous Referee #1

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The near-inertial motion associated with typhoons' passage is an important topic in the South China Sea. Most of previous research in this region are based on in-situ data. This manuscript provides a modelling study on the spatial and temporal distribution of near-inertial energy. It found an interesting modulation of the near-inertial energy by a jet stream in the South China Sea, with strong (weak) activities at places of positive (negative) vorticity (A1 and A2), and with large values at places even ∼400 km away from the cyclone track (C1 and C2). The investigation of energy budget provides valuable insights into functions of different terms (pressure work, viscous effect, and nonlinear terms) at different stages (forcing and relaxation) in different layers (upper 30, 30-200, below 200). This work merits publishing, however, some questions as follow

should be considered.

Specific comments:

1. The 6-hourly wind from CCMP is used to calculate the wind stress. Since the cyclone induces a wind stress changing rapidly with time, an interpolation from such a long time interval is unreliable and probably underestimates the KEin (Jing, Wu and Ma, 2015, JAOT). A time interval less than 1 hour may be necessary. Furthermore, the wind speed of a typhoon is probably underestimated in the CCMP data. Most of previous research reconstruct the cyclone wind from analytic expressions, such as Holland (1980).

2. The model employed has been well validated and used in several previous research, however, the process of a typhoon response is of short time scale, baroclinic, and intermittent. A validation with ADCP current data at some places is critical.

3. The much weaker KEin at A2 is considered to be due to the positive vorticity induced by the jet. Information on the horizontal and vertical scale of the background vorticity may be necessary. And usually the wind is the first order factor of near-inertial intensity. A comparison of wind time series between A1 and A2 makes sense.

4. The depth of 30 m is used as a boundary between upper and mid-depth layers. There is no clarification why 30 m is chosen, not 50 m or other values.

Technical comments:

1. Figure 1. The value of isobaths should be noted since you mention it in the text (Line 240).

2. Figure 5. The way to display different magnitudes is not good. Think about a better way.

3. Line 221 When the mid-layer and upper layer are firstly mentioned, the exact depth range should be noted. The word 'upper' seems to represent a range much larger than

30 m. Maybe ‘surface’ or ‘top’ is a bit more appreciate.

4. Lines 273 and 315: Equations are not clearly seen.

5. Line 393: ‘AJEin’ may be corrected to ‘AKEin’.

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