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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

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In this study, near-inertial oscillations (NIOs) generated by a tropical cyclone (TC) and modulated by a background jet stream are simulated. The proposed work is meaningful, and the results are encouraging. However, a few points need to be clarified:

Response: We appreciate the detailed reading and helpful comments from the reviewer, which are now integrated into the revised manuscript.

Comments:

1. Line 61: the transport of KEni is modulated by the velocity and vorticity of a jet

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Discussion paper

stream. This jet stream plays an important role in this study and more descriptions and explanations on the stream is necessary. One reference (Gan and Qu, 2008) has been cited by the author on Line 61, but no further description on the jet. Under what condition will the jet stream exist? Is the intensity/velocity of the stream changes a lot? The jet stream is lumped with the NIO generated by the TC, and this interaction is nonlinear. The intensity/velocity of the stream will significantly affect the interaction. Is the stream located in its typical location with its typical velocity during the typhoon season? If a reader wants to know how much KEni will be generated and how the NIO propagates, which is the main topic of the present study, he would want to know whether the scenario used in this study is applicable.

Response: The jet stream was resulting from the (summer) monsoon-driven strong coastal current over narrow shelf topography off Vietnam and it persisted as a distinct circulation feature in the SCS during the summer. The northward flowing coastal current separated from the coast and overshoots northeastward into the SCS basin as it encountered the coastal promontory in the central Vietnam. We now add this information in section 3.1 to provide background for the jet stream shown in Fig. 2

2. Line 98: how the TC forcing is exerted on the sea surface is not clearly explained. CCMP provides the wind speed at 10 m high, can it represent the drag direction on the sea surface?

Response: In ROMS, surface wind stress is calculated from wind speed at 10 m high by using bulk algorithm based on Monin–Obukhov similarity theory, described in Fairall et al. (2003). We have mentioned this in the 2nd paragraph of section 2.2 Ocean Model.

3. Line 99: Fairall et al. (2003) is not listed in the References.

Response: Reference has been added in the list according to the comment.

4. Line 114 : The author emphasizes the model is well-validated, but these validations

are in a general sense. Is there any evidence that NIOs can be properly simulated by this model? Some validations should be presented in the paper. For example, the near inertia component of the model can be compared with that of the ADCP data measured by the station shown in Fig. 1.

Response: The rigorous model validation of circulation and physics have been conducted by Gan et al. (2016a, b), which provides a level confidence for the ocean circulation (e.g. jet stream) and dynamics hub for this study.

The full-scale model-observation comparison is built on both availability of field measurement and advanced theoretical study. We compared the TC induced surface cooling from SST data (Fig. 3), and the rotary energy spectra from ADCP data (Fig. 4) in section 3.1. TC-induced surface cooling is reasonable in both intensity and the spatial coverage. Rotary spectra shows that the model can capture the inertial signal and simulate the low frequency current with reasonable intensity. In addition, we found that the correlation coefficients of near-inertial band-passed velocity between ADCP and model simulation at Wenchang station were 0.62 and 0.57 for east-west (u) and north-south (v) component, respectively, which indicated that the model captured reasonably well the NIOs under the influence of the background circulation of the SCS.

There existed inevitably the model-observation discrepancies, such as differences of velocity magnitude ($\sim$0.06 m s-1) at near-inertial band and rotary spectra at the higher frequency (Fig. 4). These discrepancies could have been caused by many reasons, such as the lack of mesoscale and sub-mesoscale processes in the atmospheric forcing field, the linear interpolation process of the atmospheric forcing (Jing et al., 2015), and not resolving the oceanic subscale processes by the current model resolution. However, these discrepancies will not undermine the discussion about the process and mechanism of near-inertial energy response to the TC and jet stream in this study.

Some of the above information are now integrated into the revised ms..

5. Line 273: eq. (3) is out of nowhere. Please provide references for eq. (3).

Response: citation of Eq. (3) has been added in the reference list.

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