

***Interactive comment on “North Pacific subtropical sea surface temperature frontogenesis and its connection with the atmosphere above” by Leying Zhang et al.***

**Anonymous Referee #2**

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1. Line 51: “respective”—> “perspective” 2. Line 187-188: Authors should give some explanations about how “the residual term (R) is mainly positive and facilitates an increasing SST” and how “the residual term acts to suppress SST decreasing tendency (Line 197)”, since term R represents sub-scale process and dissipation. 3. Line 203-204: Authors can not consider that “the GM tendency is mainly caused by the net heat flux term (Fig. 5e)”. For example, at 26.5°N, GM tendency increases temporally from October to the middle of December, however, the net heat flux term experiences a decreasing period from October to the end of December. In fact, vadv term and R term also contribute to GM tendency especially in January and February. 4. Authors should not cap the GM tendency at 100% in October and November in Fig. 6b. 5. Fig. 7

C1

could be omitted. 6. Caption of Figure 8: It is the contribution of individual radiation component to the GM tendency. 7. Line 269-270: How to estimate a 75% contribution of Ekman convergence to the meridional temperature advection in January and February. 8. Line 334-338: “The thermodynamic calculation uses a specified mixed-layer depth, and the temperature of the slab is calculated based on the mixed-layer depth and surface fluxes. It means that the ocean dynamic processes can be ignored and the SST variation responds to the atmosphere.” Why? Since “The SST and meridional oceanic current velocity from the last 15 model years are used for analyses. (Line 342-343)” and “suggesting ocean dynamics may play an important role in the northward migration process (Line 354-355)”. 9. Section 4.3 about analysis with model outputs is unnecessary since no additional sensitivity experiment was carried out, the model output itself only provides misrepresented “observations”. 10. Check the caption of Figure 13.

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