Review on the WCD manuscript egusphere-2024-735, "Influence of mid-latitude Sea Surface Temperature Fronts on the Atmospheric Water Cycle and Storm Track Activity"

General comment:

In this paper, model output of "aqua-planet" experiments was examined to illustrate the effects of a midlatitude SST front on atmospheric water cycle and storm track activity. The position of a midlatitude SST front was found to have noticeable influences on surface evaporation, atmospheric moisture fluxes and precipitation. Storm track activity was changed as well, by the change of the SST frontal latitude, through the changes in eddy energy conversions and generation of eddy available potential energy by diabatic heating.

I think that the analyses of atmospheric water cycle and energy cycle of transient eddies in this paper were done systematically, and that the presented results and conclusion are reasonable in general. However, some terms were used in the analysis without sufficient descriptions, which sometimes hinders reader's understanding of the details of the results. I therefore recommend minor revision of this manuscript.

Specific comments:

1. Section 4, L119-L133

(a) CZ is missing in the equations. (Presumably, Eq. 14)

(b) The meaning of CE, CZ, CA, CK, GE, and GZ should be described. (Conversion from what/to what, and generation of what kind of energy?)

2. In section 7, the roles of $\dot{q}_m$, $\dot{q}_c$, $\dot{q}_b$ in the model should be described to clarify the physical processes those terms represent. Does $\dot{q}_m$ only represent the removal of moisture by large-scale condensation? Does $\dot{q}_c$ correspond to both of the removal of moisture by convective precipitation and the vertical redistribution of moisture by convection? Does $\dot{q}_b$ correspond only to the vertical redistribution of moisture evaporated from the ocean surface? Without the understanding of the physical processes that those tendency terms represent, it is difficult to interpret Fig. 4.

3. (L243-L244) "the double peak structure in GE is hinted in both CA and KIN_E,"

Why is the double peak structure reflected in CA? In Figure 5, GE adds energy to the eddy APE, but CA is at the *upstream* side of the energy flow to the eddy APE (CA supplies energy to the eddy APE) in the energy cycle.