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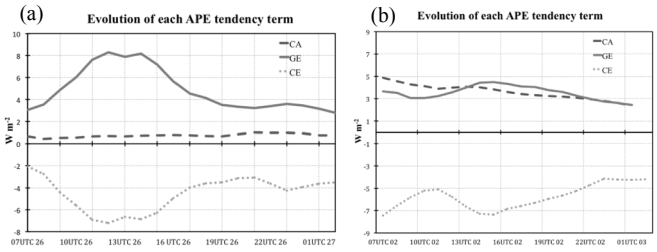

Fig. 1. Time series of each available potential energy (APE) tendency term (W m^{-2}) for the (a) W-BFD and (b) E-BFD. Solid, dashed, and dotted lines show diabatic heating, baroclinicity and conversion from eddy kinetic energy to APE, trespectively.

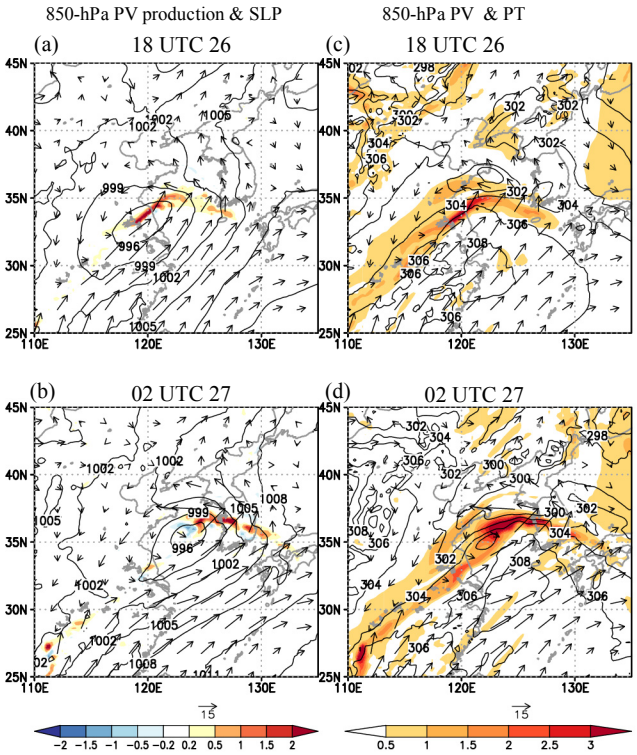

Fig. 2. (a, b) 850-hPa PV production rate due to latent heating (color shading; PVU $(hour)^{-1}$) and (c, d) 850-hPa PV for the W-CNTL at (a) 18 UTC 26, and (b) 02 UTC 27 2003. Contour lines in (a) and (b) show SLP (hPa), and those in (c) and (d) show potential temperature at 850 hPa. Vectors indicate wind fields at 850 hPa.

- This work investigates development processes of Baiu frontal depressions (BFDs) using WRF model. Two typical cases were selected from BFDs that appeared in June and July, 2000-2007: a BFD that developed in the western part of the Baiu frontal zone (W-BFD) and a BFD that had formed in the eastern part of the Baiu frontal zone (E-BFD).
- The effect of latent heating is dominant during the W-BFD development, while baroclinicity as well as latent heating is important to the E-BFD development.
- The W-BFD has a development mechanism driven by latent heating. In the early developmental stage, PV near the W-BFD center is enhanced. This feature is consistent with the nonlinear conditional instability of the second kind mechanism. In the later developmental stage, PV is produced in front of the W-BFD center, in which low-level baroclinicity is large. This process is consistent with a diabatic Rossby vortex.