

Interactive comment on “A High-order Staggered Finite-Element Vertical Discretization for Non-Hydrostatic Atmospheric Models” by J. E. Guerra and P. A. Ullrich

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Some preliminary results on the sphere are attached, including the Jablonowski Williamson baroclinic instability and the DCMIP2012 3D mountain-induced Rossby wave train. No reference state is used and the model is able to accurately retain hydrostatic balance.

Figure 1: Snapshots from the baroclinic wave test case at day 7 and 9 simulated on a c90 grid with 30 vertical levels and 30 kilometer model cap ($n_{vp} = 3$). The time step is chosen to be $\Delta t = 250$ s. Surface pressure is plotted in the upper row, 850 hPa temperature in the middle row and 850 hPa relative vorticity in the bottom row.

C1

Figure 2: Snapshots from the mountain-induced Rossby-wave train wave at day 5 (top row), day 15 (middle row) and day 25 (bottom row) simulated on a $n_e = 30$ grid with 30 vertical levels and 30 kilometer model cap ($n_{vp} = 3$). Geopotential height and temperature at 700 hPa are shown in the left and right column, respectively.

Figure 3: Snapshots from the mountain-induced Rossby-wave train wave at day 5 (top row), day 15 (middle row) and day 25 (bottom row) simulated on a c90 grid with 30 vertical levels and 30 kilometer model cap ($n_{vp} = 3$). Zonal and meridional wind at 700 hPa are shown in the left and right column, respectively.

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C2

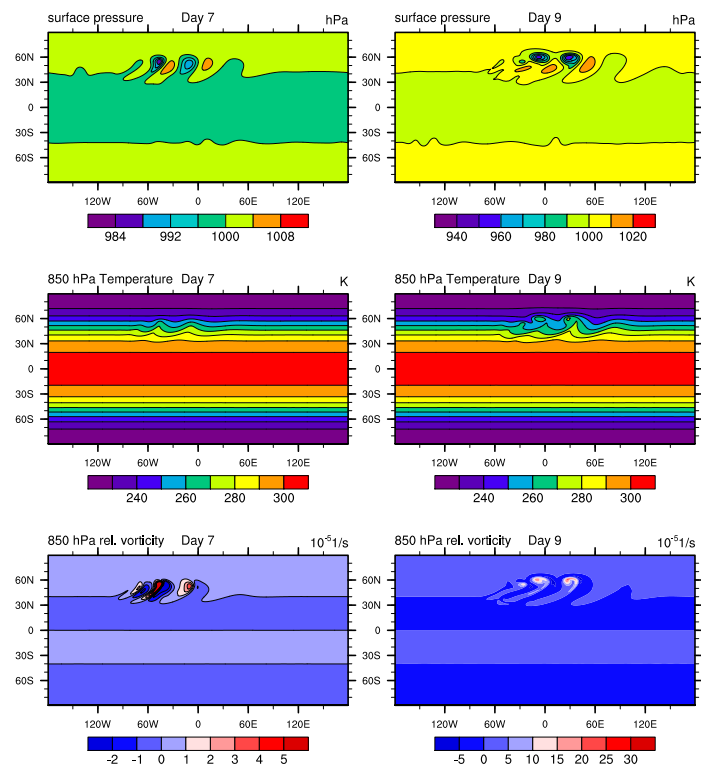


Fig. 1.

C3

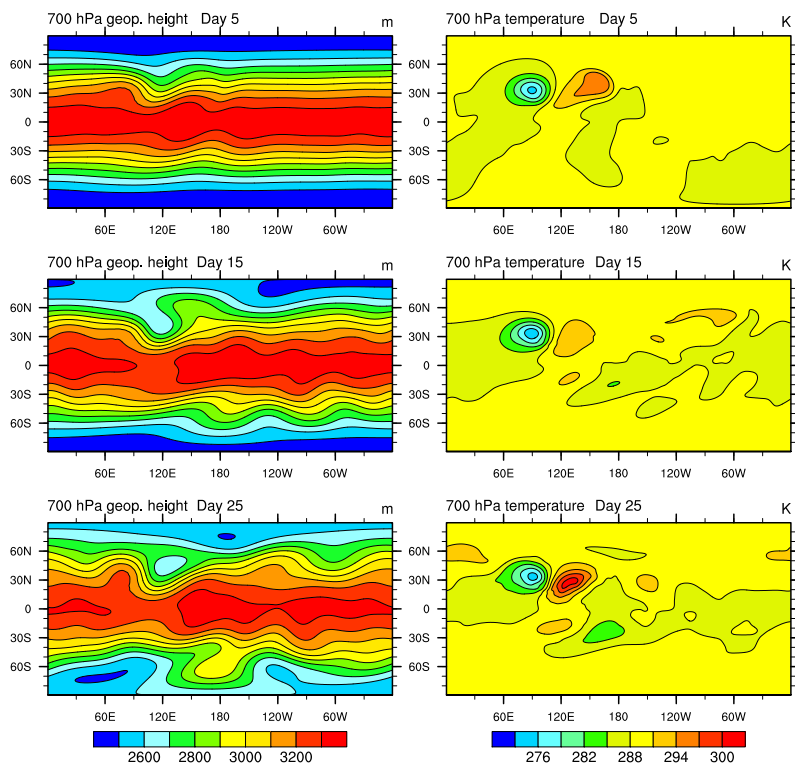


Fig. 2.

C4

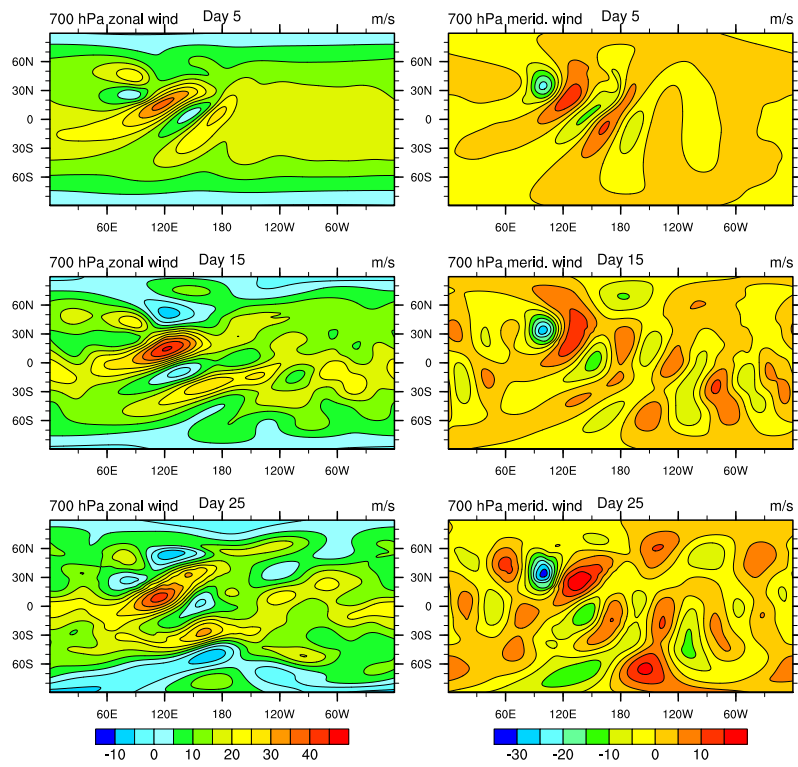


Fig. 3.