

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

**P. A. Ullrich**

paulullrich@ucdavis.edu

Received and published: 10 March 2016

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.

[Printer-friendly version](#)

[Discussion paper](#)



---

Interactive  
comment

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.

---

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2015-275, 2016.

[Printer-friendly version](#)

[Discussion paper](#)



Interactive  
comment

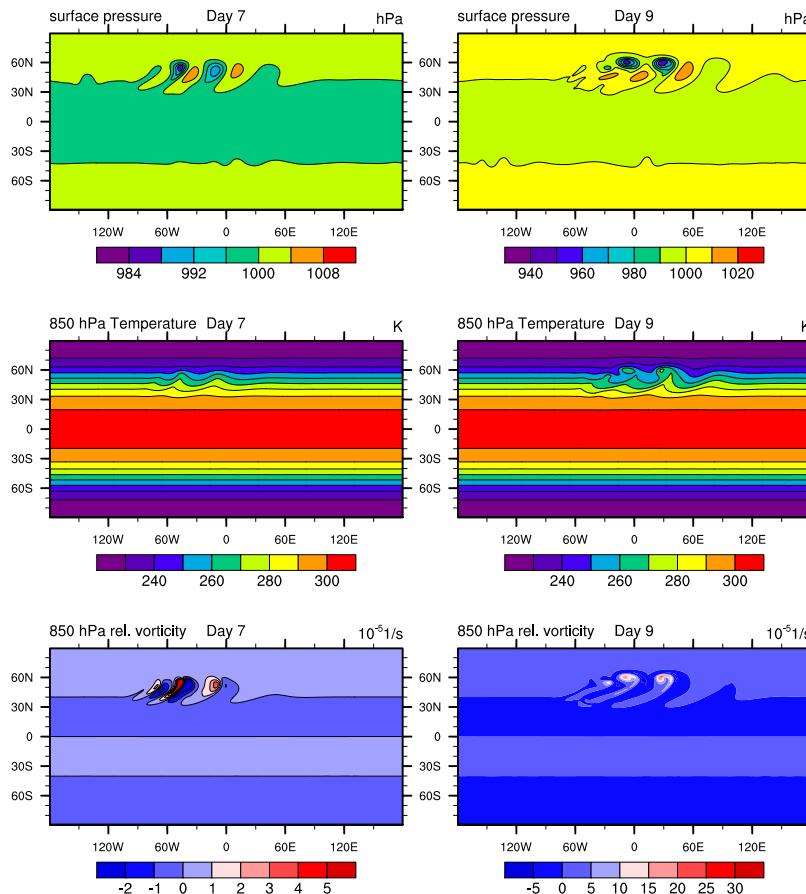


Fig. 1.

Interactive  
comment

[Printer-friendly version](#)

[Discussion paper](#)

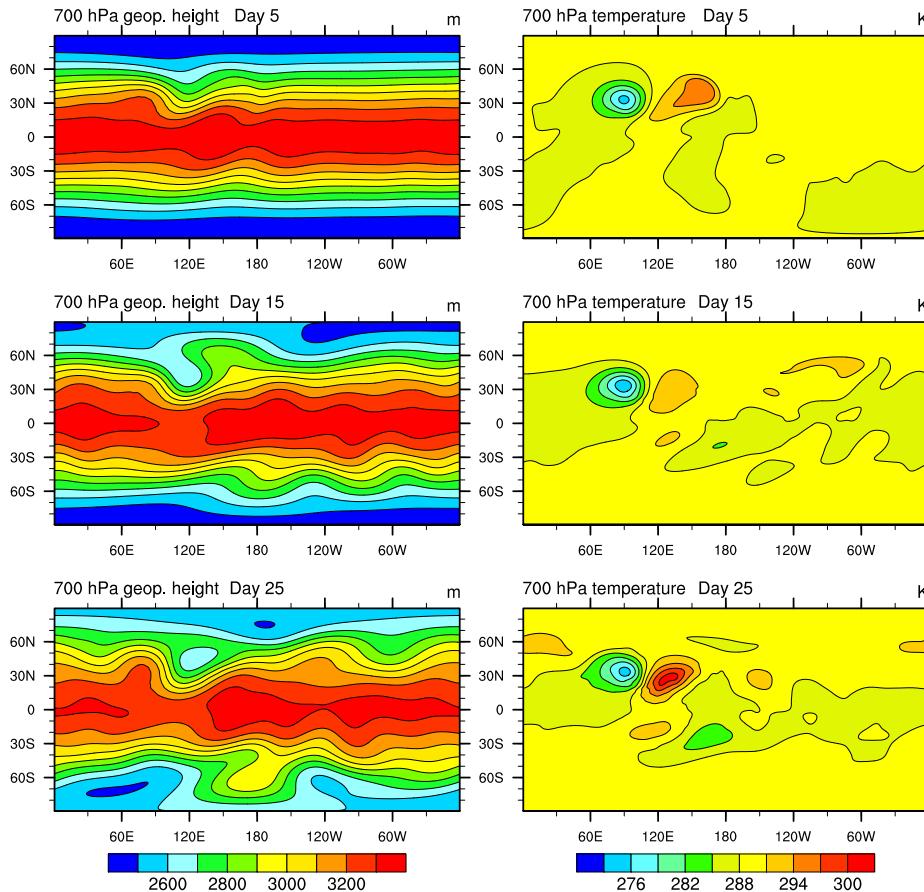


Fig. 2.

Interactive  
comment

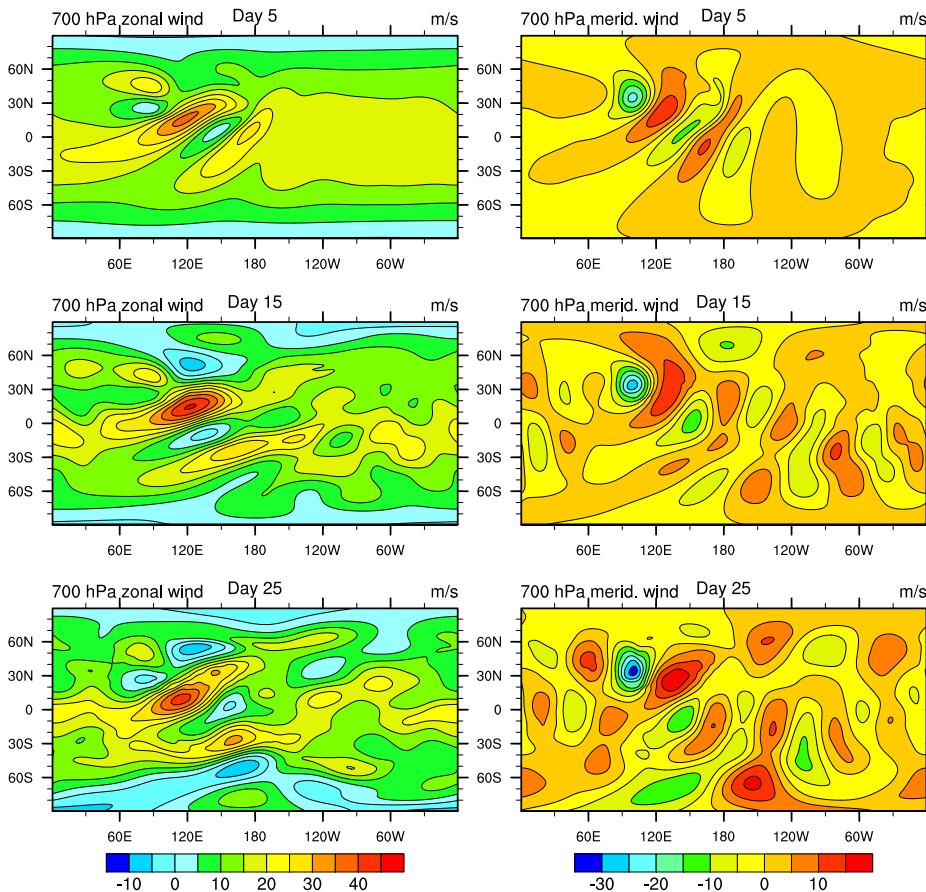


Fig. 3.