

The Release of Inertial Instability near an Idealized Zonal Jet

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Abstract

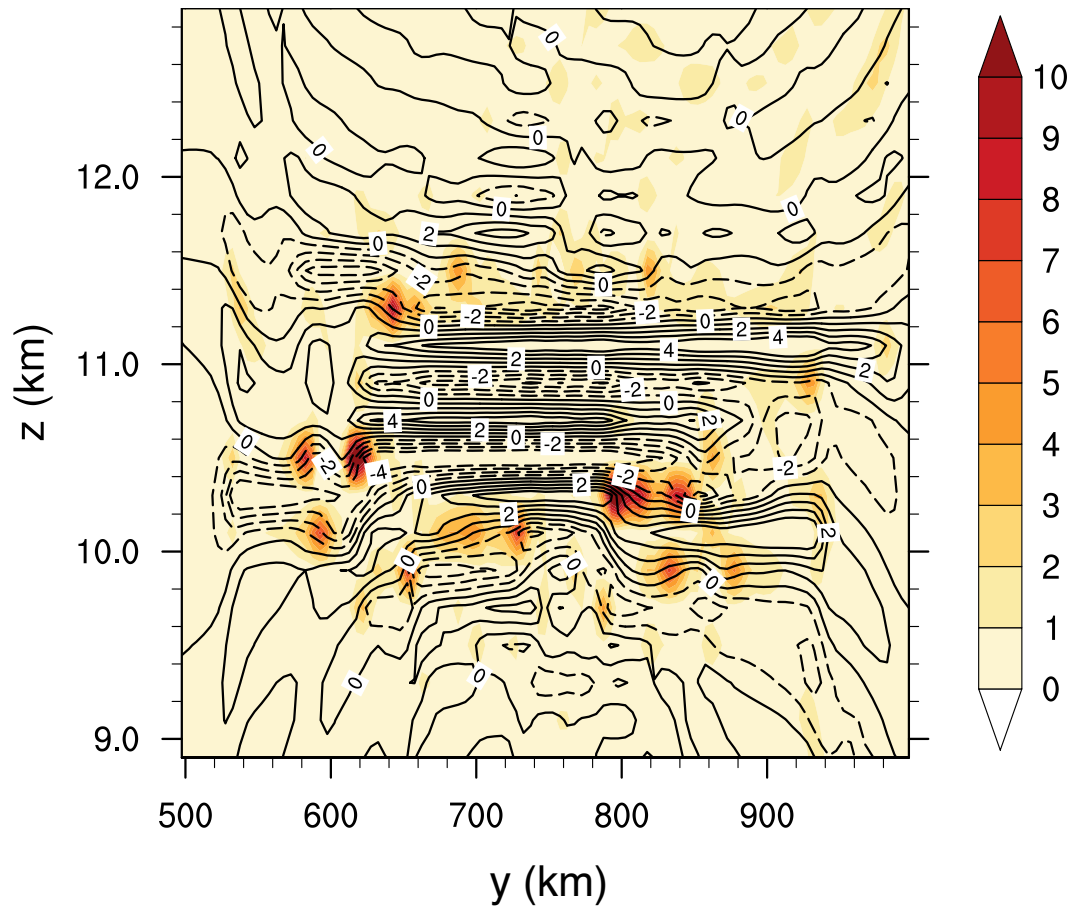
Inertial instability is a hydrodynamic instability that occurs in strong anticyclonic flow and is typically diagnosed by negative absolute vorticity in the Northern Hemisphere. As such, inertial instability is often observed on the anticyclonic-shear side of jet streams, yet the release of the instability in this environment is still poorly understood. We simulate the release of inertial instability near an idealized midlatitude zonal jet compared to a control simulation with no instability. We find that the release of the instability results in flat meridional wind perturbations of up to 7 m s⁻¹ over 200 km that persist for several days, in addition to radiating inertia-gravity waves several hundreds of kilometers away from the unstable region. Furthermore, these perturbations instigate light-moderate occurrences of clear-air turbulence around the unstable region that persist for up to 12 hours.

Figure 4.

96 h

(a)

Turbulence Index



(b)

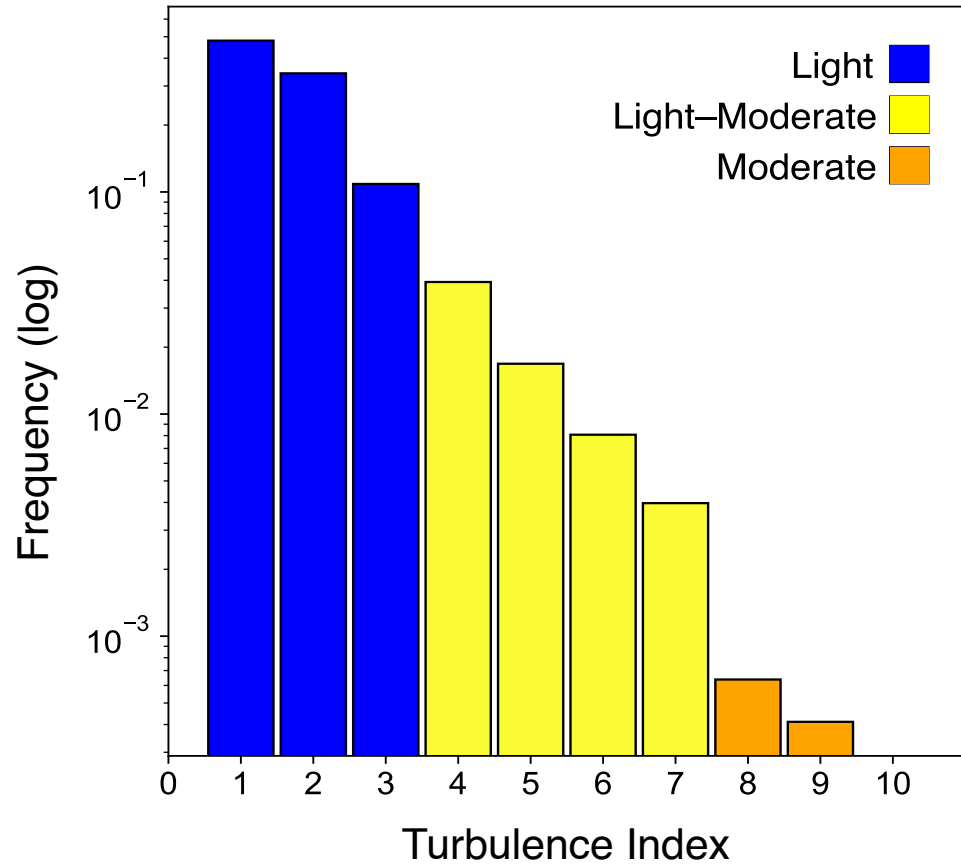


Figure 3.

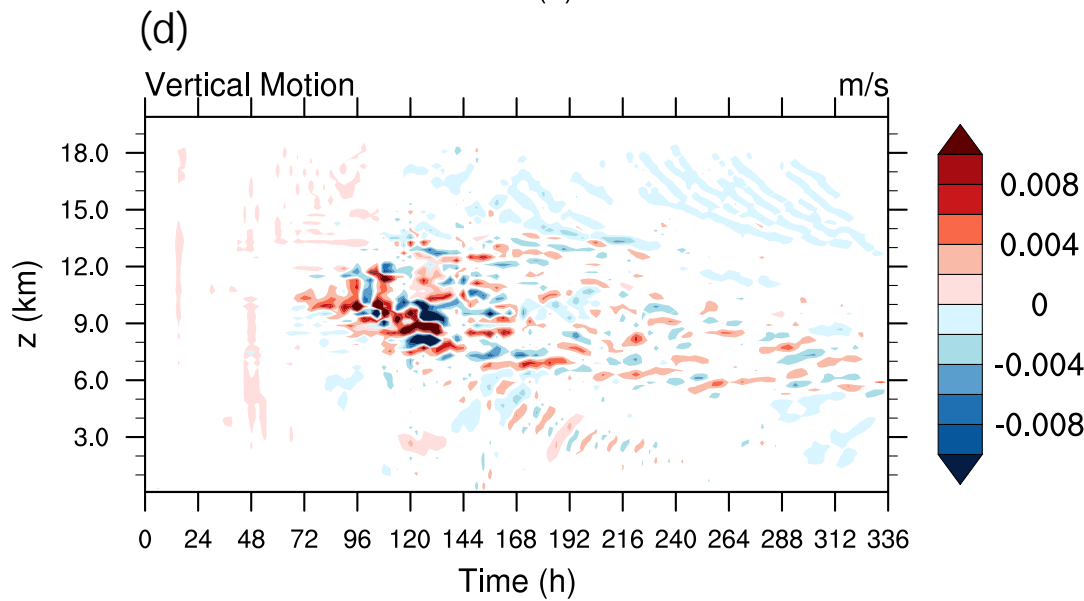
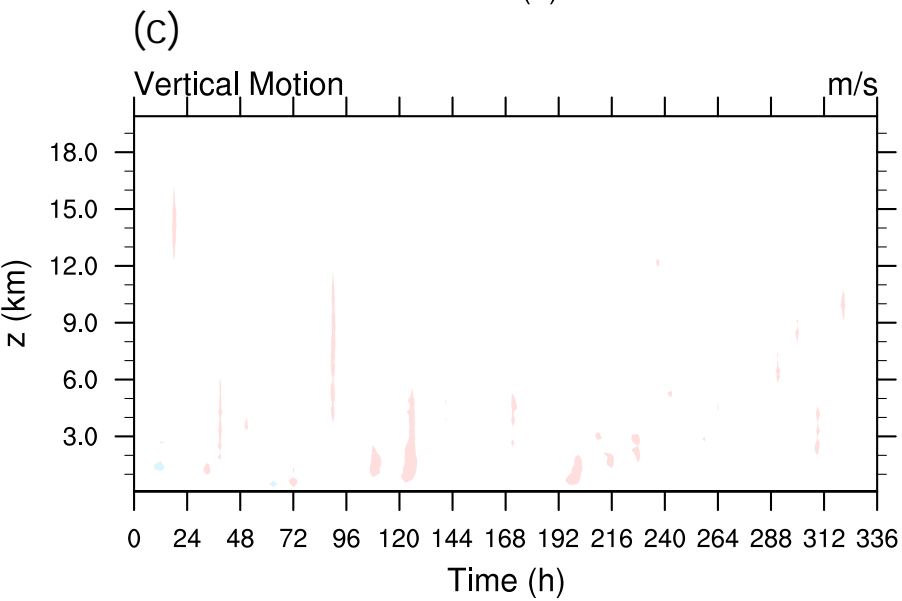
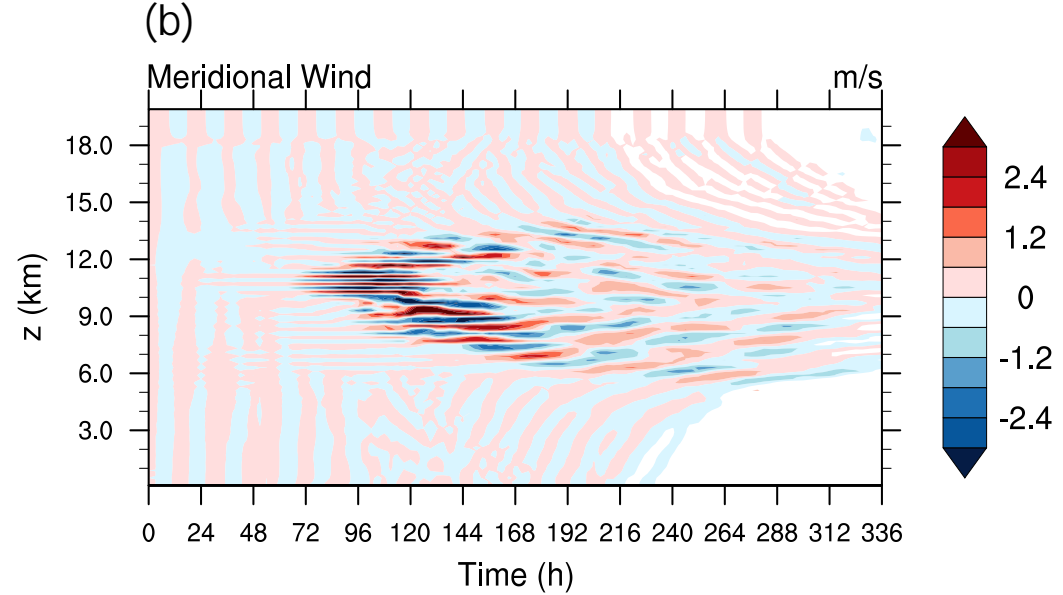
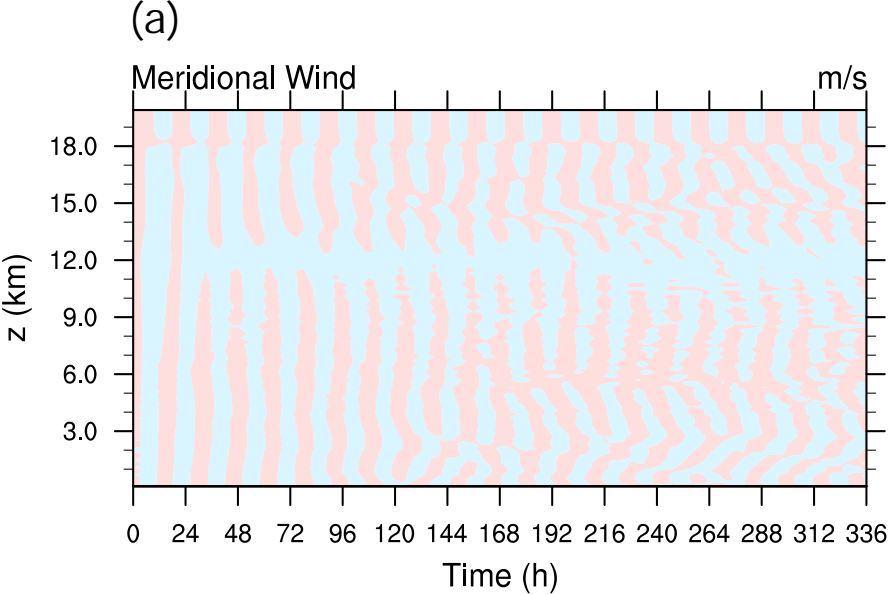


Figure 1.

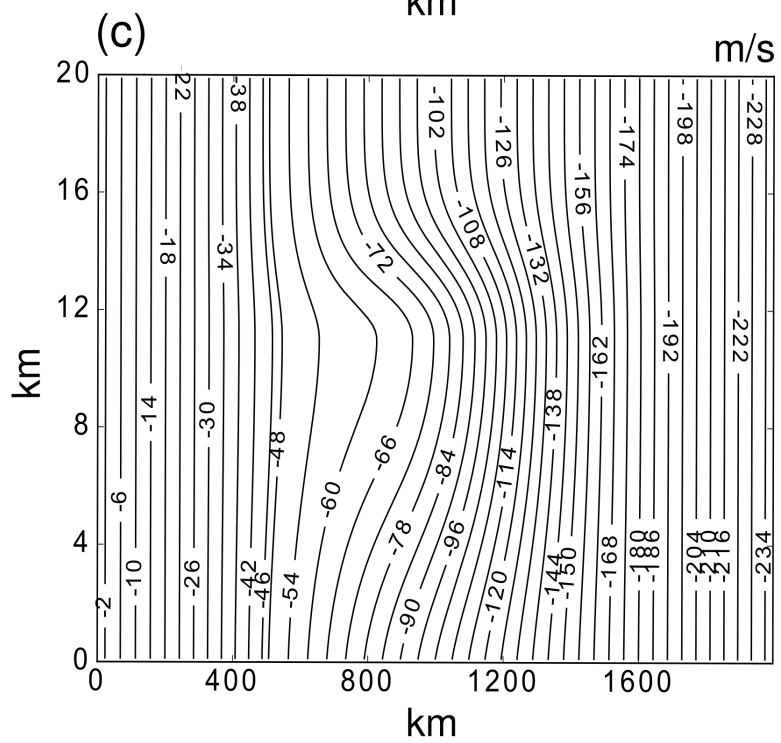
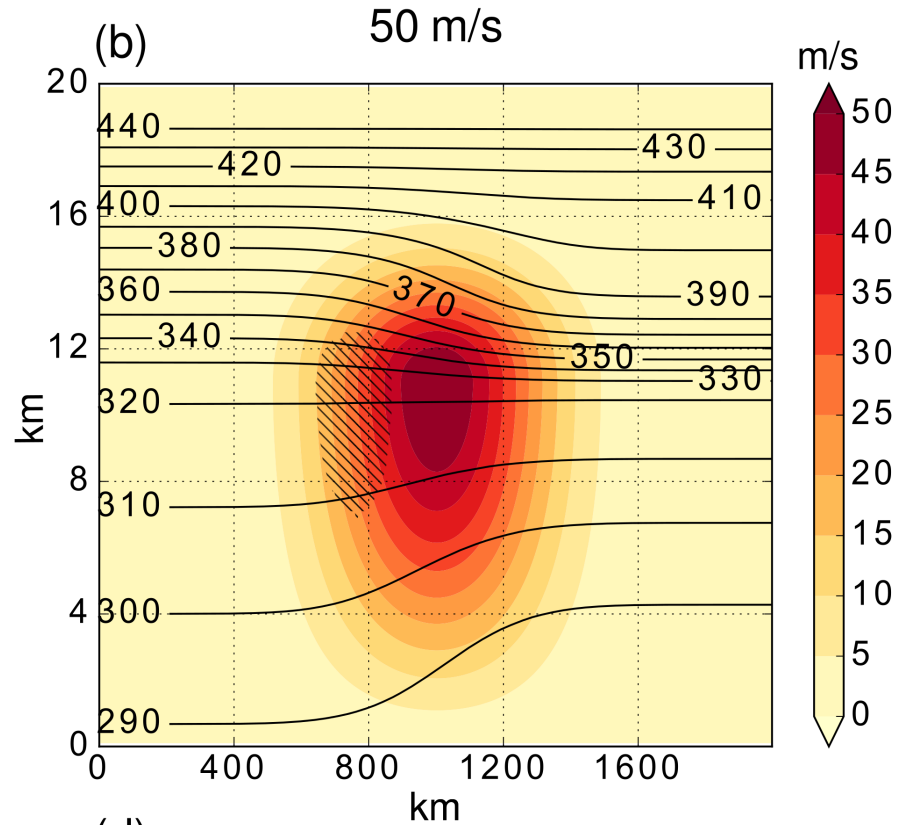
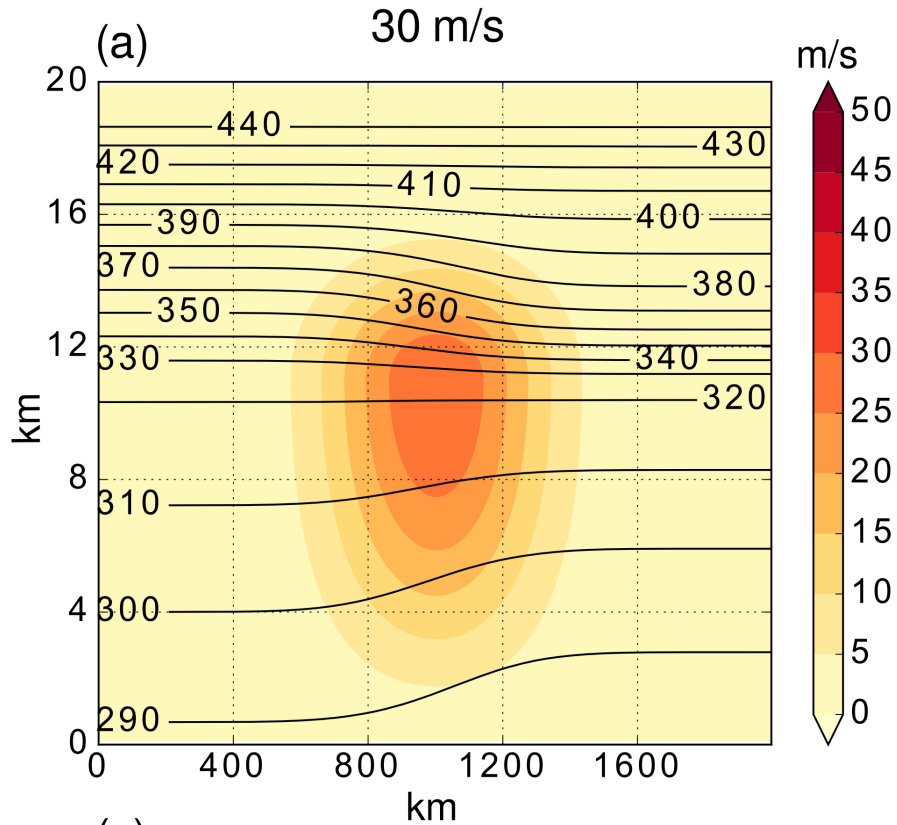


Figure 2.

