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Plain Language Summary: Japan Meteorological Agency (JMA) developed the non-hydrostatic numerical weather prediction (NWP) model named ASUCA. This paper outlines specifications of ASUCA with focus on the dynamical core and its configuration/accuracy as an operational model. ASUCA exhibited better performance than the previous operational model in idealized and NWP tests.

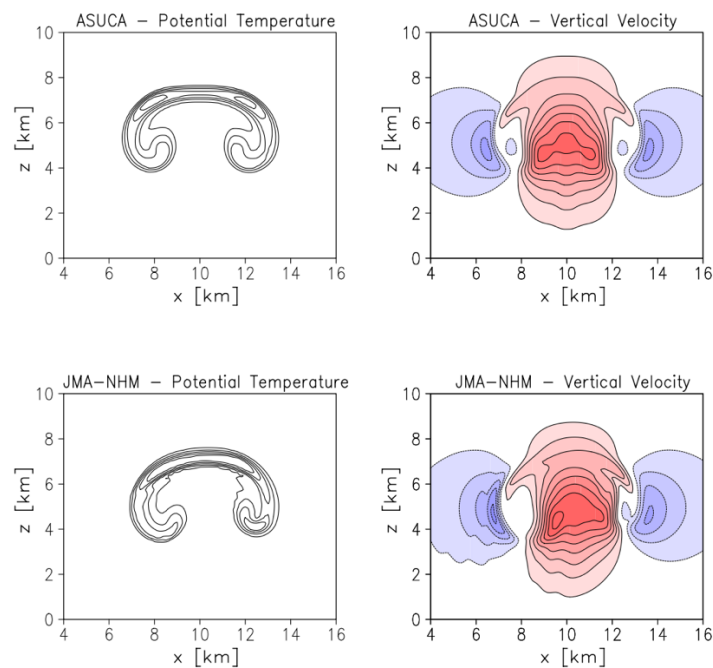


Figure 1. Results for rising thermal in a uniform horizontal flow testing simulated using (top) ASUCA and (bottom) the JMA-NHM. The panels on the left and right show potential temperature (contour interval 0.25 K) and vertical velocity (contour interval 1.5 ms⁻¹), respectively.

- ASUCA employs the third-order advection scheme with the flux-limiter function to preserve monotonicity and time-splitting techniques for the acoustic terms to achieve high computational stability.
- The dynamical core of ASUCA satisfies total mass conservation due to employing the flux-form total density equation with finite volume method.
- ASUCA is optimized for massive parallel scalar computers and designed so that computation, communication and disk-I/O are overlapped as much as possible.