

Specification of CReSS model configuration (3.5-km, 80 CPUs) used for
SoWMEX/TIMREX 2008, running three times daily at Department of Atmospheric Sciences
on the High-Performance Computer (HPC), Chinese Culture University, Taipei, Taiwan
(prepared by Chung-Chieh Wang)

Model domain	
Domain size (km)	1155 × 980 × 20 (centered at 23.5°N, 119.0°E)
Grid size (km) and number	3.5 × 3.5, 100-663 m stretched (330 × 280 × 40)
Projection	Lambert Conformal, 120°E, secant at 10°N, 40°N
Initial and boundary conditions	NCEP/GFS analysis/forecast (1° × 1°, 26 levels, 3 h)
Topography and SST data	Real at (1/120)°, and observed at 1° resolution
Initial time and forecast length	0000, 1200, 1800 UTC (08, 20, 02 LST), each for 48 h
Data output frequency	Every 15 min (193 output times, t_0 included)
Model physics	
Advection and diffusion	Forth order in H/V, forth order in H/V
Cloud microphysics	Bulk cold rain scheme (6 species: $q_v, q_c, q_r, q_i, q_s, q_g$)
Cumulus parameterization	None
PBL parameterization	1.5-order closure with TKE prediction
Surface processes	Energy and momentum fluxes, and shortwave and longwave radiation (no cloud radiation)
Soil (substrate) model	41 levels, every 5 cm to 2 m deep
Numerical methods	
Time steps (large/small)	$\Delta t = 6$ s, $\Delta \tau = 3$ s (time splitting)
Time integration	Filtered leapfrog for Δt (HE-VE), and leapfrog and Crank-Nicolson for $\Delta \tau$ (HE-VI)
Number of PEs	80 CPUs (20 nodes) on HPC at CCU

Specification of CReSS model output (3.5-km, 80 CPUs) plots during SoWMEX/TIMREX
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Under normal conditions, three CReSS model runs, initialized at 0000, 1200, and 1800 UTC (08, 20, and 02 LST), are executed daily, all for a forecast length of 48 h, and results typically become available (on the web) within 11 h after the time of initialization. Model outputs are produced at 15-min intervals, and for each time the following plots are made:

(A) Plots to depict precipitation systems and convection:

1. MSLP, u , v , and 15-min rainfall at surface: 15-min accumulated rainfall (mm, shading as indicated by color bar), MSLP (hPa, purple lines every 1 hPa, ocean only), u and v at 10 m (knots, wind barbs), terrain contour (gray lines at 1 and 2 km).
2. Streamline, convergence/divergence, and potential temperature (θ) at 591 m (near 600 m): Convergence (10^{-4} s^{-1} , shading as indicated by color bar) and divergence (10^{-4} s^{-1} , thin magenta lines at same levels as convergence), streamline (thin gray arrow lines), θ ($^{\circ}\text{C}$, cyan lines every 1°C), terrain height at 591 m (gray lines).
3. Pressure (p), u , v , and mixing ratio of precipitating hydrometeors (q_p) at 1976 m (near 2 km): q_p (total mixing ratio of rain, snow, and graupel, i.e., $q_r + q_s + q_g$, g kg^{-1} , shading as indicated by color bar), p (hPa, purple lines every 0.5 hPa), u and v (knots, wind barbs), terrain height at 1976 m (gray lines).
4. Relative vorticity (ζ), p , u , v , and w at 3201 m (near 3.2 km): ζ (10^{-4} s^{-1} , shading as indicated by color bar), p (hPa, gray lines every 1 hPa), u and v (m s^{-1} , wind barbs), w (m s^{-1} , thin contours at levels of 0.1, 1, 2, 5, 10, 15, 20 m s^{-1} , upward only).
5. p , u , v , and divergence at 11718 m (near 12 km) and w at 4912 m (near 5 km): Divergence (10^{-4} s^{-1} , shading as indicated by color bar, positive only), p (hPa, purple lines every 1 hPa), u and v (m s^{-1} , wind barbs), w at 4912 m (m s^{-1} , thin contours at levels of 0.1, 1, 2, 5, 10, 15, 20 m s^{-1} , upward only).

(B) Plots at standard levels for comparison with other models:

6. MSLP, T , u , and v at surface: T at MSL ($^{\circ}\text{C}$, shading as indicated by color bar, ocean only), MSLP (hPa, black lines every 1 hPa, ocean only), u and v at 10 m (knots, wind barbs), terrain contour (gray lines at 1 and 2 km).
7. p , mixing ratio of water vapor (q_v), u , and v at 896 m (near 925 hPa): q_v (g kg^{-1} , shading as indicated by color bar), p (hPa, black lines every 1 hPa), u and v (m s^{-1} , arrows), terrain height at 896 m (gray lines).
8. p , T , u , and v at 1594 m (near 850 hPa): T ($^{\circ}\text{C}$, shading as indicated by color bar), p (hPa, black lines every 1 hPa), u and v (m s^{-1} , arrows), terrain height at 1594 m (gray lines).
9. p , T , u , and v at 3201 m (near 700 hPa): T ($^{\circ}\text{C}$, shading as indicated by color bar), p (hPa, black lines every 1 hPa), u and v (knots, wind barbs), terrain height at 3201 m (gray lines).
10. p , T , u , and v at 5773 m (near 500 hPa): T ($^{\circ}\text{C}$, shading as indicated by color bar), p (hPa, black lines every 1 hPa), u and v (knots, wind barbs).
11. p , T , u , and v at 9408 m (near 300 hPa): T ($^{\circ}\text{C}$, shading as indicated by color bar), p (hPa, black lines every 1 hPa), u and v (knots, wind barbs).
12. p , T , u , and v at 12379 m (near 200 hPa): T ($^{\circ}\text{C}$, shading as indicated by color bar), p (hPa, black lines every 1 hPa), u and v (knots, wind barbs).