

[short version]

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**Quasi-Operational High-Resolution  
CReSS Model Forecasts at CCU  
during SoWMEX/TIMREX 2008**

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# 1. Setup for SoWMEX/TIMREX 2008

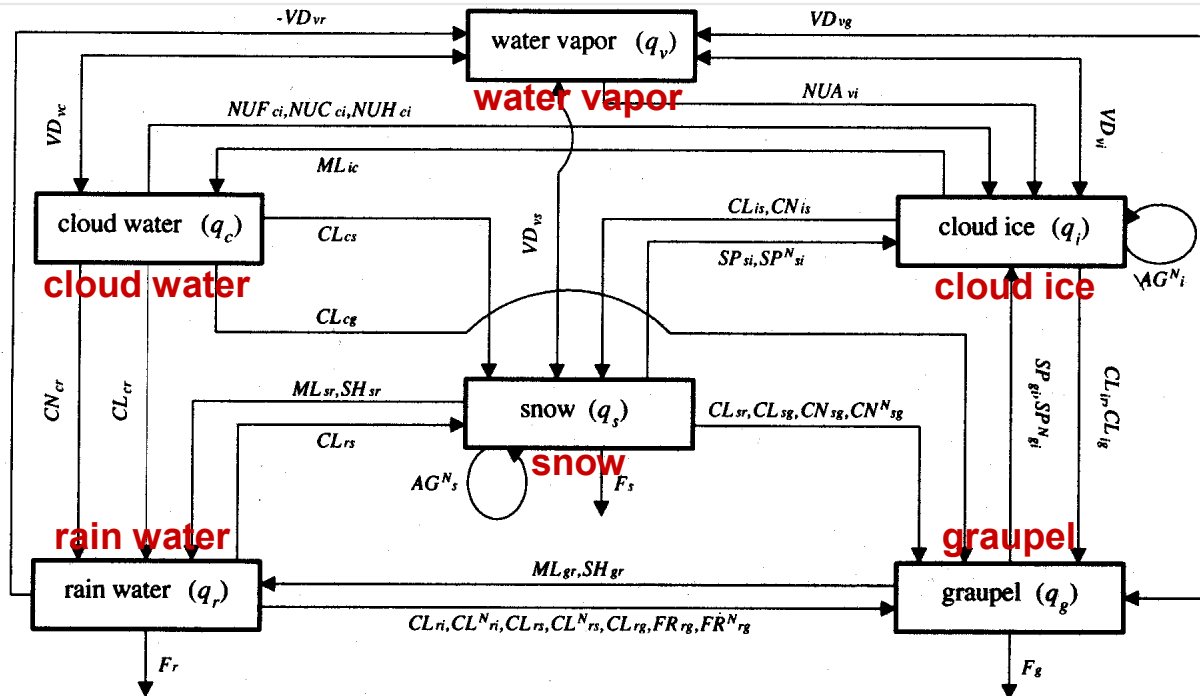
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- ❑ CReSS (Cloud-Resolving Storm Simulator): Developed at HyARC (Hydrospheric Atmospheric Research Center) of Nagoya University, Japan, by K. Tsuboki
  - ❑ Setup at CCU to provide info on development/evolution of precipitation systems at short-range to help SPG members make decisions during daily planning meeting
  - ❑ At a resolution of 3.5 km (40 levels), three 48-h runs are executed daily in a quasi-operational mode, starting at 00, 12, and 18 Z (08, 20, and 02 LST). Results (at 15-min intervals) are available before 2000, 0700, and 1330 LST
  - ❑ Results posted at <http://140.137.32.16>, reachable through the links from CCU/DAS at <http://www.atmos.pccu.edu.tw> or from the SoWMEX 2008 catalog page (under links)
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## 2. Model configuration

	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 $\Delta t$ (HE-VE), and leapfrog and Crank-Nicolson for $\Delta \tau$ (HE-VI)
Number of PEs	80 CPUs (20 nodes) on HPC at CCU

## Bulk cold rain scheme in CReSS (6 species):

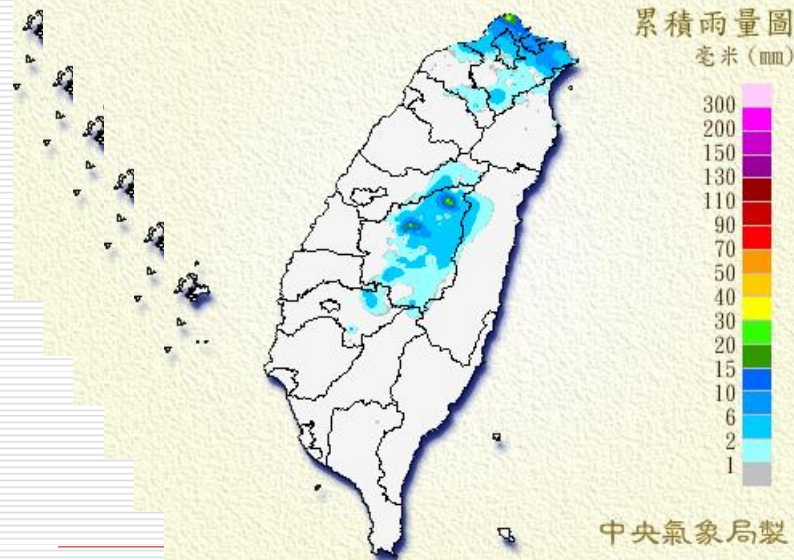


- Nucleation: Deposition/sorption, condensation-freezing, homogeneous process, contact, secondary
- Deposition, evaporation, sublimation, melting, freezing
- Falling, collection, conversion, aggregation, water shedding

### 3. A quick example from early May

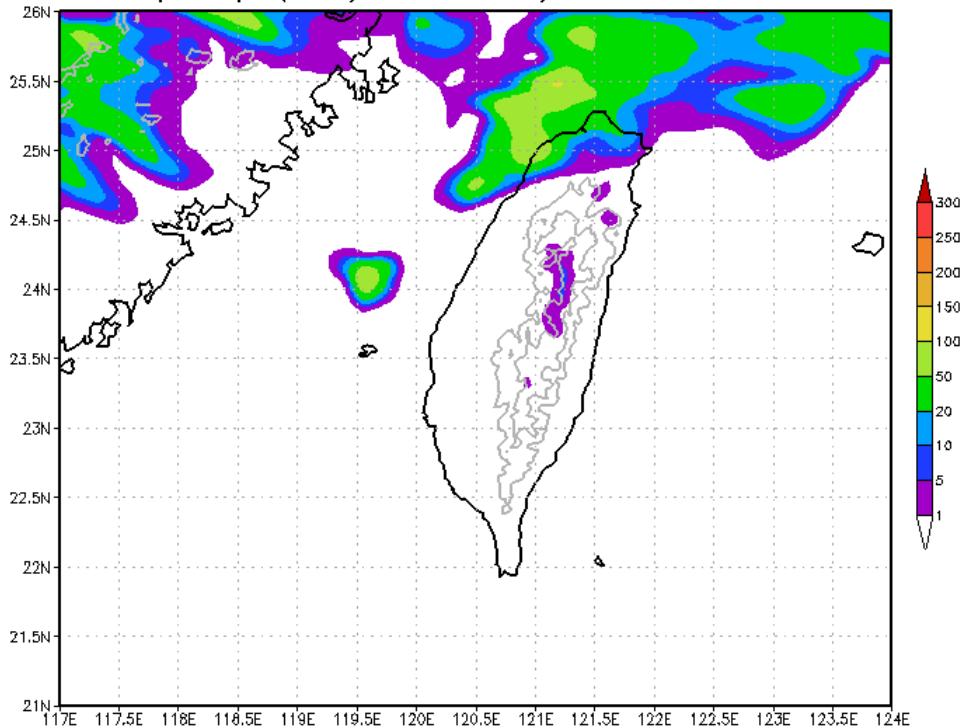
Daily rainfall, obs., 5/4-9 2008

5/04 00:00 ~ 5/05 00:00  
5/05 00:00 ~ 5/06 00:00  
5/06 00:00 ~ 5/07 00:00  
5/07 00:00 ~ 5/08 00:00  
5/08 00:00 ~ 5/09 00:00  
5/09 00:00 ~ 5/10 00:00



Model 16-40 h QPF, starting at 00 Z, 5/3-8 2008

total precip (mm) 2008 05/04 0000-2400 LST  
total precip (mm) 2008 05/05 0000-2400 LST  
total precip (mm) 2008 05/06 0000-2400 LST  
total precip (mm) 2008 05/07 0000-2400 LST  
total precip (mm) 2008 05/08 0000-2400 LST  
total precip (mm) 2008 05/09 0000-2400 LST



## 4. Web page and forecast operation

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- ❑ On the webpage, select product (plot) → *submit* → select display method → *loop/single frame* → adjust looping speed (+/-) or select frame (*previous/next/first/last/>>/<<*) → *stop*
  - ❑ Model and plot info available for download on webpage
  - ❑ Run on High-Performance Computer (HPC) at CCU using 20 nodes (80 CPUs), each job needs about 11 h (4.5 h waiting for GFS forecasts, and 6.5 h for integration plus post-processing)
  - ❑ Nearly 1/2 of the total computing power of HPC (45 working nodes) is constantly devoted to CReSS forecasts
  - ❑ Please make good use of our CReSS model products, available at <http://140.137.32.16>, or through the links from <http://www.atmos.pccu.edu.tw> or from the catalog page
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- The End -

Thank you for your attention!

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