MSM specifications

1. System	
System	Meso-scale model
Date of implementation	1 March 2001
2. Configuration	
Domain	Japan and its surrounding area Lambert projection, 817 × 661 grid points
Horizontal resolution	5 km at 60°N and 30°N (standard parallels)
Vertical levels	76
Model top	22 km
Forecast length	51 hours (00, 12 UTC), 39 hours (03, 06, 09, 15, 18, 21 UTC)
Runs per day (times in UTC)	8 (00, 03, 06, 09, 12, 15, 18 and 21 UTC)
Coupling to ocean/wave/sea ice models	None
Integration time step	100/3 seconds (3-stage Runge-Kutta method)
3. Surface boundary conditions	
Sea-surface temperature	Analyzed SST and sea-ice distribution
Land surface analysis	Climatological values of evaporability, roughness length and albedo Snow cover analysis over Japan using a land surface model
4. Lateral boundary conditions	
Model providing lateral boundary conditions	GSM
Lateral boundary condition update frequency	4 times/day 00 – 57-hour GSM forecasts initialized at 00/06/12/18 UTC for (03, 06)/(09, 12)/(15, 18)/(21, 00) UTC forecasts
5. Other details	
Soil scheme	Ground temperature prediction using an eight-layer ground model Evaporability prediction initialized using climatological values depending on location and season
Radiation	Short wave: two-stream with delta-Eddington approximation (every 15 minutes) Long wave: two-stream absorption approximation method (every 15 minutes)
Large-scale dynamics	Finite volume method with Arakawa-C-type staggered coordinates, horizontally explicit and vertically implicit time integration scheme, and combined third- and first-order upwind horizontal finite difference schemes in flux form with a limiter as proposed by Koren (1993) in advection treatment for monotonicity, time-splitting of vertical advection Fully compressible non-hydrostatic equations
Boundary layer	Mellor-Yamada-Nakanishi-Niino Level-3 scheme Similarity theory adopted for surface boundary layer
Convection	Kain-Fritsch convection scheme
Cloud/microphysics	Three-ice bulk cloud microphysics Consideration of PDF-based cloud distribution in microphysics Time splitting of vertical advection for water substances, cloud water and cloud cover diagnosed using a partial condensation scheme
Orography	Mean orography smoothed to eliminate shortest-wave components
Horizontal diffusion	None
Gravity wave drag	None
6. Further information	
System documentation URL	https://www.jma.go.jp/jma/jma-eng/jma-center/nwp/nwp-top.htm