

Meso-scale Analysis specifications

4D-Var formulation	Incremental 4D-Var using a nonlinear forward model in the inner step with low resolution
Data cut-off time	50 minutes for analysis at 00, 03, 06, 09, 12, 15, 18 and 21 UTC
Observation (as of 31 August 2018)	SYNOP, METAR, SHIP, BUOY, TEMP, PILOT, Wind Profiler, Weather Doppler radar (radial velocity, reflectivity), AIREP, AMDAR; AMVs from Himawari-8; ocean surface wind from Metop-A, B/ASCAT; radiances from NOAA-15, 18, 19/ATOVS, Metop-A, B/ATOVS, Aqua/AMSU-A, DMSP-F17, 18/SSMIS, GCOM-W/AMSR2, GPM-core/GMI; WV-CSR of Himawari-8; radar-raingauge analyzed precipitation; precipitation retrievals from DMSP-F17, 18/SSMIS, GCOM-W/AMSR2; GPM-core/GMI; GPM-core/DPR; GNSS RO refractivity data from Metop-A, B/GRAS, COSMIC/IGOR, GRACE-A, B/blackjack, TerraSAR-X/IGOR, TanDEM-X/IGOR; Total Precipitable Water Vapor from ground-based GNSS
First guess	3-hour forecast produced by the JMA-NHM
Domain configuration	(Outer step) Lambert projection; 5 km at 60°N and 30°N, 817 × 661 Grid point (1, 1) is at the northwest corner of the domain. Grid point (565, 445) is at 140°E, 30°N. (Inner step) Lambert projection; 15 km at 60°N and 30°N, 273 × 221 Grid point (1, 1) is at the northwest corner of the domain. Grid point (189, 149) is at 140°E, 30°N.
Vertical levels	(Outer step) 48 levels up to 22 km (consistent with the forecast model setting) (Inner step) 38 levels up to 22 km
Analysis variables	Wind, potential temperature, surface pressure and pseudo-relative humidity
Assimilation window	3 hours