

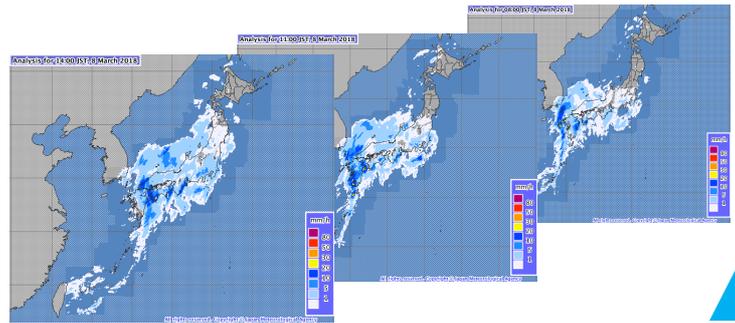
RADAR/RAINGAUGE-ANALYZED PRECIPITATION

Outline

The Radar/Raingauge-Analyzed Precipitation product (referred to here as "R/A") provides estimation data on precipitation in areas lacking raingauges based on radar observation of rainfall intensity. Radar rainfall calibration using precipitation data from raingauges increases the quantitative accuracy of R/A information, giving it clear superiority over radar and raingauge data alone.

R/A data generation is based on observation results from JMA and MLIT and on information from raingauges operated by JMA, MLIT and local governments. The process involves the following:

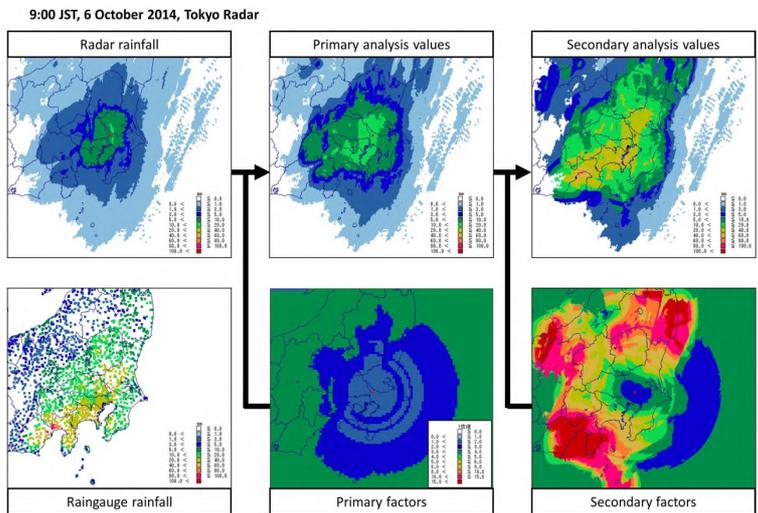
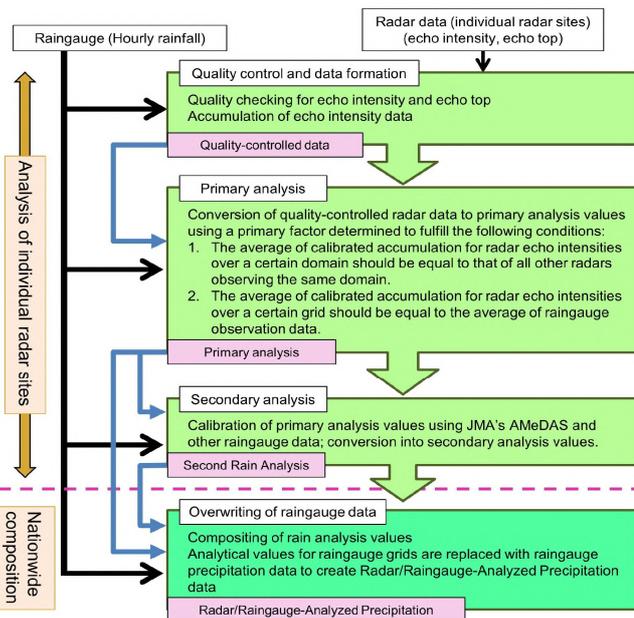
- Quality control
- Data conversion
- Primary analysis of rainfall
- Secondary analysis of rainfall
- Nationwide composition generation
- Raingauge data overwriting



Raingauge data overwriting

Pre-secondary factor interpolation for secondary factor estimation may cause underestimation at raingauge grid points. To prevent non-detection of heavy rain, hourly raingauge rainfall data are overwritten for such grid points. Data in the surrounding eight grid points are also overwritten with interpolated values if their original values are lower than hourly raingauge rainfall.

Light rain from stratus clouds sometimes evades radar detection even if it is caught by raingauges. When hourly raingauge rainfall ranges from 0.5 to 4 mm and secondary analysis values around the gauge are lower than this, the hourly raingauge rainfall for the grid point and its surrounding points is also overwritten.

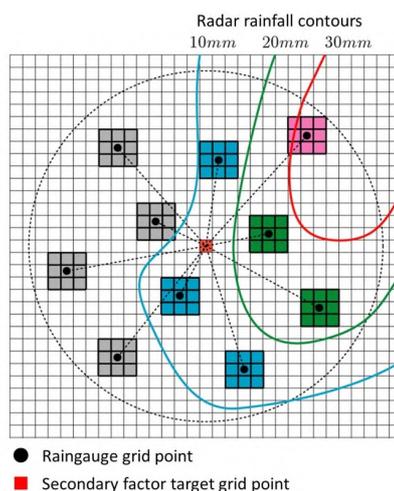
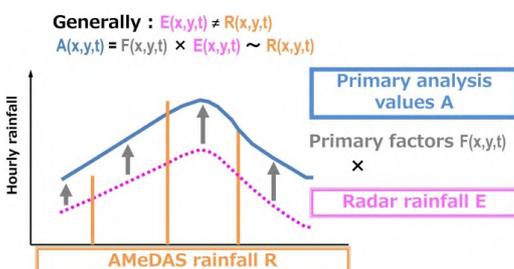


Raingauge quality control

Raingauge data provided from outside JMA are quality-controlled upon arrival. Data from raingauges with quality flags and those for which reported positional conversion and values in the constant table differ are not used. Data from gauges showing excessive cumulative hourly precipitation are also eliminated.

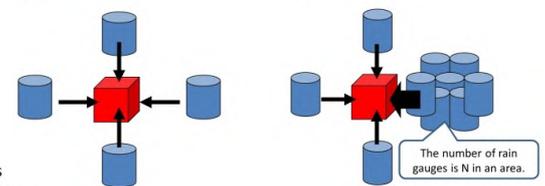
Primary analysis

Primary analysis is conducted to adjust spatial distributions of hourly radar rainfall data to AMeDAS-based hourly rainfall observation data. AMeDAS is an acronym of Automated Meteorological Data Acquisition System – the name given to JMA's AWS (Automatic Weather Station) network in Japan. The network has approximately 1,300 raingauges at intervals of around 17 km. Adjustment is conducted by multiplying radar-observed rainfall values with a primary factor for each radar.



Secondary analysis

The objective of secondary analysis is to examine small-scale precipitation distribution using raingauge data provided by JMA, MLIT and local governments.



Unbalanced distribution of raingauges
The red cubes indicate target grid points, and the blue cylinders are raingauges.
a) Each area has one raingauge.
b) One of the four areas has more raingauges.

Secondary factor calculation
The pre-secondary factor for a raingauge grid point is determined by calculating the ratio of hourly raingauge rainfall to the primary factor value of its maximum in an 3 x 3 km area. Quality is controlled by comparison with the surrounding areas and values from the past three hours. Secondary factors for target grid points (shown here by the red square in the center) are determined by pre-secondary factor interpolation in a 101 x 101 km area.