

Vieux, Inc. Radar Rainfall Quality Assurance Plan for the South Florida Water Management District

Radar data quality assurance is accomplished by application of automated and manual methods of quality control to the raw reflectivity data produced by the National Weather Service (NWS). These methods are applied to the radar reflectivity data produced by the NWS to improve accuracy and consistency of the rainfall data produced in Near Real Time (NRT), End-of-Day (EOD), and End of Month (EOM). Manual QA/QC procedures applied during the production of EOM and EOD products are accomplished using proprietary software tools applied to radar data.

Automatic data processing relies on Level II and Level III reflectivity data generated by the NWS radars. Individual radars are combined to form a mosaic in a NRT database and adjusted to agree with rain gauge observations through bias correction within a 6-hr moving window. Rainfall is accumulated in 15-minute intervals after rain gauge data is received. The Level II and III radar reflectivity data is received from six (6) NEXRAD radars located at Tampa (KTBW), Melbourne (KMLB), Jacksonville (KJAX), Miami (KAMX), Tallahassee (KTLH) and Key West (KBYX).

Workflow Processes

The workflow process used for quality assurance and quality control in the NRT, EOD, and EOM processing is documented as follows.

NRT Workflow Process

1. Ingest Level II and III reflectivity data into RainVieux database
 - 1.1. Apply vertical continuity check to remove ground clutter and anomalous propagation.
 - 1.2. Convert reflectivity to rainfall rates using selected Z-R relationships
 - 1.3. Filter radar data into temporal aggregation.
2. Ingest rain gauge data into RainVieux database
 - 2.1. Filter gauge data into temporal aggregations.
 - 2.2. Select available gauges for statistical tests
3. Combine radar/gauge pairs to compute bias correction
 - 3.1. Remove radar/gauge pairs that do not meet statistical criteria.
 - 3.2. Process gauge-adjusted radar rainfall using mean field or local bias corrections.
 - 3.3. Internally generate gauge-adjusted statistics, scatter plots, calibrated average difference, and number of gauges used.
4. Mosaic gauge-adjusted radar data to output 2x2 km pixels
5. Populate database and generate output at required intervals at 15-minute and daily accumulations as required.
6. Produce final output format from database for 2x2 km pixels in CSV pixel ID and rainfall amount.

EOD/EOM Workflow Process

1. At the end of each day, review the real-time database from the previous day to identify any remaining ground clutter, anomalous propagation or excessive clutter suppression that was not automatically removed during real-time operation.
 - 1.1. Use RainVieux tool to edit the radar database.
 - 1.2. For End-of-Month review, check monthly storm total for any remaining radar inconsistencies to be addressed using RainVieux.
2. At the beginning of each day, review radar to gauge comparisons from midnight to midnight to identify gauges that may either be clogged, out-of-sync, non-reporting or significantly under/over-reporting gauges.
 - 2.1. Remove those periods of inconsistent gauge data from the database.
 - 2.2. For End-of-Month review, compare daily gauges to radar database to identify inconsistent gauges.
3. Combine radar/gauge pairs to re-compute bias correction with edited radar/gauge database.
 - 3.1. Remove radar/gauge pairs that do not meet statistical criteria.
 - 3.2. Process gauge-adjusted radar rainfall using local bias corrections.
 - 3.3. Generate gauge-adjusted statistics and display scatter plot, calibrated average difference, and number of gauges used.
4. Mosaic gauge-adjusted radar data and output to 2x2 km pixels
5. Populate database and generate output at required intervals at 15-minute and daily accumulations.
6. Internally generate statistics and display scatter plot, cumulative distribution plots, calibrated average difference, and gauges used for verification of EOD and EOM products.
7. NEXRAD Rain Gauge (NRG) data is a quality controlled EOM product generated at the request of SFWMD to fill missing or inconsistent rain gauge data. It is produced by sampling the EOM mosaic pixel containing the gauge location, and inserting GARR rainfall values for the period during which the rain gauge performed inconsistently. This product is transferred to SFWMD along with other EOM GARR products.
8. Produce and transfer final output format from database for 2x2 km pixels in CSV pixel ID and rainfall amount.

Operational FTP data download will be made for delivery of NRT products and upload of rain gauge data from the Districts.

Quality Assurance Responsibilities

The Project Manager for Vieux & Associates is responsible for over all quality assurance. Quality control procedures exercised in the monitoring of the near real-time operational system, end-of-day procedures to enhance radar data quality, and post-processing will be performed by the hydro-meteorologist assigned to this project.

The contact person for Vieux & Associates, Inc. is:

Jean E. Vieux
Project Manager
Vieux & Associates, Inc.
350 David L. Boren Blvd., Suite 2500
Norman OK 73072
405 325-1818 Office
405 412-6259 Cell
Jean.vieux@vieuxinc.com