

American Water Resources Association
2010 SUMMER SPECIALTY CONFERENCE
GIS & Water Resources VI
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Tuesday, March 30
1:30 PM – 3:00 PM
SESSION 19: Nexrad

Validation Rain Gauges for Quality Assurance of NexRad Rainfall Data - Michael Daly, St Johns River Water Management District, Palatka, FL

The availability and use of NexRad rainfall data has increased greatly in recent years. Typically, the NexRad data is adjusted using empirical rain gauge data. However, uncertainty regarding the accuracy and reliability of the NexRad data remain. In 2007, the St Johns River Water Management District established validation rain gauges to reduce the uncertainty of the NexRad data. The validation rain gauges are withheld from the NexRad adjustment process, serving as an independent set to assess the accuracy and reliability of the NexRad radar rainfall data. The comparison of the validation rain gauges to the NexRad data will be presented with an emphasis on the benefits and limitations of this quality-assurance method.

Representative Rainfall for the Florida Water Management Districts: Quality Control of Radar and Rain Gauge Data in a Geospatial Context - Jean Vieux, Vieux & Associates, Inc., Norman, OK (co-author: Baxter E Vieux)

Representative rainfall information with known accuracy is needed by water management agencies in Florida. The Florida Water Management Districts (Districts) are regional governmental agencies with responsibilities for water quality, flood control, water supply, and environmental restoration. Rain gauge-adjusted radar rainfall captures the spatial variability of rainfall and provides rainfall estimates between rain gauges, helping to better characterize basin-wide rainfall amounts and to improve water resources management. Rainfall information used by the Districts is derived from a combination of rain gauges and weather radar because merged radar and rain gauge networks can provide better rainfall information than either system alone. Rain gauge networks do not provide information on how much rain falls between the rain gauges, and it is not feasible to maintain a network dense enough to capture the spatial variation of rainfall over specific basins. Also, when rain gauge networks fail, decision makers may have no quantitative rainfall information for a location or surrounding area. Conversely, the NEXRAD weather radar system captures the spatial pattern and relative intensities of rainfall, but is not reliable at quantifying these intensities without rain gauge adjustment. Merging rain gauge data with weather radar data and performing bias correction provides accurate and representative rainfall for hydrologic applications. Quality Assurance and Quality Control (QA/QC) procedures improve data accuracy and provide coverage that can compensate for data gaps or loss. Bias correction of radar using the rain gauge network improves rainfall accuracy by 50%, as measured on a continuous basis for the Districts since October 2007. Up to 515 rain gauges and nine NEXRAD radars are merged together with quality control to produce radar rainfall for the Districts. Rainfall estimates are provided on 15-minute, hourly, and daily intervals for 106,825 radar rainfall pixels at 2x2 km resolution. This rainfall data supports improved water management for controlled burning, land preparation, planting, operations of water control structures, and other precipitation-influenced activities.

Utilizing Radar-Derived Rainfall Data for Watershed Model Calibration - Mathew Mampara, Dewberry, Fairfax, VA (co-authors: Srikanth Koka, Arvind Goswami)

On the face of it, the task to collect rainfall information to support the development of rainfall runoff models for the East and Middle Branch Croton Rivers in Putnam County, New York should be straight forward. Located in the City of New York's extensive drinking watershed meant that extensive recorded rainfall data was available. In addition, specific NOAA rainfall gauges were available as well. The short stream gauge record available for East and Middle Branch Croton River watershed included two summer flood events and three winter flood events; however, the available gauges had sparse or no rainfall data recorded for any of these events. To develop precipitation input to the HEC-HMS models for the East and Middle Branch Croton River

watersheds, radar-derived rainfall data was used. Even though raw rainfall data files from single sites can be downloaded at no cost from NOAA, multi sensor precipitation estimate data published by River Forecasting Centers are more appropriate to use with hydrologic model calibration. RFCs process rainfall data in a format called GRIB, with 24 1-hour scenes representing a day's precipitation. The rainfall data has to be converted to DSS format before it can be recognized by the USACE's HEC-HMS program, as was done to develop the Croton River watershed models. The GRIB files were first transformed in intermediate XMRG data format so that they can be transformed to the DSS format. North East River Forecasting Center (NERFC) supplied the GRIB files for the five storm events selected for calibration. The radar rainfall was validated against ground based rain gage measurements taken at neighboring rain gage stations. Using radar rainfall data, it was possible to obtain individual rainfalls measured for each of the sub basins. This accurate representation of the spatial distribution of the calibration storm rainfall resulted in straightforward calibration of the models to the events with only minor adjustments to watershed parameters. Radar rainfall input facilitates the HEC-HMS model to be used for forecasting as well as reservoir regulation purposes.