



## **A System for Distributing Real-Time Customized (NEXRAD-Radar) Geosciences Data**

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Hydrometeorologists and hydrologists can benefit from (weather) radar derived rain products, including rain rates and accumulations. The Hydro-NEXRAD system (HNX1) has been in operation since 2006 at IIHR-Hydroscience and Engineering at The University of Iowa. It provides rapid and user-friendly access to such user-customized products, generated using archived Weather Surveillance Doppler Radar (WSR-88D) data from the NEXRAD weather radar network in the United States. HNX1 allows researchers to deal directly with radar-derived rain products, without the burden of the details of radar data collection, quality control, processing, and format conversion.

A number of hydrologic applications can benefit from a continuous real-time feed of customized radar-derived rain products. We are currently developing such a system, Hydro-NEXRAD 2 (HNX2). HNX2 collects real-time, unprocessed data from multiple NEXRAD radars as they become available, processes them through a user-configurable pipeline of data-processing modules, and then publishes processed products at regular intervals. Modules in the data processing pipeline encapsulate algorithms such as non-meteorological echo detection, range correction, radar-reflectivity-rain rate (Z-R) conversion, advection correction, merging products from multiple radars, and grid transformations.

HNX2's implementation presents significant challenges, including quality-control, error-handling, time-synchronization of data from multiple asynchronous sources, generation of multiple-radar metadata products, distribution of products to a user base with diverse needs and constraints, and scalability. For content management and distribution, HNX2 uses RAMADDA (Repository for Archiving, Managing and Accessing Diverse Data), developed by the UCAR/Unidata Program Center in the United States. RAMADDA allows HNX2 to publish products through automation and gives users multiple access methods to the published products, including simple web-browser based access, and OpenDAP access. The latter allows a user to set up automation at his/her end, and fetch new data from HNX2 at regular intervals. HNX2 uses a two-dimensional metadata structure called a mosaic for managing metadata of the rain products. Currently, HNX2 is in pre-production state and is serving near real-time rain-rate map data-products for individual radars and merged data-products from seven radars covering the state of Iowa in the United States. These products then drive a rainfall-runoff model called CUENCAS, which is used as part of the Iowa Flood Center (housed at The University of Iowa) real-time flood forecasting system. We are currently developing a generalized scalable framework that will run on inexpensive hardware and will provide products for basins anywhere in the continental United States.