



BARON HYDROLOGY



BARON

Critical Weather Intelligence®

HYDROLOGIC FORECAST MODELING & DECISION SUPPORT

Baron offers fully integrated, turn-key hydrologic solution for the advance detection and notification of potential flooding events. The following information offers a detailed description of Baron hydrologic capabilities, customizable and scalable for use throughout the world.

NHRPS (National/Basin Hydrologic Radar Processing System)

The NHRPS system handles the integration of sparsely spaced surface hydrological and meteorological measurements with the high spatial resolution of remotely-sensed radar imagery.

Rain gauge bias is used for data corrections to precipitation rate and accumulations, which are based upon real-time surface rain gauge measurements.



Radar Futurecasting

Projects individual radar imagery into the future, taking into account advection, growth and decay, allowing for an accurate 0-2 hour Quantitative Precipitation Forecast (QPF). This capability provides extremely accurate short-term forecasting—90% accurate over 15 minutes and 75% accurate over 30 minutes.



Hydrologic Data Processing

Generates a suite of derived 1km hydrologic products from individual and composite radar base data, including 1, 3, 12 and 24-hour products. Estimated rainfall totals are produced every 5 minutes, with a 1-hour Quantitative Precipitation Estimate produced every 5 minutes.



Precipitation Mask

Differentiates between areas of snow, sleet, rain and mix. Produced in 1km resolution, with updated data available every 5 minutes.

National/Basin Hydrologic Prediction System (NHPS)

The NHPS acquires data from the National/Basin Hydrologic Radar Processing System, as well as Numerical Weather Prediction (NWP) model outputs, and produces water level, flow rates and flooding forecasts for all major streams and river basins using that data. Rain gauge bias is performed using ground truth information from surface observations.

GIS-based Soils, Vegetation, and Terrain Database

This system incorporates best possible local soils, vegetation, terrain, and water-body data in order to capture the most physically realistic basis for hydrological models used in decision support.

High-Resolution NWP model for Atmospheric Forcing

This system provides critical input data not available from real-time sensors to drive analysis and forecast versions of the hydrological modeling systems.

Quantitative Precipitation Estimation/Forecasting Module

Allows the users to adjust input QPE and/or QPF prior to making forecast or simulation runs of the hydrological models. This is especially useful in exploring what-if/scenario re-simulations of critical events.

Real-Time Hydrologic Models

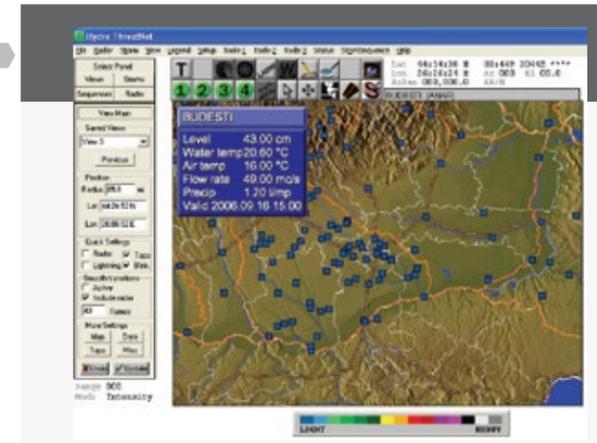
Baron's comprehensive suite of hydrological models includes full dynamics distributed models, semi-distributed models for catchment applications, traditional lumped-modeling using the NWSRFS, flash-flood guidance using ARI extreme event statistics, and ensemble forecasting. The full dynamics models can couple with a suite of HEC tools for water management applications, and can assimilate observed streamflow data for improved initial conditions. In addition, Baron is the leading commercial expert on the WRF-Hydro modeling system. All hydrologic models are supported by a comprehensive set of calibration tools.

National Mosaic Hydro Data Server (NMHDS)

The NMHDS combines all the meteorological and hydrologic information from multiple radars and surface data into nationwide digital image products for analysis and display. The data is also transmitted to regional hydrologic centers for use on workstations and briefing stations.

Hydro Mosaic

The Hydro Mosaic data product utilizes digital, composited imagery from the NHRPS radar processing system, making the same data available at specified times and resolutions to the briefing stations.



Heavy Rainfall Notification System (HRNS)

Automated Alerting

Delivers site-specific alerting of potential flooding via e-mail, mobile devices and alert radios. Patented technology ensures that only subscribers in the threatened areas are alerted.



Baron Water Management System (WMS)

Allows the user to interact directly with the system not only to optimize scheduled releases while meeting competing demands on the resource, but also to manage unscheduled events.

The scenarios include increased outflows required to support electric system emergencies, line overloads, and off-system sales, or suddenly decreased outflows that may be required due to environmental spills, boating accidents, or equipment malfunctions.

▶ In August 2015, Baron was awarded a contract to provide hydrologic forecasting services to the U.S. Army Corps of Engineers (Seattle District).

National Hydrologic Research Archiving System (NHRAS)

The NHRAS incorporates data incoming from the hydrologic prediction system and archives it for post-analysis. The objective is continuous improvement of existing and newly-provided advanced surface hydrologic and atmospheric models.

INTEGRATED DISPLAYS

Baron display and analysis tools provide forecasters with a wealth of meteorological and hydrological information, including single-site and composite radar images, hydrographs and sensor observations.

An available briefing terminal delivers accurate situational awareness to administrators, the general public, or other non-forecast operations personnel. An easy-to-use interface makes Baron displays an ideal tool for anyone to stay informed of developing conditions with a single glance.

Regardless of application, information from an entire Baron hydrology solution can be displayed in 2D or 3D. In addition, organizations can automatically deliver weather and hydro imagery to their websites, accessible to any authorized user or the general public.



Briefing terminals allow authorized officials or the general public to easily access precision weather information for their areas.



Value-added data products, displayed on 2D and 3D workstations, provide critical weather intelligence to decision-makers, allowing them to make effective choices.



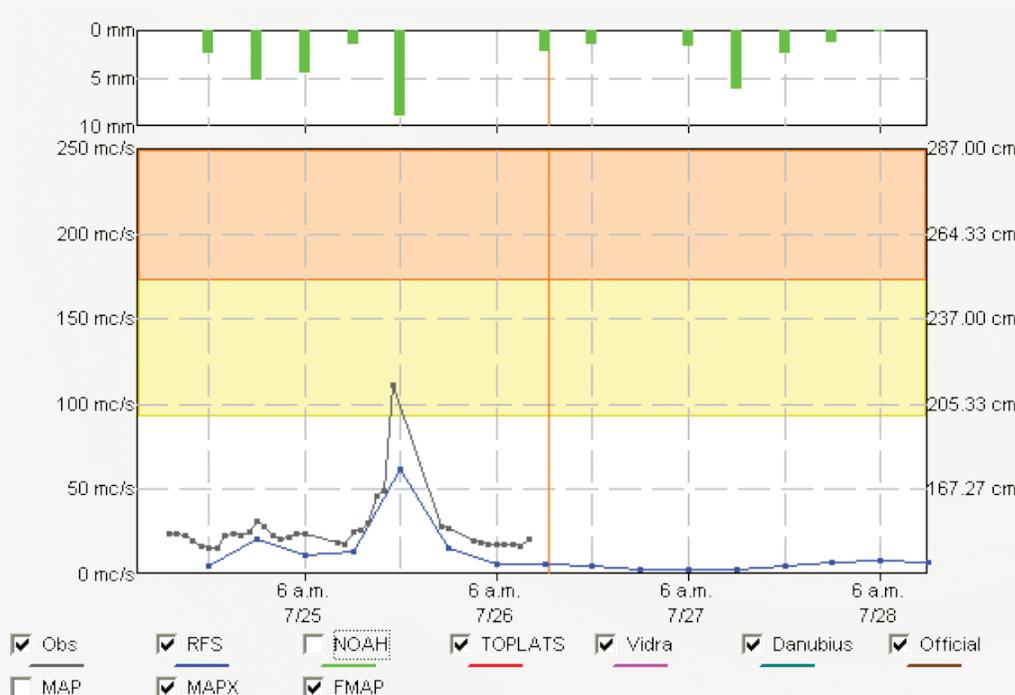
Baron weather data can be displayed locally, regionally, and even globally.

FLOODING AND URBAN FLOODING

No other natural hazard has claimed more human lives, destroyed more homes and ruined more farmland over past decades than flooding. It is critical that the prediction and management of floods be a priority in order for organizations to ensure that both lives and property are secure.

Baron provides a fully integrated turn-key solution for the advance detection and notification of potential flooding events. Its hydrology solutions produce forecasts of potential floods, and presents these forecasts as hourly time series hydrographs, allowing for visual inspection of the information using universally accepted tools and methodologies. The hourly time series is also made available to river system modeling tools, for use by a reservoir manager, for example, so that they may run interactive scenarios to find the best-fit operation for the given flow situation.

Baron hydrology solutions also perform urban flood studies, using industry-accepted tools, and implements them as continuous urban flood models. The outputs from these models are available as time series, and presented on Baron display tools. City managers and emergency management personnel can then visually inspect both the magnitude and timing of flows, allowing them to make effective decisions that reduce loss of life and property during dangerous flooding events.



Hydrographs display flows, mean areal precipitation and high-flow zones. The systems are fully-integrated to allow the user to display multiple forecasts simultaneously from multiple flood models, and to compare those forecasts with the latest river observations to ensure accuracy.

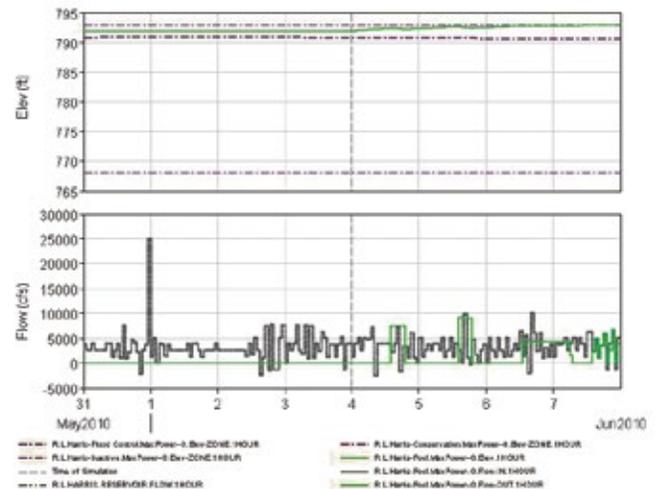
WATER MANAGEMENT

Water needs are at the forefront of concern for governments, industries and individuals. And water isn't simply a finite resource; the United Nations has named it an essential human right. Water managers, in particular, must make decisions based on many competing demands on the resource, all while following policies and regulations.

Baron water management technologies comprise fully integrated, turn-key solutions for accurate monitoring of reservoirs, streams and lakes. Comprehensive data collection, interpretation and manipulation, as well as interactive displays, are customized to customer needs and budget. Baron hydrology solutions provide industry-standard models and tools that allow the water manager to make effective, efficient and safe use of this limited resource.

Data from government agencies, including new and legacy sensor reports, can be incorporated into Baron solutions. An inherent flexibility for incorporating numerous data sources allows users to receive timely and effective feedback. Observed sensor data is stored in an integrated database and is also available for display as a time series. This information can then be visually compared with the accuracy of the forecast models and water management tools, in tandem with observed measurements.

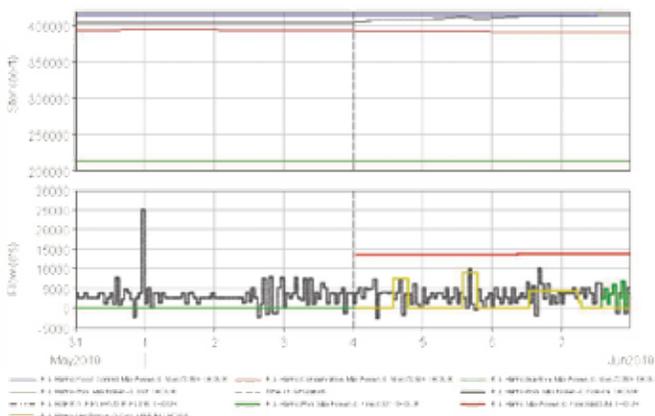
Reservoir storage and outflows are displayed along with reservoir inflows to allow the user to quickly assess how much "fuel" is available for power and how much can be stored for use later.



POWER GENERATION

Hydroelectric generation providers no longer are able to use water resources without giving consideration to other demands on those resources. The effects of climate change have further exacerbated the need to use decision support systems in not only the day-to-day, but also moment-to-moment operations.

Baron Hydrology Solutions provide a suite of industry-standard tools that allow the hydro dispatcher to make sound decisions based on timely sensor data, forecasts, and reservoir and river models. The outputs are visually presented in a user-friendly graphical interface. Additionally, the hourly time series outputs are available alongside observed historical/forecasted/precipitation datasets on Baron display tools.

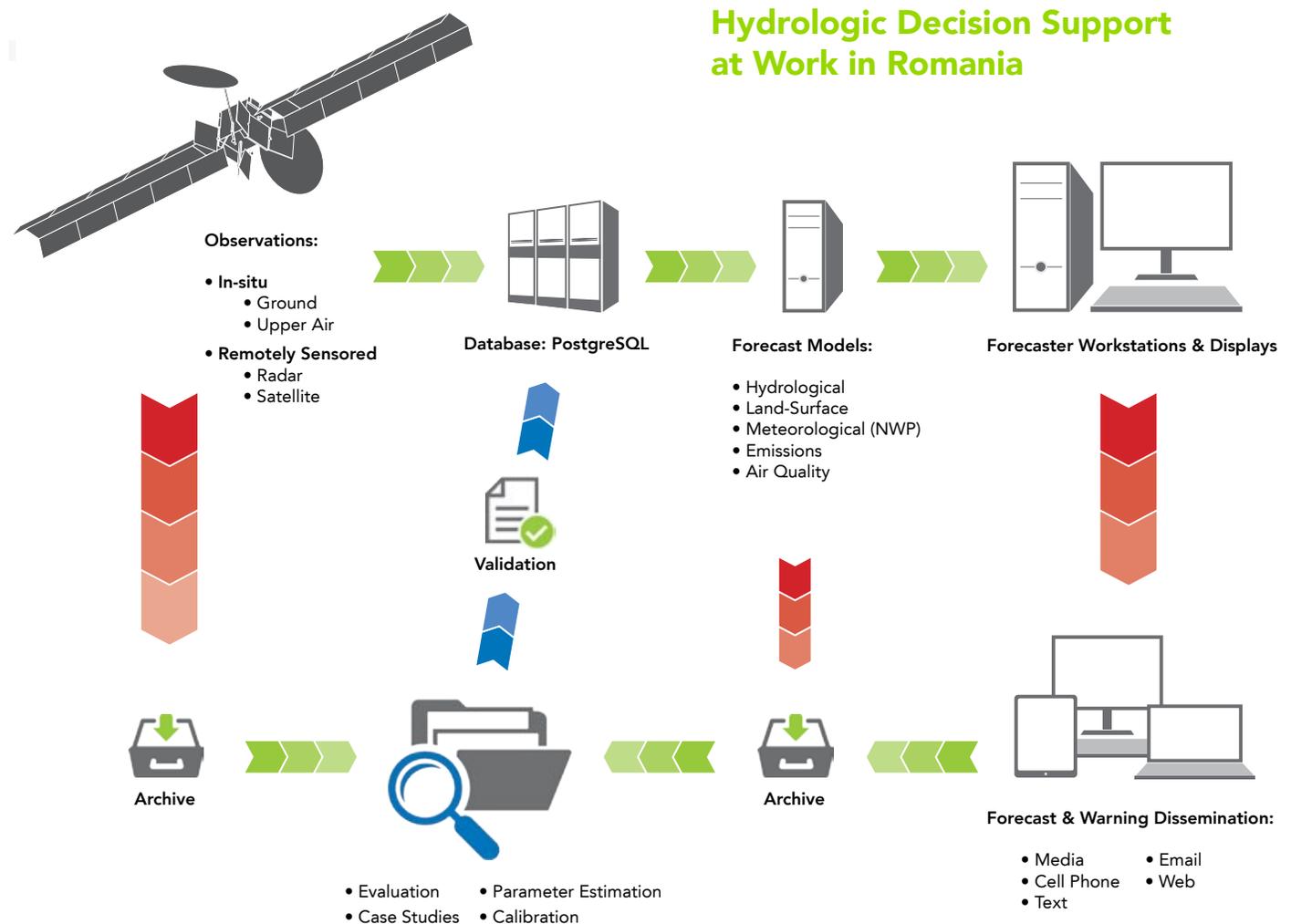


Elevations, volumes, inflows and outflows are displayed to allow the user to quickly determine the effects of projected releases on water supplies.

PROOF OF PERFORMANCE

Romania's rivers, mountains, and rolling hillsides contribute to a unique environment that makes flood forecasting and water management a constant challenge. Commissioned by Romania's Apele Romane water authority and the National Institute of Hydrology and Water Management, the DESWAT (DEStructive WATers) project used a complete Baron hydrology system.

Baron provided the technology for DESWAT data acquisition, modeling, integration, and redistribution. Due to the country's relatively large surface area and varied terrain, data collection and processing are distributed across a multi-tiered network. Integrated assets included more than 600 hydrological surveillance sensors, including automated hydrological sensor stations and water quality observations, deployed across Romania's river basins. Information is shared among 36 local sub-basin hydro service stations, 11 regional basin hydro service centers, and the central offices for National Forecast Operations and the Apele Romane water authority.





CRITICAL WEATHER INTELLIGENCE

For 25 years, Baron has provided organizations with actionable information for accurate, effective decision support. Providing hydrometeorological capabilities, including weather radar, data fusion, forecast modeling, display, distribution/alerting, and the systems integration to tie these all into a single unified network, Baron ensures that users, stakeholders and the public receive critical weather intelligence that reduces loss of life and property during significant weather events.



BARON

baronweather.com

international-sales@baronweather.com

4930 Research Dr. Huntsville, AL 35805

256-881-8811

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