

Real-time information, sound decisions

/ HYDROLOGICAL MONITORING AND FORECASTING



VAISALA

Water movement knowledge is critical



Knowing and anticipating water's movement is critical to both safety and productivity: it helps us to grow crops, generate electricity and transport goods. But water also has the potential to cause tremendous damage in the places we live and work.

The value of accurate and timely hydrological data far outweighs the cost of collecting it. High quality hydrological information is crucial for the economic and social well-being of our cities, our countries, and the world.

Hydrological applications

Vaisala provides custom-designed hydrological monitoring and forecasting solutions for:

- Flood early warning – key to disaster prevention, and guarding against losses caused by floods
- Urban water management – observing water movements in built environments
- Agricultural water management – optimizing irrigation, drainage, seeding and pesticide application, as well as monitoring drought in water scarce areas
- Hydropower optimization – making use of real-time and forecast data for optimizing hydropower production
- Inland waterway navigation – aiding in vessel traffic control essential to safe and fluent inland water transportation

An integrated approach

Good decisions come from accurate and trustworthy information. Moreover, gathering and disseminating that useful hydrological information to decision makers requires an integrated approach: the requirements of all water information users must be considered when designing hydrological monitoring and forecasting systems.

Turning observations into relevant, usable information requires several distinct steps. Vaisala's solutions support Integrated Water Resource Management by providing better, more complete data for informed decisions. This in turn helps us in maximizing our customers' return on their investment.

Recognized benefits

Each hydrological challenge is different. The exact nature and scope of the solution depends on what is being monitored and what the intended applications are. But in every case, an integrated system has clear benefits:

- The same observations can be utilized across multiple applications
- Augments reliability, compatibility and cost-efficiency
- Provides one-stop shop convenience

Vaisala custom-designs hydrological systems and solutions to suit specific needs



Integrated hydrological monitoring and forecasting





The hydrological cycle

Constant monitoring of the hydrological cycle is key to creating timely and reliable information and forecasts. Many parameters need to be monitored in real-time, such as, water level, discharge, snow depth, evaporation, and soil moisture. These observations are typically recorded automatically by hydro-meteorological stations. Weather radar increases the accuracy and spatial resolution of precipitation measurement.

The observations are first transmitted in real-time to a centralized data management system. The data can then be used as input for hydrological and hydraulic models, which are in turn used to create forecasts. Ultimately, the forecasts can then be presented to different stakeholders in different formats depending on their requirements.

Building preparedness

No matter how many parameters require monitoring, or how many applications the data serves, there is always a satisfactory solution. Following are the key components Vaisala uses to shape each custom hydrological solution:

Automatic hydro-meteorological stations

Vaisala hydro-meteorological stations are specially designed to support a broad range of sensors to suit any measurement need (coastal, precipitation, water level, agro-meteorology, etc.). Fixed and mobile installations come complete with a high-accuracy data logger and a variety of powering options. Vaisala stations are designed for unmanned operations at remote sites – they are highly reliable and have very low maintenance requirements.

Characteristics:

- Flexibility to choose the measurement technology that suits local conditions best
- Fixed and mobile installations
- Integrated networks with centralized data collection
- Most commercially available telemetry methods supported

The solution tailored to your needs



Weather radar

Weather radar measures the intensity and location of precipitation covering large and small-scale phenomena including convective rain, which is not well observed by rain gauges. Vaisala weather radar has outstanding temporal and spatial resolution and makes use of the latest dual-polarization technology to detect precipitation type, including sleet.

Characteristics:

- Rapid data updates
- Antenna optimized for dual-polarization
- Advanced algorithms for Quantitative Precipitation Estimation (QPE)
- Possibility to combine weather radar data with Vaisala lightning data

- Vaisala SIGMET Interactive Radar Information System (IRIS) software provides ready-made products for hydrological applications

- CATCH estimates QPE in pre-defined catchment areas
- FCAST forecasts and tracks storm cells and precipitation fields
- GAGE adjusts in-situ observations and weather radar data

Data management

A centralized data management system makes processing and use of all environmental data instantaneous.

Characteristics:

- Data storage, quality control and application software interfaces
- Support for various data formats for observation, forecast, satellite, GIS and other types of data
- Automated pre- and post-processing operations, such as statistical analysis, spatial analysis and format conversions

Hydrological and hydraulic modeling

Hydrological and hydraulic models are used to predict water levels, quantity and flows in river channels, reservoirs and soil. Vaisala can build highly customizable systems, which can support all scales of hydrological and hydraulic modeling including the most commonly used commercial, open source and public domain modeling suites.

The key advantage of our modeling concept stems from the data-centric, open modeling interface approach, which allows for a seamless integration of models from a number of suppliers to represent all aspects of the hydrological cycle. This enables the production of more accurate, holistic information in relation to the individual elements of the hydrological cycle.



Decision support and visualization system

The acquired observation and modeling data is of little use until it is transformed into information that can be understood and put to use. Decision support and visualization systems generate focused hydrological forecasts for user groups such as civil protection agencies, water management authorities, and hydropower plants. For example, when a hydrological model predicts rising water levels, flood warnings are generated automatically, and dispatched in real-time to a local fire department.

Characteristics:

- Thematic maps, graphs and symbols enhance comprehension
- GIS is commonly recognized as a crucial technology in decision support processes

- Fully supports OGC (Open Geospatial Consortium) standards as well as open source and commercial GIS platforms

Meeting needs, safeguarding lives

Knowing and anticipating the movement of water helps us to safeguard lives, property and the environment while maximizing productivity. An integrated hydrological solution tailored to the

customer fulfils the needs of all end users and provides decision makers with the accurate, complete data they need to make the best decisions.



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www.vaisala.com

For more information, visit
www.vaisala.com or contact
us at sales@vaisala.com

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