HYDROSCOUT®

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Floods are without doubt one of the most devastating natural disasters, striking numerous regions of the world each year. During the last decades the trend in flood damages has been growing exponentially due to the increasing frequency of heavy rain, changes in upstream land-use and a continuously increasing concentration of population and assets in flood prone areas. Experience has shown that structural flood control measures alone cannot prevent the loss of lives and property. To mitigate flood related risks, accurate and timely meteorological and hydrological forecasting products are needed to form the basis of successful decision making and flood management.

INTEGRATED SOLUTION

HydroScout® is a turn-key solution for hydrometeorological decision making and incorporates detection, monitoring and forecasting. Observations from weather radar systems together with state-of-the-art data processing are used to obtain the amount of rain that is falling to the ground with high temporal and spatial resolution. Future rainfall is derived from extrapolation techniques and this information is fed into hydrological models to produce different types of clear, consistent, and targeted warnings to assist the enduser in daily decision making.

MODULARITY AND SCALABILITY

HydroScout® is designed as a modular system based on long-term experience in radar meteorology and hydrology. The modular design means the individual requirements of the specific end-users and the existing infrastructure are met perfectly. HydroScout® embraces hardware consisting of weather radar systems as the key instrument for the spatial observation of precipitation, and a series of algorithms for the generation of hydro-meteorological contents, products, and alerts. These provide the basis for Delft-FEWS (Flood Early Warning System) from Deltares, an open framework for the integration and dissemination of hydro-meteorological data. All information is combined in the FEWS system and presented via a web-based interface to the end-user. Alerts can be disseminated via internet technologies.

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MODULES

Weather Radar

Weather radar systems are the most important components for a hydro-meteorological decision support system as they are able to observe and detect precipitation over wide areas with a high spatial and temporal resolution. Different wavelengths and systems are used depending on the prevailing meteorological conditions and/or local restrictions. Generally speaking, longer wavelengths (e.g. S-Band) are preferred for tropical regions as these systems suffer less from attenuation by heavy precipitation. C-Band systems are often used in mid-latitudes as they provide high data quality and are less expensive. The smallest systems (X-Band) can be an alternative for surveillance of smaller basins and regions or in combination with larger systems for gap-filling. All systems are available with the option of dual-polarization offering enhanced data quality and precipitation estimates, and further products as e.g. the classification of hydrometeor types.

Sensor Integration

HydroScout® is designed to integrate additional sensors and data. Sensors like rain gauges, disdrometers, weather stations, satellite reception or lightning detection systems complete the available information on the current meteorological situation. Other data, for example from numerical weather prediction, provide a forecast up to several days in the future.

Quantitative Precipitation Estimation

Weather radar is the only instrument able to observe quantitative precipitation over wide areas with a high temporal and spatial resolution. However, data quality has to be controlled and algorithms have to be applied to the data to obtain the best possible quantitative precipitation estimation. HydroScout® relies on the Rainbow® software suite for data quality control, processing, and product generation.

Quantitative Precipitation Forecasting

Quantitative precipitation forecasts are used to increase lead times. Short term (30 - 60 minutes) forecasts, the so-called nowcasts, are based on radar data. Two main philosophies of nowcasting exist: cell tracking and field tracking. Cell tracking focuses on thunderstorms and traces the position of storm cells. The observations and behaviour of cells are then extrapolated to forecast their future locations. In contrast, field-trackers are usually used for wide-spread stratiform precipitation events taking into account the entire field of precipitation. Where data from numerical weather prediction models is available this data can be easily integrated into the system providing the basis for forecasts beyond 30 - 60 minutes.

Hydrological Modelling

Although warnings can be issued directly on the basis of observed or forecasted rainfall data, hydrological and hydraulic modelling and the resulting forecasts of discharges and river levels provide information on the duration and magnitude of the event and increase the lead time for issuing warnings. Expertise is provided when choosing from hydrological and hydraulic models of different degrees of sophistication. Furthermore, existing hydrological and hydraulic models can be fully integrated into HydroScout®.

Decision Support

The process of decision-making not only depends on the underlying information, but also on their presentation. Within HydroScout®, customizable alerts summarize the situation in an empirical way supporting fast and safe decision making. The clear presentation of information together with dedicated forecasting products provide the basis for a rapid overview of the entire situation without the need for complex interpretation. The visualization platform is customizable and each user can specify the displayed products. Furthermore, all contents and products can be accessed and disseminated via the internet.

Delft-FEWS is a software product of

Deltares
Enabling Delta Life

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