



GMON

Automatic Snowpack Sensor

An accurate knowledge of river and reservoir inflows from snowmelt is vital information for Hydro-Québec in managing hydropower generation. It is thus important that the company can rely on leading-edge measuring instruments. With this in mind, a team from the company's research institute, IREQ, has developed an automatic snowpack sensor.

GMON (for gamma monitoring) is a remote sensor that automatically measures snow water equivalent (SWE) to improve the quality of spring flood forecasting. This offers many advantages over conventional manual measurement methods. Changes to the snowpack can be monitored in real time, thus improving water inflow forecasts.

Accurate, reliable measurements

GMON measures the extent to which natural gamma radiation from the soil is attenuated by the presence of water. Sensor output is thus used to calculate snow water equivalent (SWE) and soil moisture. Installed above the snowpack, the sensor can transmit data up to four times daily for an area of 50 to 100 m² regardless of the condition of the snow (e.g., dry, crusty or wet).

The sensor is composed of a scintillator (sodium iodide crystal), a circuit board and a connection box. A collimator demarcates the surface area being observed.

Conventional snowpack measurement methods use a snow tube. Such measurements vary in frequency and regularity, resulting in less accurate snowmelt estimates. GMON's ability to take automatic, remote measurements ensures the precision required for snowmelt estimates and hydropower management.



*Internal GMON components:
gamma radiation detector, photomultiplier,
data acquisition and processing circuit board*

Specifications and advantages

- > Operating temperature: -40°C to +55°C, maximum relative humidity of 93%
- > Power supply: 12 V batteries recharged by solar panels
- > Instrument size: 65 cm long, 12.7 cm outside diameter
- > Weight without collimator: 12 kg
- > Highly reliable, accurate measurements: water content uncertainty of $\pm 5\%$ at maximum snow depth
- > Accurate daily SWE and soil moisture readings
- > Low manufacturing cost
- > Low data collection cost
- > Many applications: reservoir level management, detection of water in wood and other materials, flood and forest fire prevention

For more information

Research

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Patent

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