

# Forecast the evolution of groundwater levels by improving national piezometric network's data, and provide public access to almost real-time data (maps and curves). From the sensor to measured data dissemination : "la MétéEau des nappes".

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# Forecast the evolution of groundwater levels by improving national piezometric network's data, and provide public access to almost real-time data (maps and curves). From the sensor to measured data dissemination : "la MétéEau des nappes".

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Geoscience for a sustainable Earth — brgm

**Abstract n°1568 (Session 3.01 Groundwater data in the New Digital Age)**

In front of current societal expectations and of climate-related events more and more marked (water resource's quantity and quality, pressures, climate change, drought, floods by water table rise, the need to have as quickly as possible recently measured data), the BRGM internal research project called "MétéEau des nappes" is trying to provide public access to almost real-time basic and improved data that comes from the French national piezometric network. The aim of this project is to couple these data with meteorological data and rivers discharge. The objective is also to show modelled and forecast groundwater levels (high and low) on maps and curves.

## The "MétéEau des nappes" project

This project, led by a multidisciplinary team (hydrogeologists, computer scientists, and geostatistical ingineers of the BRGM), deals with various scientific and technical problems :

1) storage and provision of basic data coming from more than 1400 sensors of groundwater levels (Nicolas et al., 2013) and from model forecast of the aquifers behavior,
2) development of interoperable communication tools / standards (Grellet et al., 2015) allowing exploitation and cross-referencing data from other networks (meteorology, river flow) to daily characterize in almost real-time quantitative state of groundwater resources (droughts and flooding).

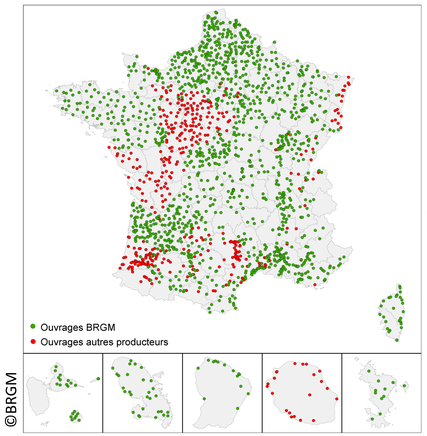
## Work done in 2015 :

- inventory of global models done by the BRGM for various aims (rainfall-runoff or rainfall-runoff-piezometric level models)
- selection of 7 study areas, collection, development or updating of models
- first equipment of regional sites in GPRS (real-time data)
- edition a demo prototype tool for providing and visualizing data, beginning writing its technical and functional specifications
- technical exchanges with Météo-France and SCHAPI on meteorological and hydrometric data
- work on sensors interoperability and providing environmental data (Sensor Observation Service, Sensor Web Enablement)

## A response to the French stakeholders needs

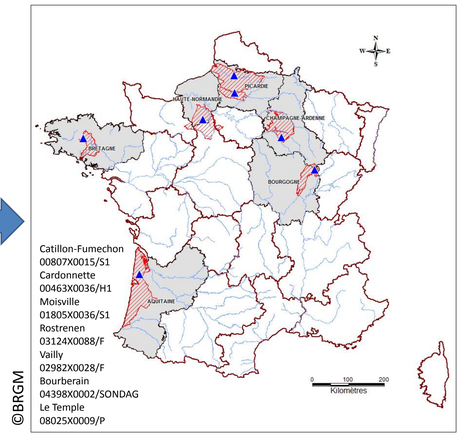
After 3 years of project (2015-2016-2017), a practical and innovative tool could be set up. It would allow varied uses : from a simple display of current and future groundwater table by water's stakeholders (French SAGE's moderators, technicians of river catchments), to the improvement of the water use management during high or low water levels by State's Services (for example : prefect order of water restriction).

Among the French stakeholders interested in this initiative, we can also indicate : Water agencies, DREAL, DDT, Regions and Departments, Association of Municipalities, Industrial water producers…



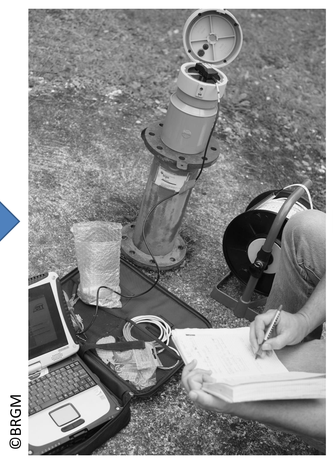

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French national piezometric network (1700 stations including 1400 managed by the BRGM)



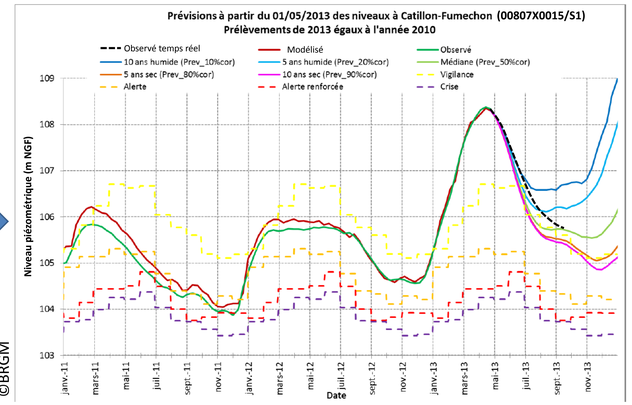

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Selection of 7 representative stations on 6 French regions, 7 groundwater bodies, and 4 geological formations



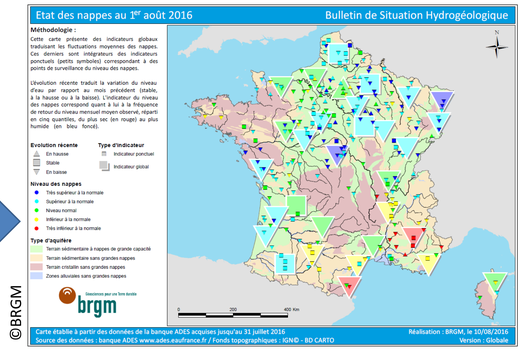
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Borehole equipped with real-time data transmission sensor (GPRS)




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Updating model (Bault et al., 2013) and creation of forecasts. Comparison of groundwater levels observed in real-time and forecast results.




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French groundwater's level situation at the end of July, 2016

Forecast in 2 months ?

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