



RÉPUBLIQUE
FRANÇAISE

Liberté
Égalité
Fraternité

WATER



DIGITAL



AGRI/AGRI-FOOD



TERRITORY



INTERNATIONAL



Our SOLUTIONS

MétéEAU Nappes,
a tool for real-time
monitoring and forecasting
of groundwater levels

Are you a public authority or organisation involved in managing water resources? Would you like to know the current state of the water table levels in your region and be able to establish reliable forecasts? BRGM's MétéEAU Nappes tool enables you to consult the status of your water resources and facilities in real time and thus to put in place an effective water-resource management and protection plan.

Waterfall (Spain, 2014).
© Fotolia - David Delossan



Geoscience for a sustainable Earth

brgm



The Blue Spring resurgence with transparent waters (Doubs, 2007). © BRGM - François Michel

YOUR ISSUES AND NEEDS

In the face of increasingly severe weather events and growing pressure on water resources, it is crucial for all the stakeholders involved in water management to have access to real-time information about the availability of water resources and to be able to predict the level of water tables, particularly as regards the implementation of the GEMAPI plan (French national plan concerning the management of aquatic environments and flood prevention). This information makes it possible to:

- Characterise the specific features of a site
- Optimise resource management by adapting groundwater abstraction and managing conflicts of use
- Take decisions when faced with water shortages or surpluses
- Test different scenarios to anticipate the effects of climate change.



OUR **ADDED VALUE**

BRGM has developed the MétéEAU Nappes website, which displays real-time data of measurements carried out by the national piezometric network, for various monitoring points linked to the French hydrological model.

These data are displayed as maps and dynamic curves based on modelling and forecasting studies of water table levels during low and high-water periods. Meteorological, hydrological and piezometric data from several representative sites in metropolitan France are published online in real time and in an interoperable format. Combined with the general models used (Gardenia and Tempo ©BRGM), these data make it possible to forecast groundwater levels. The forecasts (which cover 6 months) are compared with piezometric thresholds (for example: drought thresholds taken from Prefectoral decrees in force concerning restrictions on water use).

MétéEAU Nappes provides a whole range of services that enable users to monitor the current and future behaviour of aquifers in France. It is a valuable decision-support tool for managing water resources in sensitive areas (management of low water periods, risk of flooding due to rising water tables, etc.).



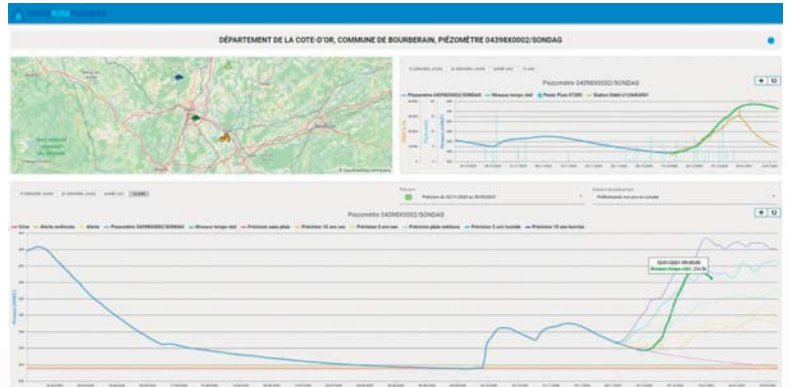
Borehole equipped with measurement systems (Brittany, 2011). © BRGM - Bruno Mougin



View of a karst aquifer (Dominican Republic, 2008).
© BRGM - Christophe Rigollet



A piezometric chronicle survey at Maheswaram (Central India, 2015). © BRGM - Adrien Selles



Screenshot of the website MétéEAU Tablecloths (dated 12/01/2021). © BRGM

FEATURES AND SERVICES

- Simplified web interface.
- Display of historical and real-time meteorological groundwater and surface water data provided by SCHAPI, Météo-France and BRGM.
- Maps of the groundwater status for the day in question and forecasts based on various weather scenarios.
- Superimposed graph curves of piezometric levels (history, real-time data, forecast levels; drought/flood piezometric thresholds), real-time rainfall and river flowrates.
- Automatic monthly update of forecast data concerning groundwater levels with recent weather data (from Gardénia).
- Provision of metadata linked to the forecasts: model used, frequency, benchmark period, correlation coefficient, samples taken into account (or not), natural slope of the terrain above the piezometer, bibliographical sources of the piezometric thresholds, etc.
- Dynamic private application programming interface (API).



PUBLICATIONS

- Mougin B., Nicolas J., Bessière H., Vigier Y., Loigerot S. (2018). *Vers une prévision en temps réel du niveau des nappes françaises?* (Moving towards real-time forecasting of groundwater levels in France) The "MétéEau des nappes" decision-support tool. "Géologues" journal No. 195 of December 2017, pages 16 to 21.
- "MétéEAU Nappes": a website with useful services for water and drought management. Mougin, B., J. Nicolas, Y. Vigier, H. Bessière, and S. Loigerot. *Houille Blanche-Revue Internationale De L'Eau*, No. 5 (Dec 2020): 28-36.
- Surdyk N., Thiéry D., Nicolas J., Gutierrez A., Vigier Y., Mougin B. (2022). *WeatherWATER Groundwater: a real-time water-resource management tool and its application to a sandy aquifer in a high-demand irrigation context*. *Hydrogeology Journal*. <https://doi.org/10.1007/s10040-022-02509-1>.
- Vicente-Serrano SM, Domínguez-Castro F, Peña-Angulo D, Peña-Gallardo M, Henriot A, Caballero Y, Mougin B, Coscarelli R, Antronico L, Zimbo F, Petrucci O, Pasqua AA, del Jesus M (2020) Report on comparison of the ISD with sectoral data. Indecis Project Deliverable 4:5 <http://indecis.eu/docs/Deliverables/Deliverable4.5.pdf>. Accessed July 2022

A FEW REFERENCES

- Contribution to the groundwater section of the French National Hydrological Status Report.
- Forecasting the evolution of surface water tables by grouping together regional hydrogeological models on a nationwide platform (Aqui-FR project).
- Contribution to the National Commission for Hydrological Anticipation and Monitoring (CASH) in terms of seasonal forecasts of the state of groundwater (<https://www.ecologie.gouv.fr/secheresse-berangere-couillard-reuni-comite-danticipation-et-suivihydrologique-prevenir-degradation>).
- Supporting the Ministry of Ecological Transition and Territorial Cohesion in France in their construction of a map highlighting territories at risk of drought by the end of summer 2022 (<https://www.ecologie.gouv.fr/secheresse-reunion-du-comite-danticipation-et-suide-hydrologique> and <https://www.brgm.fr>).
- The MétéEAU tool will be deployed to measure the groundwater level near the exploitation fields of the City of Cape Town (South Africa). <https://www.engineeringnews.co.za/article/cape-town-nets-r83m-groundwater-funding-agreement-2022-03-16>.
- Visit the MétéEAU Nappes website: <https://meteeanappes.brgm.fr/en>



EDUCATION & TRAINING, one of BRGM's missions

BRGM helps to develop scientific and technical skills through both "off-the-shelf" and "tailor-made" training courses, provided by its specific professional training branch: BRGM Formation.

Training course themes :

Geology | Sustainable management of groundwater resources | Mineral resources and circular economy | Environment, land-use projects | Energy transition and underground space | Natural risks, impacts of climate change.



Service géologique national
3, avenue Claude-Guillemin
BP 36009 – 45060 Orléans Cedex 2
Phone 02 38 64 34 34
Email: contact-brgm@brgm.fr
www.brgm.fr

