Prefaces

In 1995, the DATAR (French Delegation for Regional Planning and Development) commissioned researchers from the University of Poitiers to design scientific activities related to the planned underground laboratory for radioactive waste storage, located in the southern part of the Vienne department. Drawing on the expertise I had acquired during my doctoral research at the Béthune study site—developed under the supervision of Professor Norbert Crampon—and on the data already collected in southern Vienne, I naturally proposed the creation of an ambitious hydrogeological study area. However, due to the high degree of fracturing in the granitic bedrock, the National Evaluation Commission issued an unfavorable opinion regarding the siting of the underground laboratory.

It was within this context that the Hydrogeological Experimental Site (HES) project was born. Submitted as part of the 2000–2006 State–Region planning contract to the Ministry of Research, the project was accepted and received funding of 13 million French francs. The first borehole was drilled in July 2002. By 2025, the HES comprised 45 boreholes spread over 32 hectares, traversing fractured and karstified limestone aquifers of the Lower and Middle Jurassic, with a thickness of 160 meters.

Today, the HES stands as a unique experimental platform in France, open to the entire scientific community. It supports research projects, both initial and ongoing education programs, and serves as a testing ground for various disciplines, including pedology, geology, geophysics, hydrogeology, hydrogeochemistry, and numerical modeling. For over twenty years, this infrastructure has enabled significant advances in the understanding of the structure, behavior, and dynamics of carbonate reservoirs.

I am particularly pleased by the fruitful collaboration between Thierry—a passionate geologist and Jurassic specialist—and Jean-Luc, a geophysicist involved with the HES from its inception. Together, they have produced a major work that skillfully combines their respective expertise to improve our understanding of the structural organization of the limestone reservoir. The detailed characterization of Middle

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Jurassic lithology, combined with a diverse geophysical approach, made it possible to identify the karstic levels responsible for the rapid flows observed at the site.

Throughout the nine chapters, readers are guided toward a coherent and well-supported representation of the reservoir structure, where variations in carbonate chemistry (pure limestone vs dolomitized limestone) emerge as key drivers of karstification. Within the 100-meter-thick section under study, three horizontal productive levels have been clearly identified, representing priority targets for the sustainable extraction of groundwater resources.

Pr. Gilles POREL
Head of the hydrogeological experimental site
at the University of Poitiers

It is with genuine satisfaction that I have the privilege, less than a year after the publication of the AGAP notebook *"Geophysics in Geothermal Exploration: a review"*, to write the preface to this new work: *"A New Concept of Karst Development Based on Hydrogeology and Geophysics."*

Once again, the term *"notebook"* hardly does justice to the content, as this is far more than a simple collection of summaries. It is a work of undeniable scientific merit, enriched by clear and visually compelling figures of exceptional quality.

I would like to extend my sincere congratulations to the authors of the nine chapters and express my gratitude to Jean-Luc Mari and Thierry Gaillard. Their respective expertise in geophysics and in the geology of the Poitou-Charente Threshold has ensured a vital coherence in a work that demands true multidisciplinary mastery.

I am highly confident that this "notebook" will be well received by its readers—whether geologists, hydrogeologists, karstologists, geophysicists, or geoscientists in general.

Michel HAYET
President, AGAP Quality