



RÉGION WALLONNE

Ministry of the Walloon Region - Direction Générale des Ressources Naturelles et de l'Environnement

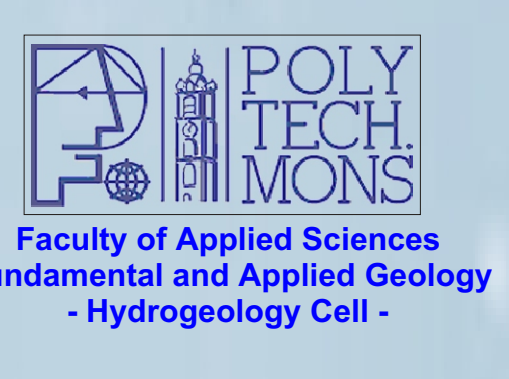
GIS and Hydrogeological Mapping of the Walloon Region (Belgium)

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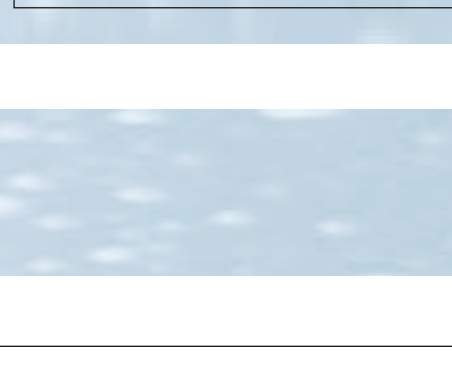
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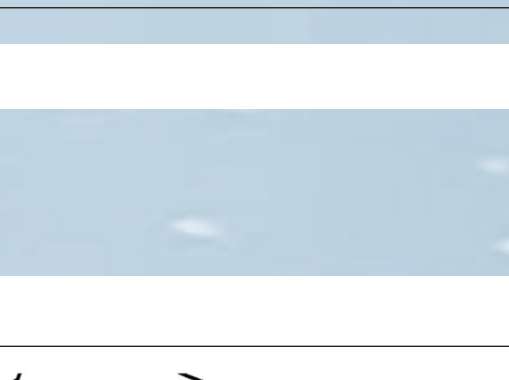
Luxembourg University Foundation - Laboratory of Hydrours Resources



Faculty of Applied Sciences Fundamental and Applied Geology - Hydrogeology Cell



University of Namur - Department of Geology



UNIVERSITÉ de Liège - GEOMAC Department

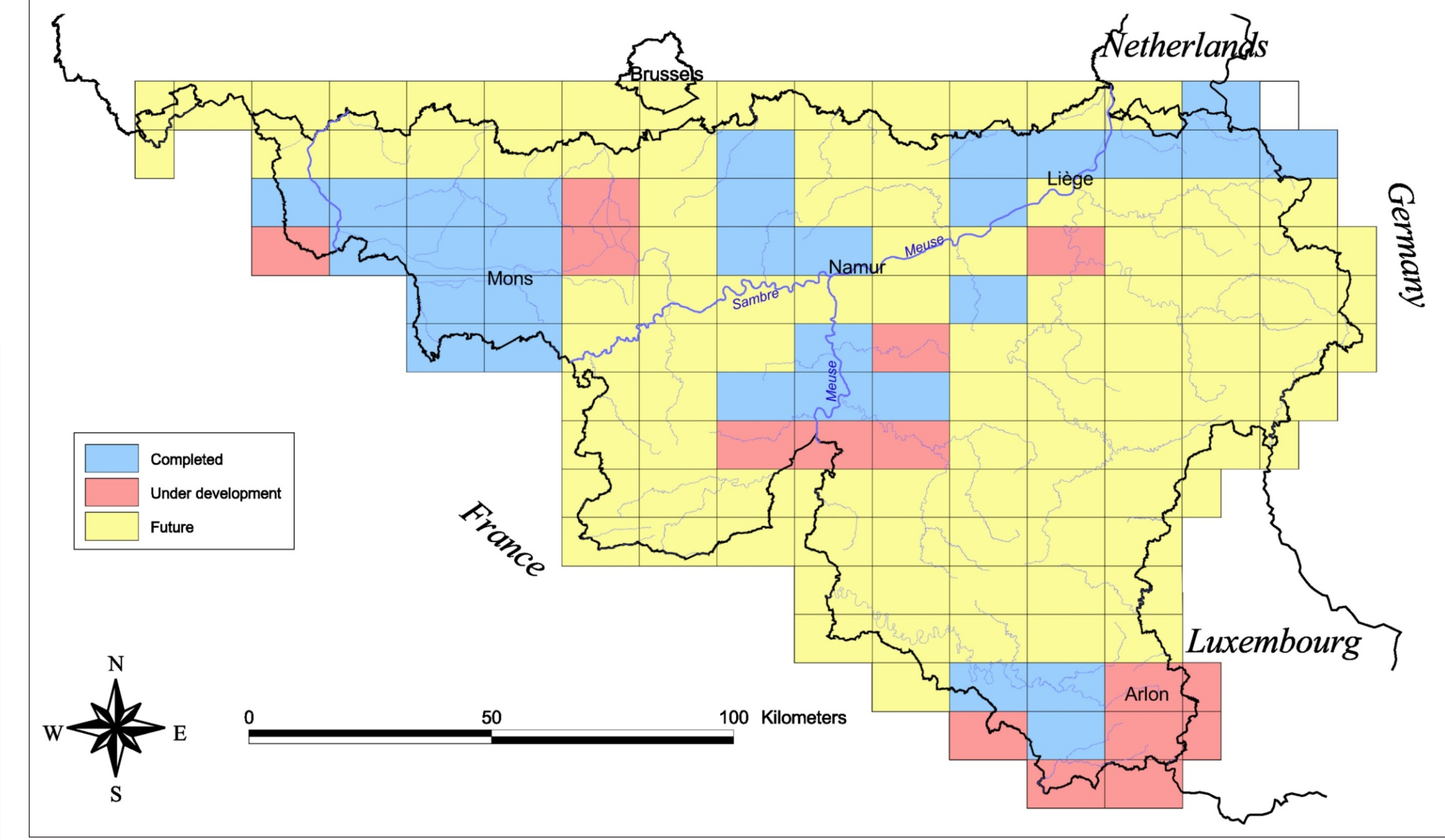
Introduction

The Ministry of the Walloon Region, *Direction Générale des Ressources Naturelles et de l'Environnement*, has initiated in 1999 the first Belgian hydrogeological mapping program. This program involves four Walloon universities. Twenty-eight hydrogeological maps are already completed at the 1/25,000 scale. At the annual rate of three maps per team, the entire hydrogeological coverage of the Walloon Region should be completed in 2010.

Aims

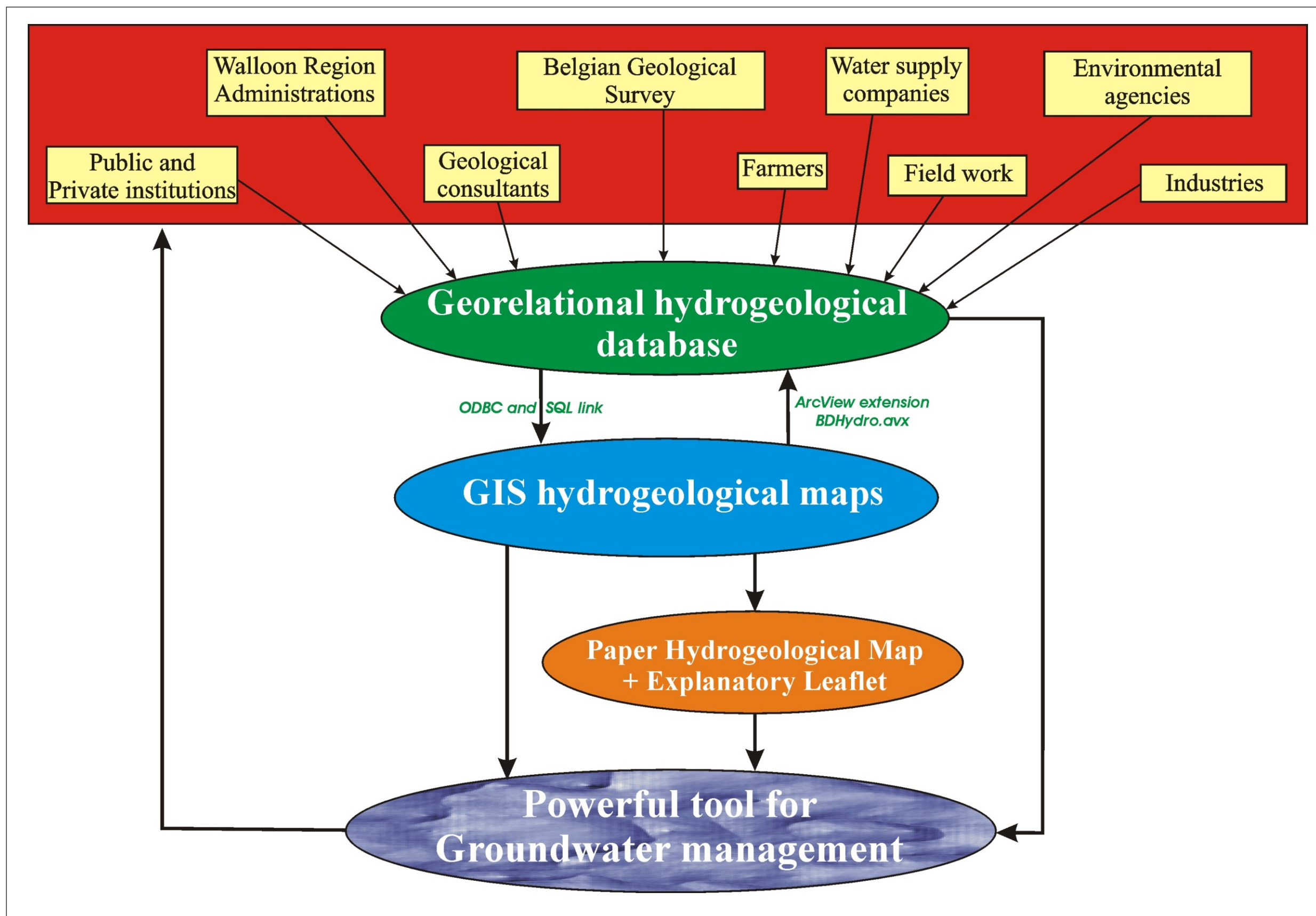
Hydrogeological maps are very useful and strongly required documents for all people, companies or institutions concerned with the quantitative as well as qualitative management of groundwater resources. They synthesize, at a local scale, hydrogeological knowledges of a region. Principal aims are to inform on the extension, geometry, piezometry, hydrodynamic and hydrochemical characteristics of the regional aquifers.

It can be used to manage qualitatively as well as quantitatively exploited groundwaters, to estimate the aquifer vulnerability and to evaluate the risks of pollution of production wells or galleries according to the direction of underground flows, to plan intervention in case of contamination of the water table, to locate new water catching points for water supply companies or industries, to supervise land-use policy, to give information for the interested consumer, ... Potential fields of application of such a document are as many as varied.



Progress report of hydrogeological maps of the Walloon Region, Belgium

Methodology



The development of hydrogeological maps is essentially based on the collection and synthesis of existing data coming from numerous and various sources. All these data concern general as well as specific information on the local hydrogeology (topography, geology, climate, location of all water catching points, hydrochemistry, well equipment, various tests, exploited volumes, hydraulics heads,...). A significant field work is also carried out to check the exactitude of the collected data and to supplement them where they are missing.

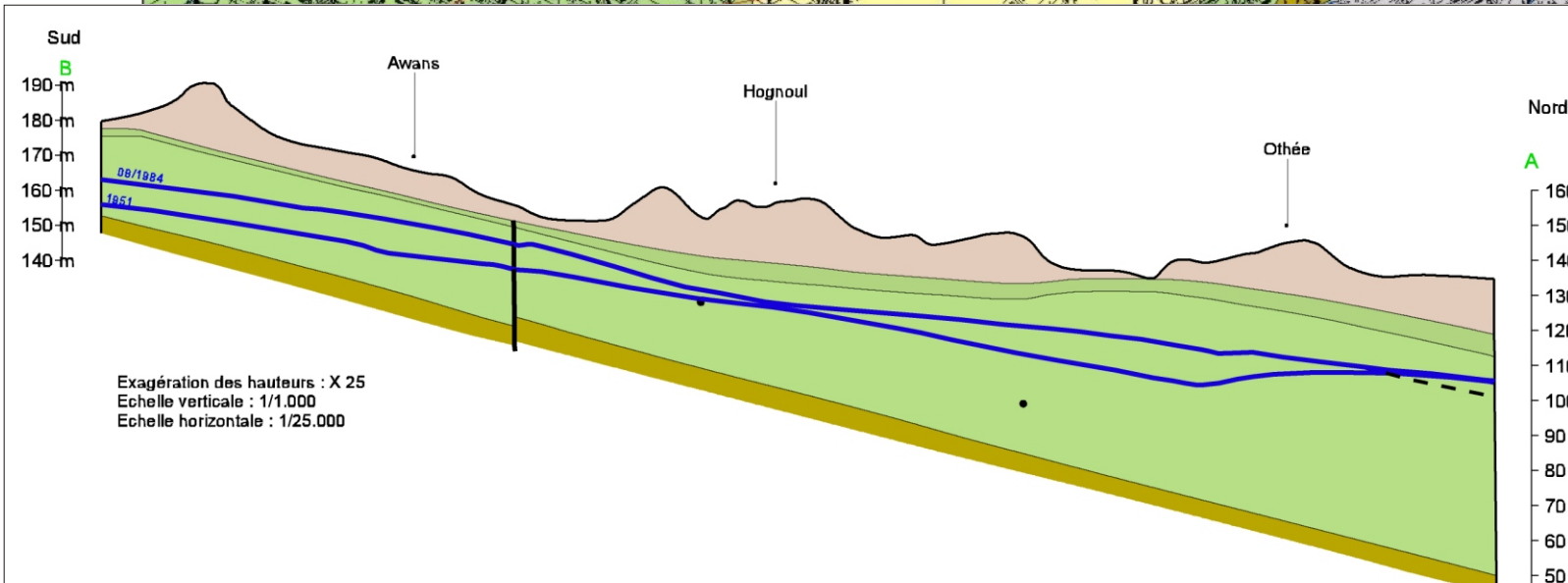
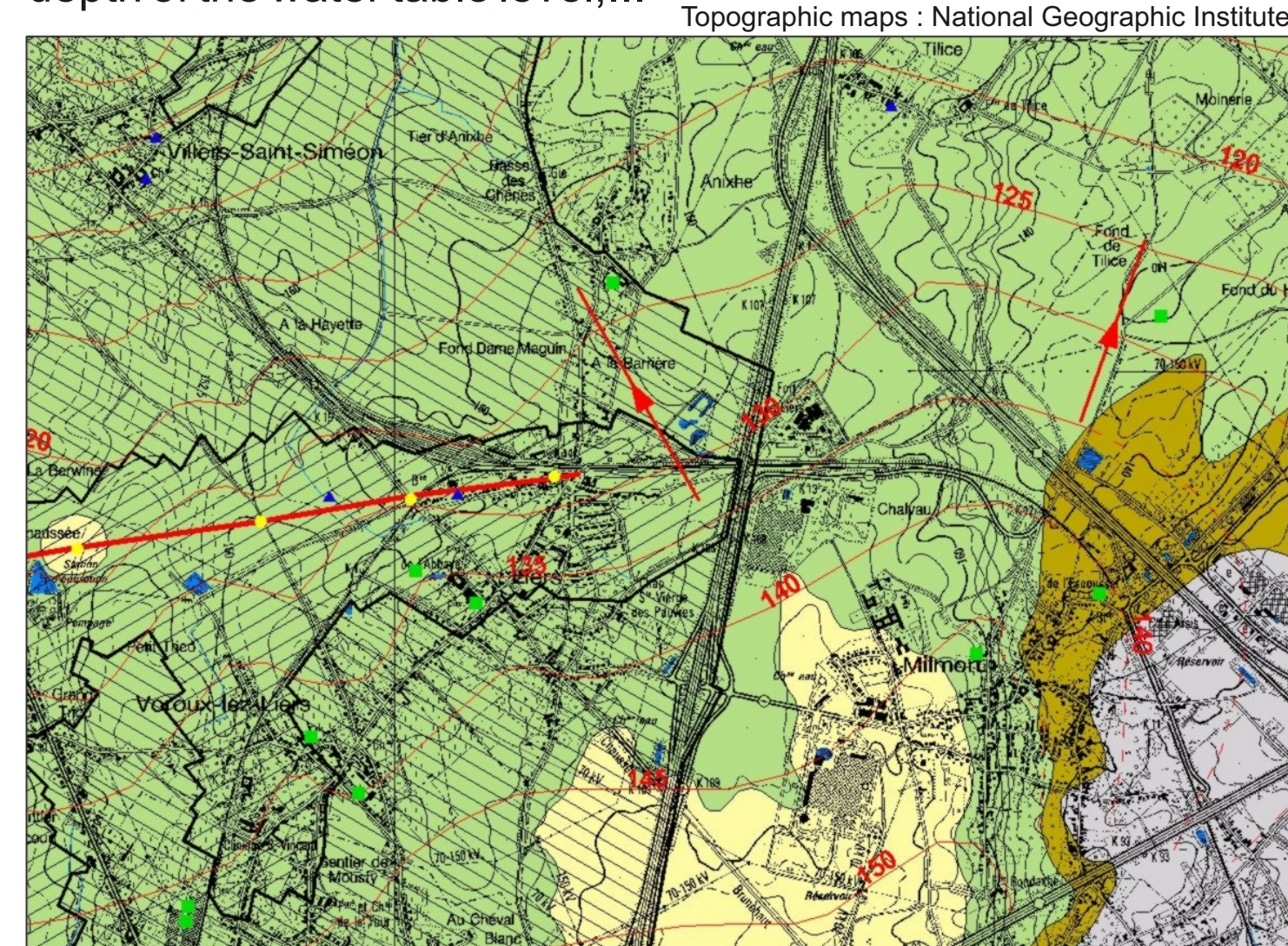
Collected data are stored in a georelational database (Access, Microsoft®) from which hydrogeological maps are built. That database is actively linked to the GIS hydrogeological map project (ArcView, ESRI®) by an ODBC/SQL connexion. This connexion allows an automatic update of the GIS project thanks to the geographic coordinates.

Points (wells, springs,...), polylines (galleries, isopiestic lines,...) and polygons (protection zones, watersheds,...) are all geographically referenced with Lambert coordinates (Belgium Lambert Conformal Conic Projection) and superimposed on georeferenced topographic and geological maps.

The hydrogeological database can be consulted throughout the map in the GIS project thanks to a developed ArcView extension called BDHydro. This program allows the user to display specific information concerning for example a well or a spring (hydrochemical analysis, isopiestic evolution, geological or technical logs,...) by simply clicking on it.

Components of hydrogeological maps of Wallonia

MAIN HYDROGEOLOGICAL MAP (1/25,000) displaying several layers of information as : topography, geology adapted to hydrogeology (with lithological formations grouped to form hydrogeological units depending on their hydrogeological characteristics), hydrographic network, localization of wells, springs, piezometers, galleries, drains, karstic phenomena, protection zones, hypothetic direction of the underground flows, depth of the water table level, ...

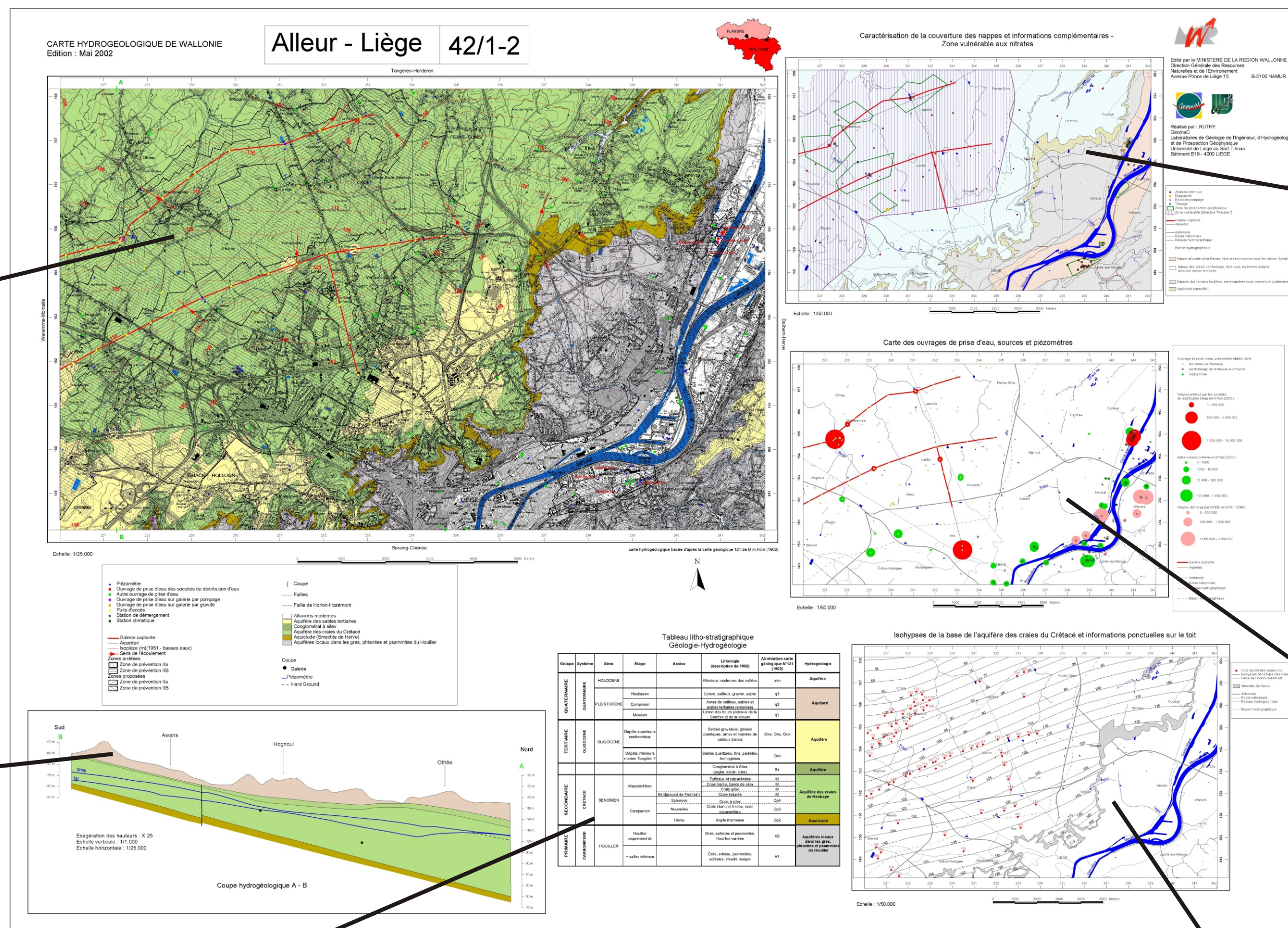


GEOLOGICAL AND HYDROGEOLOGICAL CROSS-SECTIONS displaying geological structures and the saturation level depth.

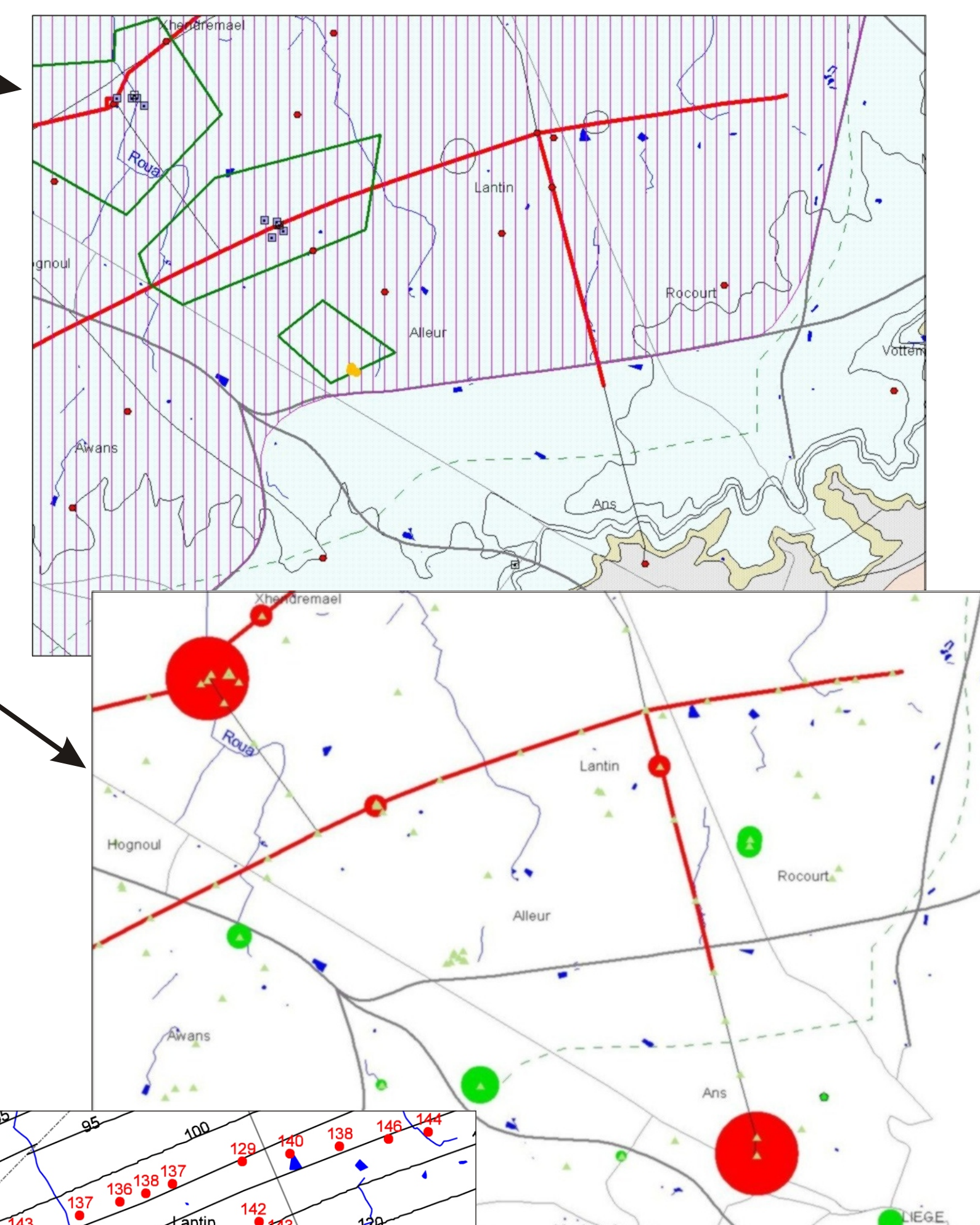
Groupes	Système	Série	Etage	Assise	Lithologie (description de 1962)	Abbréviation carte géologique N°121 (1962)	Hydrogéologie
QUATÉNAIRE	Quaternaire	HOLLAÏNE	Hoilaire		Aluvene récentes (sables)	am	Aquifère
			Hoislayen		Limons, cailloux, gravier, sables	ap	
			Carrièreux		Arges de cailloux, sables et graviers	aq	Aquifère
TERTIAIRE	Craieuse	CLOUÏSIENNE	Clouïse		Sables gravillonnés, argiles, cailloux et graviers	Crn, Cns, Cnc	Aquifère
			Clouïse inférieure		Sables, argiles, cailloux et graviers	Om	
			Clouïse supérieure		Sables, argiles, cailloux et graviers	Os	Aquifère
SECONDAIRE	Craieuse	SENONIENNE	Moustérien		Grès, calcaires et marbres	Ms	Aquifère des crans de Hestaye
			Senonien		Grès, calcaires et marbres	Sc	
			Compiègne		Grès, calcaires et marbres	Co	Aquifère
PRIMAIRE	Craieuse	HOLLAÏNE	Hollaïre		Grès, schistes et psammites	Hc	Aquifère local
			Hollaïre inférieure		Grès, schistes, psammites, sables, Houilles marges	Hf	Aquifère des crans de Hestaye

LITHOSTRATIGRAPHIC TABLE showing the correspondences between geological formations and hydrogeological units.

GIS Hydrogeological Map Project

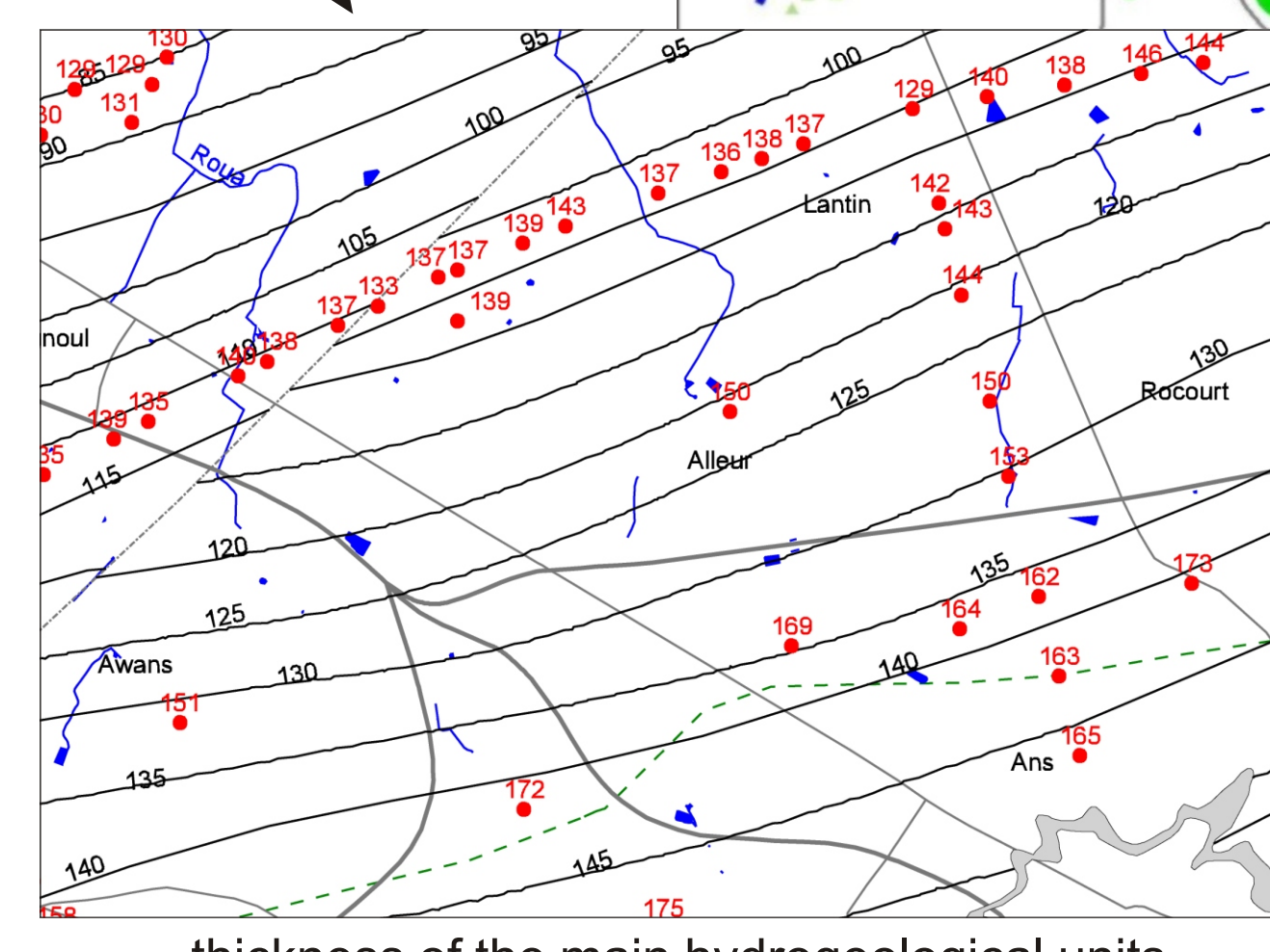
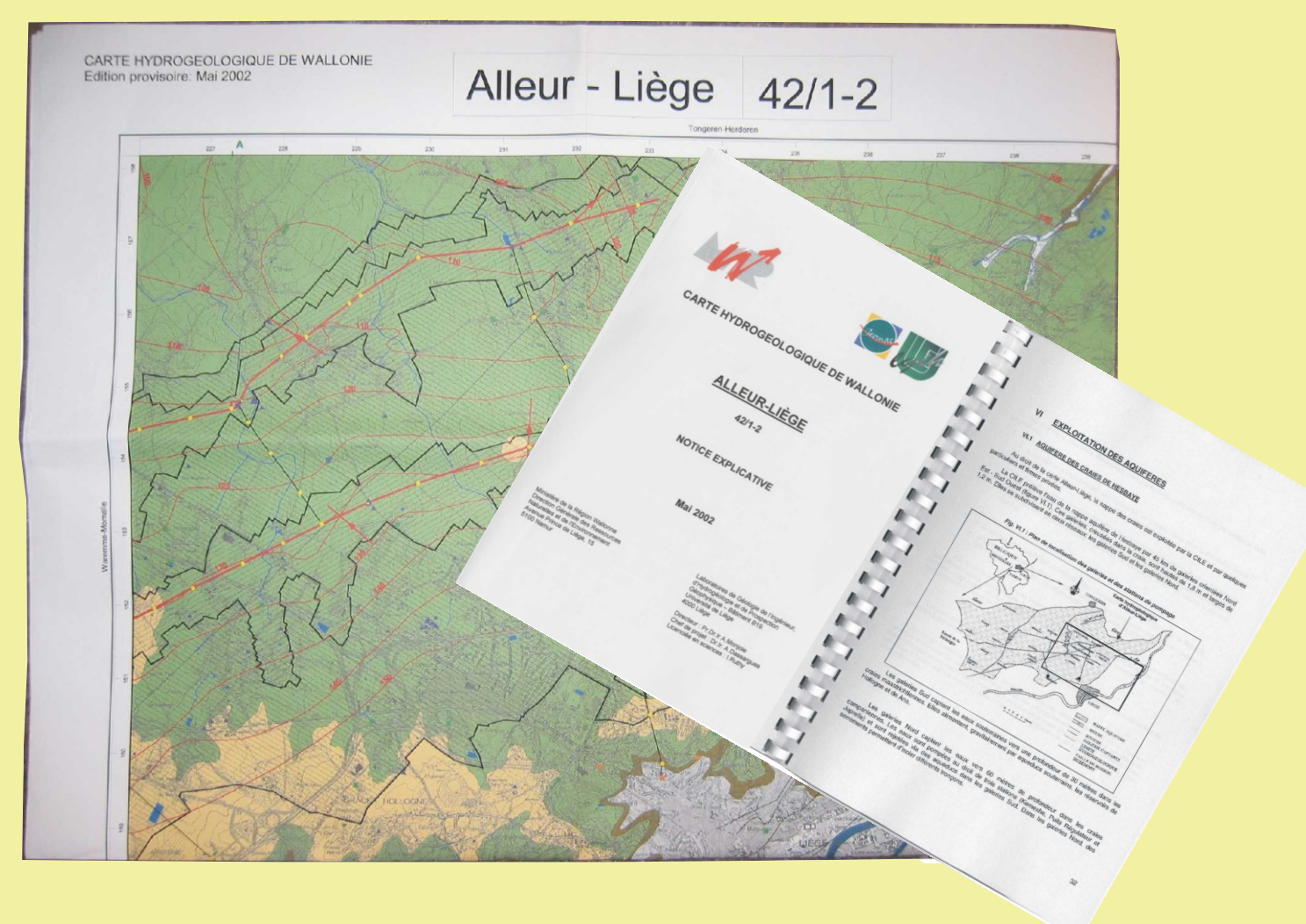


THEMATIC MAPS at the 1/50,000 scale showing more specific information as the confined or unconfined nature of the aquifer, various tests (geophysical prospection, hydrochemical analysis, pumping and tracing tests,...)



...actual exploited volumes, localization of water catching points with symbols depending on the solicited hydrogeological units,...

Hydrogeological Map and Explanatory Leaflet



...thickness of the main hydrogeological units, isohypses or local elevation of their bottom and their roof,...

Currently, hydrogeological maps are available only as paper ones with an explanatory leaflet. The latter is written for a non specialist public and allows a better understanding of the map. It develops general considerations on regional geography, geology and hydrogeology. It also focuses on specific hydrogeological aspects as local behaviour of the water table, karstic phenomena, hydrochemistry, hydrodynamic parameters, delimited protection zones in the area, ... A project of restricted access to the hydrogeological maps and database on the Internet is being studied.