A platform to harmonize the regional hydrodynamic models in the southwestern part of France

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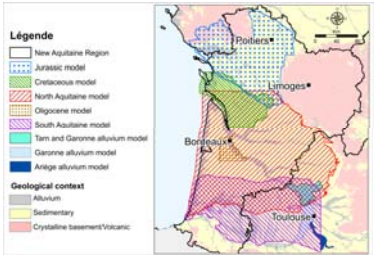
To support the authorities in water resource management and contribute to the understanding of the hydrodynamic of multilayered aquifers, different groundwater models have been developed in southwestern France for nearly twenty years. All these models, developed independently from each other, are intended to be integrated in a common platform in order to harmonize their functioning with the experience gained during the development and their individual usage. Moreover, this work contributes to cope with the issue of lengthening their lifespan.

2 Context – presentation of the 4 models

Groundwater models used to groundwater management have been developed in the Adour-Garonne and Loire-Bretagne basins (with the funding of the Aquitaine and Poitou-Charentes Regions and Adour-Garonne and Loire-Bretagne Water Agencies). Four among them coexist and cover a total area of 82,570 km² corresponding to 87% of the sedimentary formations of the new Aquitaine Region: Cretaceous (Douez et Bichot, 2012), Jurassic (Douez, 2015) models in Poitou-Charentes, North Aquitaine Model (MONA - Thiery et al, 2010) and South Aquitaine Model (Seguin, 2003).



In addition to these regional models, other models with refined geometry or mesh have been developed on a part of the same territory in order to respond to local and specific problems (as for instance in Saltel et al, 2010).

3 Groundwater modeling

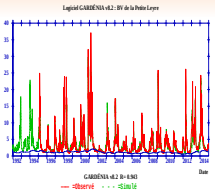
Spatialized groundwater models need data that are used for their construction and calibration. The numerous parameters used during the calibration phase create a matrix made of as much dimensions that are multiplied by the number of active cells in the model. Thus, the modeler needs to rely on reliable data and process in order to constrain the values integrated within the matrix.

4 Using a geological modeler

The use of a geological modeler allows to properly represent the geometry of sedimentary formations that may have registered folding, faulting, erosion, etc. during their lifespan. Moreover, it allows the combination of geological and geophysical data for their elaboration. At last but not least, it allows a relative flexibility in order to regularly update the geological model with the latest geological data (used for the North Aquitaine model).

5 Harmonizing the assessment of the recharge

The use of climate spatialized data (SAFRAN data from Météo-France) coupled with the use of a specific recharge module allows, in the same way as for the Jurassic model, to homogenize and calculate the groundwater recharge in the different models for the aquifers. The recharge module is based on the decomposition of river hydrograms that are in connection with a specific aquifer. This method allows the restitution of surface runoff as well as recharge, which means that rivers flow may be simulated.



6 Managing the withdrawals data

A proper identification of groundwater withdrawals, their time variations and the aquifer tapped is a sine-qua-none condition for the elaboration of a groundwater management program. Thus, a water withdrawal database is built to handle and treat in the same way all data gathered from different origins with variable time steps and specific issues related to each models (water withdrawals in groundwater and/or surface for various uses for water supply, industry, irrigation, dam releases, sewage discharges, etc.).

The accuracy (measured, estimated, reconstituted in case of old withdrawals) and the origin of the information are traced in order to be able to update the data in case new information become available.

7 Preliminary conclusions

Harmonizing the process and the data used for groundwater modelling allows faster updates, faster adaptation of models and it increases the modelers capacity to assist water resource management's authorities.

Moreover, it contributes to improving the capacity of a modelling team to develop synergy, it facilitates their ability to handle models and limits the risk of losing groundwater models due to the departure of the know-how sole agent.

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