Groundwater modelling of a complex multilayer coastal aquifer under climate change in the framework of the DEM'EAUX ROUSSILLON project

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The Plio-Quaternary aquifer of the Roussillon plain (multilayer aquifer of more than 350 m thick, made up of sandy layers embedded in low-permeability clay material from the Pliocene and topped by alluvial formations from the Quaternary) was extensively studied in the framework of the Dem'Eaux Roussillon project. Relying on a conceptual model of the whole groundwater system describing the main factors controlling the hydraulic behaviour of groundwater flow (recharge areas, surface-groundwater interactions, sea water intrusion risk,…) of Quaternary and Pliocene aquifers, a numerical modelling exercise of both onshore and offshore reservoirs was performed.

Two parallel modelling approaches sharing a common description of the reservoir geometries, the boundary conditions and the pumping withdrawals locations were carried out, using two (not so) different modelling tools. Results comparison illustrates the uncertainty associated to numerical methods and calibration strategies applied for each modelling tool. Climate change projections were used to explore the future evolution of the groundwater resource and results of both modelling tools were compared. An analytical formulation of the increase of the hydraulic head of the sea due to swell and waves close to the coastline was provided. The analysis of its influence on the groundwater dynamics simulated by the models highlights the potential influence of storms and future sea level rise on the risk of saline intrusions for coastal sedimentary aquifers along the Mediterranean basin.