

Groundwater evolution in a Mediterranean coastal aquifer under multiple forcing factors?

Dem'Eaux Roussillon project





Scientific Assembly of the International Association of Hydrological Sciences Montpellier, France, 29/05/2022-03/06/2022

S15 - Advancements on understanding and modelling of the fluxes of groundwater across boundaries

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insciences pour une Terre durable -fugeo

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Roussillon basin: geological context

(-30 My): rotation of the Corso-Sardinian bloc → Gulf of Lion





(-6 My): Messinian salinity crisis







Roussillon basin: geological context

(-6 My ; -3 My): Pliocene sedimentation



(-3 My ; present): Quaternary sedimentation

Glaciations and sea level fluctuations controlled deposit/erosion stages and river courses oscillations leading to 10 to 50 m of clay, sand, alluvial and conglomerates deposits.







Roussillon basin: modelling



Outcrops description



Core drilling supervision and analysis



Well geophysical logging



Lithological logs database and correlations



Gravimetric data processing



Off-shore reflection shooting acquisition & data processing



3D modelling





Roussillon basin: modelling





A thick and extended offshore aquifer?!!



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Roussillon aquifer: conceptual model

<figure>

hydro-geophysical observatories



Channel – aquifer – river interactions



Geochemical maps



Conceptual & Numerical modelling



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Roussillon aquifer: conceptual model









Roussillon aquifer: observatories

Vertical high-resolution GW flows monitoring



Willing to join the H+ network of hydrogeological research sites

Core-drilled





Channels – aquifer – river interactions

Tracking Têt channels flows...



Geochemical maps

Spatial and temporal analysis of GW quality evolution



Upstream freshwater -> Pliocene GW mineralization - Sea water





Dinking water demand

Can the DW water demand be supplied, respecting the regulated pumping volumes and at the lowest cost?





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Irrigation water demand

IW demand not well known → estimation based on cartographic approach

(2016): 8000 ha irrigated:

- 63% orchards
- 20% vegetable gardening
- 9% grassland
- 8% vineyard





Supplied through GW pumping & SW (channels)



Numerical modelling





Project and data communication







Conclusions

□ A coastal aquifer with a large off-shore extension to be explored

- GW pumping management crucial for a sustainable use of the groundwater resource (recharge ; seawater intrusion)
- Adaptation to climate change and future sea level rise could be driven by a proper management of the Quaternary aquifer groundwater resource
- A web platform for data sharing useful for collaborative water management
- Methods from different disciplines that enabled the conceptual modelling of the system: "transdisciplinarity"?





