

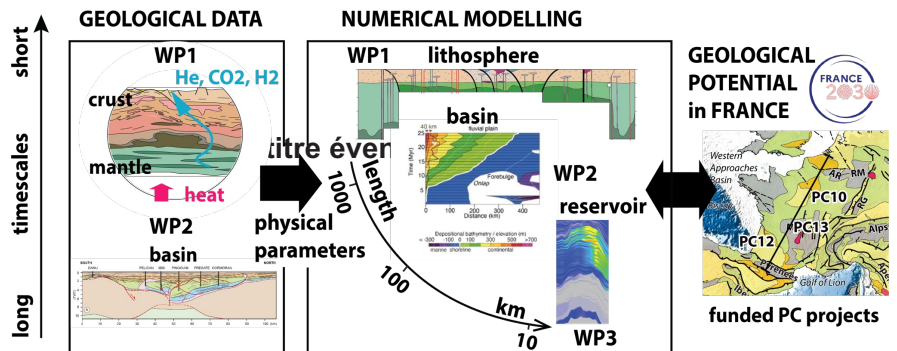
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The IDYLLE project seeks to bridge the gap between lithosphere-scale processes and the origin and transfer of heat, gas and fluids stored in shallow crustal reservoirs. IDYLLE will fill an important knowledge gap in the way exploration of natural resources, in particular natural hydrogen, is conducted in Aquitaine Basin.

Main scientific questions

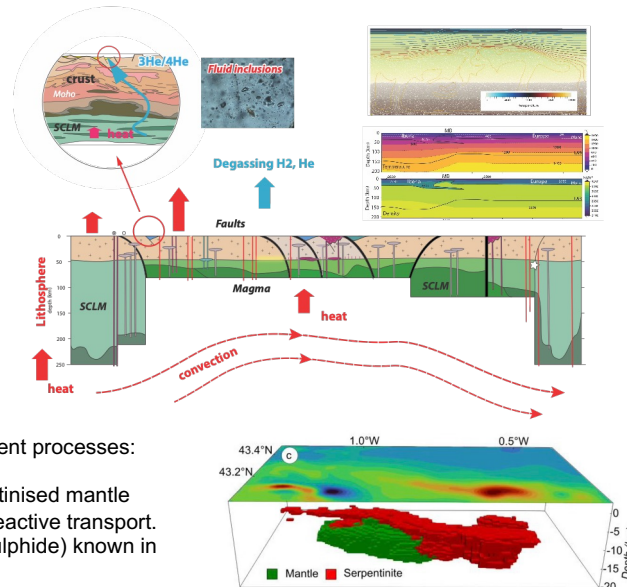
Resolving critical issues on the timing and degree of fluid-rock interactions at the origin of H₂, heat flux distribution relevant to geothermal energy and reservoirs characteristics. Unsolved questions are:

- How mantle and crustal heat flux and temperatures varied during the evolution of sedimentary basins until present ?
- How these changes controlled vertical motions recorded in the stratigraphic architecture of sedimentary basins ?
- How heat flux, reservoir properties and H₂ production and storage were affected by changes in lithosphere-scale processes ?



WP1 - lithosphere dynamics, heat and degassing fluxes

- 1) We will quantify mantle degassing fluxes and heat fluxes using mantle helium measured in fluid inclusions in the Aquitaine basin trapped in calcite during basin evolution
- 2) combined with mantle temperature evolution inferred from magmatic petrology and geophysical-petrophysical modelling.
- 3) We will study mantle heat flow using convection models in order to revise classical thermal lithosphere evolution models.



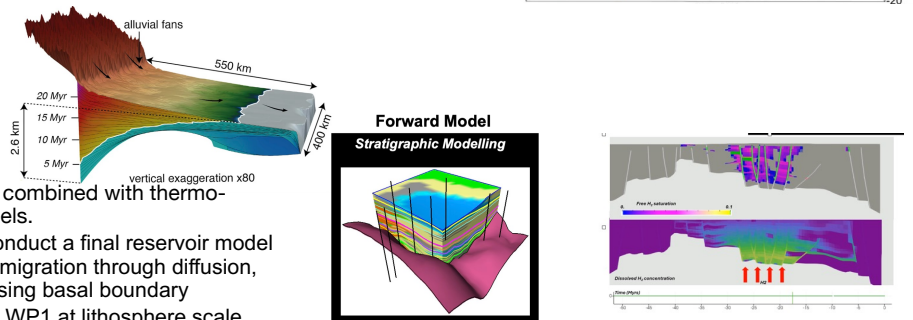
WP2 – H₂ potential in Aquitaine sedimentary basins

- 1) Quantifying H₂ production during Cretaceous rifting in Aquitaine Basin, from two different processes: serpentinisation and cracking at HT of natural gas CH₄ and H₂S.
- 2) We will analyse the thermal evolution of Aquitaine basin and refine mapping of serpentinised mantle using a new model call PoNH₂ which is based on inversion of geophysical data and reactive transport.
- 3) We want to understand H₂ production through cracking of CH₄ and H₂S (hydrogen sulphide) known in the basin using HT experiments in autoclaves.

WP3 – Modelling of heat & fluids pathways at reservoir scale

Determine H₂ accumulation at play or prospect scale.

- 1) Establish the 3D stratigraphic architecture of the basin combined with thermo-mechanical models coupled with surface process models.
- 2) Building a 3D stratigraphic basin evolution models to conduct a final reservoir model in which we estimate the fluid pathways, determine H₂ migration through diffusion, convection as dissolved H₂ in aquifers or as free gas using basal boundary conditions such as H₂ fluxes and heat fluxes defined in WP1 at lithosphere scale.



References :

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