CHLOE

Adera

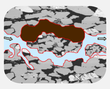
Mission: Independent analyses of innovative concepts, methods and processes.

Skillfulness and Expertise: Evaluation of the technical feasibility of novel technologies using customized modelling and advanced simulation workflows.

Data

Evaluation of different maturity levels, from **basic principles** and technological concepts to actual **system operation,** including **pre-design** of laboratory experiment.

Literature



Laboratory Experiment

Pilot project

Industrial application

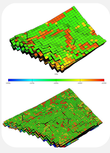
Scales

Range of study across multiple scales, from **pore size** to **laboratory** and **field scale.**

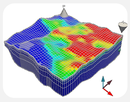
Pore

Core

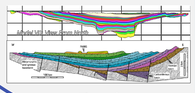
Multiscale - Upscaling



Well



Field



Basin

CHLOE Assets

Since 2006, CHLOE benefits from a high-level **university environment** with a **multicultural team** specialized in **geosciences** and **chemical/process engineering**.

Simulation Tools

CHLOE's team has developed extensive **HPC and modeling expertise** through **its own cluster**. They deliver solutions using:

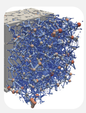
- Open-source codes
- Commercial software
- Custom/tailor-made/in-house applications
- Coupled simulation frameworks

Geosciences

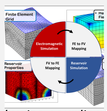
Developing **multiphysics models** for novel technologies by analyzing multiple simultaneous physical phenomena and **understanding key mechanisms**. Including:

- Multiphase Fluid Dynamics
- Porous media (inc. fractured)
- Geochemistry
- Heat Transfer
- Geomechanics
- Transport
- Wave propagation
- Thermodynamics
- Flow assurance

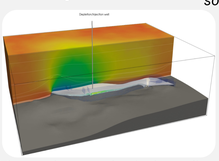
Ostwald ripening



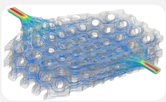
Pore Network Modeling



Multiphysics coupling between Electromagnetic and reservoir solvers



Flow and geomechanical coupling: application to fault destabilisation

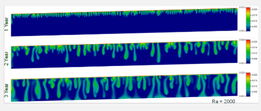


Coupled heat and flow direct numerical simulation

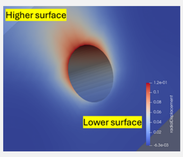
Applications

This expertise supports critical applications in **energy** and **subsurface engineering**, including:

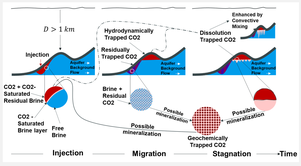
- Oil and gas production and reservoir simulation
- Geological gas storage (CO_2, H_2) and storage safety
- Battery design optimization
- Geothermal energy production



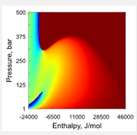
CO_2 convective dissolution flux



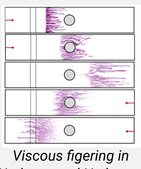
Wellbore closure for inclined well



CO_2 plume migration and trapping mechanisms in aquifers



Multiphase isenthalpic flash for CO_2 storage



Viscous figering in Underground Hydrogen Storage

CHLOE is recognised for multi-scale modeling —from pore-scale physics to basin-scale simulations— delivering experimentally validated, cost-effective solutions for energy storage and production. CHLOE expertise spans carbon capture and storage, hydrogen geological storage and production, digital rock physics, enhanced oil recovery, and renewable energies, with a proven track record of assessing industrial projects.

TotalEnergies · Université de Pau et des Pays de l'Adour · slb · CMG · IFP Energies nouvelles · COMSOL · SAFT

among others

CHLOE

Computational Hydrocarbon Laboratory for Optimized Energy Efficiency

Adera

Soutenir les acteurs de l'innovation