Responsible oil and gas | Basins and reservoirs modeling and simulation

Carnot IFPEN Ressources Energétiques

BASINS AND RESERVOIRS MODELING AND SIMULATION

OUR STRENGHTS

Over the course of many years, IFPEN has developed renowned expertise in:

- descriptive and quantitative geosciences, sedimentology, petrophysics, geochemistry, and geological modeling
- physical sciences, physical chemistry of complex materials and fluids, fluid, solid and structural mechanics, and applied mathematics (numerical methods)
- Information technology (high performance computing, software design, etc.)
- digitalization (data science, cloud computing, IoT, smart sensors, virtual reality, etc.)

These skills are useful when it comes to understanding sedimentary basins and hydrocarbon reservoirs and more generally, when it comes to understanding:

- multiphase phenomena and fluid/rock interactions,
- geomechanical aspects,
- reactive transport modeling,
- multiscale modeling, and modeling of heterogeneous or fractured media,
- flows in porous media,
- optimization and uncertainties.

From the field to the laboratory and modeling

Through the IFPEN Ressources Énergétiques Carnot Institute, IFPEN has laboratory equipment **to help it gain a deeper understanding and to conceptualize geological processes**, especially in fields such as porous media imaging, geochemistry and microfluidics (link to the web pages of the corresponding Carnot Institute platforms when they are online).
IFPEN **links data gathered in the field, laboratory and modeling tools**. Its researchers carry out small and large scale characterization and propose an interpretation that links the two together. Their geoscientific expertise ranges from understanding the phenomena involved at the nano and microscopic scale to modeling at the basin scale.

High-performance computing: IFPEN is developing a new generation of simulators using the Arcane open source HPC platform developed with the CEA, with the objective of increasing the performance of its geosciences applications.

A leading edge in digital technologies

The digital transition calls for transformational change in exploration and production activities and working methods. IFPEN plans to provide guidance and support for their partners through a POC (proof of concepts) approach to help them grasp digital technologies to optimize how they exploit their data (AI and Big Data), improve their performance (HPC-AI coupling and task automation) or make the best use of their models (Natural Language and AI).

To give a few examples, the SmartAnalog™ tool uses 3D photogrammetry to produce digital copies of complex geological outcrops, while the GeoAnalog™ web service catalogues a range of dynamic geological models reproduced in the laboratory and scanned in 3D. IFPEN also coordinates the TELLUS Community, in which IFPEN and their partners address issues related to digital transformation for Geosciences 4.0.

Two subsidiaries and a partner for the industrial development of research-based software

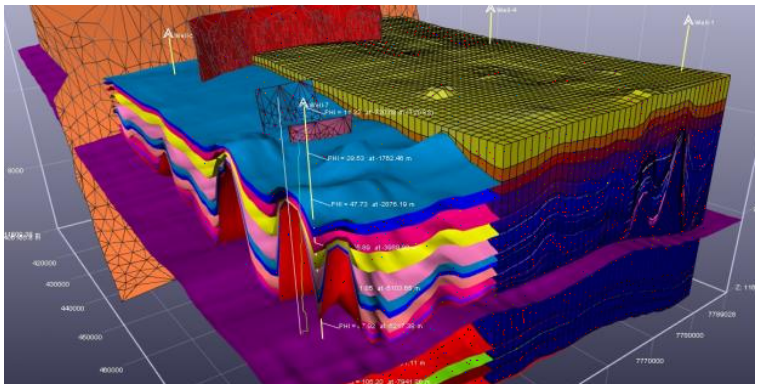
Beicip-Franlab conducts technical and economic studies and markets geoscientific software developed by IFPEN. Beicip-Franlab is active in over 100 countries. Its basin modeling and reservoir simulation software solutions are world references.

TECH'advantage is developing expertise in software architecture, modeling, 3D visualization, scientific computation, graphic interfaces and digital technologies, acquired in the industrial development of software used in geosciences.

Since 2016, KAPPA Engineering (KAPPA) has teamed with IFPEN and BF to collaborate on the industrial development of a complete reservoir simulation chain that incorporates the **Carbone** thermodynamic tool and the **PumaFlow** simulator.

A software suite covering everything from basin modeling to reservoir simulation

Most of the software products stemming from IFPEN's research are bundled into the **OpenFlow Suite™** integrated solution marketed by Beicip-Franlab.
This software suite comprises the TemisFlow, DionisosFlow, FracaFlow, CougarFlow and EasyTrace.
The Carbone and PumaFlow software form part of the Kappa range and supplement it.



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Basins and reservoirs modeling and simulation: Our strenghts

Link to the web page :