

# TECHNICAL SPECIFICATIONS



## TemisFlow™

Petroleum System Modeling  
2D Complex Tectonics

### Software Presentation

TemisFlow 2D Complex Tectonics is a specific module of TemisFlow dedicated to 2D basin modeling in structurally complex environments. It features a unique simulator able to take advantage of an accurate description of the basin structural evolution through time while simulating the impact of folding and faulting on compaction, heat transfer, and hydrocarbon generation, migration, and accumulation.

TemisFlow unified workflow offers the following key stages:

- Section properties definition (lithology & geochemistry)
- Boundary conditions definition
- Simulations (temperature, maturity, expulsion, pressure, migration)
- Calibration & Post-Processing

Combined with KronosFlow, TemisFlow 2D Complex Tectonics allows conducting 2D basin modeling studies in complex regions where classic tools cannot be applied.

### Functionalities & Algorithms

#### INITIALIZATION FROM KRONOSFLOW

- Automated TemisFlow scenario creation
- Initialized with:
  - Stratigraphy and ages
  - Paleo-geometries
  - Lithology distributions
  - Associated lithology library

#### 2D GEOGRID

- A dedicated 2D Section Editor with:
  - Stratigraphy and ages
  - Lithologies
  - Source rocks and properties (TOC, HI)
- Task manager for quality control and automatic corrections
- Interactive edition with a painting tool
- Easy to update
- Pre-processing visualization

#### SCENARIO MANAGER

- Step by step workflow
- Tracking of the modifications and hypothesis through a Scenario Tree
- No duplication of unmodified data

#### LITHOLOGICAL INFORMATION

- IFPen databank with reference lithologies
- Creation of user-defined or mixed lithologies

- Possibility to tune and define:
  - Depth-compaction curves
  - Permeability (thanks to Kozeny Carman, log(K) or user defined laws)
  - Thermal conductivity and radiogenic production
  - Relative permeabilities and capillary pressure curves

#### GEOCHEMICAL INFORMATION

- Definition of laterally variable Initial TOC, Initial HI and Net to Gross for each Source Rock layer
- IFPen or BP databanks with reference kerogens, fractions and schemes
- Creation of user defined kerogens (composition, thermal reactivity) and fractions (viscosity, phase behavior, etc.)
- User-defined multi-compositional HC systems and kinetic schemes
- Primary and secondary thermal crackings
- User-defined Vitrinite-Transformation Ratio law

#### THERMAL BOUNDARIES

- Surface temperature
- Temperature gradient
- Heat flow at base of sediments
- Temperature at base of upper mantle

#### ADVANCED FAULT MODELING

- Faults can be transparent, permeable or impermeable through a unique modeling of the core and damage zones properties (thickness, permeability, capillary pressure)
- Faults activity can vary through time
- Each fault may have its specific behavior
- Graphic edition with painting tools on a 2D section editor

#### PIEZOMETRIC SURFACES

- Definition of the water table depth as a function of the topography
- Reference surface for the pressure regime computation

#### FULLY COUPLED SIMULATIONS

- Temperature and maturity
- Pressure
- Expulsion
- Decoupled Darcy migration
- Non-compositional or multi-component
- PVT computation

#### PARALLELIZED RUNS WITH ADVANCED OPTIONS

- Parallelization on several processors
- Possibility to run simulations on remote machines or clusters
- Tuning of time steps and simulation control criteria

# Results Analysis

## THERMAL AND MATURITY PROPERTIES

- Temperature regime
- Maturity indicators: Vitrinite Reflectance
- Various TOCs: Current TOC and Residual TOC
- Source Rock Maturity Timing

## PRESSURE PROPERTIES

- Water Pressure and Overpressure
- Mud Weight
- Effective Stress

## EXPULSION AND MIGRATION PROPERTIES

- Expelled and Migrated masses
- Hydrocarbon saturation and composition
- PVT properties: Volumes, API Degree, BO, BG...

## BUNCH OF VISUALIZATION TOOLS

- 3D Viewer
- Log Viewer
- Cross Plot Viewer
- Statistics Viewer

## DATA EXTRACTION & CALIBRATION

- Cell History
- Well extraction and automated comparison to observed data

## FILTERING & REPORTING

- Filtering capabilities and creation of areas of interest
- Statistics and quantitative report on areas of interest

# Data Management

## DATA IMPORT/EXPORT

The following formats are available:

- Cultural data in shape files and .leg format
- Polylines in ASCII, CPS3 and Z-Map+
- Well paths and logs in ASCII, LAS 2.0 and 3.0, and OBDAT2
- Lithology and geochemical libraries in .xml and .ltds formats
- Seismic in XML and SEG-Y
- Templates, preferences and color scales from OpenFlow
- Data exchange between OpenFlow Suite projects

## DATABASE

- MySQL or Oracle database
- Improved data security and integrity, reduced data storage
- User and project administration

## OTHER PLATFORM FACILITIES

- Colorscale & unit system management
- Remote machines or cluster simulation launcher
- Simulation monitoring
- Online & contextual Help

# System Requirements

## Operating Systems:

- Windows Seven 64 bits service Pack 1 and Windows 10
- Linux RedHat 6.6

- **RAM:** 16 Gb or more recommended, 8Gb minimum

- **Minimum free disk space:** 5 Gb (for installation)

- **CPU:** x86-64 processors (Opteron, CoreDuo, Core2Duo, Xeon & EMT64, Nehalem, Westmere, Sandy Bridge, Core i3, i5, i7)

- **Dualcore or Quadcore:** 2 GHz or more recommended

- **Graphics board:** NVIDIA (except Quadro FX 1000, Quadro FX 3500, Quadro NVS 110 M and Quadro NVS 280 SD) with recent driver (at least OpenGL 3.3 -driver 330 or later)

- Openmotif rpm package must be installed on Linux

- **Database:** MySQL 5.5 or 5.6.X (with X superior to 22) and Oracle 11g or 12c

- FlexLM 11.13.1.3 server for licensing



**Beicip-Franlab Headquarters**  
232, avenue Napoléon Bonaparte  
92500 Rueil-Malmaison - France  
Tel.: 33 1 47 08 80 00  
Email: [info@beicip.com](mailto:info@beicip.com)