

TECHNICAL SPECIFICATIONS



DionisosFlow™ Stratigraphic Modeling

Software Presentation

DionisosFlow is a 3D forward stratigraphic modeling software which aims at helping petroleum geologists to better quantify the sedimentary architecture and filling of a basin, both in siliciclastic and carbonate environments. DionisosFlow applicability ranges from fluvial to deep offshore environments, at exploration and appraisal scales.

DionisosFlow unified workflow offers the following key stages:

- Accommodation space definition through subsidence and eustasy variations
- Sediment supply definition through fluvial input and/or in-situ marine carbonate production
- Transport laws definition
- Simulation & calibration
- Post-processing & facies definition

The main DionisosFlow output is a 4D geometrical and facies model which allows a detailed 3D quantification of sedimentary units geometry (location, thickness, extension...) and of facies inside these units (sand/shale ratio, depositional bathymetry, slope...). DionisosFlow also provides a quantification of physical parameters such as subsidence and eustasy, sediment source location and intensity, water-charge and wave energy, which allows testing several geological assumptions.

Data Management

DATA IMPORT/EXPORT

The following formats are available:

- Dionisos 4.2 & 4.93 projects and results (*.pro, *.sav)
- Horizons in ASCII cloud of points, CPS3 ASCII and binary, Fraca, GMap, gOcad Tsurf and Z-Map+
- Property maps in ASCII cloud of points, CPS3 ASCII and binary, Fraca, GMap and Z-Map+
- 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
- Faults in CPS3 ASCII and binary, Fraca, EarthVision, gOcad Tsurf and Z-Map+
- Lithology and geochemical libraries in .xml and .ltds formats
- Seismic in XML and SEG-Y
- 3D Grids in GRDECL Eclipse format
- Templates, preferences and color scales from OpenFlow
- Groovy scripts and packages
- Data exchange between OpenFlow Suite projects

DATABASE

- MySQL 5.5 or 5.6.X (with X superior to 22) or Oracle 11g or 12c
- User and project administration

OTHER PLATFORM FACILITIES

- Colorscale & unit system management
- Remote machines simulation launcher
- Simulation monitoring
- Online & contextual Help
- Integrated mini-tutorials on clastic and carbonate environments

Functionalities & Algorithms

MULTIPLE ENVIRONMENTS

- Clastics
- Carbonates
- Mixed

MODEL BUILDING FACILITIES

- Map creator & editor
- Easy data formatting
- Automated QC

EUSTASY VARIATION DEFINITION

- Definition of the evolution of the sea level through time
- Initialized with a Long Term or Short Term Haq curve
- Tuned through a User-defined curve

CLASTIC SEDIMENT SUPPLY

- Several sources around the model and through time
- Constrained by their supply and fluvial discharge
- Variation of the clastic input composition through time

CARBONATE PRODUCTION LAWS

- Function of a reference production through time, bathymetry, wave influence and ecology
- Seafloor and transported sediment content constraints
- Sea temperature and salinity constraints
- Carbonate dissolution
- Transformation into bioclasts

EVAPORITIC MODELING

- Precipitation and dissolution of in situ elements
- Depends on the sea water salinity and temperature

DIFFUSIVE TRANSPORT PROCESSES

- Linear & non-linear diffusive equations
- Depend on slope, water discharge and paleo-environment
- Low energy long term processes for slow gravity permanent fluvial transport
- High energy short term processes for hyperpycnites and fine turbidites

EROSION MODELING

- Uniform erosion law for continental environment
- Lithology-dependent erosion law for both continental and marine environments
- Advanced erosion law integrating uniform or water weathering (erosion is a function of water discharge)

WAVES IMPACT

- Definition of several waves characterized by energy, speed, period and height
- Variation of the wave energy with depth and time
- Wave propagation following Snell's law

CLIMATIC CYCLES

- Creation of cyclic phenomenon
- Impact on supply, fluvial discharge and carbonate production

STRUCTURAL FEATURES

- Salt diapirism
- Flexure

COMPACTION

- Empirical or user-defined porosity-depth laws
- Compatibility with basin simulators

LACUSTRINE SYSTEMS

- Estimation of lake levels alongside with sea level variation
- Balancing rain falls and evaporation
- Carbonate production within lakes

PARALLELIZED AND REMOTE SIMULATIONS

- Parallelization on several processors
- Simulation on remote machines or clusters

SENSITIVITY & RISK ANALYSIS

- Based on an experimental design methodology (linear, quadratic, Latin hypercube, user defined...)
- Parametric or non-parametric response surface models
- Global Sensitivity Analysis to determine the contribution of uncertain parameters on an output property
- Propagation to determine the range of possible values for a property given some uncertain inputs (P10, P50, P90)

INTEGRATED LINK TO TEMISFLOW

- Automated extraction of sequences information to populate a basin model
- Automated conversion of a DionisisFlow model into a TemisFlow model

Results Analysis

BUNCH OF VISUALIZATION TOOLS

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

DATA EXTRACTION & CALIBRATION

- Map extractions
- Well extractions

- Burial analysis
- Section extractions
- Automatic comparison with observed data
- Time markers management
- Pseudo-simulation
- Automatic error maps computation
- Automatic NTG maps computation

FILTERING & REPORTING

- Filtering capabilities on simulated output
- Synchronization between views
- Statistics on areas of interest

OUTPUT STRATIGRAPHIC PROPERTIES

- Sediment Proportion
- Paleobathymetry
- Thickness
- Sedimentation Rate
- Slope
- Water Flow
- Exposure Time
- Drift Current Energy
- Porosity
- Lake Level
- Sediment Turbidity Indicator

FACIES DISTRIBUTION

- Facies definition according to sediment ratios, bathymetry and other output properties
- Facies distribution maps extractions
- Reservoir and source rocks location and extension

Extensions & Customization

- Direct link with TemisFlow for basin modeling
- Direct link with CougarFlow for sensitivity and risk analysis
- Petrel link for direct maps, wells and grids exchange
- Scripting facility based upon Groovy language

System Requirements

- **Operating Systems:**
 - Windows Seven 64 bits service Pack 1 and compatibility with 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



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