

# Plug Isatis Geostatistics Software in Your Reservoir Modeling Cycle



### Data Reconciliation

**Integration of 2D and 3D data sets** (2D or 3D seismic data, well logs, faults, grid).

### Data Quality Control

- Investigate and clean your data with Isatis unique Exploratory Data Analysis interactive module.
- Analyse the relationships between variables.
- Analyse the spatial correlations between variables.
- Characterize the **spatial behaviour** of your data (variography and modelling).

## Time-to-Depth Conversion and Structural Modeling

- **Coherent 3D velocity cube** estimation from 2D or 3D seismic velocities.
- Handle 2D and 3D faults from variography to kriging and simulations.
- Perform optimal 2D & 3D time-to-depth conversion by using multivariate kriging techniques controlled by seismic.
- Identify and process **misties** between well and seismic depths through multivariate kriging techniques.
- Quantify the uncertainties on surfaces using appropriate stochastic simulation algorithms.

## Facies Modeling

 Put the model in the original stratigraphic system by flattening the 3D grid.

- Define the **bedding geometry**. Choose between parallel and proportional layering.
- Build the 3D model of lateral and vertical facies distributions over the field from the (local) Vertical Proportion Curves. Possibility to use a 2D facies proportions constraint derived from seismic.
- Distribute the facies over the 3D grid using the stochastic simulations. The various available techniques allow adapting the facies modeling to the amount of information (spatial variability, 3D facies proportion) and geology complexity (objects, facies transition, ...).

## Petrophysical Modeling

- Populate the grid with **petrophysical properties** (porosity, permeability, water saturation) from well logs using data integration techniques.
- Get optimistic and pessimistic scenarios with the appropriate stochastic simulation method.
- Constrain petrophysical modelling by facies modelling.

### Reservoir Volumetrics

- Compute accurate volumes by zone, facies, stratigraphic units taking into account the uncertainties on surfaces, fluid contacts and/or petrophysical properties in an optimal way through the Volumetrics application.
- Get the probability distribution of GRV, HCPV, STOIIP, GIIP.
- Determine the reservoir closure and identify the spill points with Isatis specific module.

# isatis



## Isatis Overview

#### Data Integration

- Import and export interfaces with most Oil & Gas market formats (ASCII, Arcview Shapefile and grids, CMG, DXF-Autocad, Eclipse, Excel, Geoshare, LAS, ODBC, NetCDF, SEG-Y, VIP, Z-Map Plus) and professional packages (Irap Classic, Roxar RMS).
- Direct link from/to ISATIS database in SKUA-Gocad®, the RML®, Petrel® and DecisionSpace® Geosciences.

#### Data Management

- Integrated database to save data and derived properties reusable later in the workflow.
- Parameter files and journaling file system for automatic procedures using batch.

#### Data Quality Control and Spatial Analysis

- Unique ability of interactive and dynamically linked basemaps, histograms, scatter diagrams, H-scatter plots, QQ-plots and PP-plots, variogram clouds, experimental variograms and related functions in any direction of space. Boxplots, swathplots. Experimental variograms on large grids.
- Unique ability of picking data in the linked graphic windows for identifying possible outliers or anomalous data.
- Unfolding/Folding.

#### Variography

 2D/3D isotropic/directional variogram, identification of directions and scales of continuity through unique 3D interactive variogram map. Variogram modelling on large grids using FFT.



 Simple and cross-variogram automatic fitting. Exhaustive set of models with no limitation in the choice of nested variograms.

#### Full Range of Estimation Methods

- Ordinary/simple kriging/IRF-k. Punctual/block estimation. Drift estimation. Collocated co-kriging. Kriging with external drift. Kriging with Bayesian drift. Stationary/non stationary models.
- Univariate/multivariate kriging.
- Global Trend Modeling. Universal Kriging.
- Kriging with local parameters.
- Powerful search neighborhood control.
- Automatic factorial kriging (MAAFK) for extracting common/different components from two grid datasets.
- Possible use of 2D or 3D faults in estimation procedures.

#### Stochastic Simulations

Conditional/non-conditional simulations.

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- Surface and properties modeling: turning bands, collocated co-simulations, simulations with external drift, Sequential Gaussian Simulations (SGS). Cloud Transform simulations.
- Facies modeling: Sequential Indicator Simulations (SIS), Truncated Gaussian Simulations (TGS), Plurigaussian Simulations (PGS), Boolean simulations, Multiple-point simulations, Flumy, reservoir model for meandering channelized systems.
- Possible use of 2D or 3D faults in estimation procedures.

#### Quantification of Uncertainties

- Probability maps, quantile maps, risk curves.
- Volumetrics. Spill Points calculation.

#### **3D Viewer**

 Representation of 3D punctual data, wells/boreholes data, 3D models, 2D surfaces, 2D/3D polygons, 2D/3D faults, 3D wireframes.



- Visualization of 3D neighbourhoods.
- Many features such as clipping, slicing, zooming, filtering, database inquiry.
- Easy export of any graphic page in standard image formats.

## System Requirements

#### **Operating systems**

Available on PC Intel/AMD Windows 7 or 8, 32-bit or 64-bit (recommended) or Linux Red Hat Enterprise 5 (or 6) or equivalent (64-bit). Isatis on Windows OS requires the PC X server Exceed V14+.

#### Hardware

- Processor: Pentium ~1Ghz (Windows)
- Memory: 1 GB required

Hard Drive: 200 MB of disk space

#### License

Reprise Manager licensing system (by Reprise Software) allowing flexible use on any system. Single-user or site license system. Dongle-based license. License borrowing enabling temporary check out of a license for working offline.

## Consulting Training

Our highly experienced consultants provide a wide range of top quality services for beginners and specialists in Geostatistics: one-to-one technical support, mentoring, training workshops, consulting.