

NEXT

A Schlumberger Company

Petrel 2017 Property Modeling Module 15: Kriging in Petrophysical modeling



Schlumberger-Private

Petrel 2017 Property modeling

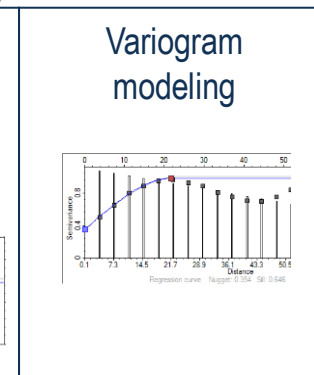
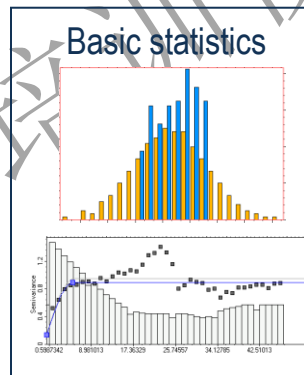
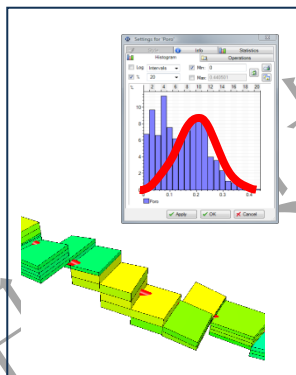
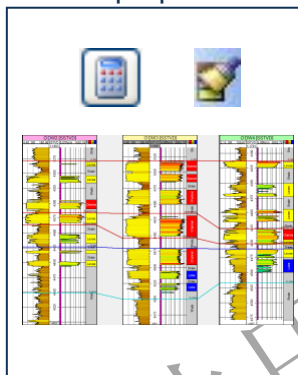
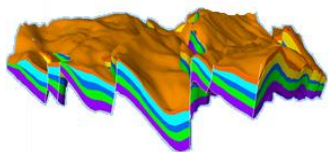
Intro

Property modeling
data preparation

Scale up well logs

Univariate and bivariate geostatistics

Petrel Property Modeling
objective and workflow



Facies modeling

Petrophysical modeling

Volume calculation and
Uncertainty analysis

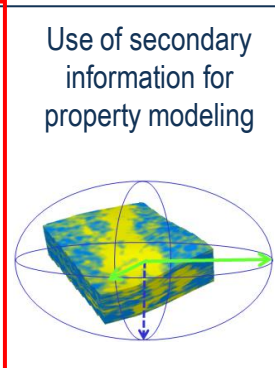
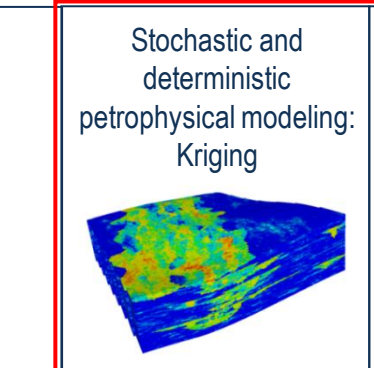
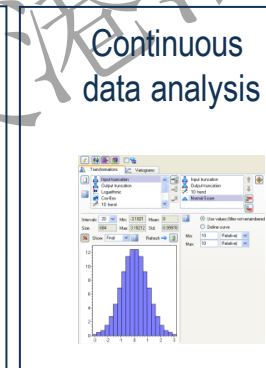
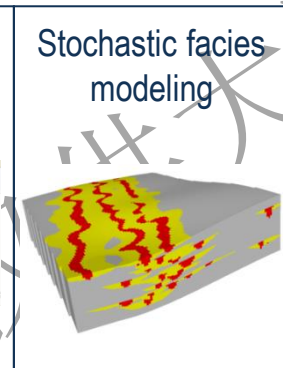
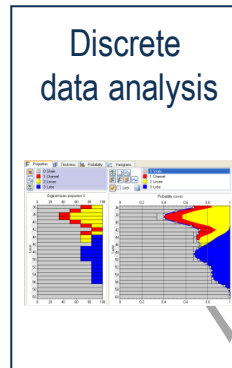
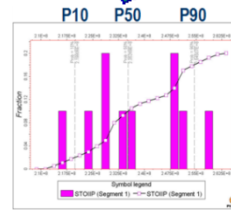
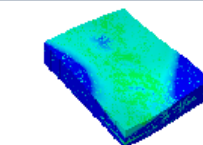
Discrete
data analysis

Stochastic facies
modeling

Continuous
data analysis

Stochastic and
deterministic
petrophysical modeling:
Kriging

Use of secondary
information for
property modeling

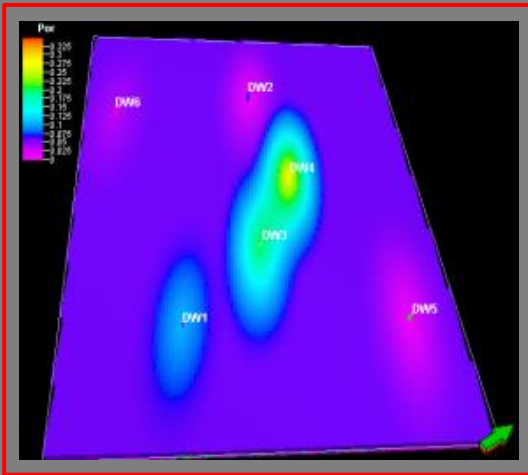


Petrel modeling techniques for continuous properties

Methods used in this course:

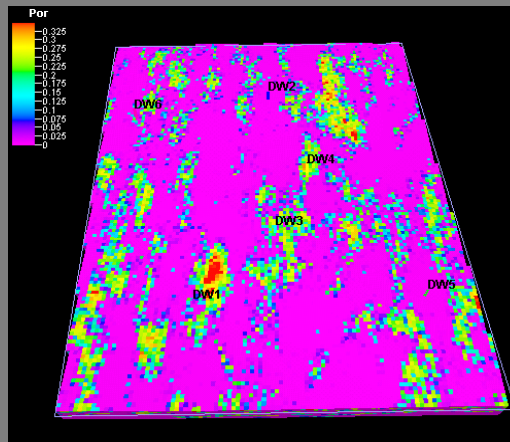
Deterministic: One output

Kriging

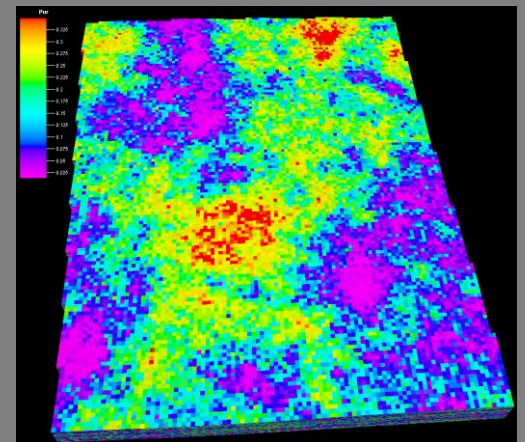


Stochastic: Multiple equally probable outputs

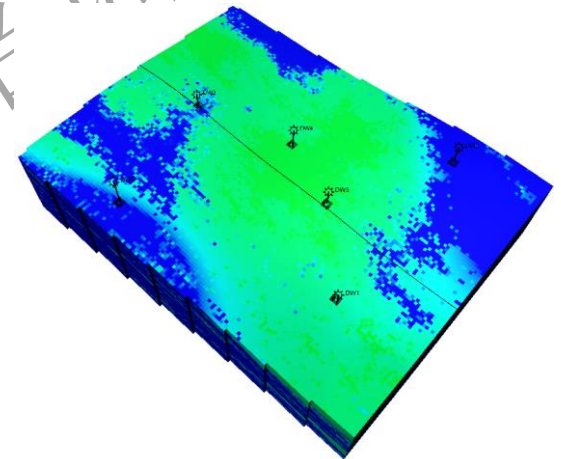
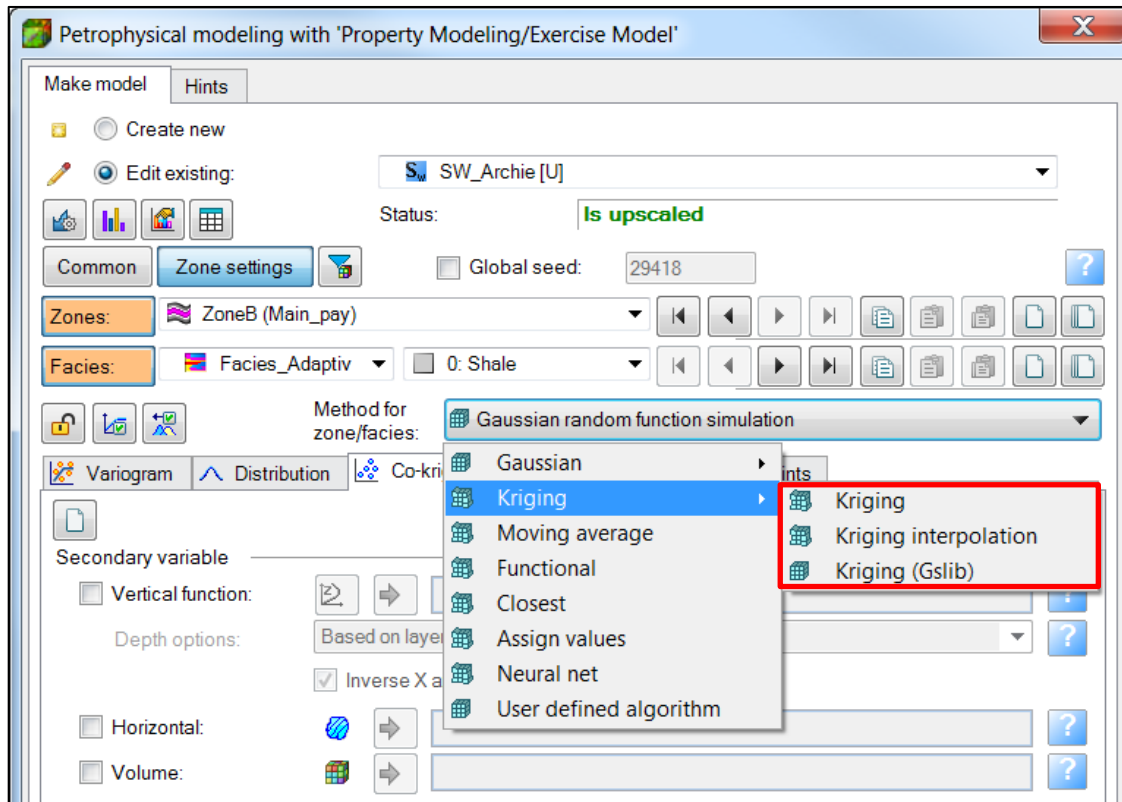
SGS



GRFS



When can you use Kriging?



Variogram settings

Pick up the correct upscaled property

Select the Zone and Facies model.

Select Kriging

Specify Sill, Nugget, and other information.

SW_Archie [U]

Status: Is upscaled

Global seed: 29418

Zones: ZoneB (Main_pay)

Facies: Facies_Adaptiv

0: Shale

Method for zone/facies: Kriging

Variogram

Total sill: 1.0

Nugget: 0.0001

Range

Variogram type: Spherical

Major dir: Minor dir: Vertical:

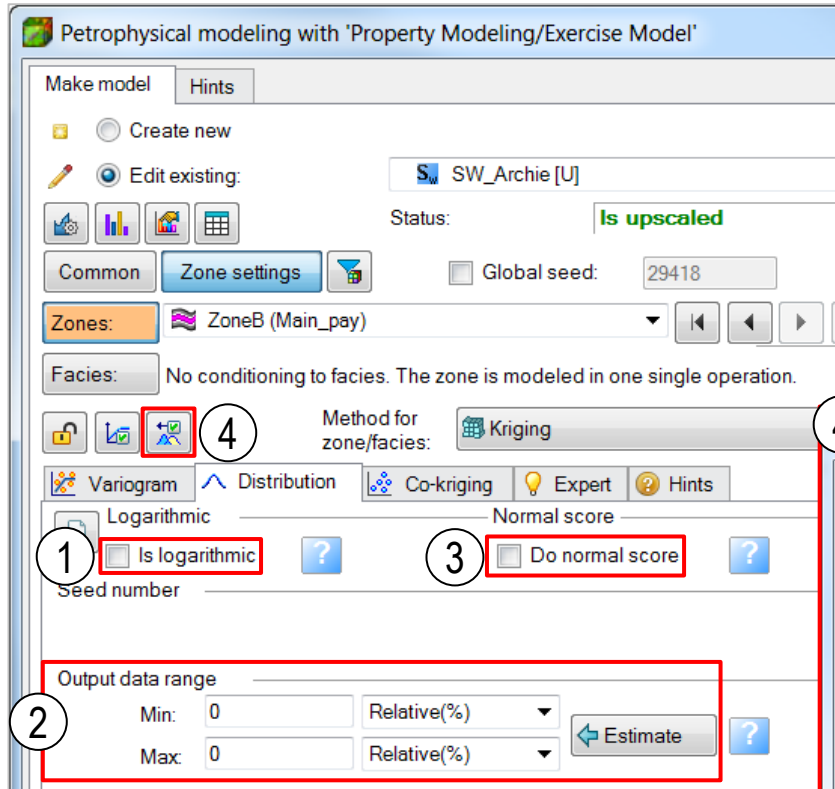
Anisotropy range: 8000 5000 4

Major direction orientation

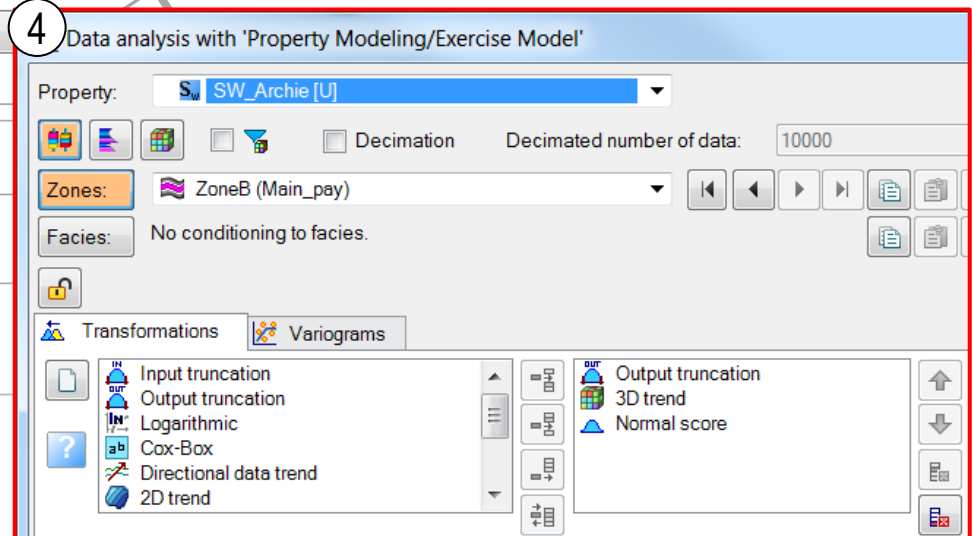
Azimuth: -45 Dip: 0

Diagram showing orientation with N, S, E, W labels and a scale from -90 to 90.

Distribution settings



1. Is logarithmic
2. Output data range
3. Do normal score
4. Optionally set the transformations needed on data analysis.



Variance

Variogram Co-kriging Expert Hints

Total sill: 1.0
Nugget: 0.1

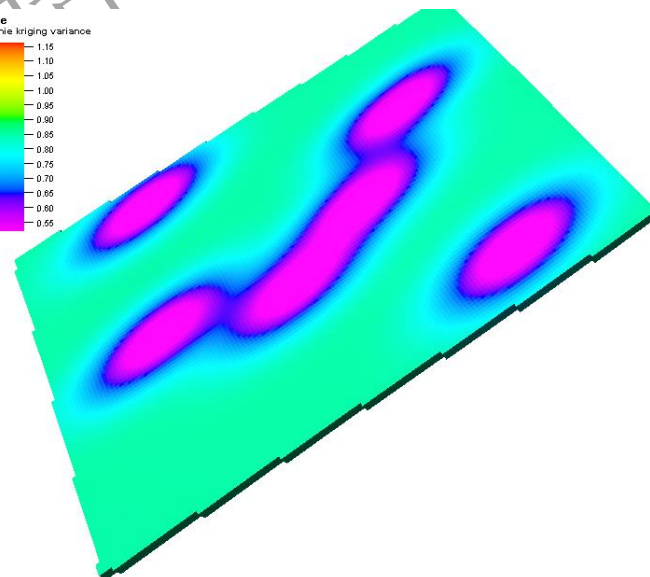
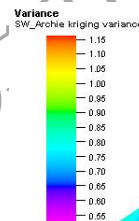
Variogram type: Spherical

Major dir: Minor dir: Vertical:
Anisotropy range: 8000 4000 10

Major direction orientation
Azimuth: -46 Dip: 0

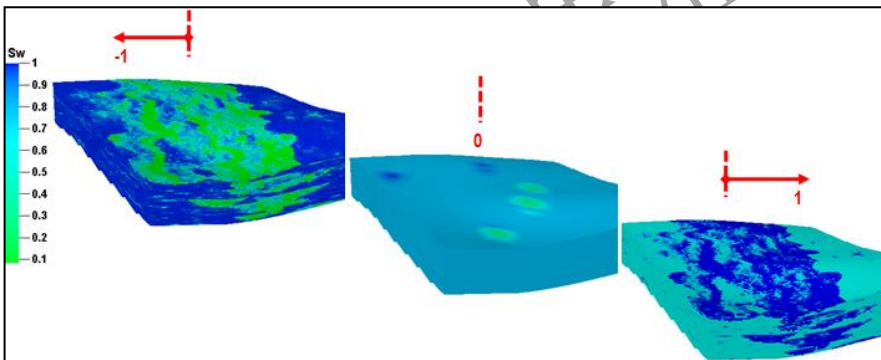
☒ Create variance output: VAR SW_Archie kriging variance ?

☒ Normalized



Co-kriging and trend usage

- The Kriging method has a Co-kriging option that can use a secondary variable.
- To generate the linear correlation coefficient, click *Estimate* or the interactive slider bar.



Variogram Distribution Co-kriging Expert Hints

Secondary variable

☒ Vertical function: ?

Depth options: Based on layer index ?

☒ Inverse X axis

☒ Horizontal: ?

☐ Volume: ?

Variogram Distribution Co-kriging Expert Hints

Secondary variable

☐ Vertical function: ?

Depth options: Based on layer index ?

☒ Inverse X axis

☐ Horizontal: ?

☒ Volume: ?

Method

Collocated co-kriging

Coefficient: [-1 to 1] ?

Secondary variable transformation

☐ No transform

☐ Transform using input distribution

☒ Normal score transform

Exercise

Model Sw using Kriging and secondary data

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