Four days course in
Geostatistics and Advanced Geomodelling
arranged and developed by Norwegian Computing Center for Statoil

Contacts

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Course objective

- To learn the basics of geostatistical modelling in order to be able to contribute alone or in teams to the building of complex geological models.
- Obtain knowledge of available methods and their limitations.
- Be able to analysis and prepare data for use in geostatistical models.

Description

The course aims at increasing the understanding of applied geostatistics and focus on concepts and methods important for modelling heterogeneity and uncertainty in reservoir models. Emphasis is put on work processes for 3D reservoir modelling rather than mathematics and algorithms. Approaches for making geological facies models and continuous parameters such as permeability are covered. The course is based largely on practical exercises.

Learning goals

- Refresh basic statistical concepts and become familiar with standard geostatistical terminology. After the course, the following technical terms should sound familiar:

  "Kriging, multipoint, variogram, range, sill, spatial correlation, Gaussian random fields, indicator kriging, object models, stochastic simulation, bias, normal score transformation, conditional probabilities."
- Get an overview of available geostatistical methods for modelling geological heterogeneity and uncertainty.
- Learn geostatistical methods for generating
  - Surfaces (e.g. cap-rock and zonation)
  - Facies architecture (e.g. fluvial deposits)
  - Petrophysical properties (e.g. porosity and permeability)
- Gain practical experience in using these methods during the exercises.

Exercises

A significant time is spent on exercises. These range from very simple data analysis to sophisticated model building. The exercises are probably the most important part of the course and give us an opportunity to give some individual guidance. Usually, there will be two lecturers available during the exercises.

Prerequisites

This is *not* an Irap RMS course. However, Irap RMS will be used in most exercises, so some basic experience is favourable. Basic statistical terminology will be reviewed, so no previous experience is required.

Course organization

The number of attendants is limited to 14. We usually use 5 different lecturers.

Practicalities

Handouts are prepared and pdfs (for Acrobate Reader) of the presentations are available.

About Norwegian Computing Center (NR)

NR is a non-profit research institute organized as a private foundation. The institute was established in 1952 and currently employ 80 research scientists. The main focuses are on computer science and statistical and mathematical analysis and modelling. We do research and advanced consultancy for industry, public sector, the Norwegian Research Council, and EU. For more information please visit www.nr.no.

The lecturers in the course belong to the SAND department. We have been involved in developing new methods for the petroleum industry since 1984 with a major focus

on reservoir modelling and geostatistics. We have published close to 200 conference contributions and journal articles. Some of our contributions are commercially available in the STORM and Irap RMS software. In particular the RMS Geoplex software depends on software developed at the Norwegian Computing Center. For more information please visit www.nr.no and follow the link to SAND.

Course feedback

Having run the course a couple of times with encouraging feedback we feel confident that a lot of professionals would benefit from the course. Philip Ringrose (Advisor, Reservoir Geomodelling and Uncertainty Analysis, Statoil) says: *"Statoil found this course to be very useful with contents presented to a high standard scientifically and pedagogically!"* Vegard Sangoldt (Advisor, Subsurface Uncertainty Evaluations, Norsk Hydro) sum up their experience with the course: *"The lecturers present the theory in a pedagogical way. The course can largely be adapted to the attendants requests and needs since the lecturers know the topics in depth."*

Course schedule

The schedule can be modified to meet any specific requests.

Day 1

09.00 – 09.15	Welcome
09.15 – 10.45	Statistics, data analysis, and transformations
	Coffee & tea
11.00 – 12.00	Statistics, data analysis, and transformations
12.00 – 13.00	Lunch
13.00 – 14.00	Exercises: Statistics, data analysis, and transformations
	Coffee & tea
14.15 – 16.00	Exercises: Statistics, data analysis, and transformations

Day 2

09.00 – 09.30	Summing up exercises
09.30 – 10.30	Gaussian random fields, variograms and kriging
	Coffee & tea
10.45 – 12.00	Exercises: Gaussian random fields, variograms and kriging
12.00 – 13.00	Lunch
13.00 – 14.00	Exercises: Gaussian random fields, variograms and kriging
	Coffee & tea
14.15 – 16.00	Exercises: Simple kriging equations

Day 3

09.00 – 09.30	Summing up exercises
09.30 – 10.30	Truncated Gaussian fields
	Coffee & tea
10.45 – 12.00	Exercises: Truncated Gaussian fields
12.00 – 13.00	Lunch
13.00 – 14.00	Object models
	Coffee & tea
14.15 – 16.00	Exercises: Object models

Day 4

09.00 – 09.30	Summing up exercises
09.30 – 10.30	Indicator simulation//Multipoint
	Coffee & tea
10.45 – 12.00	Exercises: Indicator simulation//Multipoint
12.00 – 13.00	Lunch
13.00 – 13.15	Summing up exercise
13.15 – 14.00	Petrophysics & general summary
	Coffee & tea
14.15 – 16.00	Exercises: Petrophysics