Reservoir modeling

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PETE 5150 / GEOL 5210
3 Credits
Spring, 2014

Grading: A-F

Location: TBA
Time: Tuesday - Thursday (02:45~04:00 pm),
Office hours: Monday - Wednesday (10:00~12:00 pm), GE 223
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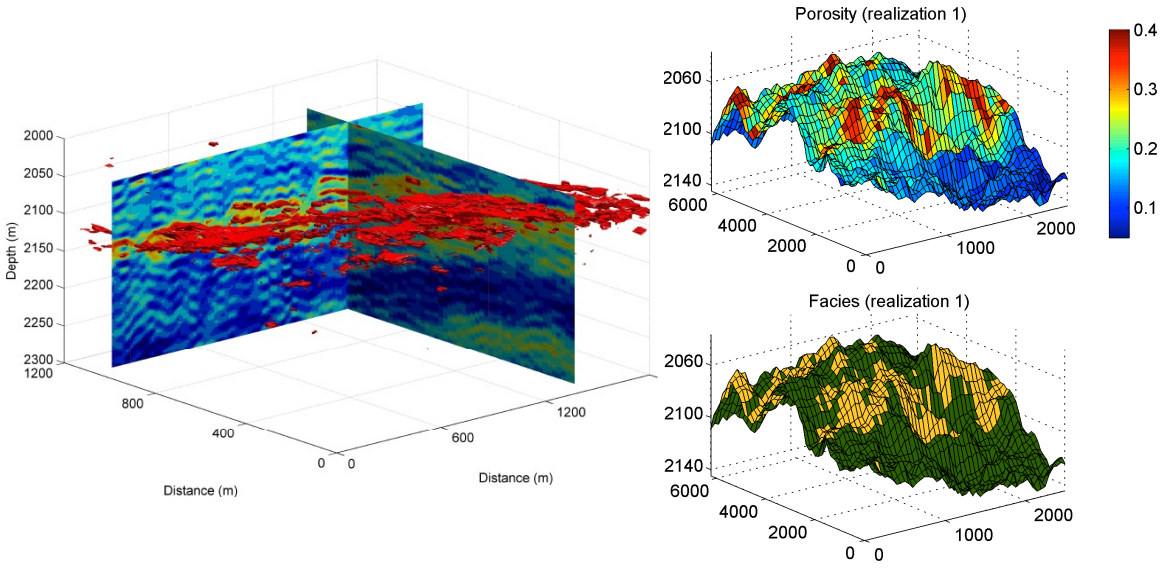
Course Description:

Reservoir modeling provides a set of techniques to create three-dimensional numerical earth models in terms of petrophysical rock properties. A key challenge is the integration of reservoir geophysics in static and dynamic earth modeling workflows. The course focuses on modeling of facies and rock properties from geophysical properties and on quantification of uncertainty of these models. Topics covered include deterministic and stochastic elastic inversion, petrophysical inversion, integration of geostatistics and rock physics to predict reservoir properties, geostatitsitcal algorithm, uncertainty propagation techniques, building of geomechanical earth models, and 4-D earth models generation for monitoring applications.
Lectures will include exercises with Matlab (basic knowledge required) and a free software developed by Stanford University called Sgems (no previous knowledge required).

Suggested textbook (not required): P. Doyen, *Seismic Reservoir Characterization:* EAGE publications, 2007.



Isoprobability surface of oil-sand facies (left) and simulations of reservoir properties (right)

Schedule:

- Introduction
- Basic Reservoir Geophysics Concepts
- Review of mathematical inverse theory and probability
- Part 1: Inversion methods for petrophysical properties estimation
- Part 2: Statistical rock physics modeling
- Part 3: Geostatistical interpolation
- Part 4: Facies modeling
- Part 5: Stochastic inversion
- Part 6: Modeling of rock and dynamic properties (static model of porosity, permeability)
- Part 7: 4-D earth modeling

We could diverge from this schedule to some extent, depending on students' interests.

Homework and final:

Homework are assigned bi-weekly. Each homework will contain optional problems. At the end of the class students can either take the final exam or complete a final project.

Grade:

The final grade is computed as follows:

- Homework grade average: 60%
- Final exam/ Final project: 40%
- Optional problems in the homework can increase the final grade up to 20%

Note that each homework/exam has a standalone grade of 100 points. When determining the final grade, these will be normalized reflecting the percentage distribution above. The final letter grade is given based on the numerical grade:

A	B	C	D	F
90-100	80-89	70-79	60-69	<60

Prerequisite:

- Linear Algebra;
- Basic Matlab knowledge.

Attendance Policy:

Each student is expected to attend the lectures to fulfill the academic requirements. University sponsored absences are cleared through the Office of Student Life (OSL). Students with official authorized absences shall be permitted to make up work without penalty in classes missed (UW Regulation 6-713).

Disability statement:

If you have a physical, learning, or psychological disability and require accommodations, please let the instructor know as soon as possible. You must register with, and provide documentation of your disability to University Disability Support Services (UDSS) in SEO, room 330 Knight Hall. 766-6189, TTY: 776-3073).

Academic dishonesty:

The University of Wyoming is built upon a strong foundation of integrity, respect and trust. All members of the university community have a responsibility to be honest and the right to expect honesty from others. Any form of academic dishonesty is unacceptable to our community and will not be tolerated. The University of Wyoming has a time-tested procedure to judge such cases, and serious penalties may be assessed.