Where: Stanford Terrace Inn, 531 Stanford Ave., Palo Alto, CA 94306
When: Sunday August 23, 2009

MULTISCALE STRATIGRAPHIC FORWARD MODELLING USING SEDSIM

Instructors: Dr. Cedric Griffiths, and Dr. Tristan Salles, *Commonwealth Science and Industrial Research Organisation (CSIRO), Australia, contact: cedric.griffiths@csiro.au*

TECHNICAL BACKGROUND

Stratigraphic Forward Modelling has evolved over the past twenty years to become a sophisticated and adaptable tool in the exploration of three-dimensional stratal patterns at a wide range of scales. There is a convergence of code from the engineering and sedimentology/stratigraphy worlds with engineering/hydrology code being run on longer time scales, and stratigraphic modelling code being applied to engineering-scale problems. Sedsim is based on hydraulic sediment transport code originally developed at Stanford in the 1980's. It has undergone several generations of modification at the University of Adelaide and CSIRO since the mid 1990's. The original subaqueous siliclastic transport code has been augmented by code addressing the growth of carbonates and vegetation, and aeolian processes. Sedsim has been applied to the prediction of grain-size and composition at scales from seconds/cm (digital flume tank), through metres/months (beach replenishment), hundreds of kilometres/months (continental shelf sediment response to climate change), and metres/millions of years (reservoir, field and play-fairway applications in hydrocarbon exploration and appraisal).

This short course introduces the attendees to the theory, concept and practice of stratigraphic forward modelling. It provides a rare opportunity to become familiar with the concepts and application of stratigraphic forward modelling. The instructors are at the forefront of development and application of this approach both in academia and in industry.

PARTICIPANTS

Anyone who is interested in the practical application of stratigraphic forward modelling (SFM) is encouraged to attend. Participants will be encouraged to bring a laptop on which the Sedsim program can be run.

GENERAL OBJECTIVES

The short course will focus on hands-on use of the Sedsim code as an example of SFM, together with the workflow needed to develop and test predictions at a variety of scales. The goal of the class is to teach attendees to use SFM on realistic 3D modelling problems. The treatment of theory will be limited. Instead, there is a strong emphasis on understanding and using SFM programs in a real-world setting such that their capabilities and limitations are well understood.

SPECIFIC OBJECTIVES

Concept and theory: The attendees will be introduced to the notion of stratigraphic forward modelling and its place in a range of applications from digital flume tanks, climate change mitigation and adaptation, hydrocarbon exploration and appraisal, and carbon storage and sequestration in saline aquifers. The importance of tight specification of the problem to be addressed will be emphasized.

Hands-on exercise: Copies of the latest demonstration version of Sedsim and documentation will be distributed for both Apple and Windows machines and exercises will assume that participants, either individually or in groups of two or three have access to a laptop in the room. Sedsim can be downloaded in advance from http://www.csiro.au/products/Sedsim.html

Previous experience with running Sedsim could be advantageous, though not essential. Through hands-on exercises with Sedsim software, the attendees will learn how to extract the input parameters from a variety of sources and the importance/sensitivity of the input parameters, and evaluate the results by using a variety of additional programs provided.

CONTENT AND PROGRAM

The short course will last for a full day. The instructors will assist during the exercise sessions.

08:30 – 09:00	Welcome and General Perspectives (historical review, current status, trend and future)
09:00 - 10:00	Sedsim (algorithm, parameters, problem identification and specification)
10:00 – 10:20	Coffee break
10:20 – 11:15	Sedsim Exercises (Use of Demo Sedsim and discussion of the input files)
11:15 – 11:45	Constraint and verification of stratigraphic forward models
11:45 – 12:30	Sedsim Exercises – simple own problems
12:30 – 13:45	Lunch
13:45 – 14:15	Sedsim marine siliciclastic process application
14:15 – 15:10	Sedsim carbonate and organics
15:10 – 15:30	Coffee break
15:30 – 16:15	Sedsim aeolian modelling
16:15 – 17:00	Sedsim digital flume tank
17:00 – 17:15	Discussion / Conclusions

INSTRUCTORS

Tristan Salles is currently working as a research scientist at CSIRO Petroleum Resources. Tristan's principal interests are in numerical programming of submarine gravity flows (turbidity currents, debris-flows…), transport-erosional-depositional processes and post-depositional sediment evolution (compaction, diagenesis…).
Tristan obtained his undergraduate degrees in 2003 both from Centrale Engineering School (France) and Marseille University (France) in the field of marine sciences and physical oceanography. He joined IFP in 2003 where completed a PhD in 2006 in collaboration with Bordeaux University. He was working on the construction of a numerical model to simulate the sedimentary fill of the canyons and channel-levee complexes present in turbiditic systems.

Cedric Griffiths is currently a Research Group Leader in Predictive Geoscience at CSIRO Petroleum Resources. Cedric graduated in geology in 1972 from Durham University, England. He carried out field work in Angola, SE Asia, the USA, N. Sea and Zambia before studying for a PhD at Newcastle University, England in 1979. From 1983 to 1988 he worked in Norway as a Senior Research Scientist for Sintef Petroleum. He went on to work for BP Exploration, Stratigraphic Research International (where he was the co-founder and Director) and the University of Trondheim where he was Nordic Council Research Professor of Petrophysics. From 1994 to 1999 he held the South Australian Chair in Petroleum Geology at the University of Adelaide. In 2000 Cedric joined CSIRO where he spent three years as Theme Leader. Cedric has been involved with Quantitative Stratigraphy in various forms for the past 30 years, and has been responsible for the development and application of stratigraphic forward modelling programmes in several diverse fields.