Introduction to Clastic Facies (G073)

Tutor(s)

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Overview

This course provides an introduction to siliciclastic facies in all aqueous settings, focusing on sand deposition for application to conventional reservoirs. The course begins with an overview of sedimentary structures and their recognition in outcrop and core. Observations of sedimentary structures and facies stacking patterns are then used to interpret depositional environments and make predictions about sand body geometry, size, and compartmentalization. The course makes extensive use of large-format (50% scale) core photos and outcrop photopans from a wide range of environments. Subsurface data sets, including seismic and well logs, are used to illustrate the application of these concepts to subsurface mapping. We will also cover an introduction to core description workflows.

Duration and Logistics

Classroom: A 2-day course comprising a mix of lectures and exercises. The manual will be provided in digital format and participants will be required to bring a laptop or tablet computer to follow the lectures and exercises.

Virtual session: Four 3-hour interactive online sessions presented over 4 days. Digital course notes and exercise materials will be distributed to participants before the course.

Level and Audience

Fundamental. The course is intended for subsurface geoscientists who would like an introduction to siliciclastic facies and their interpretation from core, well logs and seismic. There is no assumption of previous knowledge of clastic systems, and simple concepts are built up into sophisticated depositional models. Skills are built through a series of exercises using outcrop photopans, high-resolution core photos, well logs and seismic. There is abundant opportunity for interaction.

Objectives

You will learn to:

1. Interpret basic depositional models of siliciclastic systems with a focus on sandy facies, and prediction away from control at a range of scales.
2. Collect basic observations from core that can be used to constrain depositional models.
3. Integrate cores, well logs and seismic, in order to make predictions about the distribution of reservoir, source and seal.
4. Interpret genetic stratigraphic units in core, well logs and seismic.

Course Content

Session 1: Fluvial systems

- Reynolds numbers and how they relate to bedforms
- Recognition of sedimentary structures in core
- How to utilize sedimentary structures and burrows to constrain depositional conditions
- Fluvial depositional models (meandering, braided and fixed rivers)
- Large-scale fluvial systems (alluvial fans, distributive fluvial systems, tributary systems)
- Paleosols and how to use them

Session 2: Coastal systems

- Introduction to coastal parasequences, the fundamental genetic unit of prograding clastic shoreline
- Wave-dominated coasts (barrier islands, strand plains, wave-dominated deltas)
- River-dominated deltas
- Tide-dominated deltas and tidal recognition criteria

Session 3: Incised valley fills – Deepwater fans part 1

- Incised valley facies models
- Sediment gravity flows (slumps, debris flows, turbidity currents)
- MTCs
- Deepwater channels and levees

Session 4: Deepwater fans part 2

- Avulsions
- Lobes
- Passive margin fans
- Active margin fans
- Drift deposits