Fluvial Depositional Systems: From Exploration to Development Scale, Wyoming (G139)

Tutor(s)

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Overview

An integrated outcrop and modern analog course designed to explore a wide variety of fluvial reservoirs and the variables that drive their behavior as reservoirs in the subsurface. Clasts, beds, bars, and belts form the building blocks of the fluvial reservoirs and the ability to predict how these components combine with charge history and fluid viscosity to determine performance is crucial for reducing risk and uncertainty. The modern Laramie River, and outcrops of the Flathead Sandstone, Mesaverde Group, and Lance Formation will be explored in the field.

Duration and Logistics

A five-day field course based in Wyoming comprising a mixture of outcrop and modern analog examinations and discussions (70%) and lectures/exercises (30%). The field course is conducted in southern and Wyoming, USA. Note: flexible options available for more or fewer days in the field.

Exertion Level

This class requires a MODERATE exertion level. Most walks are under 2 km at elevations of 5,000-7000’ (1500-2500 m).

Level and Audience

Intermediate. Geoscientists, drillers, engineers, and managers requiring a better working knowledge of fluvial settings in order to better constrain uncertainty and risk.

Objectives

You will learn to:

1. Identify and differentiate distributive from tributary fluvial systems (including incised valleys).
2. Predict the degree of channel belt amalgamation, static, and dynamic connectivity, and degree of potential anisotropy at various locations in the basin.
3. Move beyond the simple (and generally irrelevant) framework of meandering, braided, and anastomosing rivers to more meaningful criteria for differentiating and predicting reservoir behaviors in fluvial channel belts.
4. Anticipate and predict potential drivers of reservoir performance and flow units based on sedimentary processes, diagenetic history, and fluid viscosity.
5. Reduce uncertainty and potential risk when working with subsurface fluvial reservoirs in which minimal (or no) 3D seismic data are available.

Course Content

Day 1: Arrive, Laramie, Wyoming

Classroom:

- Course introduction and safety briefing.

Overnight Laramie

Day 2: Laramie River

Classroom:

- Flume tank experiments (or core examination).

Fieldwork:

- Examination of depositional processes and preservation potential of beds, bars and belts in the Laramie River.

Overnight Laramie

Day 3: Fluvial I

Fieldwork:

- Fine-grained fluvial deposits (including tidally-influenced) of the Allen Ridge Formation and Pine Ridge Sandstones.
- Examination of aggradational (distributive) fluvial deposits and degradational (tributary or incised valley) deposits and the constraints on exploration and exploitation in both systems.

Overnight Rawlins

Day 4: Fluvial II

Fieldwork:

- Coarse-grained fluvial deposits of the Flathead Sandstones, Lance Formation, and Fort Union Formation and the role of sediment supply/accommodation ratios on planform geometry, reservoir quality, connectivity, and compartmentalization.
- Heterogeneity in coastal plain river systems, Ericson Formation at Rock Springs.

Overnight Rock Springs

Day 5: Fluvial III

Fieldwork:

- Lithological heterogeneity and reservoir behavior/compartmentalization in amalgamated channel belt deposits of the Rusty and Trail Members of the Ericson Formation at Rock Springs.

Overnight Rock Springs

Day 6: Departure from Rock Springs, Wyoming

- End of course and travel home