The Geology of the Paradox Basin and Implications for Deepwater Gulf of Mexico Exploration, Moab, Utah (G095)

Tutor(s)

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Overview

The primary technical goal is to provide a widely applicable introduction to the interrelationship between sedimentation and structural geology with a particular focus on salt tectonics and salt-sediment interaction. The geology is examined with reference to deepwater exploration themes with the Gulf of Mexico.

Duration and Logistics

A 4-day field course starting and finishing in Grand Junction, Colorado, comprising a mixture of lectures, field work and exercises.

Level and Audience

Intermediate. This course requires a basic understanding of geoscience and will suit those working in the geoscience, geotechnical and engineering fields. The aim is to facilitate knowledge and experience exchange among the participants, so is open to those from a very wide range of experience levels.

Exertion Level

This course requires a **MODERATE** exertion level. There will be hikes to outcrops of up to 6.5km (4 miles) round trip. Some of these will encounter uneven and rocky ground with some short, steep inclines. The climate in southern Utah is typically warm to hot and dry with temperatures up to 37.5°C (100°F) and the elevation is between 1,250–1,500m (4,000–5,000 ft).

Objectives

You will learn to:

1. Describe the regional stratigraphy and principal structural features of the Paradox Basin, Utah.
2. Characterize and interpret controls on Paradox Basin salt-related structures and key features of passive diapiric systems, including halokinetic sequences, caprock development, non-evaporite stringers / inclusions, welds, megaflaps, counter-regional faults, radial faults and burial wedges.
3. Examine stratal geometries and halokinetic sequences and how these relate to intervals of salt inflation / evacuation and sediment flux.
4. Assess the controls on basin fill architecture, fluid flow and deformation within the Paradox Basin and compare this to analogous salt basins worldwide.
5. Understand the importance of salt basins to the energy industry for hydrocarbon production.

Course Content

Course Details

This course is principally an introduction to the interrelationship between sedimentation and structural geology with a particular focus on salt tectonics and salt-sediment interaction.

Day 1: Arrive in Grand Junction

Classroom:

- Course introduction and safety briefing

Fieldwork:

- Books Cliffs overview and Dead Horse Point
    - Colorado and Utah regional geology
    - Paradox Basin introduction

Overnight in Moab.

Day 2: Fisher Valley and Onion Creek

Fieldwork:

- Fisher Valley Salt Wall and Stinkin' Spring
    - Non-evaporite inclusions and stringers
    - Burial wedges and halokinetic sequences
    - Caprock shear zones
    - Salt shoulder, gravitational, syndepositional chevron folds and radial faults in burial wedges
    - Synhalokinetic radial faults that compartmentalize fluid flow/cementation in Permian fluvial sandstone.

Overnight in Moab.

Day 3: Arches and Salt Valley

Fieldwork:

- Arches National Park
    - Fault cataclasis and fracture system.
    - Deformation bands on relay ramp between two large salt dissolution collapse faults.
    - Burial wedge syndepositional folding and halokinetic sequences.

Overnight in Moab.

Day 4: Castle Valley

Fieldwork:

- Castle Valley and Bull Canyon
    - Overview vista of Castle Valley salt wall showing halokinetic sequences
    - Counter regional system associated with secondary weld
    - Footwall paleotrap in Permian aeolian dune reservoir with tilted oil/water contact 3-way against salt and weld
    - Dinosaur trackways

Return to Grand Junction for travel home.