

Instructors:

EGI Research Staff and
Affiliate Scientists

Course Structure

Lectures, presentation,
and field course

Participants

10-15 persons

Duration

5 days

Location

Field locations and EGI
Salt Lake City offices

Rocky Mountain Depositional Systems Field Course

Available to EGI Corporate Associate Members

OVERVIEW

The objective of this five-day field course (three-day field course with one-day core workshop and a full-day class) is to observe and understand the depositional environments, sedimentology, and tectonic evolution of several unconventional shale resources in the middle Rocky Mountains of the western United States.

We begin with a classroom overview of Jurassic-Cretaceous mountain building during the Sevier Orogeny on the west, and establishment of a foreland basin



toward the east. During the Cretaceous, a clastic wedge of sediments was deposited eastward, ranging from coarse conglomerates near the mountain front grading into sands and shales, and including many prolific sandstone reservoirs known for oil and gas production.

Farther east in quieter waters carbonate rocks are found. Inter-bedded in these sequences are several known source rocks, some of which have now been proven to be reservoir targets for unconventional resource development. On the road, we will travel from west to east, from the proximal mountain-front clastics to the distal carbonates and shales.

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DAY 1: EGI OFFICE, SALT LAKE CITY, UTAH

The course starts with a full-day classroom overview of Jurassic-Cretaceous mountain building during the Sevier Orogeny on the west, and establishment of a foreland basin toward the east, establishing a foundation for the three-day field component. This will include presentations by EGI research scientists and a tour of the EGI labs.

DAY 2: SALT LAKE CITY TO GREEN RIVER, WYOMING

The first day stops are focused primarily on regional geology and tectonics in order to understand the context for foreland basin sedimentation during the Cretaceous. We also observe Tertiary units, ending with the Eocene Green River Formation – a classic “oil shale” deposited in a lacustrine environment.

DAY 3: GREEN RIVER, WYOMING TO LARAMIE, WYOMING

Crossing the Rock Springs Uplift, we examine both conventional shore-face sand units and unconventional shales (Baxter, Mowry, and Niobrara). We also see evidence of the Late Cretaceous Laramide Orogeny faulting and warping the foreland basin into the multiple basins and mountain ranges of present day Wyoming.

DAY 4: LARAMIE, WYOMING TO LAKEWOOD, COLORADO

This last day in the field focuses on chinks and marls of the Niobrara Formation observable in outcrops and quarries. Current exploration and development activities of the Niobrara in the Denver-Julesberg Basin are discussed as well.

DAY 5: LAKEWOOD, CO, USGS CORE RESEARCH CENTER

The last day is a core workshop with presentations and discussions in an adjacent training room, examining Niobrara core related to what we saw on Day 4, plus the addition of Bakken Core from North Dakota and Montana. The Bakken unconventional system is quite different, and since it doesn't outcrop (it is only present in the subsurface), core examination is the only way to see it.

Planning for one day of classroom overview, three days in the field, and one more day in the lab allows for flexible travel arrangement on the front and/or back of the time slot, while still fitting into a standard five-day work week. Participants need to travel to Salt Lake City to begin, and fly out of Denver at the end.

Stop 1 – Echo Canyon. Regional tectonics, Sevier Orogeny, Thrust Belt, Cretaceous stratigraphy, clastic wedge, conglomerates to sandstones to shales in the foreland basin, epicontinental seaway.

Stop 2 – French Rd, rim. Eastern limit of Sevier thin-skinned thrusting; Green River Basin, Moxa Arch.

Stop 3 – Manila, UT. Flaming Gorge Reservoir; Cretaceous sediments; Mancos Shale; Mowry Shale; Frontier Formation sandstones; Dakota Sandstone.

Stop 4 – Green River, WY. Green River Formation; lacustrine sedimentation; oil shales; trona mining; fossil fish. Stay for the night at hotel in Green River, WY.

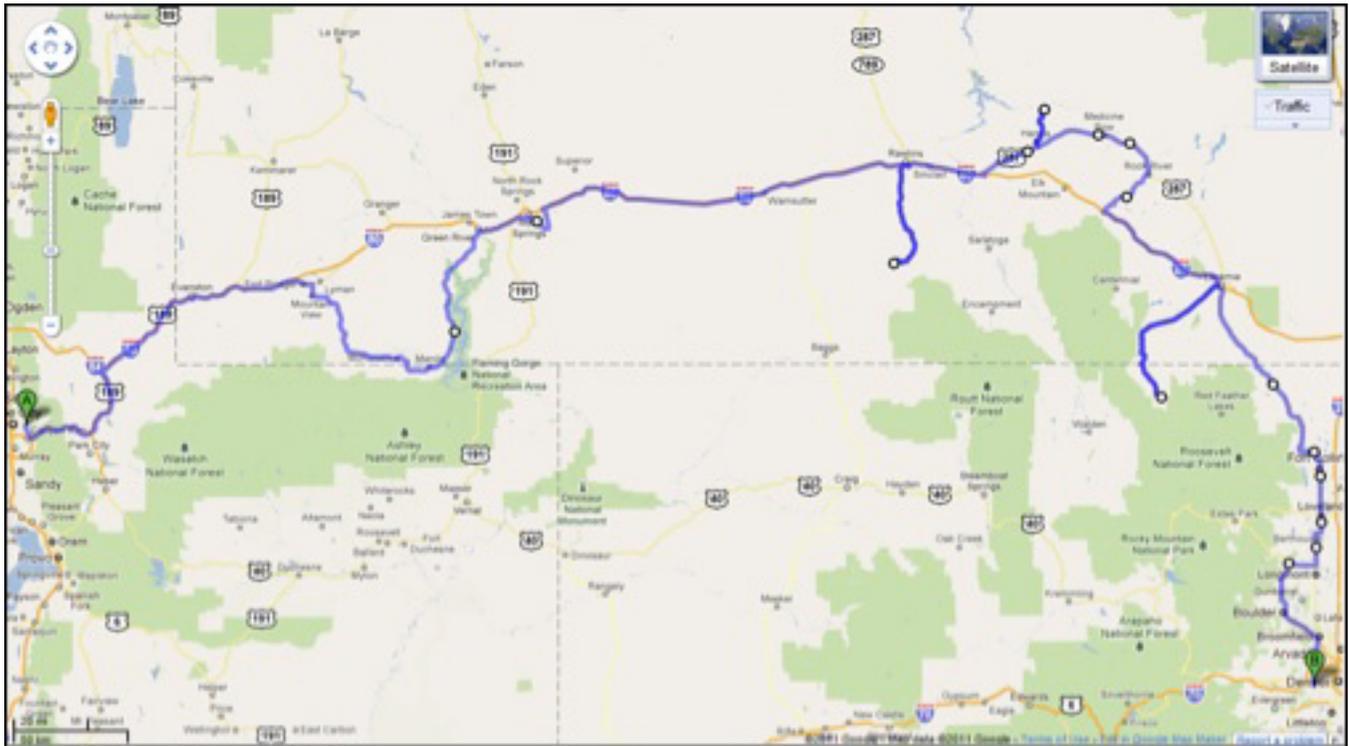


Figure 1. Route for Rocky Mountain Shales field Field Course; Salt Lake City, UT to Denver, CO

Stop 5 – Airport Rd. Rock Springs Uplift; Baxter Shale; Mesaverde Fm sandstones (Almond, Erickson, Blair).

Stop 6 – Sage Creek Rd. Cretaceous stratigraphy; Niobrara Shale (and chalks); Frontier; Mowry Shale.

Stop 7 – Hanna Basin. Coal mining; Laramide tectonics; Beer Mug Anticline; stratigraphy.

Stop 8 – Medicine Bow. Laramide tectonics; Mowry Shale; Triassic redbeds; Como Bluff dinosaur quarries.

Stay for the night at hotel in Laramie, WY.

Stop 9 – Laramie Basin. O & G fields; Quealy Dome; diamond-bearing kimberlites; Niobrara outcrop.

Stop 10 – La Porte, CO. Boettcher Quarry; Niobrara sequence stratigraphy.

Stop 11 – Lyons Cemex Quarry; Niobrara.

Stop 12 – Six Mile Fold; Niobrara.

Stay next two nights at hotel, Lakewood, CO for Day 4: Lakewood, CO, USGS Core Research Center; Bakken and Niobrara core.

PHYSIOGRAPHY AND GEOLOGIC OVERVIEW

On this Field Course, we will travel west from the west side of the Great Plains geologic province, through the Southern Rocky Mountains, Wyoming Basin, Middle Rocky Mountains, and end up on the eastern edge of the Basin and Range province.

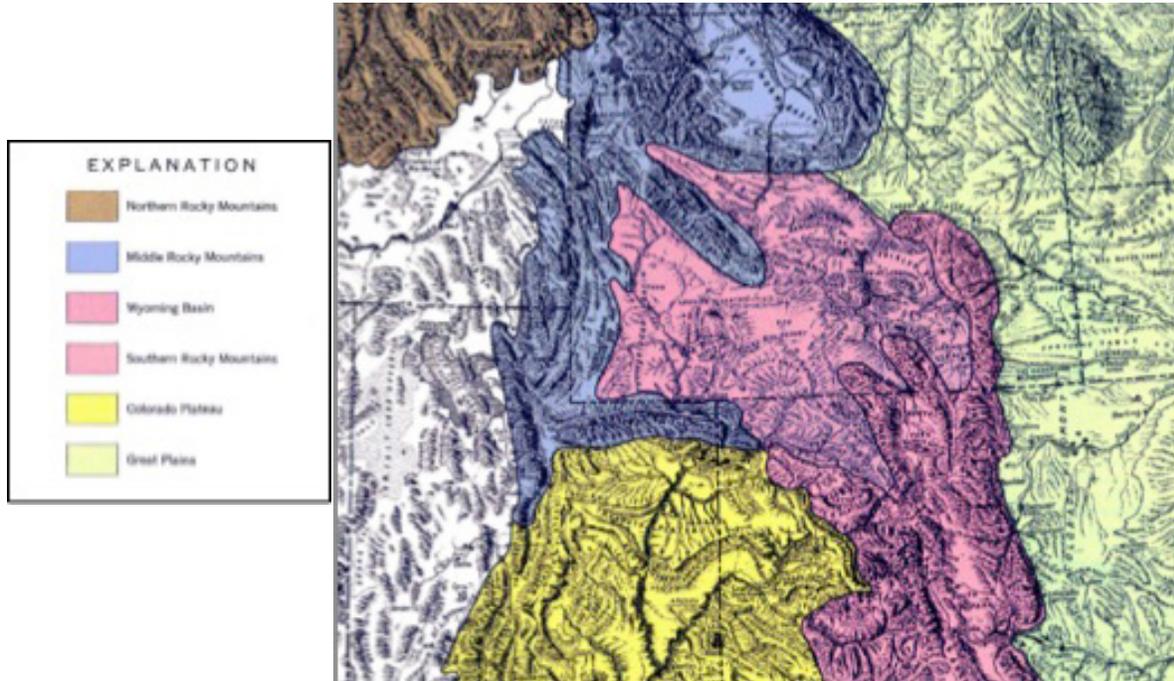


Figure 2. Physiography

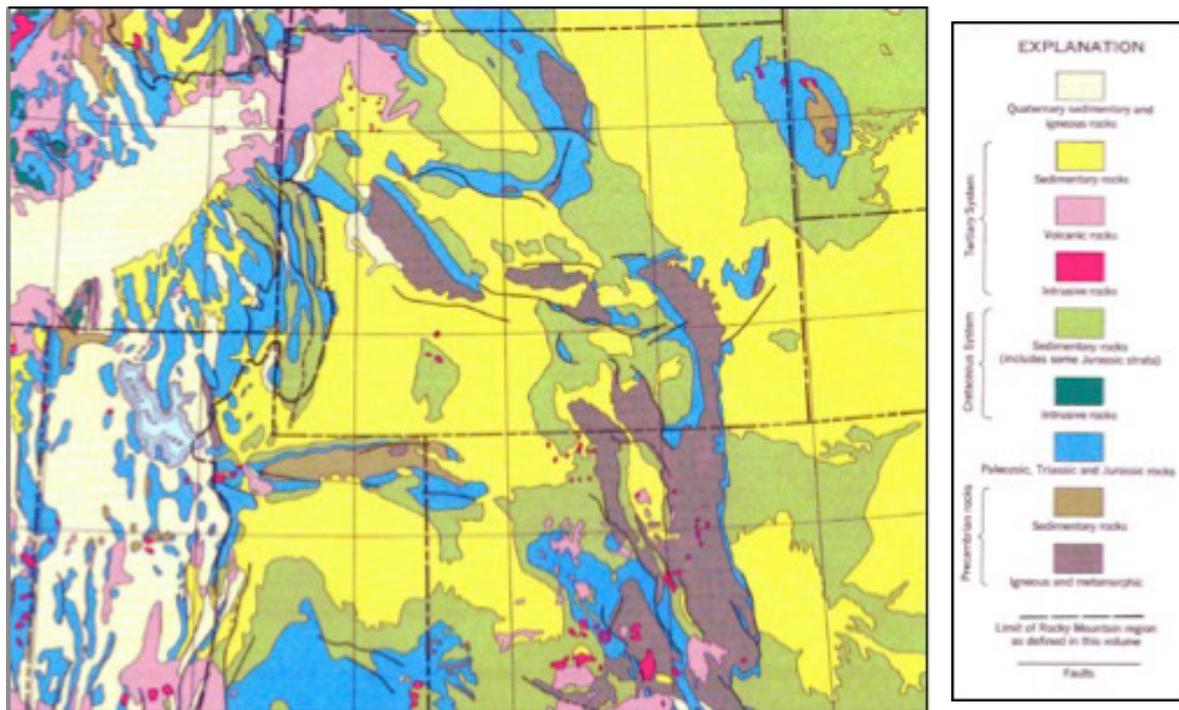


Figure 3 Geologic Map