Ride the Rockies

Frisco to Frisco Loop

2007 Geology Highlights

June 17 – June 23

Presented by Wells Fargo and The Denver Post

Quaternary—0 to 1.8 million years ago

This is the geologic time period during which the present landscape formed. Glaciation peaked and waned several times, sculpting cirques and U-shaped valleys. Last major glaciers retreated about 12,000 years ago.

Includes alluvium (sand, gravel, and silt deposited by rivers and streams), eolian (windblown) deposits, glacial deposits, landslide deposits, and young volcanic rocks (basalt flows).

Tertiary—1.8 to 66 million years ago

A major mountain-building episode, the Laramide orogeny, occurred during this period—70 to 45 million years ago. Erosion then exposed basement rocks and created a flat surface. Erosion of this surface during regional uplift — beginning 10 to 5 million years ago—shaped the present mountain landscape. Rifting (faulting) began about 30 million years ago, creating the Arkansas and San Luis Valleys.

Sedimentary rocks of Tertiary age

Includes sandstone, siltstone, shale, claystone, and conglomerate (rounded rock fragments in a fine-grained matrix).

Igneous rocks of Tertiary age

Includes volcanic rocks, such as basalt, rhyolite, and ash-flow tuffs (especially in the San Juan Mountains), and intrusive rocks with compositions similar to granite.

Cretaceous—66 to 144 million years ago

A seaway flooded Colorado, depositing shallow-marine, shoreline, and swamp sediments. Dinosaurs became extinct by the end of this period.

Includes primarily shale, sandstone, and coal, and minor limestone and conglomerate (rounded rock fragments in a fine-grained matrix).

Jurassic and Triassic—144 to 245 million years ago (includes some rocks as old as 320 million years)

The Ancestral Rockies were eroded during this time of deserts, intermittent streams, salt flats, coastal plains, dunes, and deltas. Dinosaur fossils and footprints are found in deposits of ancient river channels.

Includes sandstone, siltstone, and claystone, and minor limestone, gypsum, and conglomerate (rounded rock fragments in a fine-grained matrix).

Permian and Pennsylvanian—245 to 320 million years ago

During this time, rocks were uplifted to form the Ancestral Rocky Mountains, which were just as high and rugged as our present mountains. Erosion of older sediments resulted in deposition along mountain flanks and in basins.

Includes sandstone, siltstone, shale, conglomerate (rounded rock fragments in a fine-grained matrix), gypsum, and limestone.

Mississippian to Cambrian—320 to 540 million years ago

This was a time of widespread marine deposition when Colorado was intermittently below sea level.

Represented mostly by limestone, but also includes quartzite, sandstone, shale, and dolomite.

Precambrian—older than 540 million years ago (includes rocks as old as about 1.8 billion years in Colorado)

The Precambrian accounts for more than 85 percent of geologic time. These rocks are referred to as the basement rocks; they are exposed in the cores of major mountain ranges and in some of the deeper canyons. They are the products of metamorphism (changes in the chemistry and fabric resulting from heat and/or pressure) and igneous intrusion (emplacement of molten rock).

Includes intrusive rocks, chiefly granite, and metamorphic rocks such as gneiss, schist, and quartzite.

To download this and other USGS materials related to Ride The Rockies, go to *http://www.cr.usgs.gov/rtr/index.htm*

Geology Highlights Along Ride the Rockies 2007 Route

DAY 1 SUNDAY, JUNE 17 Frisco to Steamboat Springs

Heading north, down the Blue River valley from Frisco, jagged glaciated peaks of the Gore Range border the west and the rounded topography of the Williams Fork Mountains frames the east. The Williams Range thrust fault defines the western edge of the Front Range where Precambrian-age gneiss and granite (1.4 to 1.8 billion years old) override Upper Cretaceous Pierre shale (70 to 82 million years old). More durable Mesozoic rocks are exposed as we ascend from the easily erodible shale of the valley. Traversing Rabbit Ears Pass, we reach the enduring Precambrian-age rocks. Faulting along the western side of the Park Range makes for a steep descent into Steamboat Springs; these faults also serve as conduits to bring superheated water to the surface.

photo of Gore Range

USGS photo of Williams Fork Mountains

DAY 2 MONDAY, JUNE 18 Steamboat Springs to Craig

Our westward journey from Steamboat Springs takes us into the gentler terrain of the plateau country as we parallel the Yampa River downstream all the way to Craig. Most of today's ride is through undulating topography formed on Upper Cretaceous sandstone, shale, and coal of the Mesaverde Group (72 to 82 million years old), material that was deposited near the shore of an ancient seaway.

USGS photo of a Highway 40 exposure

Blanco Ranger District photo of Flat Tops Wilderness

DAY 3 TUESDAY, JUNE 19 Craig to Rifle

Our southerly route from Craig lays the White River Plateau and the Flat Tops Wilderness before us. The aptly named Flat Tops are capped by volcanic lava flows of Tertiary age (14 to 16 million years old). As we veer west, the 50-mile-wide White River Plateau east of the highway marks a transition between the faulted and folded alpine ranges to the east and the true plateaus to the west. South of Meeker, sandstone and shale beds of the Mesaverde Group and adjacent older Mesozoic and Paleozoic rocks are turned up steeply along the Grand Hogback, a monocline that borders the White River uplift.

DAY 4 WEDNESDAY, JUNE 20 Rifle to Glenwood Springs

Where yesterday we rode next to the Grand Hogback, today we ride through it. Eastbound, up the Colorado River valley, we travel downsection through geologic time—from the Upper Cretaceous rocks of the Mesaverde Group (72 to 82 million years old) through the Mancos shale, Dakota sandstone, Triassic-Jurassic rocks, and finally into the Middle Pennsylvanian (306 to 312 million years old) Eagle Valley evaporites at Glenwood Springs.

Glenwood Springs photo by Weldon Schloneger

DAY 5 THURSDAY, JUNE 21 Glenwood Springs to Aspen

We leave the plateau country behind today and return to the jagged peaks that make up the core of the Colorado Rockies. The setting of Glenwood Springs is similar to that of Steamboat Springs, where such a junction is marked by faulting and hot springs. Transit through Pennsylvanian evaporites accounts for the high salinity of these hot springs. Our route takes us past the distinctive reddish rocks of the Maroon Formation (260 to 310 million years old) which also make up one of Colorado's most scenic peaks, Maroon Bells.

Maroon Bells photo by Norm Herr

DAY 6 FRIDAY, JUNE 22 Aspen to Leadville

Thousands of feet of ice carved the U-shaped valley of the Roaring Fork River valley during the Ice Ages of the Pleistocene (maximum at about 18,000 yrs ago). The wide, nearly flat expanse of glacial outwash enables us to warm up before climbing one of the highest passes in the state. At 12,095 ft, Independence Pass bisects the Continental Divide through the Sawatch Range. Directly east of the pass is Mt. Elbert, Colorado's tallest peak (at 14,433 ft). The Sawatch Range is composed of Precambrian-age rocks (1.4 to 1.8 billion years old)—mostly granites and some gneiss.

Independence Pass photo by Rian Houston

DAY 7 SATURDAY, JUNE 23 Leadville to Frisco

Tunnels under the Continental Divide transport Western Slope water to Turquoise Lake where it is stored for downstream power generation and eventually, Eastern Slope water users by way of the Arkansas River. Conveniently situated in a U-shaped glacial valley, Turquoise Lake gets its name from the semiprecious stone that was mined locally.

We pass the remnants of the Climax Mine, once the world's largest producer of molybdenum, as we pedal over Fremont Pass. The ore bodies formed 22 million years ago when molten rock pushed into place below the surface in three episodes. Molybdenum confers toughness to our steel bicycle frames.

Turquoise Lake photo Copyright of Nelson Chen

Blanco Ranger District photo of Flat Tops Wilderness

General Information Product 52
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