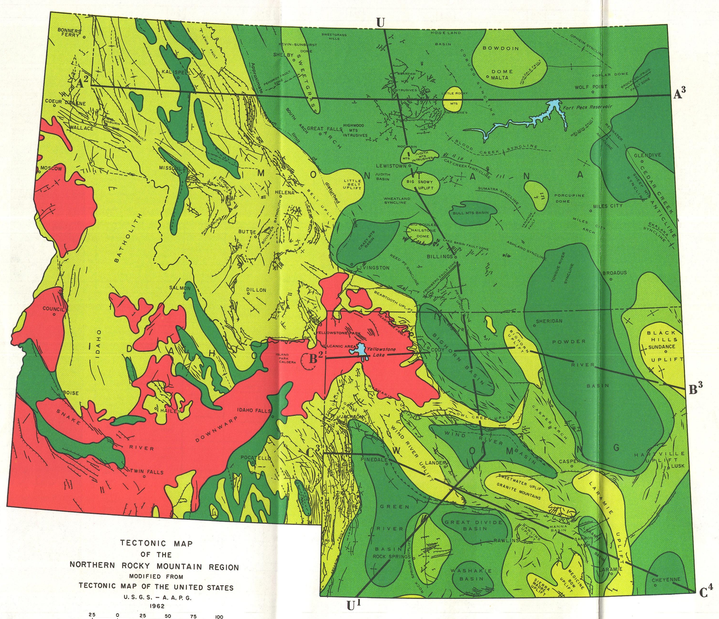


TECTONIC MAP
OF THE
NORTHERN ROCKY MOUNTAIN REGION
MODIFIED FROM
TECTONIC MAP OF THE UNITED STATES
U. S. G. S. – A. A. P. G.
1962

25 0 25 50 75 100
MILES

TECTONIC MAP

This map shows the locations of the major uplifts, downwarps, fault zones, and tectonic belts in the Northern Rocky Mountain Region. Adjustments in the earth's crust at different geological times since the earliest Precambrian have resulted in deformation of the rocks. The time and magnitude of the deformation differed from place to place. In some areas the rocks were gently uplifted or depressed and in other places the rocks were severely compressed, folded, and faulted.

Areas of maximum uplift are colored light green and areas of maximum downwarp, dark green. Two intermediate shades of green represent regions of less intense differential uplift and downwarp. Areas covered by volcanic rocks are colored red.

This map was modified from the Tectonic Map of the United States published by the United States Geological Survey and The American Association of Petroleum Geologists (1962). However, the representations and interpretations herein are solely those of the compilers.

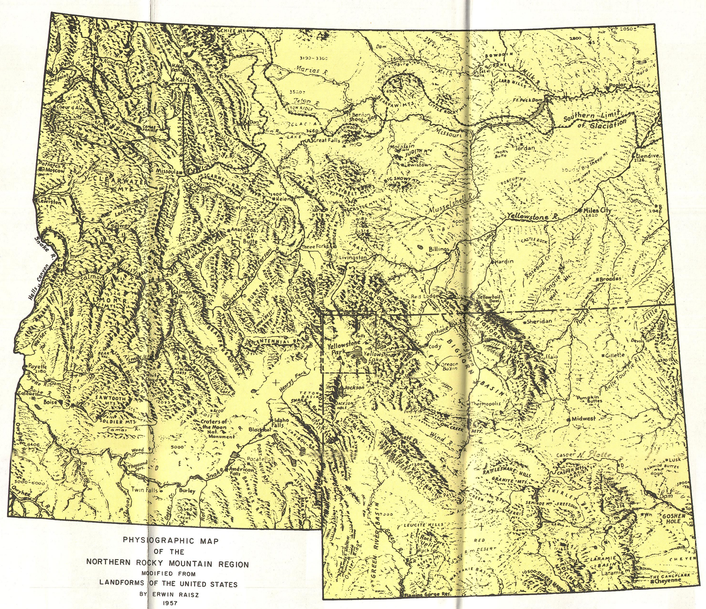
PHYSIOGRAPHIC MAP

This map shows the configuration and distribution of the major landforms in the Northern Rocky Mountain Region. Geological processes and rock characteristics combine to produce rolling hills and mountains, prairies and plateaus, hogbacks and cuestas, and basins and valleys.

Landforms of this region are related fundamentally to uplifts and depressions of the earth's crust. Water and wind are the principal erosional agents that produced the present surface irregularities. The type, composition, and texture of the rocks, and the local structure and sequence of the rock layers, are important controlling factors.

The earth's surface is changing continuously. New landforms evolve by erosion and gradual destruction of existing forms, by subsidence and uplift, and by the accumulation of freshly eroded rock materials.

The Physiographic Map supplements the other illustrations by showing the names of many surface features, by delineating areas of differential erosion, and by showing regional elevations. The other illustrations supply important information which helps to explain the geological origin of the prominent landforms. The relation of landforms in this area to landforms in adjacent states can be obtained from "Landforms of the United States" by Erwin Raisz (1957).



PHYSIOGRAPHIC MAP
OF THE
NORTHERN ROCKY MOUNTAIN REGION
MODIFIED FROM
LANDFORMS OF THE UNITED STATES
BY ERWIN RAISZ
1957

25 0 25 50 75 100
MILES

GEOLOGICAL HISTORY

The geological history of this area is shown in summary form. As viewed from left to right, the sequence of small maps pictures the changes as they took place, from ancient to recent times.

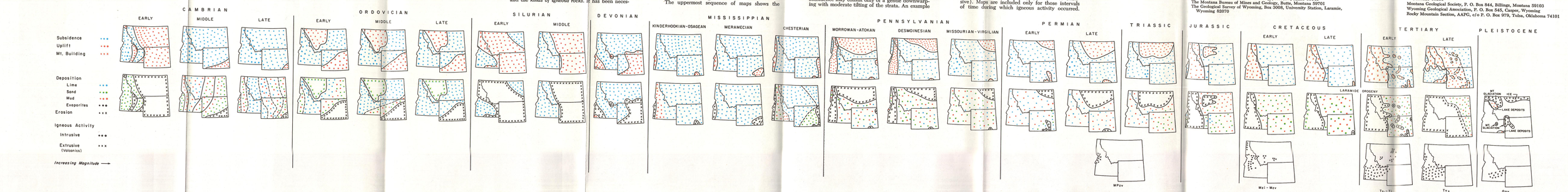
For each historically important *epoch* (the time equivalent of a rock *series*) there is shown by individual outline maps (1) the areas of *uplift* and *subsidence*, (2) the areas of *erosion* and *deposition*, and (3) the areas of *igneous activity*, and the *kinds of igneous rocks*. It has been necessary because of space limitation to combine all of the epochs of the Devonian, Triassic, and Jurassic Periods and to group epochs within the Silurian, Mississippian, Pennsylvanian, Permian, and Tertiary Periods.

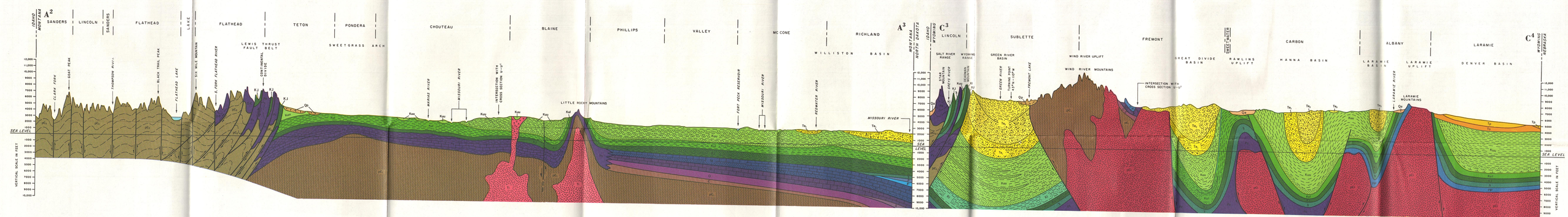
The relative magnitudes of subsidence, uplift, and deposition are indicated by the size of the symbol: the larger the symbol, the greater the magnitude of the event portrayed. The meaning of each symbol and an explanation of the color scheme are in the legend.

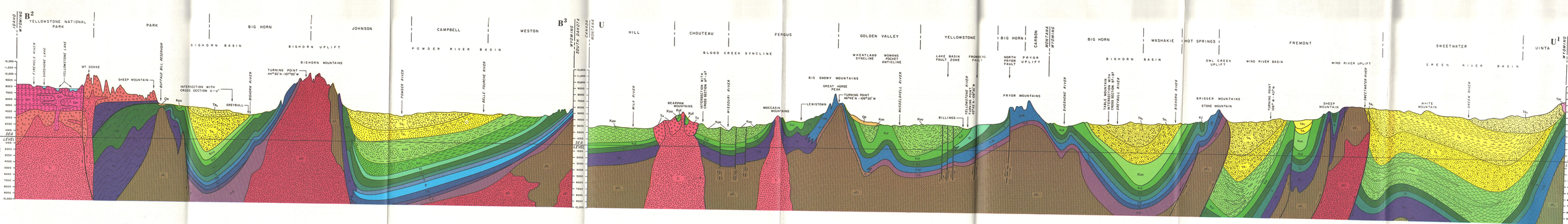
The uppermost sequence of maps shows the areas of subsidence and uplift from the Cambrian on the left to the Pleistocene on the right. The larger blue and red dots indicate areas of greater subsidence and uplift, respectively. The red crosses represent areas of mountain-building activity. A series of related mountain-building events in a particular area, or during a particular interval of time, is called an *orogeny*. These involve substantial folding and faulting of the rock layers, such as are found in the Rocky Mountains. In other areas subsidence may consist only of a gentle downwarping with moderate tilting of the strata. An example of this is the eastern part of Montana.

The middle sequence of maps shows areas undergoing erosion, and areas where deposition was taking place. Areas of erosion are outlined by black crosses. The kind of sedimentary material deposited is shown by color: blue for carbonate, green for sand, red for mud, and black for evaporites (salt, gypsum, and anhydrite).

The bottom sequence of maps shows the age and kind of igneous activity (intrusive or extrusive). Maps are included only for those intervals of time during which igneous activity occurred.







CONGLOMERATE
SANDSTONE
SHALE
LIMESTONE
MARL
DOLOMITE
EVAPORITES
LAVA
METAMORPHOSED ROCKS
INTRUSIVE ROCKS
FORM ONLY NO LITHOLOGY
NORMAL FAULT
THRUST FAULT

0 10 20 30 40 50 MILES
GRAPHIC SCALE
VERTICAL EXAGGERATION = 20 X

CROSS SECTIONS

The four cross sections illustrate the subsurface geology of the Northern Rocky Mountain Region. The locations of the four lines of section are shown by lines A^2–A^3, B^2–B^3, C^3–C^4, and U–U^1 on the Tectonic Map. These are regional segments of a nationwide cross-section network prepared for the map series.

The cross sections show (1) the surface configuration, (2) the relation of the underlying rocks to the surface profile, (3) the age, nature, attitude, thickness, distribution, and sequence of the rock layers, and (4) the location, nature, and magnitude of the structural elements. The names, colors, and lithologic symbols are the same as those used in the Geological Highway Map and the Generalized Chart of Time and Rock Units.

The surface profile was constructed from 1:250,000-scale topographic maps (United States Geological Survey). The basement profile was constructed from the Basement Map of North America (The American Association of Petroleum Geologists and the United States Geological Survey, 1967), the Basement Rock Map of the United States (United States Geological Survey, 1968), and private sources.

The cross sections were compiled from publications of state agencies and universities of the Northern Rocky Mountain Region, as well as federal agencies, national and local geological societies, individual geologists, and other published sources.

GEOLOGICAL HIGHWAY MAP
NORTHERN ROCKY MOUNTAIN REGION
IDAHO MONTANA
WYOMING

Compiled by
Geological Highway Map Committee
of
THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS

H. B. RENFRO
H. B. Renfro and Company
CHAIRMAN

DAN E. FERAY
Texas Tech University

with the cooperation of the United States Geological Survey, the Idaho Bureau of Mines and Geology, the Montana Bureau of Mines and Geology, and the Geological Survey of Wyoming.

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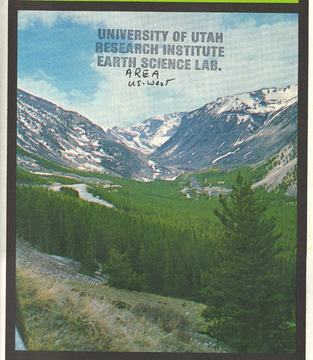
Geological Highway Map

NORTHERN ROCKY MOUNTAIN REGION

IDAHO MONTANA WYOMING



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Sources of Geological Information of the NORTHERN ROCKY MOUNTAIN REGION

Primary Sources:

United States Geological Survey, Washington, D. C. 20242
Erwin Raisz, 107 Washington Avenue, Cambridge, Massachusetts 02140
The American Association of Petroleum Geologists, P. O. Box 979, Tulsa, Oklahoma 74101
The Geological Society of America, P. O. Box 1719, Boulder, Colorado 80302
The Idaho Bureau of Mines and Geology, Moscow, Idaho 83843
The Montana Bureau of Mines and Geology, Butte, Montana 59701
The Geological Survey of Wyoming, Box 3008, University Station, Laramie, Wyoming 82070

Other Sources:

Geology departments of colleges and universities
Geological Societies:
Rocky Mountain Association of Geologists, 1660 Grant Street, Denver, Colorado 80203
Montana Geological Society, P. O. Box 844, Billings, Montana 59103
Wyoming Geological Association, P. O. Box 545, Casper, Wyoming
Rocky Mountain Section, AAPG, c/o P. O. Box 979, Tulsa, Oklahoma 74101