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  Eagle River, 99577

STATE OF ALASKA

Bill Sheffield, *Governor*
Esther Wunnicke, *Commissioner,*
Dept. of Natural Resources

COMMERCIAL GCIU PRINTING COMPANY FAIRBANKS, ALASKA

EXAMPLES OF GEOLOGIC MAP SYMBOLS

STRUCTURAL SYMBOLS

25	Contact, dashed where approximately located or gradational; arrow shows direction of dip
U D	Fault, dashed where approximately located; U, upthrown side; D, downthrown side; arrows show direction of relative movement
	Thrust fault, sawteeth on upper plate
	Anticline, showing trace of axial plane and direction of plunge
	Syncline, showing trace of axial plane and direction of plunge
	Overturned syncline showing direction of dip of limbs and plunge of axis
20	Minor fold axis, showing plunge
30	Strike and dip of beds
40	Strike and dip of foliation
25	Strike and dip of cleavage
85	Strike and dip of joints
25	Bearing and plunge of lineation

LETTER AND COLORS COMMONLY USED TO REPRESENT GEOLOGIC AGE OF ROCK UNITS

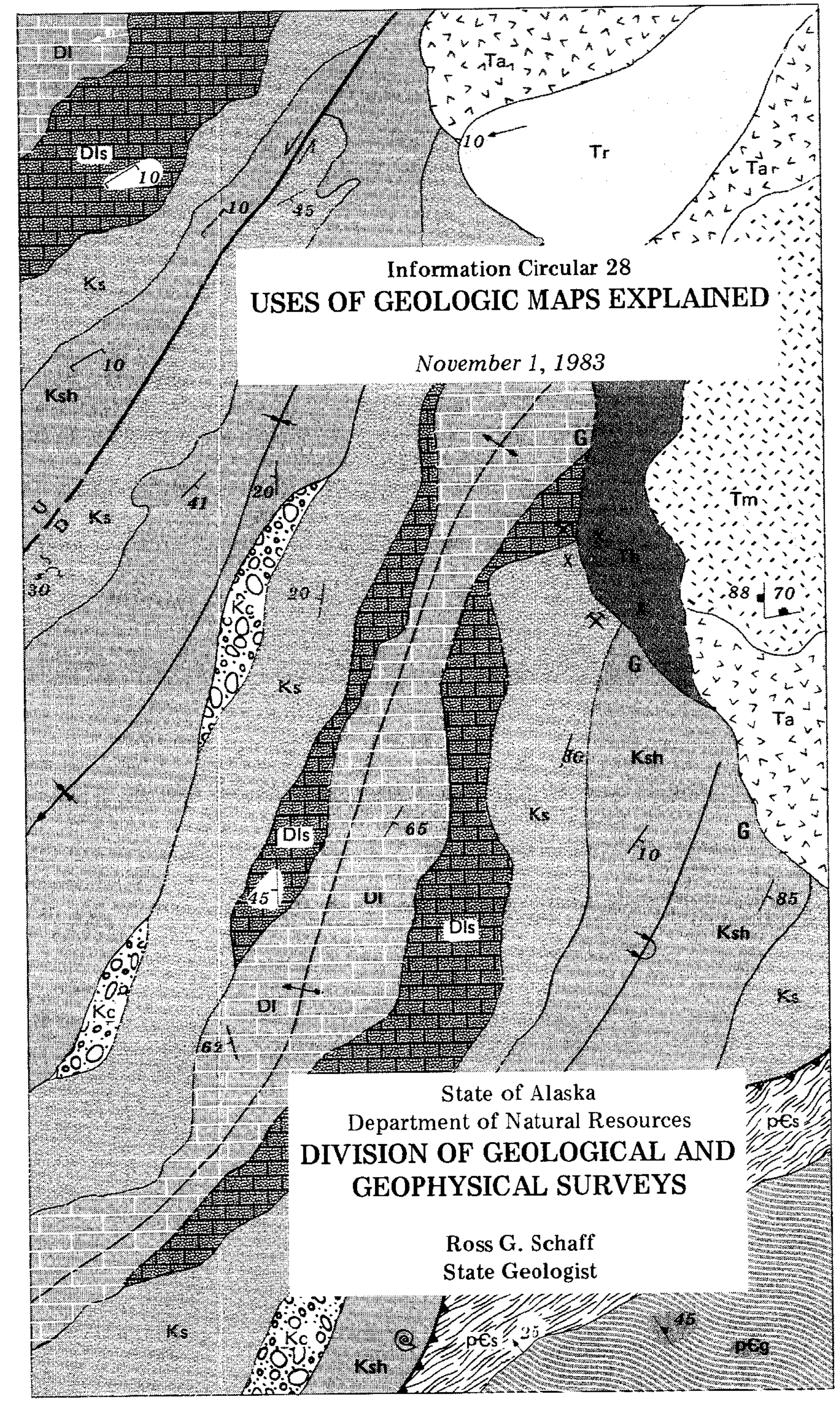
Period	Letter	Color
Quaternary	Q	Light yellow to tan
Tertiary	T	Medium yellow to tan
Cretaceous	K	Green
Jurassic	J	Blue to green
Triassic	Ƭ	Light blue to blue gray
Permian	P	Blue
Pennsylvanian	IP	Blue
Mississippian	M	Blue
Devonian	D	Gray to purple
Silurian	S	Purple
Ordovician	O	Red to purple
Cambrian	Є	Rust to red
Era		
Cenozoic	Cz	Yellow to tan
Mesozoic	Mz	Green to blue
Paleozoic	Pz	Blue to gray to purple
Precambrian	pЄ	Brown to gray

Volcanic rocks, dikes, or veins are generally red, and colors used to represent igneous rocks are generally brighter than those used for other rock types.

MAP UNITS

Tm	Monzonite		TERTIARY
Th	Hornfels		TERTIARY
Tr	Rhyolite		TERTIARY
Ta	Andesite		TERTIARY
Ksh	Shale	Cretaceous	MESOZOIC
Kc	Conglomerate	Cretaceous	MESOZOIC
Ks	Sandstone	Cretaceous	MESOZOIC
Dls	Sandy limestone	Devonian	PALEOZOIC
Dl	Limestone	Devonian	PALEOZOIC
pЄs	Schist		PRECAMBRIAN
pЄg	Gneiss		PRECAMBRIAN

- @ Fossil locality
- G Gossen
- X Prospect pit
- ⚒ Mine



Information Circular 28

USES OF GEOLOGIC MAPS EXPLAINED

November 1, 1983

State of Alaska
Department of Natural Resources
DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

Ross G. Schaff
State Geologist

USES OF GEOLOGIC MAPS EXPLAINED

The Alaska Division of Geological and Geophysical Surveys is charged by state law (A.S. 41) with, among other duties, conducting "geological and geophysical surveys to determine the potential of Alaska lands for production of metals, minerals, and fuel." In doing this, the production of geologic maps is essential.

The surface area of Alaska is large—about the size of France, Spain, Germany, and the United Kingdom combined—but its 'volume' is much, much greater. Thus, the geologic map, which helps us 'see' Alaska in a third dimension, gains increasing significance—especially because 'The Last Frontier' is not only America's largest state, but contains a sizable proportion of the nation's mineral wealth.

What is a geologic map?

Unlike the topographic, or 'topo' map, the geologic map does not portray the form of the land's surface, showing us its peaks and valleys, nor does it locate man-made features such as highways, roads, and buildings. Rather, the geologic map displays the extent, shape, position of rock bodies—folds and faults, for example—and geologic materials that lie on and beneath the earth's surface. A sample geologic map is shown in the centerfold.

Geologic maps are produced at many different scales, but can be grouped into two main types: regional geologic maps (where 1 inch on the map covers more than 1 mile) and detailed geologic maps (where 1 map inch depicts an area of 1 mile or less). The detailed map provides the most accurate information and is generally the most useful for planning specific land uses, whereas the regional map presents general geologic information over a large area.

How are geologic maps used?

Once geologic information has been mapped—that is, compiled, analyzed, and transferred to an image representing a particular part of the world—it is disseminated to a wide variety of users. Land managers use the maps for both planning and resource evaluation. Geologists and others analyze the maps to estimate the potential for energy, minerals, and construction materials and to interpret geologic conditions that may affect the construction of roads, dams, ports, and pipelines. Landowners and land managers alike acquire information about geologic hazards, mineral deposits, available water supplies, and construction materials.

Occasionally, geologic maps are produced by petroleum and mining companies for areas in which they have financial interests. Most map users, however—be they prospectors, builders, home buyers, engineers, well drillers, or students—rely on maps made by government agencies as a guide to the geologic conditions in their area.

How are geologic maps made?

Most geologic maps are several years in the making. Careful planning and a long-term commitment are essential. Many steps are involved in data collection for a typical geologic map.

In Alaska, detailed geologic maps can be made by foot traverses from base camps, but some helicopter assistance is usually required. Regional geologic mapping, on the other hand, is generally carried out with extensive helicopter support. DGGS also uses trucks, canoes, fixed-wing aircraft, pack horses, and even llamas on occasion.

To construct an accurate geologic map, rocks and geologic structures are observed in the field and plotted on a topographic-map base. Rock samples are collected and later analyzed for consideration with the field observations. (When available, remote-sensing techniques such as aerial photography, satellite imagery, and airborne magnetic measurements are used in mapping; nevertheless, even these mapping aids require confirmation by ground checking.)

Many field conditions are observed, including bedrock type and structure, surface deposits, mineral deposits, and faults, depending on the type of map to be published. During DGGS mapping programs, geologists collect many different kinds of information so that the resulting maps will be as informative and complete as possible. Most geologic maps require several years to complete because it takes time to make careful field observations—often, over several summers—and to check the analytical data from samples submitted to the DGGS Assay Laboratory.

Once the field notes and data from the DGGS Assay Lab have been analyzed and interpreted, a 'picture' emerges in the mind of the geologist. He (she) then writes up the findings and contacts two other principals in the map-production scenario, the editor and the cartographer.

The last step is cartography, or mapmaking. Here, the DGGS editor and cartographer work together to create a balanced, accurate, eye-pleasing map format. With painstaking attention to exactitude and registration, the cartographer ultimately creates a graphic reproduction of the area covered by the geologic field party.

What is the current status of geologic mapping in Alaska?

Alaska lags far behind the other 49 states in the knowledge of its physical resources. Only about half of Alaska is covered by up-to-date regional geologic maps. Most of these maps have been produced by DGGS and the U.S. Geological Survey (USGS) at a scale of 1 inch equals 4 miles (1:250,000).

Adequate detailed geologic maps, the most useful maps for public and private resource studies and for answering the needs of other state agencies, cover only about one-twentieth of Alaska.

How do DGGS geologic mapping programs differ from those of other government agencies?

Almost all published geologic maps on Alaska are produced either by DGGS or the USGS. The aims of these two agencies, however, commonly differ. Geologic mapping programs of the USGS are largely designed to satisfy national goals and objectives. Most federal geologic mapping in Alaska is on a regional scale, and federal programs are commonly directed at assisting federal land-management plans.

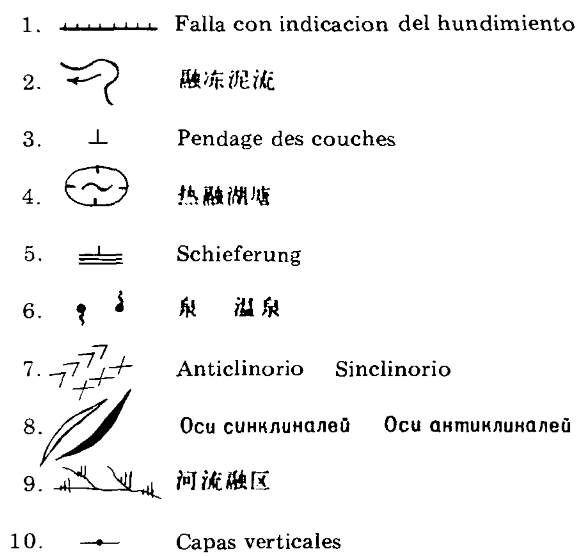
By contrast, the Alaska Division of Geologic and Geophysical Surveys produces detailed geologic maps of areas of major interest to the citizens of Alaska. DGGS formulates its mapping programs after consultation with other state agencies and with the public. Only when DGGS has determined that it can provide geologic information useful to Alaskans is the necessary long-term commitment—logistics, funding, personnel—given to a geologic mapping project.

Where has DGGS worked recently?

Recent DGGS mapping programs have been directed at the mineral belt in the southern Brooks Range, where significant state land selections were made; at the surficial geology and geologic hazards of the lower Susitna basin, an area of rapid expansion; at the geology and earthquake hazards of the Cook Inlet (Anchorage) coastal area; at the mineral and energy potential of the upper Kuskokwim (McGrath) region and of the central Chugach Mountains near Anchorage; and at major coal basins located in the northern, south-central, and interior regions of the state.

What are some of the more common geologic-map symbols?

The map on the reverse side has most of the symbols ordinarily used on geologic maps—strikes, dips, faults, and so forth. These symbols have, through the years, become recognizable throughout the world. Examples of symbols used in other idioms are shown below.



1. Dip-slip fault, hash marks on downthrown block (Spain). 2. Solifluction (China). 3. Bedding attitude (France). 4. Thermokarst lake (China). 5. Foliation (Germany). 6. Spring, hot spring (China). 7. Anticlinorium, synclinorium (Spain). 8. Anticline, syncline (Russia). 9. River talik (China). 10. Vertical beds (Spain).