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Digital generalized geologic map of the Iron Hill, Colorado, alkaline rock complex

by

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Digital Generalized Geologic Map of the Iron Hill, Colorado, Alkaline Rock Complex

NOTE FOR MONTHLY LIST

This report contains, in digital form on two 3.5" diskettes, a generalized geologic map covering the northern part of the Rudolph Hill quadrangle and the southern part of the Powderhorn quadrangle, Colorado. The data are provided in GSMAP ASCII and ARC/INFO interchange formats.

Requirements: IBM PC compatible computer capable of reading 3.5", DOS formatted diskettes.

INTRODUCTION

This report contains, in digital form on the accompanying diskettes, a generalized geologic map covering the northern part of the Rudolph Hill quadrangle and the southern part of the Powderhorn quadrangle, Colorado (Fig. 1). The data was digitized from the geologic maps of the same two quadrangles (Olson, 1974; Hedlund and Olson, 1975).

The original intent of digitizing the maps was to produce page size and poster size maps and illustrations in support of ongoing studies of the Iron Hill carbonatite/alkaline rock complex (e.g. Rowan et al., in press; Watson et al., in press). It is being provided in this digital format to make it available to others working in the Iron Hill area. It could be used to produce a base or field map, such as Plate 1, or, because it is in digital form, used as a component of a Geographic Information System (GIS) of the area.

PROCEDURES

The lithologic boundaries, major faults, and roads were hand digitized from copies of the geologic maps using GSMAP version 6.0 (Selner and Taylor, 1989) on an MS-DOS based microcomputer. The databases were then converted to GSMAP ASCII format, rewritten into ARC/INFO generate format, and copied to a UNIX-based computer system for further processing. In ARC/INFO, digitizing errors were corrected, polygon topology was built, and then each polygon was assigned a lithologic unit code. The data were again written into ARC/INFO generate format as lines and polygons and converted to GSMAP ASCII and database formats. Table 1 lists the line and polygon codes used in the GSMAP databases and their associated unit codes and unit names used in the ARC/INFO databases.

MAP CONTENT

During the process of digitizing and editing of the data, the information was generalized to simplify the resultant map. The generalization was made in two ways: 1) Some of the information from the original maps was not digitized. The omitted data include mine and prospect locations, structural data, minor faults, dikes, and lithologic units of limited areal extent. The only fault that was digitized is the Cimarron fault; the major fault in the area that traverses northwest-southeast across the map; 2) Some units of similar lithology or age were combined. The pyroxenite, ijolite, and uncompahgrite lithologies were combined into a single unit; six Tertiary volcanic tuffs were combined into four units; and all Quaternary age deposits were combined into a single unit. Refer to the key on Plate 1 for the equivalence of lithologic units between the original maps and the generalized map.

Provided with this report is a correlation chart (Fig. 2) that is a composite of the correlation charts that accompany the published geologic maps. It has been modified to include only the units that occur within the boundaries of the map in this report.

DIGITAL DATA

The digital data are provided on the accompanying diskettes in GSMAP ASCII and ARC/INFO interchange formats.

GSMAP files

The map is provided in GSMAP ASCII format files as both line and polygon codes. ASCII format is used because this is the format that is most easily modified for input into other mapping software if the user does not have access to, or prefers to use software other than, ARC/INFO or GSMAP. The GSMAP files are contained on diskette 1 and are listed below.

ih_line.asc - Geologic map as line segments in geographic coordinates.
ih_line.plt - Plot control file for display and plotting of the lines.
ih_poly.asc - Geologic map as polygons in geographic coordinates.
ih_poly.plt - Plot control file for display and plotting of the polygons.
ih.prj - Projection file used to display the maps in polyconic projection.

Although digitized in GSMAP version 6.0, the final editing and production of these files was done in GSMAP version 8.0 (Selner and Taylor, 1992), and the .asc files are in version 8 ASCII format. The only difference, however, between the version 6 and version 8 ASCII file formats is the addition of the word GEODETIC in the first line of the version 8 files. Therefore, to convert to version 6 format, delete the first line of the .asc files. To then make use of these data, convert the .asc files to GSMAP database format using option 4 in GSMUTIL (utility programs included with the GSMAP software).

ARC/INFO files

The ARC/INFO interchange format files are contained on diskette 2 and are listed below.

geology.e00 - geologic unit coverage.
faults.e00 - fault coverage.
roads.e00 - road coverage.
500shade.e00 - shadeset of 500 colors used to select the colors for the map.
mapcolor.e00 - look-up-table of colors selected for the map.
keycolor.e00 - look-up-table of colors selected for the map key.

Although these interchange files were produced using ARC version 7.0 under the UNIX operating system, according to the documentation, they should be compatible with subsequent versions and other computer platforms running ARC/INFO. When imported, the .e00 files will recreate the coverage polygons, polygon identification numbers, associated lithologic unit codes for each polygon, and the shadeset and look-up-tables needed to plot the map.

Additional support files contained on diskette 2 are:

import.aml - file of ARC commands to be used for importing the interchange (.e00) files to ARC/INFO database format.
fault.key - text for the fault part of the map key.

roads.key - text for the roads part of the map key.
equiv.key - text of map symbols for the map key.
polyconc.prj - text file of polyconic projection parameters used when plotting the map.
map_plot.aml - file of ARCPLOT commands to produce a meta file to output Plate 1.

The ARC/INFO interchange files can be converted to ARC/INFO coverages and associated INFO files by running the *import.aml* file from within ARC. The other support files are used to supply necessary information to reproduce Plate 1. In fact, an ARC/INFO meta file of Plate 1 can be produced by running the *map_plot.aml* file from within ARCPLOT.

REFERENCES

Hedlund, D.C., and Olson, J.C., 1975, Geologic map of the Powderhorn quadrangle, Gunnison and Saguache counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-1178.

Olson, Jerry C., 1974, Geologic map of the Rudolph Hill quadrangle, Gunnison, Hinsdale, and Saguache counties, Colorado: U.S. Geological Survey Geologic Quadrangle Map GQ-1177.

Rowan, L.C., Bowers, T.L., Crowley, J.K., Anton-Pacheco, C., Gumiel, P., and Kingston, M., (in press), Analysis of airborne visible/infrared imaging spectrometer (AVIRIS) data of the Iron Hill, Colorado carbonatite-alkalic igneous rock complex: Economic Geology.

Selner, Gary I., and Taylor, Richard B., 1989, GSDRAW and GSMAP System version 6.0: Graphics programs and utility programs for the IBM PC and compatible microcomputers to assist compilation and publication of geologic maps and illustrations: U.S. Geological Survey Open-File Report 89-373A, 156 p. (documentation), and Open-File Report 89-373B (five program diskettes).

Selner, Gary I., and Taylor, Richard B., 1992, System 8. GSMAP, GSMEDIT, GSMUTIL, GSPOST, GSDIG, and other programs version 8, for the IBM PC and compatible microcomputers, to assist workers in the earth sciences: U.S. Geological Survey Open-File Report 92-217AB, 217 p. (documentation and one diskette).

Watson, K., Rowan, L., Bowers, T., Anton-Pacheco, C., Gumiel, P., and Miller, S., (in press), Lithologic analysis from multispectral thermal infrared data of the alkalic rock complex at Iron Hill, Colorado: Geophysics.

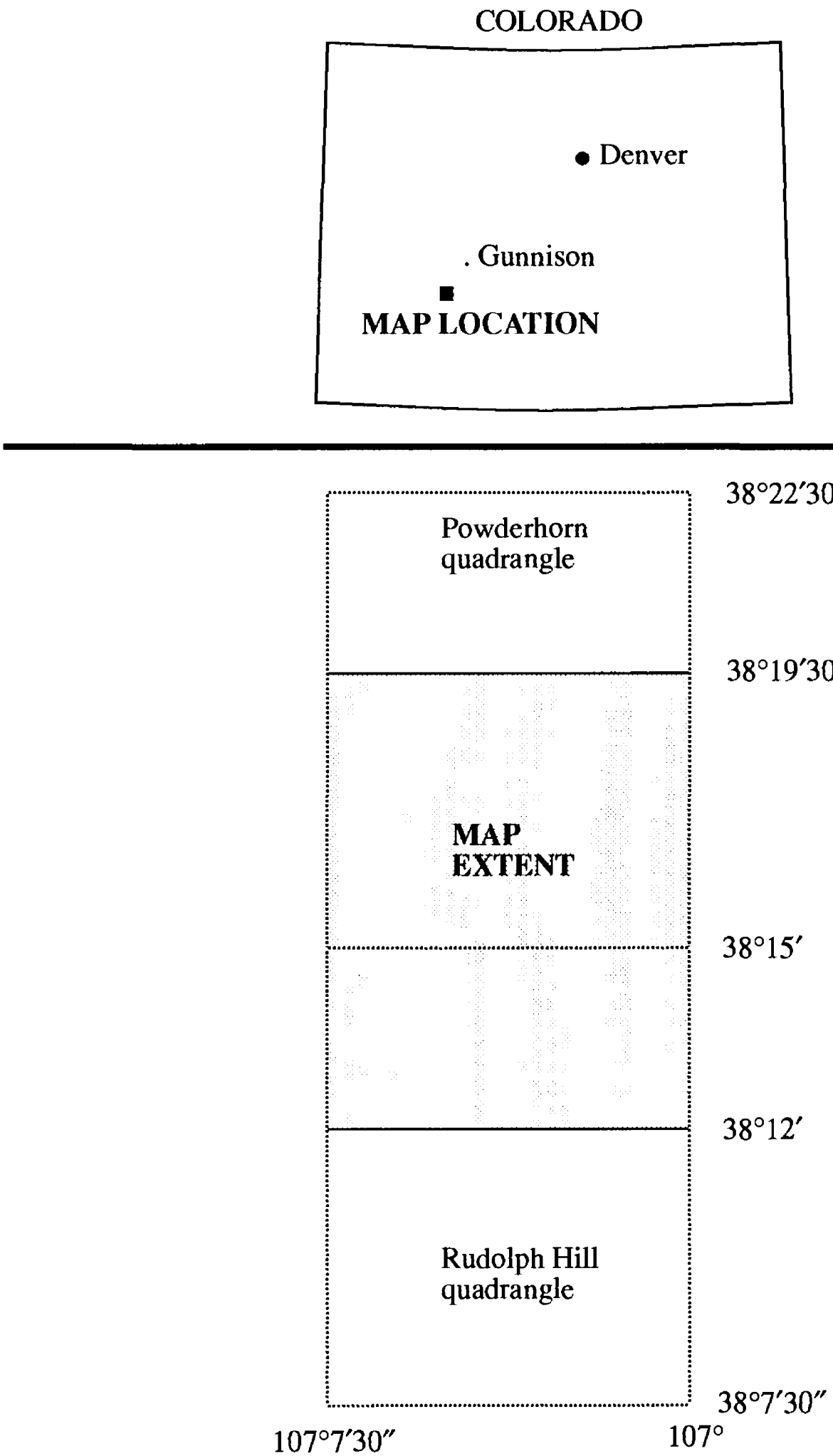

Figure 1. Iron Hill map location and extent.

Table 1. Unit names and database codes.

Unit Name or Description	ARC/INFO unit code	GSMAP polygon code
Quaternary deposits	1	401
Hinsdale Formation	2	402
Fish Canyon Tuff	3	403
Sapinero Mesa, Dillon Mesa, and Blue Mesa Tuffs	5	405
Talus, gravel, and colluvium (undivided)	4, 6	404,406
Rhyolite plug	28	428
Lake Fork Formation	7	407
Dakota Sandstone & Burro Canyon Formation (undivided)	29	429
Morrison Formation	8	408
Morrison Formation & Junction Creek Sandstone (undivided)	30	430
Junction Creek Sandstone	9	409
Diabase dikes	10	410
Carbonatite	11	411
Nepheline syenite	12	412
Pyroxenite/nepheline syenite hybrid rock	13	413
Pyroxenite, ijolite, and uncompahgrite (undivided)	14	414
Fine- to medium-grained granite	15	415
Fenitized fine- to medium-grained granite	22	422
Powderhorn Granite	16	416
Fenitized Powderhorn Granite	23	423
Granite of Tolvar Peak	17	417
Quartz diorite	18	418
Metagabbro	19	419
Hornblende schist & amphibolite (Dubois Greenstone)	20	420
Felsite & felsite porphyry (Dubois Greenstone)	21	421

GSMAP line codes

Unit boundaries - 1

Cimarron fault: exposed - 10

concealed - 11

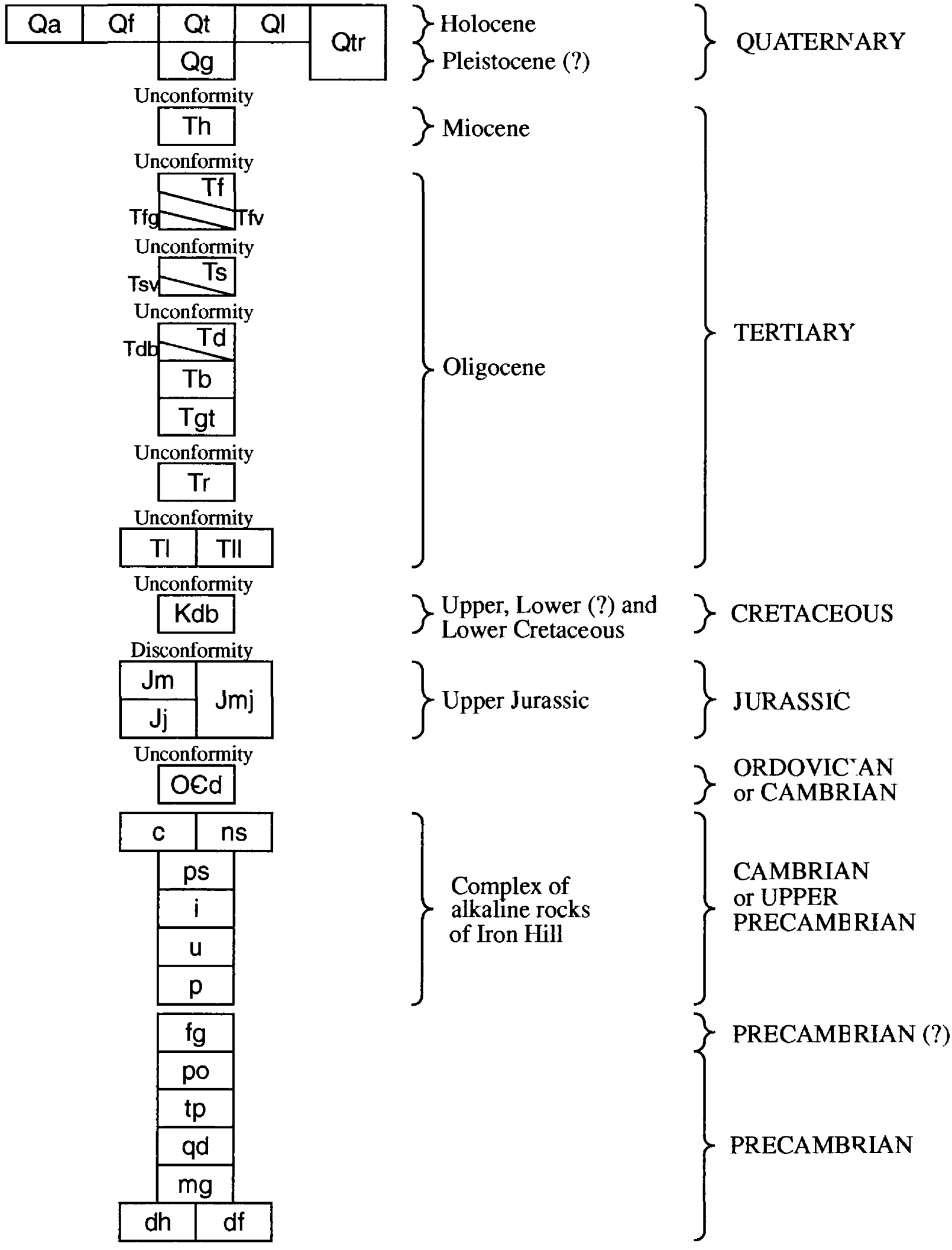

Figure 2. Map units correlation chart. Composited and generalized from Olson, 1974 and Hedlund and Olson, 1975. Refer to the original geologic maps for the descriptions of the map units.