North Carolina Department of Environmental Quality
Energy Group
Jenny Kelvington, Executive Director
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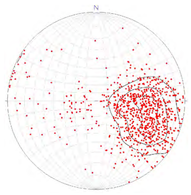
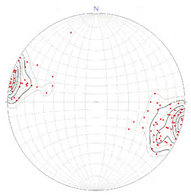
This Geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program

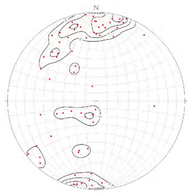
North Carolina Geological Survey
Open File Report 2016-20



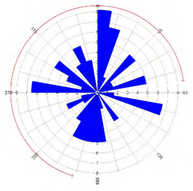
Schmidt net equal-area plot of contoured poles to regional foliation (n = 909)



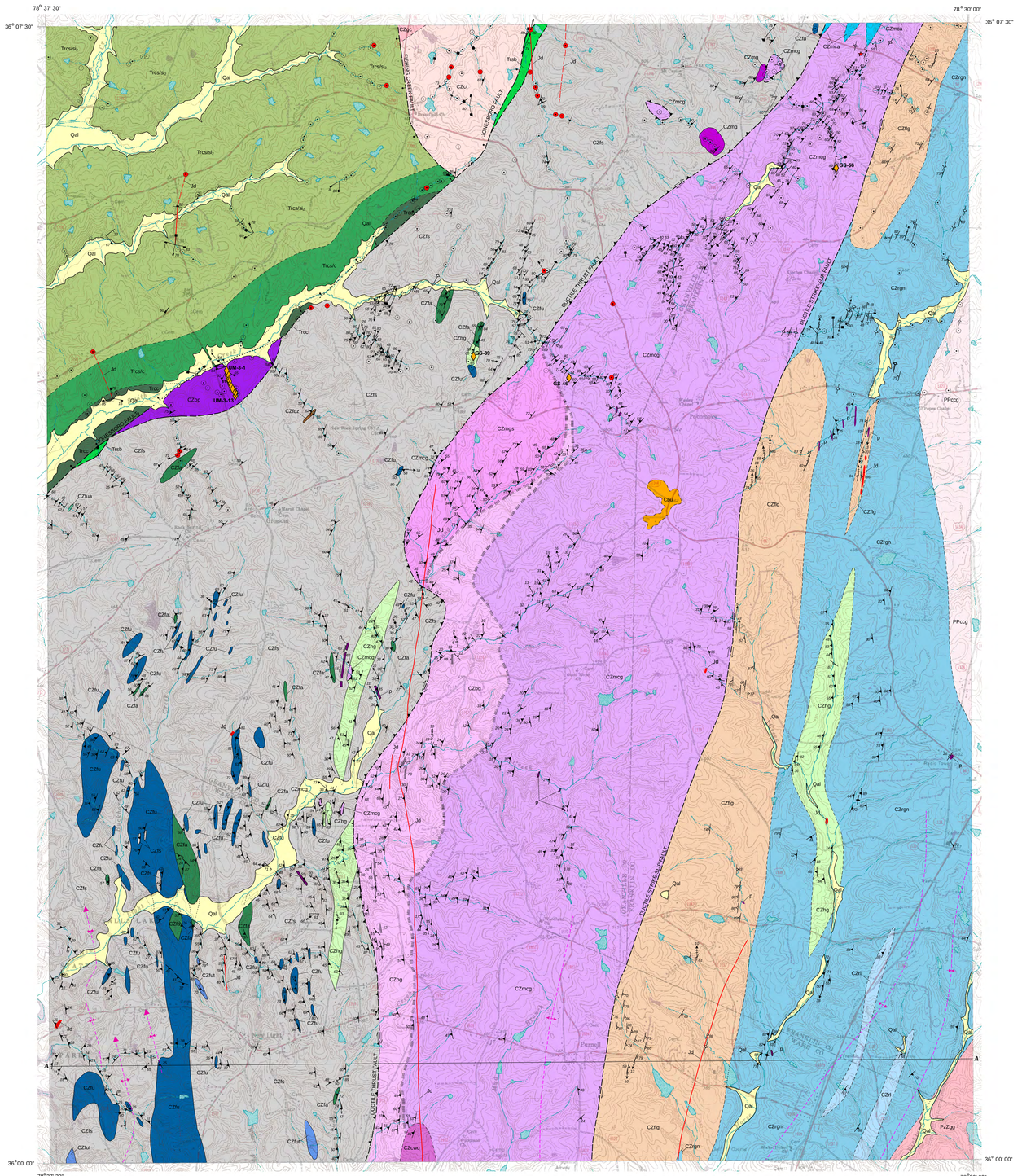
Schmidt net equal-area plot of contoured poles to shear foliation (n = 103)



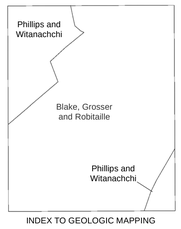
Schmidt net equal-area plot of contoured mineral, elongation, and stretch lineations (n = 65)



Unidirectional Rose Diagram of Joints N = 61



no vertical exaggeration measurement in feet below ground surface



INDEX TO GEOLOGIC MAPPING

ADJOINING 7.5' QUADRANGLES

Description of Map Units

Surficial Units

Qal - Quaternary alluvium: Unconsolidated, poorly-sorted and poorly stratified, tan to light gray deposits of gravel, sand, silt, and clay. Similar to stratified terraces along streams.

Cpu - Coastal Plain sediments, undifferentiated: Unconsolidated, fine to coarse-grained, tan to light gray arkosic sands and clayey sands with occasional gravel.

Newark Supergroup, Chatham Group

Trcc - conglomerate: Reddish-brown to dark brown, irregularly bedded, poorly sorted, cobble to boulder conglomerate. Muscovite is rare to absent in the very coarse-grained to gravelly matrix. An arbitrary cut-off of greater than 50 percent conglomerate distinguishes this unit from the Trcs/c facies. Clasts are chiefly miscellaneous felsic and intermediate metavolcanic rocks, quartz, epidote, bluish- gray quartz crystal tuff, muscovite schist, and rare meta-granitic material.

Trcs/c - sandstone with interbedded conglomerate: Reddish-brown to dark brown, irregularly bedded, poorly sorted, coarse-grained to pebbly, muddy lithic sandstones with interbedded pebble to cobble conglomerate. Muscovite is rare to absent in the matrix. Well-defined conglomerate beds distinguish this unit from conglomerate basal lags of Trcs. An arbitrary cut-off of less than 50 percent conglomerate distinguishes this unit from the Trcc conglomerate facies. Conglomerate beds are channel-shaped and scour into the underlying sandstone beds. Unit grades eastward into Trcc.

Trcs/si_s - sandstone w/ interbedded siltstone: Cyclical depositional sequences of whitish-yellow to grayish-pink to pale red, coarse- to very coarse-grained, trough cross-bedded lithic arkose that fines upward through yellow to reddish-brown, medium- to fine-grained sandstone, to reddish-brown, burrowed and rooted siltstone. Bioturbation is usually surrounded by greenish-blue to gray reduction halos. Coarse-grained portions contain abundant muscovite, and basal gravel lags consist of clasts of quartz, bluish-gray quartz crystal tuff, and mudstone rip-ups.

Trsb - silicified breccia: Light gray to white, silicified rock that has been multiply brecciated and annealed. Contains angular clasts of probable pre-Triassic rock along the Jonesboro fault.

Intrusive Rocks

Jd - diabase dikes: Steeply dipping to vertical dikes of gray to bluish-black, fine- to medium-grained, locally porphyritic plagioclase diabase, that may be olivine-bearing. Solid lines where observed; dashed lines where inferred from correlation and aeromagnetic data.

PPccg – Granite of the Cedar Creek pluton: Pink-white, medium to coarse-grained, unfoliated to moderately foliated and lineated biotite granite, with local pegmatite.

p - pegmatite: Gray-white to pink-white, very coarse grained, microcline, plagioclase, quartz, muscovite, biotite pegmatite of the Rolesville granite. Some outcrops exhibit a graphic texture.

PzZgg - gneissic biotite granitoid (Paleozoic?): Foliated biotite granitoid and granitoid orthogneiss interlayered with Raleigh gneiss.

CAROLINA TERRANE

Metamorphic Rocks

CZgc - Gibbs Creek pluton: Light green to gray-green, fine- to medium-grained, leucocratic (CI less than 20) biotite +- hornblende metagranodiorite. Locally contains planar zones of dark green to gray-green, fine-grained, well foliated and lineated, chlorite phyllite having a phyllonitic fabric.

CZct - Carolina terrane metagranitoid: Orange-tan to pinkish tan, fine- to medium-grained, highly fractured, leucocratic (CI generally less than 5), biotite-bearing metatrondhemite to metagranodiorite. Locally, biotite can increase in abundance and or be replaced by chlorite. Gray to bluish gray quartz phenocrysts are conspicuous, and the metagranitoid is locally porphyritic. Zones of silicification and pyritization are present.

CZbp - Beaverdam suite: Mixed assemblage of biotite- and hornblende-biotite metadiorite; hornblende metagabbro; and metapyroxenite.

FALLS LAKE TERRANE

CZfs - Falls Lake schist: Variably gray colored, mesocratic, medium- to coarse-grained, biotite-white mica-oligoclase-quartz schist locally having garnet, staurolite, kyanite, and chlorite porphyroblasts. Contains pods of gabbro, amphibolite, and undivided ultramafic rocks.

CZfu - ultramafic rocks (undivided): Variably altered ultramafic rocks including metapyroxenite, actinolite-chlorite schist, and talc schist.

CZfa - amphibolite: Dark gray, fine- to medium-grained, and well foliated amphibolite.

CZhg - hornblende gneiss: Dark gray to black, medium grained, poorly to moderately foliated hornblende-plagioclase gneiss and amphibolite. May contain biotite or epidote. Where biotite content is high may be somewhat schistose.

CZfut - talc schist: White to gray talc-tremolite schist, talc-chlorite schist, and soapstone. Rhombohedral cavities suggest former presence of a carbonate mineral (ankerite?).

CZmg - metagabbro: Light green to blue green, fine- to medium-grained, massive metagabbro containing relict plagioclase and hornblende, and metamorphic actinolite, epidote, and opaque minerals.

CZfqz - quartzite: White, granular, and well foliated quartzite.

CZfua - actinolite rock and actinolite-chlorite schist: dark green, schistose to almost massive, splintery rock composed of actinolite and varied amounts of chlorite; minor amounts of talc and magnetite octrahedra are common.

CRABTREE TERRANE

CZmcg - Middle Creek gneiss: Fine- to coarse-grained, gneissic to schistose, locally lineated, mesocratic (CI less than 30), biotite quartz diorltic to granodioritic gneiss. Interlayered with pink-gray to orange-tan, fine- to medium-grained, locally lineated, leucocratic (CI less than 10), white mica biotite granitoid gneiss, and fine- to medium-grained amphibolitic gneiss. Also occurs as tectonic windows within Falls Lake terrane.

CZmca - Middle Creek gneiss, mafic facies: Dark grayish-black to dark green, fine- to medium-grained, foliated and lineated, layered, epidote-bearing hornblende gneiss to aphibolite. Locally contains opaque mineral-rich metapyroxenite.

CZbg - biotite banded gneiss: White, gray, and black, compositional layered and well foliated, biotite-quartz-plagioclase gneiss.

CZmgs - mixed gneiss and schist: Complex assemblage of highly intercalated gneissic and schistose rocks. Includes quartzofeldspathic gneiss, compositionally layered gneiss, quartz ribbon gneiss, amphibolite, hornblende gneiss, hornblendite, banded biotite gneiss, muscovite schist, muscovite-garnet gneiss, biotite-muscovite-garnet schist, talc schist, and quartzite.

CZcwq - White mica-rich and quartz-rich schist: gold-gray to silver-gray, very fine- to fine-grained, moderately well foliated quartz-biotite and/or chlorite-white mica schist containing sparse to abundant garnet interlayered with silver-white, fine- to medium grained, moderately foliated white mica-plagioclase-quartz schist.

RALEIGH TERRANE

CZflg - Falls leucogneiss: Leucocratic (CI less than 5) pink-gray to orange-tan, medium-grained, weakly to moderately foliated and strongly lineated, biotite magnetite granitic gneiss.

CZrgn - Raleigh gneiss: Mixed unit consisting mainly of fine- to coarse-grained, well foliated, compositionally banded, and locally lineated biotite granitoid gneiss, and lesser amounts of biotite + hornblende gneiss, biotite schist, white mica schist, and amphibolite.

CZhg - hornblende gneiss: Dark gray to black, medium grained, poorly to moderately foliated hornblende-plagioclase gneiss and amphibolite. May contain biotite or epidote. Where biotite content is high may be somewhat schistose.

CZrl - fine-grained leucocratic gneiss: Very light gray, fine-grained, leucocratic epidote-plagioclase-quartz gneiss, locally containing darker, hornblende-bearing interlayers.

REFERENCES

Blake, D.E., 1986, The geology of the Grissom area, Franklin, Granville, and Wake Counties, North Carolina: A structural and metamorphic analyses [M.S. thesis]: Raleigh, North Carolina State University, 300 p.

Horton, J.W., Jr., Blake, D.E., Wylie, A.S., Jr., and Stoddard, E.F., 1992, Geologic map of the Falls Lake - Wake Forest area, north-central North Carolina: U.S. Geological Survey Open File Report 92-269, scale 1:24,000, 9 p.

Moye, R. J., Jr., 1981, The Bayleaf mafic-ultramafic belt, Wake and Granville counties, North Carolina, Unpublished M.S. thesis, North Carolina State University, Raleigh, NC, 115 p.

Robitaille, K. R., 2004, Geology and terrane relationships of the Tar River area, Franklin and Granville Counties, North Carolina, Unpublished M.S. Thesis, Wilmington, University of North Carolina at Wilmington, 167p.

EXPLANATION OF MAP SYMBOLS

CONTACTS

Lithologic contacts - Distribution and concentration of structural symbols indicates degree of reliability.

- contact - location inferred
- contact - gradational
- contact - location concealed
- A — A' cross section line
- in cross section, inferred axial trace of large-scale fold
- in cross section, interpreted fold form lines of non-cylindrical asymmetric folds
- in cross section, normal fault arrows indicate movement
- in cross section, A indicates movement away from observer, T indicates movement towards observer
- plunging antiform
- plunging synform
- antiform
- synform
- normal fault, bar and ball on the downthrown side, dashed where inferred
- ductile strike-slip fault, dashed where inferred
- thrust fault

PLANAR FEATURES

- strike and dip of inclined bedding in Triassic sedimentary rocks
- strike and dip of inclined bedding in Triassic sedimentary rocks
- strike and dip of inclined pegmatite dike
- strike and dip of inclined compositional layering
- strike and dip of inclined regional foliation (Srs)
- strike and dip of vertical regional foliation (Srs)
- strike and dip of inclined regional C or C' foliation
- strike and dip of vertical regional C or C' foliation
- strike and dip of vertical biotite foliation in granitoid
- strike and dip of inclined fracture surface
- strike and dip of vertical fracture surface
- strike and dip of axial surface of F_3 fold
- strike and dip of axial surface of F_3 fold
- strike and dip of axial surface of F_4 fold

LINEAR FEATURES

- bearing and plunge of mineral lineation
- bearing and plunge of slickenline
- bearing and plunge of minor fold hinge (F_1)
- bearing and plunge of minor fold hinge (F_2)
- bearing and plunge of minor fold hinge (F_3)

OTHER FEATURES

UM-3-1 whole-rock geochemical sample location
Samples UM-3-1 thru UM-3-13 collected along same transect.
Not all points are indicated on map due to small sampling area.

Base topographic map is digital raster graphic image of the Grissom 7.5-minute USGS quadrangle (1987).

Geology compiled from Blake (1986), Horton et al. (1992), Robitaille (2004), and data collected by NCGS staff in 2001-2002.
Partially supported by the USGS National Cooperative Mapping Program EDMAP and STATEMAP components.
Mapping and research of Robitaille (2004) supported by EDMAP. Mapping by NCGS staff partially supported by STATEMAP grants 01HQAG0061 (2001) and 02HQAG0043 (2002).

OXIDES IN PERCENT / **SELECTED ELEMENTS IN PPM**

SAMPLE ID	SOURCE	ROCK TYPE	MAP UNIT	SiO2	TiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	Cr2O3	LOI	TOTAL	Ag	Au	Ba	Ce	Co	Cu	Nd	Ni	Sr	Ta	Th	Zn	Zr
UM-3-1	Moye (1981)	mafic to ultramafic	CZbp	46.78	0.67	20.9	9.75	NA	6.35	13.23	1.13	0.45	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-2	Moye (1981)	mafic to ultramafic	CZbp	44.05	0.66	9.0	15.05	NA	26.2	4.0	ND	0.01	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-3	Moye (1981)	mafic to ultramafic	CZbp	45.13	0.77	19.9	10.9	NA	8.35	14.8	0.69	0.35	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-4	Moye (1981)	mafic to ultramafic	CZbp	39.5	0.39	9.35	16.37	NA	25.6	4.75	ND	ND	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-6	Moye (1981)	mafic to ultramafic	CZbp	46.3	0.31	10.03	13.13	NA	23.85	5.52	ND	ND	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-8	Moye (1981)	mafic to ultramafic	CZbp	43.1	0.16	9.95	13.1	NA	27.95	4.22	ND	0.16	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-10	Moye (1981)	mafic to ultramafic	CZbp	43.82	0.11	8.63	12.27	NA	28.95	4.26	ND	0.01	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-11	Moye (1981)	metapyroxenite	CZbp	46.6	0.47	10.41	14.55	NA	14.35	9.62	0.21	0.06	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-12	Moye (1981)	metapyroxenite	CZbp	44.7	0.82	13.64	15.7	NA	10.5	11.1	0.58	0.26	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
UM-3-13	Moye (1981)	metagabbro	CZbp	41.58	1.23	17.8	16.25	NA	6.65	12.85	0.72	0.13	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
GS-39	SGS	hornblende gneiss	CZhg pod in CZfs	57.42	0.97	15.91	8.09	0.19	3.75	7.12	3.59	1.28	0.29	<0.01	0.7	99.52	<1	8	286	48.1	24.8	49	29.9	24	438	<0.5	103	118
GS-46	SGS	Middle Creek gneiss	CZmcg	68.68	0.7	15.26	5.82	0.12	2.02	1.48	1.84	2.88	0.1	0.01	1.6	100.6	<1	5	520	59.6	16.8	43	26.8	35	136	1.2	101	181
GS-56	SGS	Mafic pod in Middle Creek gneiss	CZmcg	47.61	0.66	18.62	12.17	0.21	7.01	10.66	1.8	0.17	0.04	<0.01	1.55	100.6	<1	3	38	2.3	42.3	46	2.1	28	304	<0.5	69	18

Moye (1981) analyses were by X-ray fluorescence at N.C. State University.
Powder material processing conducted at the Petrology Preparation Laboratory of the Department of Geography and Geology at the University of North Carolina Wilmington.
Geochemical analyses completed by SGS Minerals, Toronto, Canada for 11 major and 49 trace elements. Whole-rock analyses using method codes XRF76Z + 75Y, IMS95A, and FAI303, and individual element method code ICMS12B for Ta.
NA = No sample analysis
ND = Not detected
PPM = parts per million
LOI = loss on ignition
The electronic files of the geochemical data are available upon request from the North Carolina Geological Survey.

GEOLOGIC MAP OF THE GRISSOM 7.5-MINUTE QUADRANGLE, GRANVILLE, FRANKLIN, AND WAKE COUNTIES, NORTH CAROLINA

Geology by David E. Blake, Cindy M. Phillips, Benjamin D. Grosser, Kenneth R. Robitaille and Channa Witanachchi.

Also incorporating previous mapping by Blake (1986) and Horton and others (1992).

Digital representation by Michael A. Medina and Cindy M. Phillips

2016