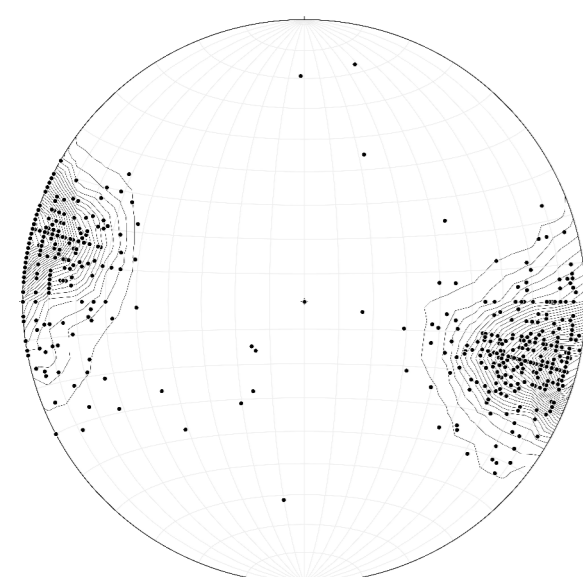


Equal-Area Schmidt Net Projections and Rose Diagram

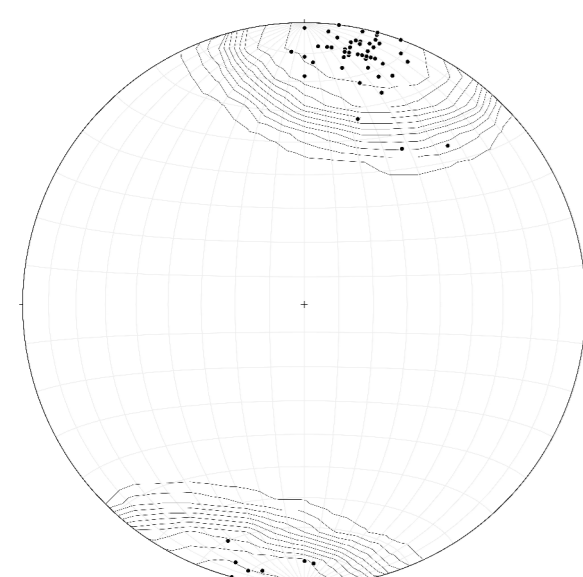
Plots and calculations created using Stereonet v. 8.6.0 based on Allmendinger et al. (2013) and Cardozo and Allmendinger (2013)

Allmendinger, R. W., Cardozo, N. C., and Fisher, D., 2012. *Structural Geology Algorithms: Vectors & Tensors*. Cambridge, England: Cambridge University Press, 289 pp.

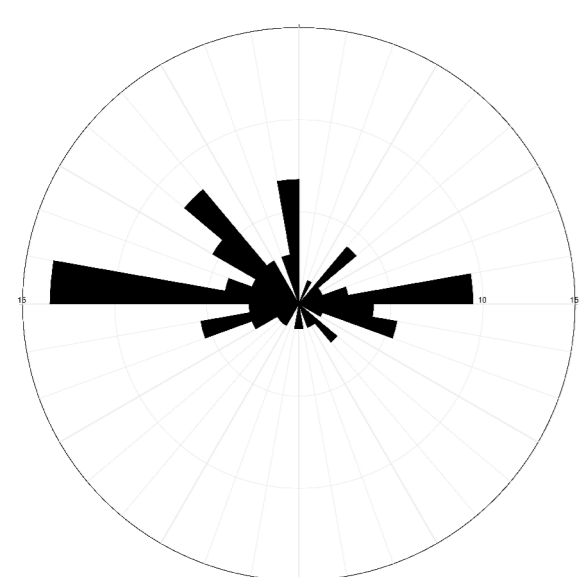
Cardozo, N., and Allmendinger, R. W., 2013. Spherical projections with QGIS/Stereonet. *Computers & Geosciences*, v. 51, no. 0, p. 193 - 205. doi:10.1016/j.cageo.2012.07.021



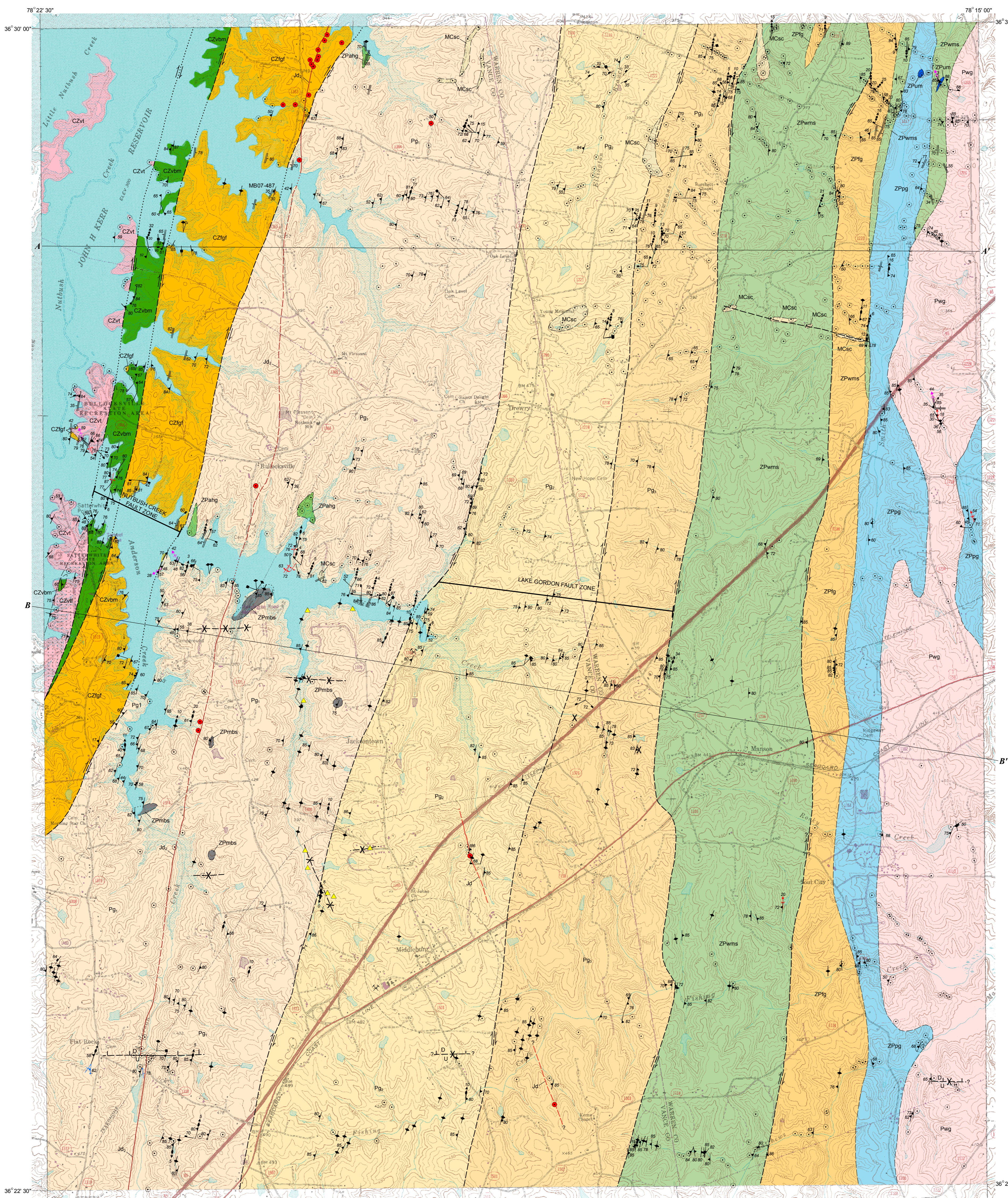
Equal-Area Schmidt Net Projection of Contoured Poles to Foliation (Shear, C or C', Regional, etc). Contour interval = 2 sigma. N = 609



Equal-Area Schmidt Net Projection of Contoured Mineral, stretching and Aggregate Lineations. Contour interval = 2 sigma. N = 62



Unidirectional Rose Diagram of Joints. N = 74. Outer Circle = 15%. Mean vector = 315 degrees



DESCRIPTION OF MAP UNITS

- Qal - Quaternary alluvium:** Unconsolidated, poorly sorted and poorly stratified tan to light gray stream deposits of gravel, sand, silt, and clay.
- Jd - Olivine diabase dikes:** Steeply dipping to vertical, gray to blue-black, slightly to severely weathered, fine to medium crystalline, locally plagioclase-porphyratic olivine diabase.
- J2 - Two-pyroxene diabase dikes:** Steeply dipping to vertical, gray to black, medium grained and typically plagioclase porphyritic two-pyroxene + quartz diabase.
- MCsc - Cataclastic fault zone:** Shear and highly fractured zone containing mm to cm scale sheared angular clasts. Extensional veins of monoclinic quartz, garnet and local epidote common. Sheared and epidotized clasts of granitic gneiss locally preserved. Considered to be Mesozoic or Cenozoic in age.
- Raleigh Terrane**
 - Pwg - Biotite granite:** Leucocratic (CI less than 15), orange-tan to gray-tan, medium to coarse-grained, locally porphyritic biotite +/- epidote granite and sparse weakly porphyritic biotite + garnet leucogranite. Locally crosscut by biotite granite. Locally contains enclaves of ultramafic-mafic rocks and of biotite-hornblende gneiss (ZPgs). May be part of the Wise pluton.
 - Pg - Foliated granitic mylonitic gneiss:** Leucocratic (CI less than 5-15), pink-tan and white-gray-tan, fine- to coarse-grained, but dominantly medium-grained, well foliated and lineated, white mica + biotite granitic gneiss and leucocratic gneiss, and biotite + white mica granitic gneiss. Some contains very fine to bottle and white mica content in a pink-white monoclinal, oligoclase, and quartz matrix and may represent earlier enclaves or later intrusive granitoids, resulting in a streaky, banded or gneissic appearance. Mylonitic and ultramylonitic overprint structures contain relationships. Flattened and rotated K-feldspar porphyroclasts form composite S-C surfaces and C-shear bands. Intruded by multiple generations of white to pink-gray white pegmatite dikes and sills. Locally contains amphibole, hornblende gneiss, and biotite schist enclaves. Lies between the Nutbush Creek and Lake Gordon mylonite zones.
 - Pg1 - Foliated granitic rocks 1:** Medium to coarse crystalline and often megacrystic, porphyroclastic, strongly foliated, blue-gray to gray-tan, leucocratic to evenly leucocratic, biotite + white mica granitic and leucocratic, locally with albite, and biotite + white mica granitic gneiss and leucocratic gneiss. Commonly protomylonitic to mylonitic and ultramylonitic. Lies within the Lake Gordon mylonite zone.
 - Pg2 - Foliated granitic rocks 2:** Medium crystalline, tan-gray, leucocratic to mesocratic, well foliated biotite + white mica metagranitoid and white mica + biotite + garnet leucocratic metagranitoid. Commonly protomylonitic to mylonitic and porphyroclastic. Also includes mylonitized pegmatite to coarse crystalline, porphyroclastic white mica + biotite + quartz + feldspar metagranitoid sills, presenting a mylonitic appearance. Lies within the Lake Gordon mylonite zone, and locally contains enclaves of white mica schist (CZms) near their mutual contact. Pg1 in cross section B-B' only. Interpreted pods of granitoid in ZPms unit.
 - ZPum - Ultramafic rocks:** Hypermelanocratic to melanocratic (CI greater than 65), green to black-green interlayers of massive, coarse-grained actinolite talc schist and medium-grained metagabbro. Locally associated with epidote-quartz rock. Occurs as meso- and macro-scale pods or enclaves in ZPgs, ZPms and Pg1.
 - ZPpg - Porphyroclastic plagioclase biotite hornblende gneiss:** Mesocratic (CI=35-45), black-gray to blue-gray, medium grained to porphyroclastic gneiss. Locally contains clinopyroxene and/or epidote. Biotite and hornblende define a foliation associated with mm-scale plagioclase and quartz compositional layers and larger plagioclase porphyroclasts. Local grain size variations in part due to mylonitic overprint.
 - ZPfg - Felsic Gneiss:** Leucocratic (CI less than 5-10), orange-gray and white-tan, dominantly very fine to fine grained, well foliated, white mica quartzofeldspathic gneiss. Minor compositional layers vary in biotite and white mica content in chiefly a microcline, plagioclase, and quartz matrix. Commonly streaky or mottled. Mylonitic and ultramylonitic overprint structures present relationships.
 - ZPms - White mica schist:** Medium-fine to medium crystalline, gray to gray-tan, strongly foliated and lineated white mica + sillimanite + garnet schist, medium crystalline, strongly foliated and lineated, green-gray, white mica + chlorite + sillimanite + garnet schist, white mica + biotite schist, and very rare corundum white mica + kyanite + corundum schist. Sillimanite is commonly overgrown by white mica and helps to define the foliation plane. Contact with ZPgs is often transitional. Flattened and rotated quartz and feldspar commonly occur as porphyroclastic aggregates forming composite S-C surfaces along with C' foliations defined by white mica. Typically intruded by pegmatite to coarsely crystalline, porphyroclastic white mica + quartz + feldspar gneissic metagranitoid sills that are locally mylonitic. Locally includes small bodies of leucogranite.
 - CZgf - Foliated felsic gneiss:** Leucocratic (CI less than 2), dark to light pink-red-orange, fine- to coarse-grained felsic, protomylonitic, mylonitic, and ultramylonitic granitic gneiss. Variably foliated and lineated, and locally containing relict red-orange K-feldspar porphyroclasts and pegmatite and quartz layers and boudins. Forms resistant, lakeside outcrops and fields of boulders and boulders that are highly fractured. Outcrops are reminiscent of the Run Creek Gneiss or Falls Leucogneiss between Henderson and Raleigh.
 - ZPahg - Amphibolite and hornblende gneiss:** Mesocratic (CI=50), blue-green-white to gray-green, foliated and lineated, medium-grained gneiss; rock having compositional layers of darker amphibolite and lighter quartzofeldspathic hornblende gneiss. Occurs as local outcrops in Pg1 interpreted to be enclaves.
 - ZPms - muscovite - biotite schist:** Medium-grained muscovite - biotite schist, locally with chlorite or sillimanite and commonly quartzofeldspathic. Occurs as float and sparse areolitic exposures representing enclaves within Pg1. Present in cross section B-B' only.
- Carolina Terrane**
 - CZbm - Chlorite-white mica phyllosite, mylonite, and ultramylonite:** Light greenish-gray to dark green, foliated and lineated phyllic rocks derived primarily from tonalite and granite of the Vance County pluton. Includes chlorite and sericite protomylonite through ultramylonite and phyllosite that form distinctive relict igneous and high strain compositional layers. Iron and manganese oxide commonly coat fractures and foliation surfaces. Flattened and rotated polycrystalline aggregates of plagioclase and quartz are common as porphyroclastic minerals that form composite S-C and C' foliations. Quartz, feldspar, chlorite, and white mica contribute to a mineral aggregate, mineral stretch, and sickle-like lineation. White mica and chlorite form conspicuous asymmetric fan structures ranging from mm to meters in scale.
 - CZvt - Vance County tonalite:** Mesocratic (CI greater than 10-20), intermediate gray-blue-green, and coarse-grained metamorphosed biotite + hornblende tonalite and minor granodiorite. Commonly forms medium- to coarse-grained boulder outcrops. Granular assemblage and saprock lakeshore exposures display a reddish salt-and-pepper appearance, and horizons of pure magnetite are common. Biotite phenocrysts + mm-scale prismatic hornblende (in rounded to tabular, saussuritized and sericitized pale green plagioclase and gray to distinctly coarsely blue quartz phenocrysts and give from outcrops a gray-blue-green tint). Locally contains foliated and unfoliated enclaves of fine-grained chlorite phyllite, metagabbro, and metadiorite. Cut by mm- to meter-scale metamorphosed trondhjemite, monzonite, and granodiorite dikes. CZvt is a high-strain equivalent of CZvt in the Nutbush Creek Fault Zone.

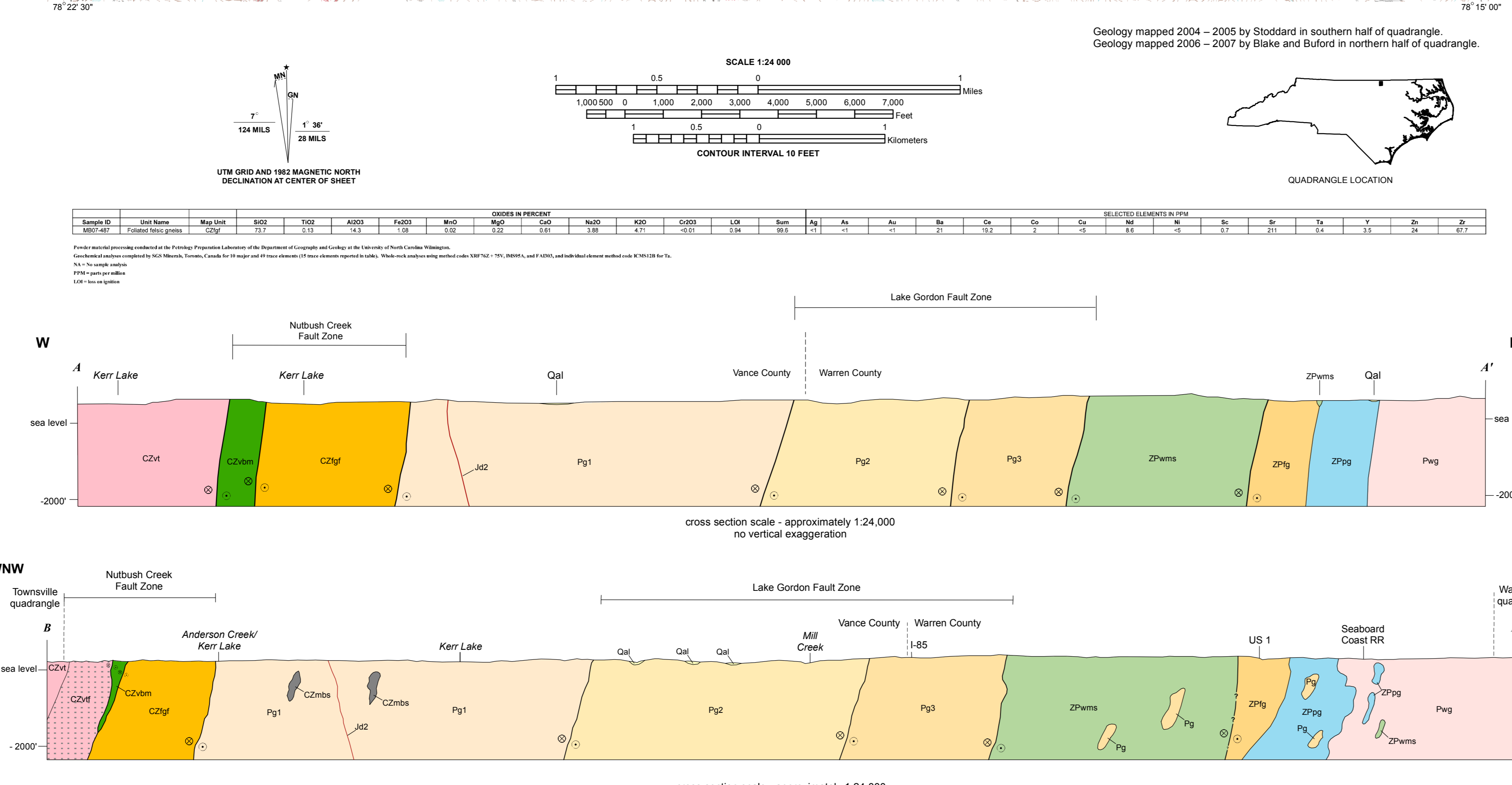
EXPLANATION OF MAP SYMBOLS

- CONTACTS, FAULTS, AND OTHER FEATURES**
- location known
 - inferred
 - concealed
 - diabase concealed
 - diabase inferred
 - diabase location known
 - cross section

Faults - Solid where location known, dashed where inferred, dotted where concealed. For normal brittle faults, D indicates downthrown side, U indicates upthrown side. The tick mark indicates dip of fault plane. Zones of late brittle fracture and/or faulting; characterized by vuggy quartz and local brecciation indicated by dashed X lines. In cross sections, for ductile strike-slip faults, the circle with an X indicates movement away from the observer, the circle with a dot indicates movement towards the observer.

LINEAR, PLANAR, AND POINT FEATURES

- Strike and dip of inclined diabase or pegmatite dike or of quartz vein
- Strike of vertical diabase or pegmatite dike or of quartz vein
- Strike and dip of inclined dike or sill
- Strike of vertical dike or sill
- Strike and dip of inclined regional foliation (Srs)
- Strike and dip of inclined regional foliation (Srs) (multiple observations at one location)
- Strike of vertical regional foliation (Srs)
- Strike and dip of inclined foliation in enclave
- Strike and dip of inclined regional foliation (Srs) (multiple observations at one location)
- Strike and dip of inclined foliation in enclave
- Strike and dip of biotite foliation in granitoid
- Bearing and plunge of oronational lineation
- Bearing and plunge of mineral aggregate lineation
- Bearing and plunge of mineral stretch lineation
- Bearing and plunge of mineral fold hinge
- Diabase station location
- Station location
- Abandoned mine or prospect
- Indicates location of vuggy quartz or shaly breccia foot
- Geochemical station location



Geologic Map of the Middleburg 7.5-minute Quadrangle, Vance and Warren Counties, North Carolina

By
 Edward F. Stoddard, David E. Blake and Christopher L. Buford
 Digital representation by Michael A. Medina and Philip J. Bradley



Scan with smartphone for link to GeoPDF of map. Third party App required.