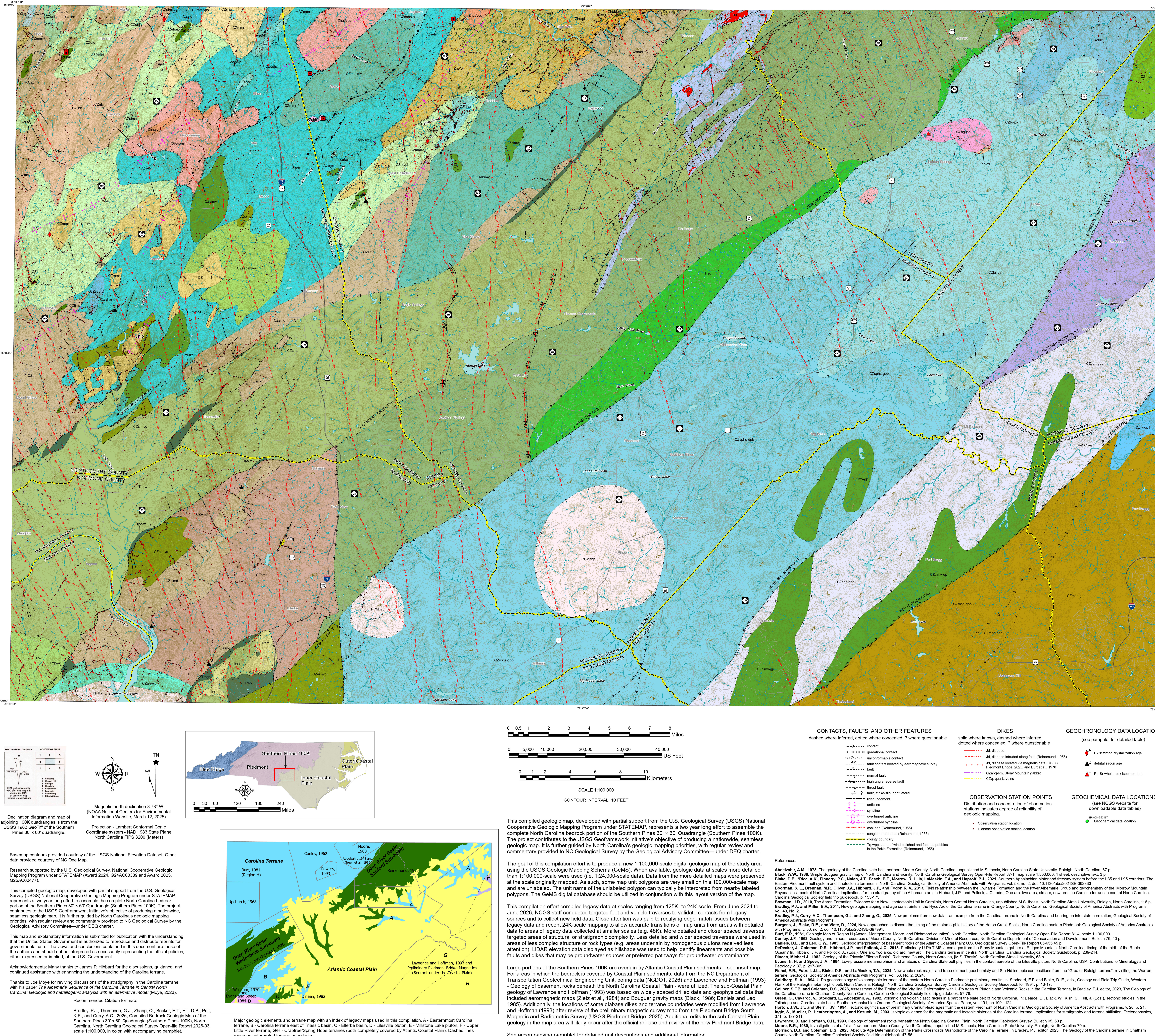
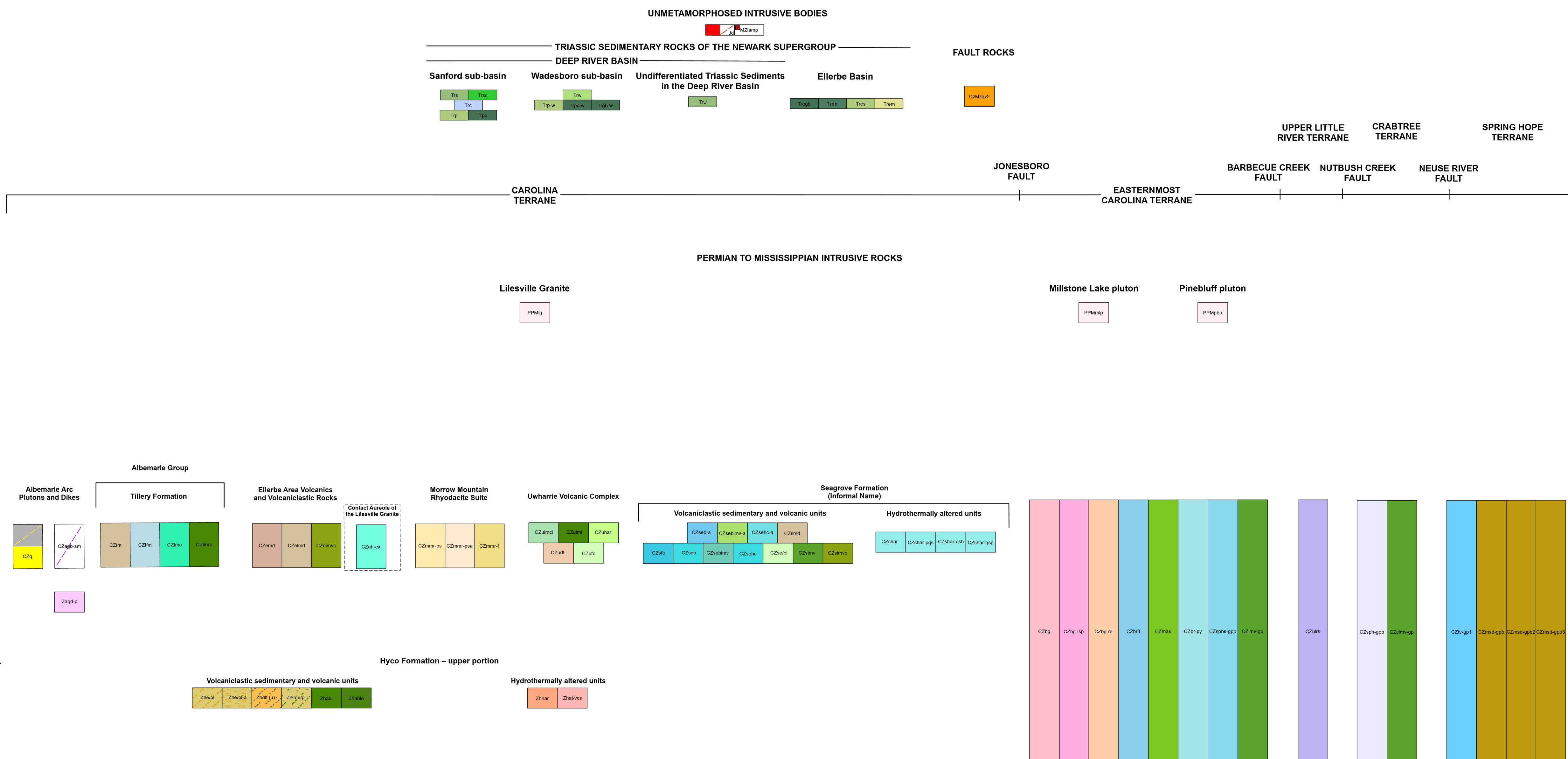


This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program

Compiled bedrock geologic map of the Southern Pines 30' x 60' Quadrangle (Southern Pines 100K), North Carolina



CORRELATION OF MAP UNITS



LIST OF MAP UNITS

[See Description of Map Units (in pamphlet) for complete unit descriptions and age information]

UNMETAMORPHOSED INTRUSIVE BODIES

Legend:
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes

Triassic Sedimentary Rocks: Newark Supergroup

Legend:
 - Sanford sub-basin
 - Wadesboro sub-basin
 - Undifferentiated Triassic Sediments in the Deep River Basin
 - Ellerbe Basin

Wadesboro Sub-basin

Legend:
 - Wadesboro Formation
 - Wadesboro Formation
 - Wadesboro Formation

Ellerbe Basin

Legend:
 - Ellerbe Basin
 - Ellerbe Basin
 - Ellerbe Basin

Undifferentiated Sedimentary Rocks of the Deep River Basin

Legend:
 - Undifferentiated Triassic Sediments in the Deep River Basin
 - Undifferentiated Triassic Sediments in the Deep River Basin

PERMANENT TO MISSISSIPPIAN INTRUSIVE ROCKS

Legend:
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes

CAROLINA TERRANE

Legend:
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes

MORROW MOUNTAIN RHYOLACITE SUITE

Legend:
 - Morrow Mountain Rhyolite Suite
 - Morrow Mountain Rhyolite Suite
 - Morrow Mountain Rhyolite Suite

UWHARRIE VOLCANIC COMPLEX

Legend:
 - Uwharrrie Volcanic Complex
 - Uwharrrie Volcanic Complex
 - Uwharrrie Volcanic Complex

SEAGROVE FORMATION

Legend:
 - Seagrove Formation
 - Seagrove Formation
 - Seagrove Formation

HYCO FORMATION

Legend:
 - Hyco Formation
 - Hyco Formation
 - Hyco Formation

CAROLINA TERRANE

Legend:
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes

UPPER LITTLE RIVER TERRANE

Legend:
 - Upper Little River Terrane
 - Upper Little River Terrane
 - Upper Little River Terrane

CRABTREE TERRANE

Legend:
 - Crabtree Terrane
 - Crabtree Terrane
 - Crabtree Terrane

SPRING HOPE TERRANE

Legend:
 - Spring Hope Terrane
 - Spring Hope Terrane
 - Spring Hope Terrane

ALBEMARLE ARC

Legend:
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes
 - Albemarle Arc: Plutons and Dikes

Tillery Formation

Legend:
 - Tillery Formation
 - Tillery Formation
 - Tillery Formation

CONTACT AURORE OF THE LITTLEVILLE GRANITE

Legend:
 - Contact Aureole of the Littleville Granite
 - Contact Aureole of the Littleville Granite
 - Contact Aureole of the Littleville Granite

UWHARRIE VOLCANIC COMPLEX

Uwharrrie Volcanic Complex
Worreston et al. (2000) reported the weighted average of six ²³⁸U/²³⁵U ages for zircon grains by SHRIMP methods of 534±15 Ma for a sample from the Uwharrrie Volcanic Complex (SS-3) in unit Z2r1 (geochronology data location A). This location was reinterpreted as a part of this study and yielded LA-ICP-MS ²³⁸U/²³⁵U weighted mean ages of 537.6±2.8 Ma (MSWD = 1.8) (geochronology data location B). Goffin and Coleman (2023) reported a CA-ID-TIMS weighted mean age of 546.7±1.1 Ma from a felsic volcanic rock in the unit in the Chapel Hill 100K. A new and unpublished LA-ICP-MS ²³⁸U/²³⁵U weighted mean age yielded 547.4±5.7 Ma (MSWD = 0.88) for a sample collected from Luther Place trail area in the Uwharrrie in the Chapel Hill 100K.

New and unpublished detrital zircon ages include: Maximum Depositional Ages (MDA) of 533 Ma, for sample CH100K-3675, MDA of 526 Ma for sample CH100K-3834, and MDA of 552 Ma for sample CH100K-Ben-165.

Seagrove Formation (Informal Name)

Pollock et al. (2010) reported a youngest LA-ICP-MS U-Pb zircon age of 545±7 Ma from a sample from the unit near 'Yow Mill' in the Chapel Hill 100K. Recent preliminary LA-ICP-MS U-Pb zircon analyses from samples from the unit in the Chapel Hill 100K yield the following: for NCGS sample Coteage-3055, there is a distinct age distribution that is <600 Ma and at MDAs are between ca. 545 Ma and ca. 549 Ma; for NCGS sample Bear Creek-625, all MDAs are between ca. 551 Ma and ca. 560 Ma (T. LaMaskin, personal communication, 2025).

New and unpublished detrital LA-ICP-MS U-Pb zircon analyses from additional Seagrove formation samples in the Chapel Hill 100K include: MDA of 559 Ma for sample COL-8005; MDA of 554 Ma for sample COL-472; and MDA of 523 Ma for sample CH100K-3839.

Also in the Chapel Hill 100K, two zircon grains from a felsic dike or tuff (UNC Chapel Hill sample NC-1842 / NCGS Station Coteage-458) from the unit yielded a crystallization age of 551.9±0.82 Ma (R. Mills, personal comm., 2018).

Additionally, two new and unpublished detrital LA-ICP-MS U-Pb zircon analyses from samples in the Southern Pines 100K include: MDA of 543 Ma for sample SP100K-GS0303 (geochronology data location E) and an MDA of 524 Ma for sample SP100K-550846 (geochronology data location D).

Hydrothermally altered units

Units C2h1e and C2h1e-pk, C2h1e-pk are surrounded by C2h1e in the Robbins area and are very small at 100K-scale and are unlabelled on map. See GEMS database for detailed locations of units.

Volcaniclastic sedimentary and volcanic units

Legend:
 - Volcaniclastic sedimentary and volcanic units
 - Volcaniclastic sedimentary and volcanic units
 - Volcaniclastic sedimentary and volcanic units

UPPER LITTLE RIVER TERRANE

Legend:
 - Upper Little River Terrane
 - Upper Little River Terrane
 - Upper Little River Terrane

CRABTREE TERRANE

The Crabtree Creek gneiss (C2crg) in the Raleigh 100K sheet yields TIMS U-Pb zircon ages of ca. 566-554 Ma (Goldberg, 1994). Horton and Stern (1994) reported TIMS ²³⁸U/²³⁵U ages of ca. 542 Ma for C2crg. A sample of Middle Creek Gneiss (Zrca) in the Henderson 100K yields an LA-ICP-MS zircon age of 562±14 Ma (Finkel et al., 2024). A sample of Home Creek schist (Zrca) in the Henderson 100K sheet yields a U-Pb concordia age of 300 Ma; zircon ages ca. 335 Ma and 265 Ma (lower intercept isochron ages; Burgess et al., 2024). Two additional samples of Zrca produce an LA-ICP-MS zircon lower concordia intercept metamorphic age of 287.4±1.30 Ma, and a muscovite ⁴⁰Ar/³⁹Ar cooling age of 251.4±2.16 Ma, respectively (Blake et al., 2021).

SPRING HOPE TERRANE

Legend:
 - Spring Hope Terrane
 - Spring Hope Terrane
 - Spring Hope Terrane

CONTACTS, FAULTS, AND OTHER FEATURES

dashed where inferred, dotted where connected, ? where questionable

DIKES

Legend:
 - Dikes
 - Dikes
 - Dikes

GEOCHRONOLOGY DATA LOCATIONS

Legend:
 - Geochronology data locations
 - Geochronology data locations
 - Geochronology data locations

GEOCHEMICAL DATA LOCATIONS

Legend:
 - Geochemical data locations
 - Geochemical data locations
 - Geochemical data locations

OBSERVATION STATION POINTS

Legend:
 - Observation station points
 - Observation station points
 - Observation station points

CONTOUR INTERVAL: 10 FEET

Legend:
 - Contour interval: 10 feet
 - Contour interval: 10 feet
 - Contour interval: 10 feet

LEGEND

Legend:
 - Legend
 - Legend
 - Legend

LEGEND

Legend:
 - Legend
 - Legend
 - Legend

Compiled Bedrock Geologic Map of the Southern Pines 30' x 60' Quadrangle (Southern Pines 100K), North Carolina

New data collection and compilation work by: Philip J. Bradley, Garrett J. Thompson, Qingxin Zhang, Ezra T. Becker, Douglas B. Hill, and Katherine E. Pelt

New geochronology data reduction and interpretation by Adam C. Curry

Cartographic representation by: Garrett J. Thompson, Philip J. Bradley, and Michael A. Medina

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