QUATERNARY GEOLOGIC MAP OF THE HATTERAS 4° X 6° QUADRANGLE, UNITED STATES

QUATERNARY GEOLOGIC ATLAS OF THE UNITED STATES
MAP I-1420 (NI-18)

State compilations by
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NOTE 1: This map is the product of interorganizational collaboration. Following a meeting of the State compiler with compilers of adjacent quadrangle maps and with the coordinator to establish map units and related matters, a preliminary map of this quadrangle was prepared. Subsequent meetings with the coordinator and compilers in North Carolina as well as field conferences with others were held to resolve problems of stratigraphic and material definition. The map and explanation were then integrated with those of adjacent quadrangles by the editors, who also compiled the associated diagrams. The tentative correlation chart of Coastal Plain formations was prepared by G. M. Richmond with the cooperation of G. H. Johnson. The compiler reviewed the map prior to its submittal for publication.

NOTE 2: The Pliocene-Pleistocene boundary defined by joint resolution of the International Union for Quaternary Research (INQUA) Subcommission 1-d on the Pliocene/Pleistocene Boundary (the International Commission on Stratigraphy (ICS) Working Group on the Pliocene/Pleistocene Boundary) and the Working Group of the International Geological Correlation Program (IGCP) Project No. 41 (Neogene/Quaternary Boundary) is that at the Vrica section in southern Italy. The age of that boundary currently is inferred to be 1.65 Ma (Aguirre and Pasini, 1984).

Time boundaries between the early Pleistocene and middle Pleistocene and between the middle Pleistocene and late Pleistocene are being proposed by the INQUA Working Group on Major Subdivision of the Pleistocene. The boundary between the early Pleistocene and middle Pleistocene is placed at the Matuyama-Brunhes magnetic polarity reversal. The reversal has not been dated directly by radiometric controls. It is significantly older than the Bishop Tuff (revised K-Ar age 738 ka; Izett, 1982), and the estimated K-Ar age of 730 ka assigned to the reversal by Mankinen and Dalrymple (1979) is too young. In Utah, the Bishop volcanic ash bed overlies a major paleosol developed in sediments that record the Matuyama-Brunhes reversal (Eardley and others, 1973). The terrestrial geologic record is compatible with the astronomical age of 788 ka assigned to the reversal by Johnson (1982). The boundary between the middle Pleistocene and late Pleistocene is placed arbitrarily at the beginning of marine oxygen isotope substage 5e (at Termination II or the stage 6/5 transition). That boundary also is not dated directly. It was assigned provisional ages of 127 ka by CLIMAP Project members (CLIMAP Project Members, 1984) and 128 ka by SPECMAP Project members (Ruddiman and McIntyre, 1984), based on uranium-series ages of the substage 5e high eustatic sea level stand. A sidereal age of 132 ka is derived by projection of the boundary onto the astronomical time scale of Johnson (1982).

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The map contains the following illustrations:

- An index map to the International Map of the World 1:100,000 topographic series showing the Quaternary geologic map of the Hatteras 4°x 6° quadrangle and other published maps of the Miscellaneous Investigations Series (I-1420).
- An illustration showing the responsibility for state compilations.
- A chart showing correlation of map units.
- A chart showing the tentative correlation of Quaternary and upper Pliocene stratigraphic units of the Atlantic Coastal Plain in the Hatteras quadrangle

LIST OF MAP UNITS

HOLOCENE

asa ALLUVIAL GRAVELLY SAND
ala ALLUVIAL SILT AND CLAY
hps SALINE MARSH DEPOSIT
hp PEAT
be BEACH AND DUNE SAND

HOLOCENE AND LATE WISCONSIN

hs SWAMP DEPOSIT
es EOLIAN SAND

LATE PLEISTOCENE

bmh BEACH AND NEARSHORE MARINE SAND
aei ALLUVIAL AND ESTUARINE SAND AND SILT
bmi BEACH AND NEARSHORE MARINE SAND
mli MARINE SAND, SILT, AND CLAY
aej ALLUVIAL AND ESTUARINE SAND AND SILT
bmj BEACH AND NEARSHORE MARINE SAND
mlj MARINE SAND, SILT, AND CLAY

MIDDLE PLEISTOCENE

aed ALLUVIAL AND ESTUARINE SAND AND SILT
bmd BEACH AND NEARSHORE MARINE SAND
mld MARINE SAND, SILT, AND CLAY
aek ALLUVIAL AND ESTUARINE SAND AND SILT
mlk MARINE SAND, SILT, AND CLAY
mlm MARINE SAND, SILT, AND CLAY

MIDDLE AND EARLY PLEISTOCENE

aef ALLUVIAL AND ESTUARINE SAND AND SILT
mlf MARINE SAND, SILT, AND CLAY
mln MARINE SAND, SILT, AND CLAY

EARLY PLEISTOCENE TO PLIOCENE

bmg BEACH AND NEARSHORE MARINE SAND

mlg MARINE SAND, SILT, AND CLAY

QUATERNARY AND TERTIARY

zsc SAND AND CLAY DECOMPOSITION RESIDUUM

LIST OF MAP SYMBOLS

CONTACT

MARINE SCARP

THIN DEPOSIT OF EOLIAN SAND OVERLYING MAP UNIT

CAROLINA BAY—Shallow oval or elliptical, generally marshy, closed depressions in Atlantic Coastal Plain; 100m to many kilometers in length. Origin debated: attributed to meteorites, upwelling springs, eddy currents, eolian erosion, solution, or thaw of permafrost

DESCRIPTION OF MAP UNITS

HOLOCENE

asa ALLUVIAL GRAVELLY SAND—Light- to dark-gray, fine to coarse sand and sandy silt, containing local layers of dark-gray peaty clay and basal lenses of pebble gravel. Both sand and gravel are chiefly quartz. Deposit is poorly sorted, thin to medium bedded, and locally crossbedded. Deposit forms a fill in broad valleys. Water table at or near surface. Mapped area includes small alluvial fan deposits at the mouths of tributary streams, deposits of locally derived colluvium, and swamp deposits (**hs**). Thickness 1-10 m

ala ALLUVIAL SILT AND CLAY—Medium- to dark-gray, highly organic fine sand, silt, and clay. Locally contains discontinuous thin beds of poorly sorted, medium to coarse sand, gravelly sand, layers of peat, and trunks of trees. Mapped areas include swamp deposits (**hs**), small channel deposits of alluvium (**asa**), and locally derived colluvium. Thickness 1-15 m

hps SALINE MARSH DEPOSIT—Black or greenish-gray, silty clay to clayey fine sand and carbonaceous clay, intermixed and interbedded. Upper part darkest and contains the most organic matter, including thin layers of herbaceous peat. Deposit commonly bioturbated. Locally includes interbedded brackish water deposits. Thickness 0.5-6 m

hp PEAT (Dismal Swamp Peat)—Dark-reddish-brown to black woody peat and reed-sedge peat; grades downward into black, highly decomposed, colloidal, sapric peat. Large deposits present in depressions within East Dismal Swamp. Map unit includes small areas of silty to clayey swamp deposits (**hs**). Thickness 0.5-4.5 m

be BEACH AND DUNE SAND—Light-gray to light-tan, alternating beds of coarse to fine sand; well-sorted, laminated, and crossbedded; mostly quartz, but contains thin discontinuous lenses of heavy minerals; includes subordinate organic matter and shells. Map unit comprises beach deposits, washover and tidal-channel deposits, and coastal dunes. Mapped areas include narrow tracts of interdune saline-marsh deposits (**hps**), commonly mantled with a thin layer of eolian sand. Thickness 0.5-25 m

HOLOCENE AND LATE WISCONSIN

hs SWAMP DEPOSIT—Dark-brown to black organic debris, muck, and local peat mixed with mud composed of fine sand, silt, and clay. Sand chiefly quartz. Deposit present in lowlands in middle and outer Coastal Plain and valleys along major streams. Locally includes areas of alluvial clay and silt (**ala**) and patches of colluvium. Thickness 0.5-4.5 m

es EOLIAN SAND—Tan to light-gray or yellowish-brown medium sand; massive to crossbedded, subrounded to well rounded; mostly quartz, but includes thin beds of organic matter. Commonly stabilized by vegetation. Present on valley floors and adjacent low terraces as sheets or irregularly spaced linear and crescentic dunes oriented southeast. Thickness 0.5-6 m

ATLANTIC COASTAL PLAIN UNITS

Quaternary deposits of the Atlantic Coastal Plain (**bmh** through **mlg**) are subdivided into three major depositional facies: (1) sand of beaches, barrier bars, and other nearshore deposits; (2) marine sand, silt, and clay deposited in lagoons, bays, and tidal marshes inland from barrier bars; and (3) alluvial and estuarine sand and silt deposited in stream channels and in estuaries tributary to shorelines during times of Quaternary high sea level. Owing to subsequent erosion, not all facies are equally well preserved. Furthermore, deposits of like facies at the same altitude may not be equivalent in age because the configuration of the coast changed considerably throughout the Quaternary.

LATE PLEISTOCENE

bmh BEACH AND NEARSHORE MARINE SAND (Part of Pamlico Formation; barrier island facies of Poquoson Member of Tabb Formation)—Light-gray to light-yellowish-brown, very fine to coarse, micaceous quartz sand; planar-bedded and crossbedded. Upper part chiefly fine to very fine sand; local fine pebble gravel at base. Underlies linear ridges 5-7 m above sea level. Thickness commonly exceeds 4 m

aei ALLUVIAL AND ESTUARINE SAND AND SILT (Part of Pamlico Formation; alluvial and estuarine facies of Lynnhaven Member of Tabb Formation)—Tan to medium-gray, slightly mottled yellowish-brown, fine sand and sandy silt, mostly quartz. Thin bedded to massive crossbedded, unfossiliferous. Underlies stream terraces 1-6 m above sea level. Mapped areas include small alluvial deposits (**asa**, **ala**), swamp deposits (**hs**), and locally derived colluvium. Thickness 0.5-4 m

bmi BEACH AND NEARSHORE MARINE SAND (Part of Pamlico Formation; barrier island facies of Lynnhaven Member of Tabb Formation)—Light- to medium-gray, coarse to medium quartz sand, locally pebbly; massive to medium bedded, locally crossbedded; contains thin lenses of dark-gray silty clay and clayey silt. Underlies linear tracts 5-7 m above sea level on outer Coastal Plain. Mapped areas include small paludal deposits (**hps**). Thickness commonly exceeds 4 m

mli MARINE SAND, SILT, AND CLAY (Part of Pamlico Formation; marine back-barrier and lagoon facies of Lynnhaven Member of Tabb Formation)—Light-gray to tan, clayey fine sandy silt or silty fine sand; thin to thick bedded, crossbedded in places; basal coarse quartz sand includes a few cobbles and pebbles. Deposit contains burrows and traces of fossils. Underlies flats 0.5-6 m above sea level. Thickness 0.5-6 m

aej ALLUVIAL AND ESTUARINE SAND AND SILT (Part of Pamlico Formation; alluvial and estuarine facies of Sedgefield Member of Tabb Formation)—Light-yellowish-brown, fine sandy silt and clayey silt. Grades down into pale-brown to medium-gray, silty to gravelly quartz sand; thin to medium bedded, locally crossbedded; contains burrows. Underlies stream-terrace segments 6-11 m above sea level. Thickness commonly exceeds 8 m

bmj BEACH AND NEARSHORE MARINE SAND (Part of Pamlico Formation; Minnesott Ridge Sand; barrier island facies of Sedgefield Member of Tabb Formation)—Upper part is light-yellowish-brown to light-gray, gravelly sand, silty fine sand, and clayey silt. Sand chiefly quartz and lesser amounts of calcite, aragonite, feldspar, and mica; clay chiefly kaolinite and illite. Sand beds commonly crossbedded and extensively bioturbated. Local peat layers at base of deposit. Underlies low ridges 6-11 m above sea level on outer Coastal Plain. Thickness 0.5-15 m

mlj MARINE SAND, SILT, AND CLAY (Part of Pamlico Formation; Core Creek Sand; marine back-barrier and lagoon facies of Sedgefield Member of Tabb Formation)—Medium- to light-gray, mottled red, orange, or yellowish-brown, clayey, silty fine sand or clayey silt; grades down into silty fine sand and fine sand; chiefly quartz, moderately micaceous, calcareous; medium to thin bedded; locally crossbedded; locally fossiliferous. Basal beds contain isolated pebbles, cobbles, and boulders. Underlies flats 5-11 m above sea level on outer Coastal Plain. Thickness 1-7 m

MIDDLE PLEISTOCENE

aed ALLUVIAL AND ESTUARINE SAND AND SILT (Part of Talbot Formation; alluvial and estuarine facies of Shirley Formation)—Light-gray to yellowish-brown, silty fine sand to clayey sandy silt; grades down into light-tan to medium-gray, mottled yellowish-brown sand, mostly quartz. Massive to well-bedded, planar- to crossbedded; ferruginous; contains scattered lenses of clay and organic matter. Basal part is

coarse to fine sand containing cobbles and scattered boulders of igneous and metamorphic rocks, many weathered. Deposit underlies stream terraces 10-15 m above sea level. Thickness as much as 24 m

bmd BEACH AND NEARSHORE MARINE SAND (Part of Talbot Formation; barrier island facies of Shirley Formation; also includes parts of the Flanner Beach, Neuse, and Socastee Formations)—Yellowish-brown or pale-brown, coarse to medium quartz sand; crossbedded to planar-bedded. Includes thin lenses of gravelly sand, burrows, and casts of fossils. Deposit grades down into bluish-gray, coarse to fine quartz sand; thin bedded to medium bedded, crossbedded, fossiliferous; interbedded with layers of silt. Underlies broad ridges 10-15 m above sea level. Thickness 1-8 m

mld MARINE SAND, SILT, AND CLAY (Part of Talbot Formation; marine back-barrier and lagoon facies of the Shirley Formation; parts of Flanner Beach, Neuse, and Socastee Formations)—Light- to medium-gray, silty clay and fine sand, chiefly quartz; bedding indistinct. Grades down into pale-brown or light- to medium-gray, silty fine sand containing local lenses of gravelly sand; fossiliferous. Thickness 1-6 m

aek ALLUVIAL AND ESTUARINE SAND AND SILT (Part of Wicomico Formation; alluvial and estuarine facies of Chuckatuck Formation)—Pale-brown to mottled light-gray, thin sandy clayey silt and silty clay; massive to indistinctly bedded, unfossiliferous. Grades down into light- to medium-gray, thin- to thick-bedded, medium to fine sand, containing thin lenses of silt and silty clay. Basal beds contain scattered pebbles and cobbles of quartz. Underlies upland terrace segments 14-18 m above sea level. Mapped areas locally include small deposits of sandy alluvium (**asa**) and locally derived colluvium. Thickness 1-8 m

mlk MARINE SAND, SILT, AND CLAY (Part of Wicomico Formation; marine back-barrier and lagoon facies of Chuckatuck Formation; Canepatch Formation)—Light-gray to pale-brown, clayey, fine sandy silt or very silty clay; grades down into beds of light-gray to tan, fine to coarse quartz sand, containing sparse cobbles and pebbles; these beds are intercalated with lenses and thin layers of silt and silty fine sand. Contains burrows and ghosts of fossils. Underlies coastal terraces 14-19 m above sea level. Thickness 1-6 m

mlm MARINE SAND, SILT, AND CLAY—Map units **mld** and **mlk**, undifferentiated

MIDDLE AND EARLY PLEISTOCENE

aef ALLUVIAL AND ESTUARINE SAND AND SILT (Part of Wicomico Formation; alluvial and estuarine facies of Charles City Formation and the Windsor Formation (restricted))—Light-gray to pale-brown, mottled yellowish- or reddish-brown, silty fine sand and clayey silt; grades down into clayey, feldspathic, coarse to fine sand, intercalated with thin beds of silt and clay; planar-bedded to crossbedded, unfossiliferous, locally cemented with iron oxide. Basal clayey coarse sand contains pebbles and boulders of crystalline and metamorphic rocks as large as 1 m in diameter. Deposit underlies upland terrace segments 18–28 m above sea level along major streams. Thickness as much as 10 m

mlf MARINE SAND, SILT, AND CLAY (Part of Wicomico Formation; marine back-barrier and lagoon facies of Charles City and Windsor (restricted) Formations)—Light-gray to pale-yellowish-brown, mottled yellowish- to reddish-brown, fine sandy silt and clayey, silty fine sand; grades down into medium-gray to brown, fine to medium sand, chiefly quartz and feldspar; massive to medium bedded; contains burrows. Local richly organic silt and peat at base. Underlies interfluves 18–24 m above sea level. Mapped areas include small deposits of alluvium (**ala**), swamp deposits (**hs**), and residuum (**zsc**) on Tertiary deposits. Thickness as much as 24 m

mln MARINE SAND, SILT, AND CLAY—Map units **mld** and **mlk**, undifferentiated

EARLY PLEISTOCENE TO PLIOCENE

bmg BEACH AND NEARSHORE MARINE SAND (Barrier island facies of Moorings unit)—Yellowish-brown, mottled reddish-brown, clayey fine sand. Grades down into yellowish-brown to medium-gray fine sand; massive to crossbedded, unfossiliferous; includes some silt layers. Underlies broad linear ridges 30–36 m above sea level. Thickness as much as 4 m

mlg MARINE SAND, SILT, AND CLAY (Part of Sunderland Formation; marine back-barrier and lagoon facies of Moorings unit; James City Formation; part of Croatan and Waccamaw Formations)—Yellowish-brown to medium-gray, mottled reddish-brown, clayey silt and silty clayey fine sand; grades down into massive to weakly stratified, gravelly sand containing local lenses of clayey sand. Underlies flats 33–39 m above sea level. Mapped areas include small deposits of residuum (**zsc**) on Tertiary deposits and colluvium. Thickness 2–6 m

QUATERNARY AND TERTIARY

zsc SAND AND CLAY DECOMPOSITION RESIDUUM[1]—White to gray, light-yellow, yellowish-orange or grayish-red, commonly mottled, silty to clayey, fine to medium sand; poorly sorted. Contains small deposits of lag gravel and zones of light-gray to greenish-gray kaolinite. Upper 3 m intensely weathered. At depths of 10–15 m, residuum grades down into medium to coarse sand containing kaolinite, glauconite, and opaline silicate clays. Thickness 2–15

[1]Decomposition Residuum—Material derived primarily by in-place chemical decay of clastic rock with no appreciable subsequent lateral transport.

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