Formation and General Geology of the Mid-Atlantic Coastal Plain

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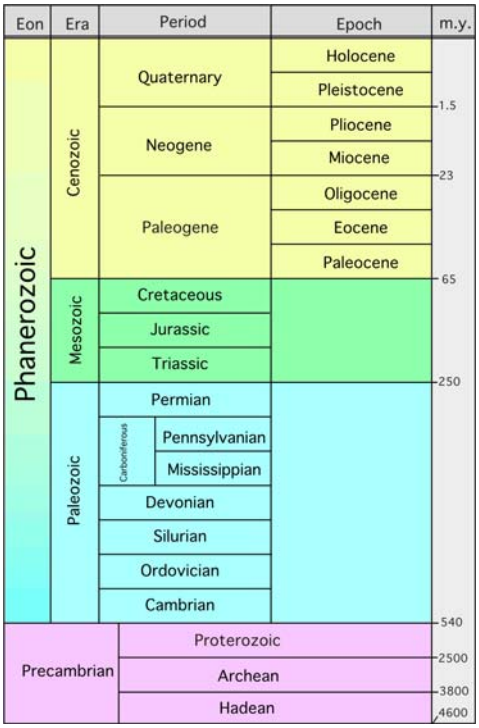
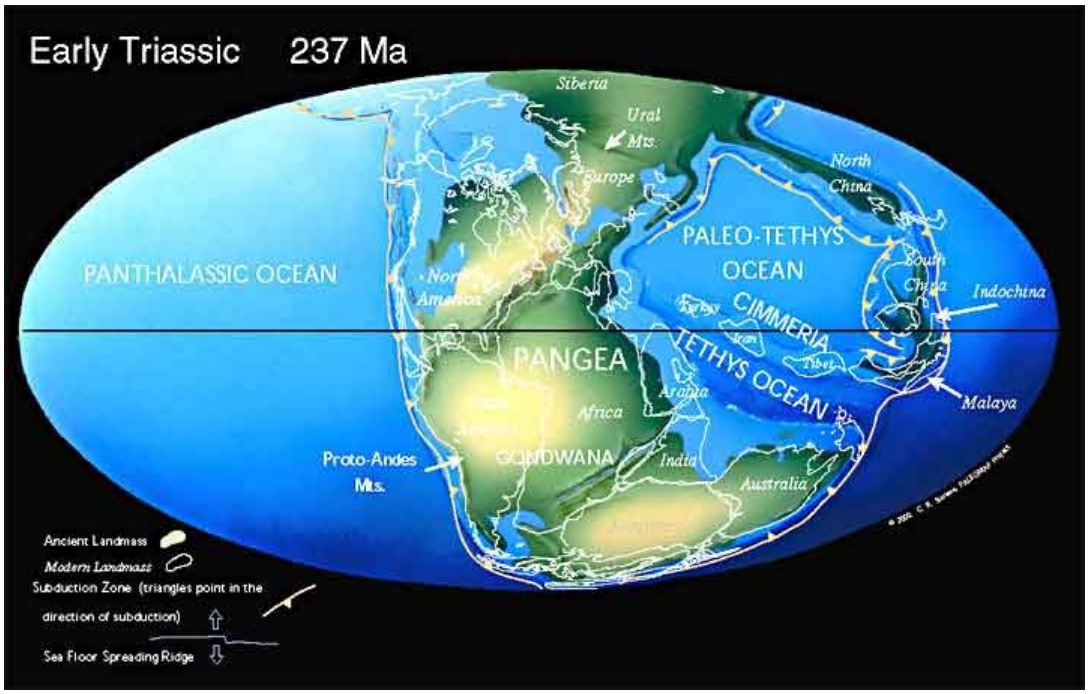
The picture below showing the Delmarva and far beyond is from Google Earth.

The Mid Atlantic Coastal Plain is a physiographic province along with the Piedmont Province and the mountain provinces of Blue Ridge, Valley and Ridge and Appalachian Plateau. The Mid Atlantic Coastal Plain is composed of the States of Delaware, New Jersey, and portions of Maryland and Virginia. The boundary between the Atlantic Coastal Plain and the Piedmont is known as the Fall Line. The Fall Line is the transitional zone where the more ancient harder rock of the Piedmont upland makes contact with the more easily eroded sands, silts and clays of Coastal Plain sediments. This erosional scarp, the site of many waterfalls, hence the term "Fall Line", hosted flume and water-wheel powered industries in colonial times and thus helped determine the location of such major cities as Philadelphia, Baltimore, Washington, and Richmond. In Maryland the Fall Line roughly follows an imaginary line linking the cities of Wilmington (Delaware), Baltimore, MD and Washington, D.C. East of the Chesapeake Bay lies the Delmarva region. Delmarva is a peninsula of land consisting of the State of Delaware and the Eastern Shores of Maryland and Virginia. It is bordered by the Delaware Bay to the northeast, the Chesapeake Bay to the west and south, and the Atlantic Ocean to the east.

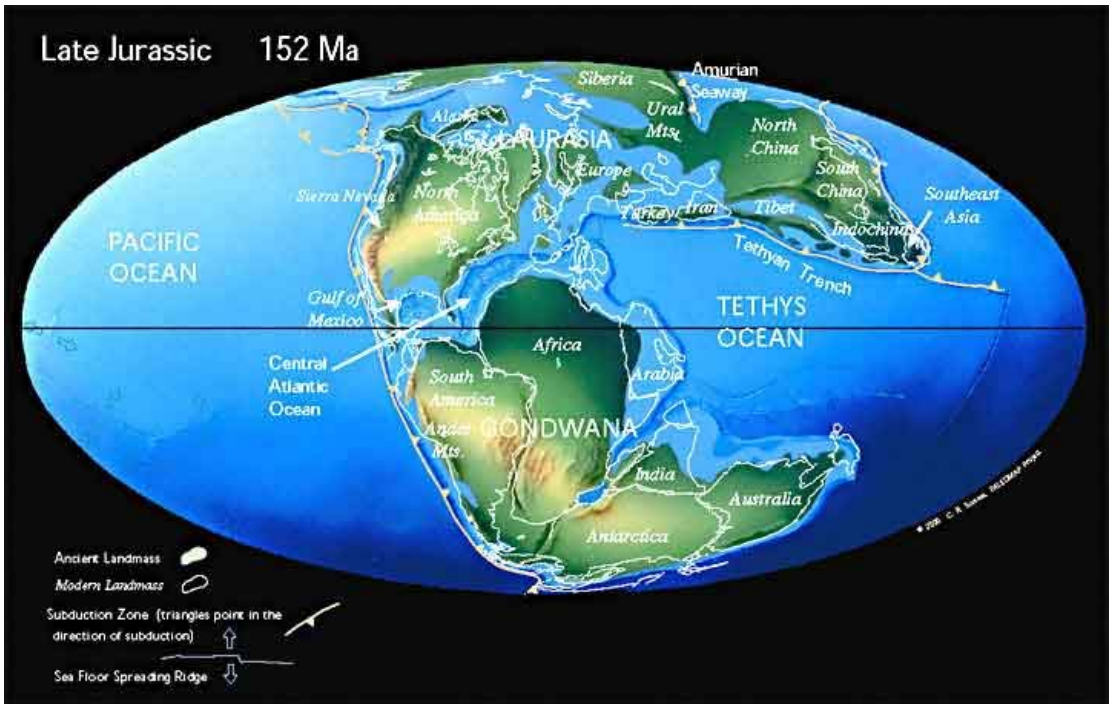


http://paleo.cortland.edu/tutorial/Timescale/timescale.htm

When the Pangaea land mass existed 450 to 250 million years ago, the pressure of these continental land masses shifting produced periods of uplift which created an ancient mountain range. This ancient mountain range was located where the Mountain and Piedmont physiographic provinces are located today. These ancient mountains are estimated to have been as tall as the present day Alps or Rockies. During Triassic times, around 200 million years ago, the continental land mass of Gondwanaland broke away and drifted south. On the edge of this remaining land mass, now known as Laurasia, in-rushing ocean waters and streams flowing down the side of the mountains carried and deposited eroded material. These unconsolidated sediments gradually formed a continental shelf consisting of gravel, sand, silt and clay beneath the shallow waters of the Laurasian coast. The present day Appalachian Mountains are all that remains of the ancient mountain range. Between 200 and 65 million years ago erosion and weathering continued during the Jurassic and Cretaceous periods depositing both marine and non-marine sediments on this coastal plain shelf.



Around 65 million years ago global sea levels dropped and the portion of the continental shelf containing the modern day Delmarva began rising above sea level. By 50 million years ago, during Eocene times, when North America began splitting from Europe, the regions rainforests were being replaced by brushy grasslands as the North American continent began drifting farther north toward cooler latitudes. The vegetation of Delmarva gradually changed to dense spruce forests and tundra as the much cooler Pleistocene period began 2 million years ago. Four major glacial advances or ice ages occurred during this Quaternary period, each lasting more than 100,000 years. As glaciers advanced, ocean waters were locked in glacial ice causing sea levels to drop as much as three hundred feet below current elevations. When warmer conditions melted ice- sheets, rising ocean waters flooded continental shelf lands depositing sheets of sand, silt, gravel and clay across the Coastal Plain. These marine sediments, referred to as the Chesapeake Group, were deposited under the large part of the coastal plain.



Delmarva Peninsula Geology

The overall stratigraphy of the coastal plain is that of a sedimentary wedge, thickening seaward, with the oldest layers on the bottom and the youngest on top. The oldest sediments exposed are fluvial sands and gravels of the Potomac Group and these occur in the westernmost part of the coastal plain near the fall line, where they just barely overlap the crystalline metamorphic rock of the Piedmont. As one goes to the east/southeast, progressively younger layers are exposed at the surface. These sediments were deposited at many different time periods and delivered by many different processes. Underlying the present-day Delmarva are thick marine sediments. The process that deposited these marine sediments would have occurred during periods of high sea level and been a low energy event that delivered fine textured silts and clays. Some sediments were deposited by fluvial processes on land surfaces by rivers that migrated back and forth across the land. These sediments are characteristic of the Beaverdam and Pensauken Formations, which are made up of sands with clay-silt beds and can be found on the interior of the Delmarva Peninsula. Some sediments were deposited in a shallow water environment, or lacustrine type process. Some sediments were transported by wind blown processes, or loess. These sediments are composed primarily of silt which blanketed much of the western edge of the peninsula and in some upland interior areas from the mid to upper parts of the peninsula. This loess deposit covers parts of the Kent Island Formation which is made up of estuarine and fluvial deposits. The Parsonsburg Sand Formation is also an eolian surface deposit on the Delmarva, believed to have been ancient dunes and/or broad plains lying between the dunes.
The age of the surface geology of the Atlantic Coastal Plain ranges from Cretaceous to Holocene. The Delmarva Peninsula part of the Coastal Plain includes the same age range though much of the exposed areas are Pliocene and younger. The barrier island dunes, found along the eastern edge of the Delmarva, and the tidal marshes, found through out the Delmarva, are primarily Holocene.

Southern Maryland Geology

The Coastal Plain on the western side of the Chesapeake Bay is generally more deeply dissected than the Delmarva Peninsula. Geologists believe that this part of the Coastal Plain was subject to more uplift hence more down cutting of streams and rivers. Many of the geologic formations that are exposed at the surface are of marine origin, including the glauconite bearing Nanjemoy and Aquia Formations. Fine and very fine sands, often containing significant amounts of diatoms and marine fossils, are characteristic of the Miocene Chesapeake Group Formations (Calvert Group). The marine origin of the sediments brings with it the likelihood of their containing sulfides. Sporadically occurring sulfidic materials have been found in nearly all of the surficially exposed Coastal Plain geologic formations on the western side of the Bay. Extensive layers of unweathered, unoxidized marine sediments are in the Nanjemoy and Aquia Formations. The clayey geologic formations, the Potomac Group silt/clay facies, and the less extensive Marlboro Clay pose both stability risks, as well as some risk of containing sulfidic or acid sulfate materials.

The broad interfluves of the south western portion of the Mid Atlantic Coastal Plain are capped with a silty mantle. These silty soils commonly have well developed fragipans. Gravel deposits of commercial interest are in many of the geologic deposits of the ancestral Potomac and Patuxent Rivers as they migrated across the area. There are numerous small faults in the bedrock and unconsolidated sediments underlying the Coastal Plain, and whose activity somewhat complicates the stratigraphy.

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