UNIVERSITY OF FLORIDA
IFAS EXTENSION

WEC189

Florida's Geological History[1]

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Introduction

Geology is the branch of natural science that studies the Earth, its rocks and minerals, and the changes that have created the Earth as we know it today. Geology incorporates other fields of study including hydrology (water resources), paleontology (fossils and ancient life), stratigraphy (the formation, composition, sequence, and correlation of rocks), geomorphology (the form of the Earth's surface and changes that take place), and petrology (history of rocks, their origins, changes, and decay).

Geologists estimate the age of the Earth at more than 4.5 billion years. The Florida plateau, which is the platform upon which Florida is perched, was formed about 530 million years ago by a combination of volcanic activity and marine sedimentation during the early Ordovician Period. When the Florida plateau was part of the supercontinent Pangaea, Florida was sandwiched between what were to become North and South America and Africa. Movement of the tectonic plates that compose the Earth's crust eventually caused Pangaea to split into Laurasia (North America, Europe, and portions of Asia) and Gondwana (South America, Africa, India, Australia, and Antarctica). When North America split from Laurasia and drifted northwesterly, it dragged the Florida plateau with it.

Sea levels have had a profound effect on both Florida's geology and ecology. The fossil record indicates a mass migration of plants and animals occurred between North and South America approximately 2 million years ago, when sea levels were much lower and a land bridge connected North America. During the last ice age, Florida was as much as three times the current land area (red line on Figure 1).

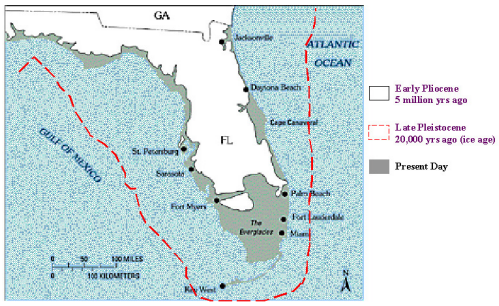

Figure 1. Previous Florida land area. Credits: U.S.G.S.

In addition to being much larger, Florida was also much drier during the last ice age. It was dominated by savanna-like conditions that supported a diverse Pleistocene megafauna and included animals such as mastodons, giant armadillos, and

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saber-toothed cats. Near the end of the last ice age, approximately 10,000-12,000 years ago, Paleoindians arrived in Florida. Humans have been implicated in the extinction of many megafaunal species throughout North America (Pleistocene overkill hypothesis), but changing weather patterns have also been implicated. As the ice age ended, sea levels rose, Florida shrank in size, the climate became much wetter, and habitats changed. A notable example of these climatic changes is formation of the Everglades, which occurred sometime around 4,000-6,000 years ago.

In addition to influencing land mass and climate, changing sea levels have influenced Florida's soils. Many of Florida's modern topographic features and surficial sediments were created or deposited during periods when sea levels were high. Waves and currents in these ancient seas eroded the exposed formations of previous epochs, reshaping earlier landforms and redistributing eroded sediments over a wide area. Florida's central ridge system represents ancient dunes that are relic habitats from periods of higher sea levels. Beneath the sea, the Florida platform acted as a marine shelf. As sea levels rose and fell, the calcium carbonate remains of sea creatures and algae formed sedimentary limestone bedrock.

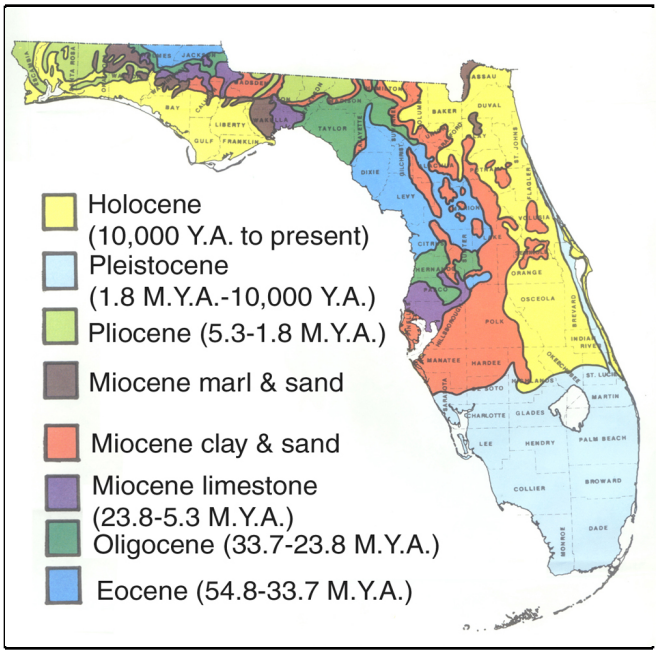

Figure 2. Florida Bedrock Layers. Reproduced from FLGS Map Series No. 112. Credits: U.S.G.S.

Erosion of the limestone bedrock causes karst development. Karst is a terrain or type of topography underlain by soluble rocks, such as limestone. The karst landscape is largely shaped by the dissolving action of groundwater made weakly acidic as rain collects carbon dioxide from the air and from decomposing organic matter on the ground. Given many thousands of years, this geological process results in unusual surface-subsurface features ranging from sinkholes, vertical shafts, disappearing streams, and springs to complex underground drainage systems and caves.

Florida's coastal areas are influenced by erosion as well. Rivers and ocean currents transport tremendous quantities of sediments into Florida derived from the Appalachian Mountains and southeastern coastal plain. Much of the quartz sand covering the state today, as well as the heavy mineral deposits, trace their origin to the Appalachian Mountains.

Regionally, Florida can be divided into north and central highlands and coastal lowlands (Figure 3).

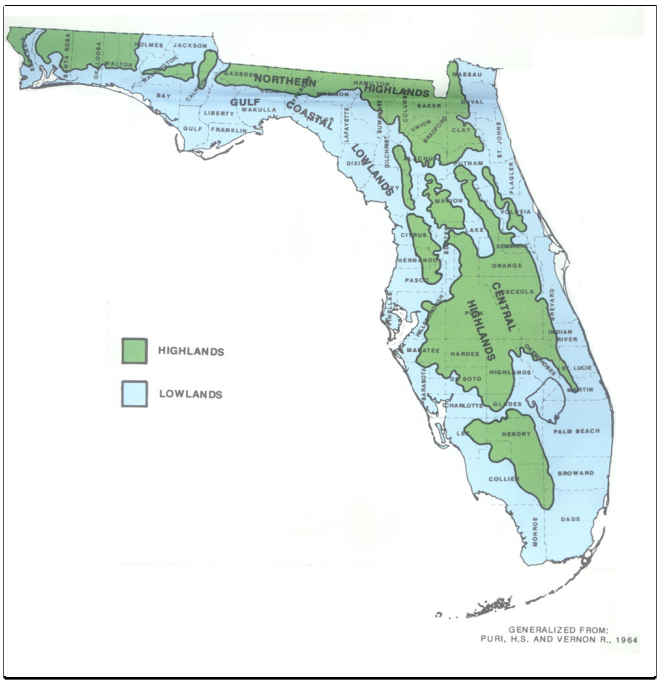

Figure 3. Landforms of Florida. FLGS Map Series No. 112 Credits: U.S.G.S

The landscape of north Florida is dominated by the northern highlands, a series of gently sloping plateaus, bordered to the south by a scarp, which separates the highlands from the Gulf Coast lowlands.

The Gulf coast lowlands extend south to the Caloosahatchee River. Central Florida is characterized by the central highlands, a series of elongated ridges. The southern peninsula is low lying and includes the Florida Everglades.

Florida's geological history has been principally affected by changing sea levels, which influenced the formation of bedrock, the resulting soils, and surface topography. These geological factors influence Florida's plant communities, which support animal communities. Geological history, therefore, has influenced Florida's environment and ecology in the past, during the present, and will continue to have effects in the future.

Additional Information

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