Shoreline Erosion and Accretion of the Middle Atlantic Coast

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Introduction

Throughout history, people have been drawn to coastal areas for both recreation and economic prosperity. The coastal environment provides a variety of resources, from food and water to harbors and beaches. However, these resources are not without risks. The dynamic nature of the coastal environment makes it susceptible to natural forces such as storms, waves, and tides, which can lead to shoreline erosion and accretion. Understanding the factors that influence these processes is crucial for managing coastal resources and protecting communities.

Coastal Geology and Geomorphology

The Atlantic Coastal Plain, from New York to Florida, is a relatively flat and gently sloping coastal area influenced by tectonic activity, glacial deposition, and coastal processes. The coastal plain is divided into three parts: the New Jersey Coastal Plain, theDelaware Coastal Plain, and the Maryland Coastal Plain. The coastal plain is characterized by a series of low, sandy beaches and barrier islands that are susceptible to erosion and accretion.

Geological processes such as sea level changes, tectonic activity, and glacial deposition have shaped the coastline over time. The coastline is influenced by the balance between the forces of erosion and deposition. Erosion occurs when waves and currents remove sediment from the shore, while deposition occurs when waves and currents move sediment onto the shore.

Selection of Erosion and Accretion Categories

Shoreline changes can be categorized into two main groups: erosion and accretion. Erosion occurs when waves and currents remove sediment from the shore, while accretion occurs when waves and currents move sediment onto the shore.

Sea Level

Sea level changes can affect coastal areas by changing the shoreline and altering the balance between erosion and deposition. Sea level changes can be caused by tectonic activity, glacial melting, or changes in ocean currents.

Bathymetric changes can also occur due to sediment deposition and the movement of sediment along the shoreline. These changes can be measured using satellite imagery and other remote sensing technologies.

Human Impact

Human activities can also impact the coastline. Coastal development, such as the construction of buildings and roads, can alter the natural processes of erosion and accretion. Coastal development can also lead to the pollution of coastal waters and the loss of natural habitats.

Coastal Engineering Measures

Coastal engineers use various measures to protect the coastline from erosion and accretion. These measures can include the construction of breakwaters, sea walls, and dikes, as well as the use of sand nourishment and other techniques to stabilize the shoreline.

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Figure 1. Conceptual model of shoreline change

This figure illustrates the model of shoreline change, which consists of three main components: the rate of shoreline change, the rate of accretion, and the rate of erosion. The model is based on the principle of mass balance, which states that the rate of change is determined by the balance between the rates of accretion and erosion.

Figure 2. Conceptual model of shoreline change

This figure shows the conceptual model of shoreline change, which consists of three main components: the rate of shoreline change, the rate of accretion, and the rate of erosion. The model is based on the principle of mass balance, which states that the rate of change is determined by the balance between the rates of accretion and erosion.

Figure 3. Conceptual model of shoreline change

This figure shows the conceptual model of shoreline change, which consists of three main components: the rate of shoreline change, the rate of accretion, and the rate of erosion. The model is based on the principle of mass balance, which states that the rate of change is determined by the balance between the rates of accretion and erosion.

Figure 4. Conceptual model of shoreline change

This figure shows the conceptual model of shoreline change, which consists of three main components: the rate of shoreline change, the rate of accretion, and the rate of erosion. The model is based on the principle of mass balance, which states that the rate of change is determined by the balance between the rates of accretion and erosion.

Figure 5. Conceptual model of shoreline change

This figure shows the conceptual model of shoreline change, which consists of three main components: the rate of shoreline change, the rate of accretion, and the rate of erosion. The model is based on the principle of mass balance, which states that the rate of change is determined by the balance between the rates of accretion and erosion.