

Coastal Processes

Erosion

Coastal erosion results from the interaction of four processes namely hydraulic action, abrasion, attrition and compression. Hydraulic action causes erosion through the sheer force with which water lashes a coastline. When combined with abrasion and compression, this force can be very considerable. Compression leads to erosion when waves force air in between rock joints and bedding planes causing rock to weaken and shatter. Abrasion erodes a coastline through the force with which the sea hurls rock fragments, stone and other materials against the coastline. Attrition is the continual wearing down of rock debris when it contacts other debris. This process is responsible for the eventual creation of sand and shingle.

Waves

Destructive waves and wave refraction aid erosion. The formation of waves depends on the fetch – the distance over which wind blows. Stronger winds and long fetches lead to stronger waves and greater erosion potential. Destructive waves are the strongest waves and occur during storms with a frequency of 12 or more waves per minute. The backwash of these waves is stronger than their swash consequently material eroded by the four erosion processes is carried out to sea.

Refraction

Wave refraction occurs when waves approach an irregular coastline in a parallel fashion. In this case, wave energy is concentrated on promontories such as headlands, erosion occurs and the consequent loss of energy leads to deposition between headlands (Bays and Headlands). Refraction along a straight coastline such as a beach occurs when waves approach the coastline obliquely (at an angle). This form of refraction can aid erosion and Longshore drift.

Deposition

Marine deposition occurs whenever the swash or incoming wave moving up a beach is stronger than the backwash – the volume of water moving down the beach through percolation. Whenever the swash is great and the percolation gentle, the incoming waves are termed constructive waves. This is because material will be added to the beach whilst the backwash will remove little or none.

Longshore Drift

Longshore drift aids deposition. When an oblique wave reaches a coastline, material is swashed diagonally up the beach. The backwash carries material vertically back down the beach where it meets another incoming wave which moves it diagonally up the beach again. In this way, longshore drift moves material along a beach.