

## GLG 101 – CHAPTER 20 - SHORELINES

- The height of a wave is the distance from the top (crest), or highest point of the wave to the bottom (trough) or lowest point. The distance between successive wave crests (or troughs) is called the wavelength. The wave height and wavelength are controlled by wind speed (wind blowing over water produces waves), length of time the wind has been blowing, and the area over which the wind is blowing over the water.
- Motion of water particles in waves is up and down in a circular (orbital) fashion. The wave/disturbance moves forward, but the water itself does not.
- The place where waves break is known as the “surf zone”, and is the only place where significant forward motion of water is actually occurring.
- Beach erosion/wave erosion is produced by abrasion and by the impact pressure of waves breaking against the beach or headlands.
- Most waves hit the shore at an angle and bend around headlands in a process known as wave “refraction”. This produces a longshore current, which moves sand down along the beaches. Eroding in one area and then redepositing in another. So long as there is a constant supply of sediment from rivers, no net erosion has to occur. When sand resupply is blocked by groins, jetties, etc., enhanced beach erosion can occur downstream from these structures, while increased deposition occurs upstream of these features.
- Sand tends to be pushed onto the beaches by mild summer waves and be eroded into offshore bars during stronger winter storms. Offshore sand bars can form and block bays (baymouth bars) or continue as spits beyond the end of headlands.
- When offshore sea stacks or breakwaters decrease wave action, sand bars can build up and connect these structures to land via a sand peninsula known as a tombolo.
- Sea level rises during warm climates when glaciers are melting away, and drops during ice ages as water is taken from the oceans and supplies the growing glaciers. Increased coastal erosion occurs during ice ages as water can flow down farther to reach the lowered sea level.
- Tides are the oscillations in local sea level produced by the gravitational pull of the moon on the oceans. As the Earth spins, the “overhead” position of the moon sweeps across all latitudes. When the moon is overhead, gravity from it is a maximum, and the water is pulled upward to form high tide. This also happens on the opposite side of the earth at the same time as water is pulled away from the “sides” of the planet (where low tide is occurring). Hence, there are two high tides and two low tides in every 24-hour period. When the moon is closest to Earth, and the moon and sun are lined up together (either new or full moon), then tides are maximum (spring tides). When the sun and moon are at 90 degrees to one another with respect to the earth (first and last quarter moon), then tides are at a minimum (neap tides).