

- (a) Discuss TWO important causes for the variation in the temperature and/or salinity of an estuary. Be sure to include the connection between each cause and temperature and/or salinity.

student 1:

(a) The variations in temperature and salinity of an estuary are caused by tidal changes and seasonal changes. As tides rise more fresh water or salt water is added to an estuary. This will either decrease or increase the salinity of the water. The increase in water during high tide also changes the temperature of estuarine water. Seasonal changes will determine the temperature of the water in an estuary. During winter water will have a decreased temperature and during summer the temperatures will increase slightly.

Commentary

In Part (a) of this response, there is an attempt to explain changes in salinity using tidal change; however, it is unclear as to whether a rising tide adds more freshwater or saltwater to the estuary, and whether that raises or lowers the salinity levels. Because the answer lacks the direction of change, no points are earned. The changes in temperature alluded to in reference to high tide is not scored because it is related to the same cause. The second cause indicated is seasonal change, but the discussion is too vague, so no points are earned.

student 2:

a) The temperature of an estuary varies greatly according to the depth of the water. The depth of water is affected by the tides. In shallow or near water, the estuary would be about the temperature of the environment. In deeper water, the estuary would be closer to the temperature of the ocean. This occurs because shallow water is quickly warmed whereas deeper water is not. The salinity of an estuary is affected by rainfall. After a storm or heavy rains, the salinity of an estuary would be low, because rain is fresh water and would be retained by an estuaries. In a time of drought or a long time w/o rain, the estuary would have high salinity because some ^{fresh} water would have evaporated and the rain had not alluded any of the salty water.

Commentary

In Part (a), the tidal cycle is identified as one cause, but there is no clear connection between the effect of the changing tides to water depth and the resulting variation in water temperature; no point is earned. The second cause addresses the impact of storms and rainfall on salinity levels, including the direction of change as a result of increased rainfall and decreased or lack of rain. This response earns one point. Because only the first two causes given are scored, no additional points are earned for evaporation.

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student 3

(a) Two causes for the variation in the salinity ~~of~~ and temperature of an estuary include air temperature and ocean ~~temperatures~~ ^{tides}.

The air temperature would ^{in part} determine the amount of evaporation of an estuary. The amount of evaporation of an estuary affects the salinity of that estuary. Also, the air temperature would have an effect on the temperature of the water in the estuary.

Ocean tides bring and remove saline water. When the ~~high~~ tide is in, the estuary would be filled with a greater amount of salt water and thus the salinity would be higher. When the tide is low, more fresh water has an opportunity to flow into the estuary, thus lowering the salinity.

In addition, ocean tides bring in cooler or warmer water that would either lower or raise the temperature of the estuary. Then, when the tide went out, the water would become warmer or cooler depending on the temperature of the departing ocean water and the weather.

In Part (a), there is an attempt to connect air temperature to the rate of evaporation and salinity; however, there is no mention of the direction of change, so no point is earned. The discussion of air temperature and water temperature also lacks direction and is a further discussion of the same cause. The second cause given is tides, and since it is clearly connected to tidal direction and specific changes in salinity, one point is earned. Again, the continued discussion of the effects of tides on water temperature is not scored since it is an additional discussion of the second cause.