Sediment Activity Answer Key

1. Were your predictions close to where calcareous and siliceous oozes actually occur?

Answers vary.

2. How does your map compare with the sediment distribution map?

Answers vary.

3. Which type of ooze dominates the ocean sediments, calcareous or siliceous? Why?

Calcareous sediments are formed from the remains of organisms like plankton with calcium-based skeletons[1], such as foraminifera, while siliceous ooze is formed from the remains of organisms with silica-based skeletons like diatoms or radiolarians. Calcareous ooze dominates ocean sediments. Organisms with calcium-based shells such as foraminifera are abundant and widely distributed throughout the world's ocean basins –more so than silica-based organisms. Silica-based phytoplankton such as diatoms are more limited in distribution by their (higher) nutrient requirements and temperature ranges.

4. What parts of the ocean do not have calcareous ooze? What might be some reasons for this?

Remember that ooze forms when remains of organisms compose more than 30% of the sediment. The edges of ocean basins bordering land tend to have a greater abundance of lithogenous sediment –sediment that is brought into the ocean by water and wind. The proportion of lithogenous sediment decreases however as you move away from the continental shelf. In nutrient rich areas such as upwelling zones in the polar and equatorial regions, silica-based organisms such as diatoms or radiolarians will dominate, making the sediments more likely to be a siliceous-based ooze. Further, factors such as depth, temperature, and pressure can affect the ability of calcium carbonate to dissolve. Areas of the ocean that lie beneath the carbonate compensation depth (CCD), below which calcium carbonate dissolves, typically beneath 4-5 km, will be dominated by siliceous ooze because calcium-carbonate-based material would dissolve in these regions.

5. Where are large deposits of siliceous diatom ooze? Are these deposits mostly near the edges of continents or in the middle of the ocean? Why?

Diatoms thrive and can dominate phytoplankton communities in nutrient rich regions like upwelling areas of the polar seas and in areas closer to land (the edges of continents) where the nutrient supply is higher. Diatom oozes decrease as you move away from the continents as nutrient supplies decrease and in areas without nutrient enrichment from upwelling. Upwelling, nutrient rich waters

[1] The skeletons of plankton may also be called "tests". These skeletons (tests) refer to the plankton's outer coverings or shells.

also occur in the equatorial Pacific off of South America. However, there are a greater proportion of radiolarians (microscopic zooplankton) in this area compared to the polar regions. Radiolarians don't require the same levels of nutrients that diatoms do and are more prevalent in the warmer waters closer to the equator. As a result, siliceous diatom ooze dominates the polar regions whereas siliceous radiolarian ooze dominates the equatorial coastal Pacific.

6. Where do you see large deposits of siliceous radiolarian ooze? Why?
You also see siliceous radiolarian ooze in nutrient-rich upwelling areas. However, since radiolarians favor the warm water, environmental conditions in the equatorial zones, they dominate the equatorial upwelling areas as opposed to polar upwelling zones. This is why most large deposits of siliceous radiolarian ooze are found around the equator.

Additional Resources: The websites below may also include useful background information on ooze distribution.

http://www.marinebio.net/marinescience/02ocean/mgbottom.htm (Accessed April 2011)
http://geology.uprm.edu/Morelock/dpseabiogenic.htm (Accessed April 2011)