

COSMOS 2013 Cluster 3

Living Oceans and Global Climate Change

Hydro Lab

Instructor: Prof. Lynn Russell
Teaching Fellow: Megan Simon
Teaching assistants: Jacob Sanchez

Objectives:

As part of this lab and field trip, the students will

1. Observe generated sinusoidal waves in a tank
2. Determine the motion of “particles” in the waves
3. Observe breaking waves in a model ocean environment
4. Determine that breaking waves cause air to be trapped as bubbles which rise to the surface
5. Discuss the role of bubble bursting in the number of aerosol particles above the ocean
6. Think about how model systems are used to study natural processes in the ocean

Define key terms:

Marine aerosol –

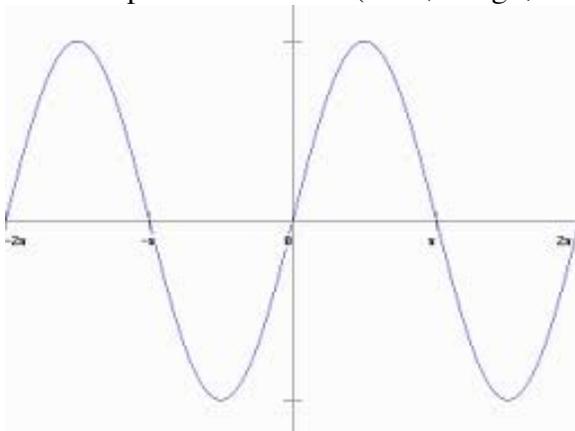
Wavelength –

Frequency –

Amplitude –

Breaking wave –

Label the parts of the wave (crest, trough, amplitude, wavelength) –



Questions:

Part I: Observing the sinusoidal waves in the wave tank

1. How were these created? How does this differ from the way waves are created in the ocean?
2. What is being transferred in the wave tank (energy, mass, water, etc.)?
3. For one set of waves, estimate the:
 - a. Wavelength –
 - b. Frequency –
 - c. Amplitude –
4. Imagine a single parcel or “particle” of water on the surface or imagine there is a toy rubber duck floating on the water surface. How does this move with the wave? What shape does it move in vertically?
5. Would a grain of sand move more on the surface of the water or at the bottom of the water column?

Part II: Observing breaking waves in the wave tank

1. After a wave breaks, what is created below the surface of the water?
2. What happens to the air that is trapped?
3. When the bubbles burst at the ocean surface, what is created above the surface of the water?
4. What is the chemical composition of marine aerosol particles? Think about the composition of the seawater.

Part III: Additional Questions

1. How would the waves be different with seawater instead of salt water?
2. What happens to waves when they hit the beach? What happens to the energy?
3. Where does the energy for waves come from?
4. What is a tsunami and how is it different from the waves we have been discussing?