

## Discovery of Sound in the Sea (DOSITS) Science of Sound, Video Summary

### What is Sound?

- Sound is created by a vibrating object.
- Sound travels as a wave through a medium.
- A sound wave is an example of a **compressional** or **longitudinal wave**.
  - o The particles in a longitudinal wave move parallel to the direction in which the wave is traveling.
  - o A sound wave alternately compresses (areas of high pressure) and expands (areas of low pressure) whatever medium it is traveling through.

**For more information on the DOSITS website:**

[www.dosits.org/science/sound/whatisound/](http://www.dosits.org/science/sound/whatisound/)  
[www.dosits.org/science/sound/howismade/](http://www.dosits.org/science/sound/howismade/)

### Characteristics of Sound

- A sound wave's **amplitude** relates to amount of energy it carries.
  - o As amplitude increases, a sound is perceived to be louder; as amplitude decreases, a sound is perceived to be softer.
  - o The average amount of energy passing through a unit area per unit of time in a specified direction is called the **intensity** of the wave. Sounds with higher intensities are perceived to be louder.
  - o Relative sound intensities are often given in units named **decibels (dB)**.
- One complete repetition of a wave is called a **[wave] cycle**.
- **Frequency** is the number of cycles per second.
  - o If the frequency of a sound is increased (there are more cycles in a second), a higher pitched sound is produced. If the frequency is decreased, a lower pitched sound is produced.
  - o A high-frequency sound has a shorter **wavelength** than a low-frequency sound. The wavelength is the distance from a point on one wave to the corresponding position on the next wave.
- **Phase** specifies the location of a point within a wave cycle of a repetitive sound. When two sounds of the same frequency are in phase, their amplitudes combine. When they are out of phase, they cancel each other out.

**For more information on the DOSITS website:**

[www.dosits.org/science/sound/characterizesound/](http://www.dosits.org/science/sound/characterizesound/)

### Sound Movement

- Sound travels about 1500 meters per second in seawater. Sound travels much more slowly in air, at about 340 meters per second.

- Sound level decreases as a sound moves away from its source. A sound wave gets smaller (loses energy) because it spreads out, or **spreading loss** occurs, and because some of the wave's energy is **absorbed**.

***For more information on the DOSITS website:***

[www.dosits.org/science/soundmovement/speedofsound/](http://www.dosits.org/science/soundmovement/speedofsound/)

[www.dosits.org/science/soundmovement/soundweaker/](http://www.dosits.org/science/soundmovement/soundweaker/)

### **Source Levels/Ambient Noise**

- Background sound is the sum of all distance sounds in the ocean, called **ambient noise**.
  - o The primary sources of ambient noise varies in different regions of the ocean and can be categorized by the frequency of the sound.
- **Source level** is the intensity level of a sound source, at a distance of 1 meter. It has units of decibels.

***For more information on the DOSITS website:***

[www.dosits.org/science/soundsinthesea/commonsounds/](http://www.dosits.org/science/soundsinthesea/commonsounds/)

### **The Difference Between Sound in Air and Sound in Water**

- Sound waves in water and sound waves in air behave differently because of the physical differences between air and water.
  - o The intensity of a sound wave depends not only on the pressure of the wave, but also on the density and sound speed of the medium through which the sound is traveling.
  - o Sounds in water and sounds in air that have the same pressures have very different intensities because the density of water is about 800 times greater than the density of air.
- **Sound levels given in dB in water are not the same as sound levels given in decibels in air.**

***For more information on the DOSITS website:***

[www.dosits.org/science/soundsinthesea/airwater/](http://www.dosits.org/science/soundsinthesea/airwater/)