



## Heat Sinks

Scientists often look to lakes and oceans to understand the impacts of climate change. This is because oceans play a significant role in understanding and slowing climate change as they are massive *heat sinks*. To understand this more clearly familiarize yourself with the following Western scientific terms!

- **Heat sinks** are anything proficient at absorbing thermal energy without becoming much warmer. In this way they are substances with high heat capacity. Oceans can absorb a lot of energy from the sun while remaining fairly constant in their temperature. For instance, the earth's energy from the sun is retained, and moves in and out of the following physical systems of our planet: the atmosphere (air), the hydrosphere (water), the cryosphere (ice/snow), the lithosphere (land), and the biosphere (living organisms). These systems, in turn, absorb and reflect energy and influence our weather and climate.
- **Atmosphere:** The Earth's atmosphere is made up of 78% nitrogen and 21% oxygen. The remaining 1% is called trace gasses which includes water vapor, ozone, carbon dioxide, and methane
- **Lithosphere:** The Earth's land masses affect weather and climate. In the long-term changes in the distribution of land masses has impacted the movement of air around the planet. This has caused large chemical changes in the Earth's climate. Volcanic eruptions also impact the earth's climate as they spew gases into the upper atmosphere which reflect sunlight and alter atmospheric chemistry. More recently, changes in the surface of land from agriculture, forestry, and urbanization have changed the amount of energy that is being absorbed or reflected to space.
- **Cryosphere:** Almost 70% of the Earth's freshwater is contained in ice caps, glaciers, and regions of permanent snow cover. Ice reflects solar energy back to space helping to keep the earth cooler. This is called albedo. Ice also insulates the ocean and land from the atmosphere which changes the dynamics of wind and weather.
- **Biosphere:** Living organisms change the chemical makeup of the atmosphere by storing and releasing carbon dioxide as well as altering the albedo of the earth's surface through colour changes. <https://rb.gy/4caui>
- **Hydrosphere:** Covering 68% of the Earth's surface, the ocean acts as a vast heat storage device in the climate system. Ocean circulation transports heat from the equator to the poles. Also, gases from the atmosphere can dissolve in the ocean and be stored for many years in the ocean depths. That said, when carbon dioxide dissolves seawater becomes more acidic which can harm marine life.  
Oceans help to regulate temperatures due to heat transfer between the hydrosphere and the atmosphere.