Climate Basics

To begin to understand climate change we need to understand some basics, for example the difference between climate and weather.

Weather is the day-to-day change of temperature, snowfall and rainfall, winds and clouds that take place in a particular location. Weather is easily observed and measured by thermometers, rain gauges, barometers, and other instruments.

Climate is the average weather that occurs in a given place over a long period of time. The study of climate requires the analysis of daily, monthly and yearly weather patterns over decades, centuries or even longer.

The Earth's natural climate is in a state of constant change. The tropical climate we commonly associate with dinosaurs, and the recurring pattern of Ice Ages, are dramatic examples of these changes. Climate is influenced by slow changes in the oceans, the land, the energy output of the sun, and the Earth's atmosphere. Major events such as the eruption of a volcano can influence our climate very quickly.

Our Atmosphere

The Earth's atmosphere is a 100-km-deep layer of gases around the planet, held in place by gravity. It is made up of nitrogen (78%), oxygen (21%), argon (0.9%), carbon dioxide (0.03%) and varying amounts of water vapour, hydrogen, ozone, methane, carbon monoxide, helium, krypton and xenon.

Greenhouse Gases and the Greenhouse Effect

Various gases within the atmosphere play a role in insulating and warming the Earth's surface. This process is often referred to as the **greenhouse effect**. In our atmosphere, water vapour, carbon dioxide, methane and nitrous oxide, are referred to as greenhouse gases because they trap the heat of the sun. Without them, the average temperature on Earth would be -18 C instead of the current 15 C. Greenhouse gases regulate the temperature of the Earth and make it capable of sustaining life. Without these gases, Earth would be a frozen planet, and life as we know it would not exist.

Ozone

Ozone is another gas which plays a vital role in the health of the planet because it absorbs ultraviolet (UV) radiation, shielding the surface of the Earth. The **ozone layer** is approximately 10 km deep, located 20 to 30 km above the Earth's surface. Without the protection the ozone layer provides, most, if not all, life on Earth would be destroyed by the UV radiation from the sun.