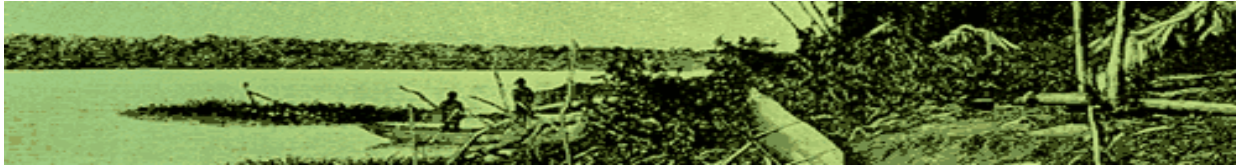


Global Change



The Earth is constantly changing. Weather and seasons are clear examples of regular changes in the global environment. Other changes are not as evident because they occur over intervals longer than a human lifetime or because the changes are not easily seen. Much of the change that takes place on Earth is part of natural cycles. Human activity, however, can also cause environmental changes.



Greenness maps are made by computer from information recorded by instruments on satellites. Areas where plants grow radiate more energy than barren areas do. These two maps show plant growth across the United States at the beginning of a growing season, in April 1992 (top) and at the peak of growth in June 1992 (bottom). The greenest areas on the image are areas of vigorous growth. Areas with no plant growth are in brown. Maps like these, made every 2 weeks during the growing season, record the effects of drought and other weather changes.

People are being asked to limit activities that change the environment, but before sensible limits can be adopted, we need information.

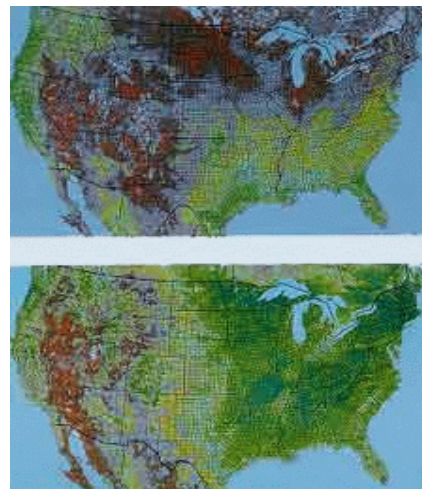
Questions include:

What are current environmental conditions and how are they changing?

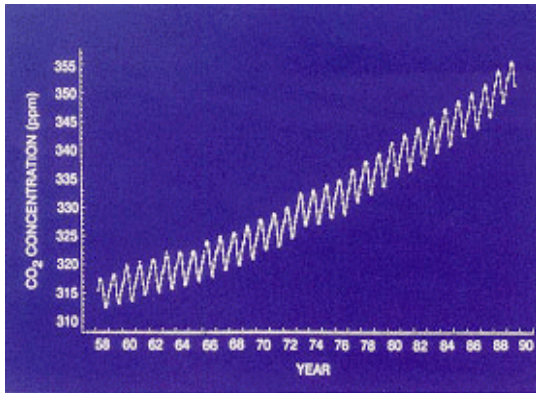
Are environmental changes caused by natural variation or by human activity, or both?

How will local changes affect other parts of the earth and its systems?

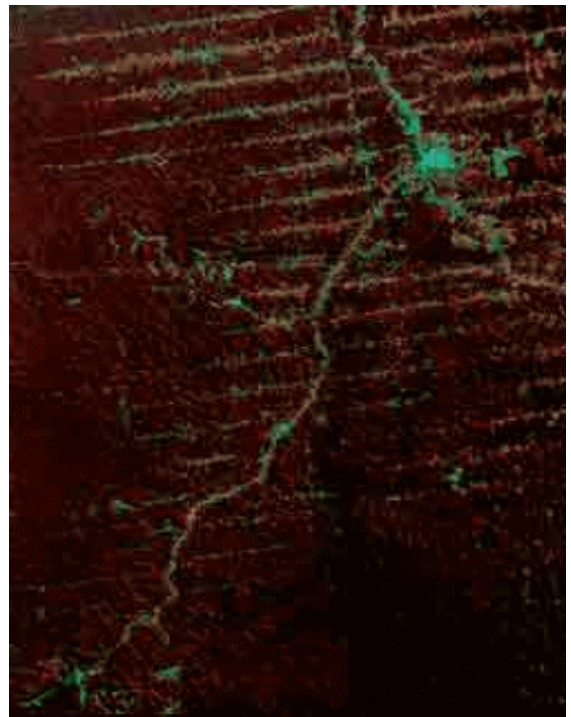
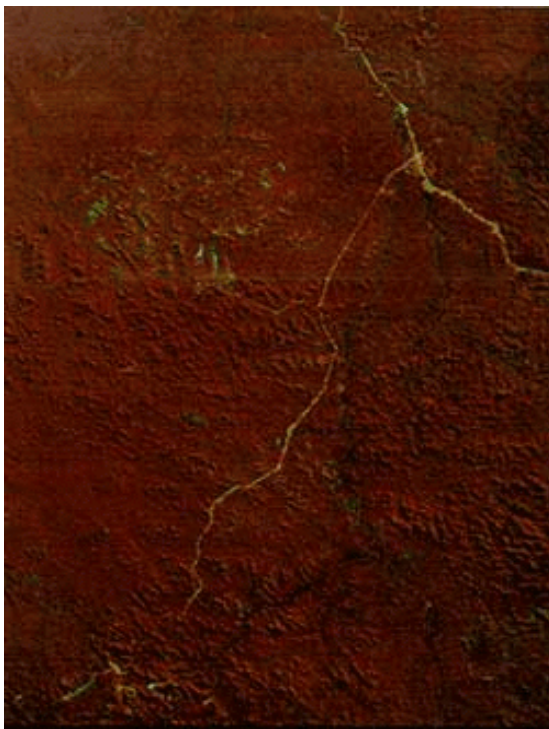
Scientists study global change to help answer these questions. Earth is our home. We can take better care of our home when we better understand how it works and what changes it is undergoing. Before global change can be studied we must be able to observe it. These pictures are evidence of global change.



Global Change

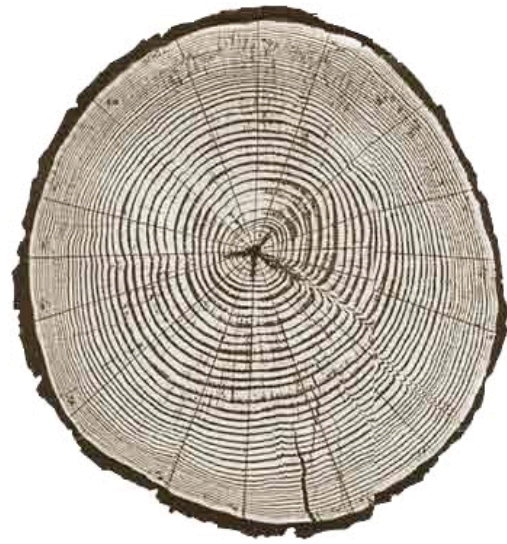


*I*n 1958, American scientist Charles David Keeling began measuring the concentration of the gas carbon dioxide (CO₂) in the atmosphere. This graph presents data gathered on Mauna Loa, a volcano 4,000 meters high in Hawaii. Two patterns can be seen. From 1958 to 1988, CO₂ concentration increased by about 40 parts per million (ppm). The "sawtooth" pattern reflects a seasonal fluctuation in CO₂ of about 5 ppm. Plants draw carbon dioxide from the atmosphere to make food. Thus, in the Northern Hemisphere CO₂ concentration peaks in early spring just before plant growth begins and falls off in October when the growing season ends.



These satellite images from the Landsat program show the same area of the Brazilian rain forest in 1975 (left) and in 1986 (right). Forest vegetation is red and the roads and cleared areas with houses and farms are in blue. In 1975 there was little development along the roads. By 1986 many secondary roads had been built. Areas where forest has been cut down for lumber or crops extend out from the secondary roads in blue feather-like patterns.

Global Change



*T*rees record climate change. Each year a tree forms a new layer of tissue. The width of each year's ring reflects growing conditions such as moisture or sunlight. A wide ring indicates faster growth (good conditions), whereas a narrow ring indicates slower growth (poor conditions). When the tree is cut, these rings can be "read" like a diary of the climate. This tree was cut in 1992. Counting backward from the outer bark, can you tell how old the tree is? Can you tell when growing conditions were good and when they were poor?

