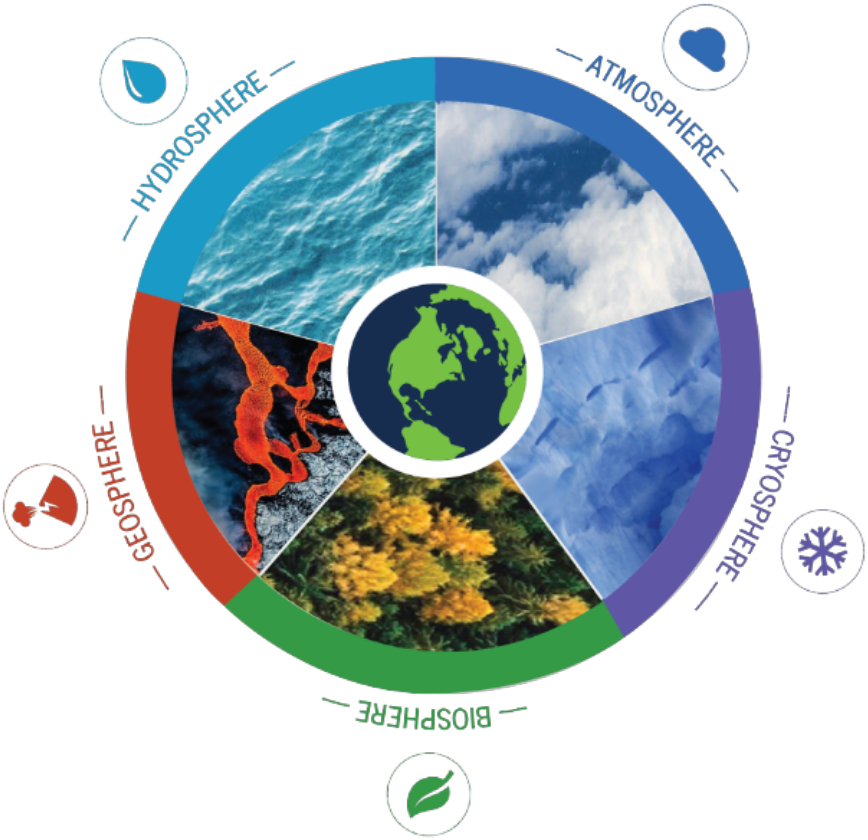
About the Earth as a System: Background Information



What are the five Earth Systems?

The first “blue marble” photo, taken in 1972 by Apollo astronauts at a distance of about 45,000 kilometers (28,000 miles) and one of the most reproduced images in human history, showcased for the first time our home planet. While Earth is also nested within much larger systems, like our Solar System and Milky Way Galaxy, Earth is also made up of five major parts or subsystems: the Atmosphere, Hydrosphere, Biosphere, Cryosphere, and Geosphere. Each major part is connected to the other parts in a complex web of processes.

Atmosphere	The thin layer made up of a mixture of gases and particles suspended in the air that surround the Earth (predominantly N_2, O_2, Ar, CO_2, and H_2O)
Hydrosphere	A sphere that includes the liquid ocean, inland water bodies, and groundwater
Cryosphere	A subset of the Hydrosphere that consists of frozen water
Geosphere	A sphere that includes the solid Earth; the core, mantle, crust, and soil layers
Biosphere	A sphere that Includes all of Earth's organisms, including humans, and matter that has not yet decomposed

What is Earth System Science?

A system is defined as a group of interacting, interrelated, or interdependent parts that work together to form a complex whole. Scientists around the world study each of these smaller systems and how they fit together to form the current picture of our planet as a whole through what is called *Earth System Science*. It is similar to the human body system. All human body systems work together to maintain a body that functions well and in good health. In terms of Earth System Science, each of these systems allows Earth to keep itself in balance. A change in one system will affect other systems.

For more information, visit UCAR's Earth as a System.

The visualization from NASA's Goddard Space Flight Center reveals that the Earth system, like the human body, is made up of diverse parts that interact in complex ways. While scientists learn a great deal from studying each of these parts individually, better observations and improved computer models help scientists to study the interactions between these interrelated parts, leading to new ideas about how the Earth system works—and how it might change in the future.