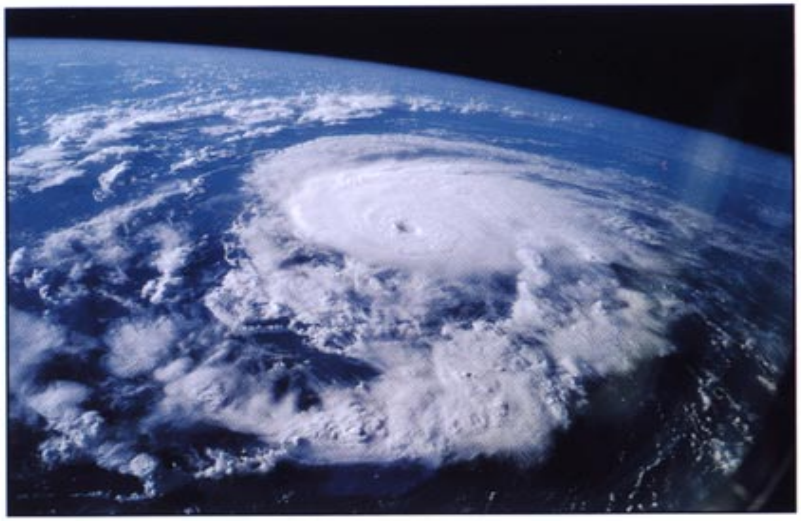
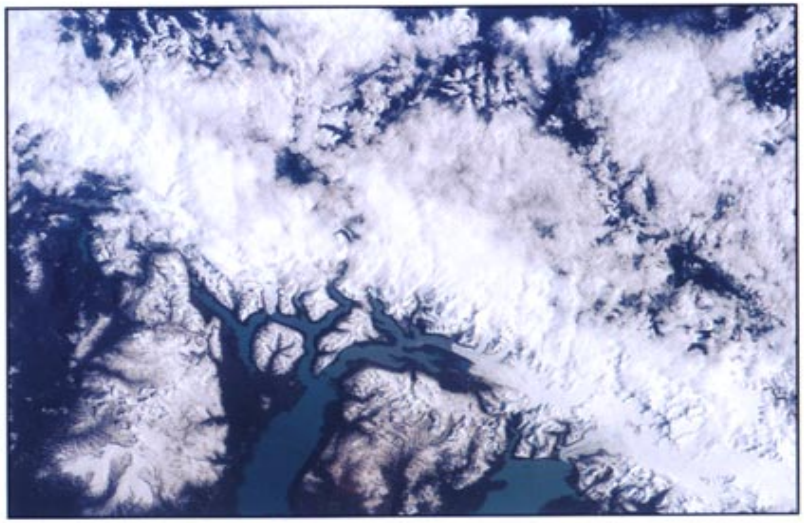
National Aeronautics and Space Administration

Water is a Force of Change

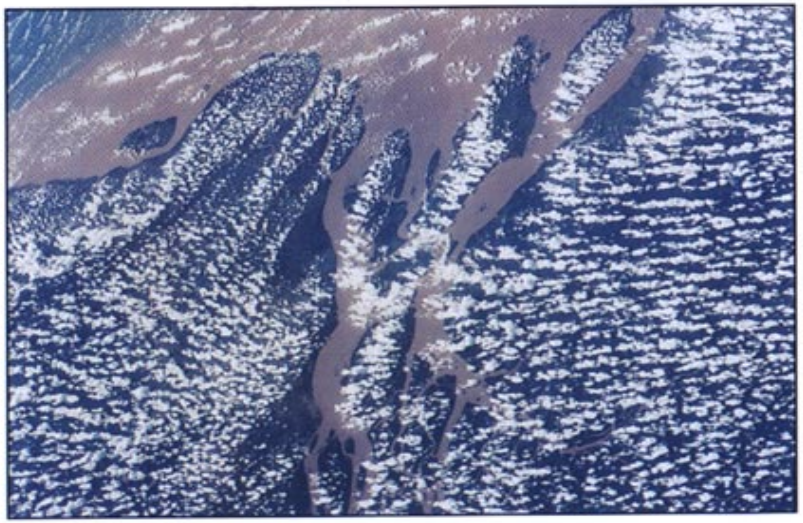


Hurricane Bonnie, Atlantic Ocean

Nile River Delta/Sinai Desert



Glaciers in the Andes Mountains



Mouth of the Amazon River

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As we look at Earth from the vantage point ot outer space, we can't but help notice how important water is to Earth's surface. Three quarters of our planet is covered with liquid and frozen water. The land surface is shaped by water's movements. Living things need water for survival. Water exists as vapor in the atmosphere and is the stuff of clouds. As a renewable resource, water transforms through three states of matter— solid, liquid, and—gas as it cycles from the oceans to the atmosphere, to the land, and back to the oceans. Water and its effects are the dominant features Space Shuttle astronauts see from space. Water is a powerful force of change.

Upper left: Hurricane Bonnie, Atlantic Ocean (STS 47-151-618)
Among the most destructive forces of nature, hurricanes and typhoons are driven by the Sun's heath and act as a great pressure relief valve for Earth's atmosphere. The view of Hurricane Bonnie was captured by the Crew of STS-47 as the storm swirled about 800 kilometers away from Bermuda near 35.4 degrees north latitude and 56.8 degrees west. At this stage in its life, Hurricane Bonnie has well-developed eye where air currents are relatively calm. Window reflections are visible on the right side of the picture.

Upper right: Nile River Delta/Sinai Desert (STS 50-153-020)
The presence and the absence of water are both clearly seen in this STS-50 view of the Sinai Peninsula from the Nile river into Iraq. The Fayum Depression, the well-watered valley of the lower Nile, and the fertile Nile Delta are dark in contrast to the lighter orange and yellow of the surrounding desert. The boundary between the light desert and darker brush land marks the Egypt-lsrael border. Other color variations are caused by differences in bedrock composition and weathering.

Lower left: Glaciers in the Andes Mountains (STS 48-151-074)
Although much slower as an agent of change than is nunning water, mountain glaciers dramatically alter the land as the ice in them slowly flows to lower elevations. Wrenching rock and soil from valley floors and walls, glaciers sculpt the land as they deposit sediment at their lower end. In this STS-48 picture, some of the most dramatic landscape in the Americas is seen. The Andes mountain range near Patagonia, Argentina is partly covered by a permanent ice cap that is part of the Los Glacieres National Park. One glacier is seen cutting off an arm of Lake Argentina (top). Water backs up behind the glacier and eventually gives way in spring in a thunderous burst that can be heard as far as 40 kilometers away.

Lower right: Mouth of the Amazon River (STS 46-80-009)
Though slow-moving at its mouth, the Amazon River has deposited millions of cubic meters of sediment into the Atlantic Ocean. Up river, heavy tropical rains cover the Amazon Basin and wash away thin tropical topsoil to the sea. Converting rain forest to agricultural land aggravates the erosion. The sediment plume from the river extends past the delta, built up of deposited sediment, and bends to the north to hug the coast. The plume is driven northward by the west by northwest Guyana Current. The large island of Marajo is partly visible through the widespread scattered cloud cover. The stnucture to the side of the picture is the remote manipulator system arm of the Shuttle orbiter.

Space Shuttle Earth Photography
A videodisc containing over 91,000 images of Earth taken by Space Shuttle astronauts is available for a modest charge from NASA CORE, Lorain County Joint Vocational School, 15181 Route 58 South, Oberlin, OH 44074. The images on the disk contain all Earth-looking still images taken during the STS-1 through STS-44 missions. A computer data base listing image data is available for both DOS and Macintosh formats.