

# Environmental CLEANUP

Jet Propulsion Laboratory Information Sheet

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## HYDROLOGY

Viewed from space, Earth appears as a dark blue sphere, highlighted by enormous streaks of stark-white clouds. As a result, Earth is often referred to as the "blue planet," or the "water planet." The abundance of water on Earth is one of the features that makes our planet truly unique in the solar system.

### Water PLANET

Water on our planet is essential to life and occurs in a number of different places. The oceans account for about 97.2 percent of all liquid water on Earth; ice caps and glaciers account for about 2.14 percent; and the remainder is a combination of surface water (0.009 percent), underground water (0.615 percent), and atmospheric moisture (0.001 percent).

Since most of Earth's water is in the oceans, it is salty; only a small amount of the world's supply of water is fresh water. In addition, because much of this fresh water is "locked up" in the ice caps, only a very small fraction is actually available to humans and is therefore a valuable environmental resource.

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Earth's water supply is constantly moving from one place to another, through the *hydrological cycle*. The Sun provides most of the energy for moving water around on Earth. Solar energy striking Earth's surface causes evaporation, which puts moisture into the atmosphere. Temperature differences, also caused by the Sun's uneven heating of our globe, are largely responsible for generating wind. As the wind blows, moist air and clouds are moved through the atmosphere. The force of gravity also plays a role by moving surface and underground water back toward the sea.

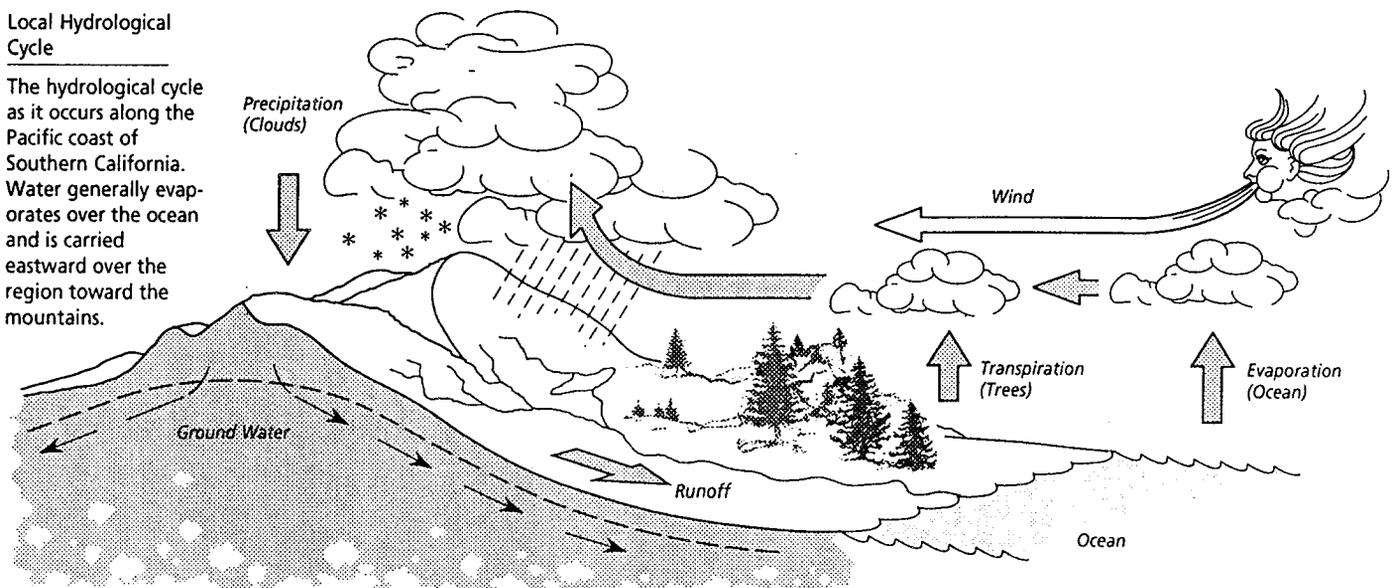
### Water CYCLE

In the Southern California area, for example, water evaporates over the Pacific Ocean and is carried over the region by prevailing westerly winds. Moisture is added to the system by a small amount of evaporation over land and largely by plants through a process called transpiration.

As moist air encounters the San Gabriel mountains, it is forced upward, causing the air to cool and lose moisture. This results in either clouds forming along the mountain front, or, if there is enough moisture, precipitation in the form of rain or snow. The result of this so-called *topographic effect* is that areas on the south side of the mountains, such as La Cañada and Pasadena, receive more rain on average than places north of the mountains, such as Palmdale.

#### Local Hydrological Cycle

The hydrological cycle as it occurs along the Pacific coast of Southern California. Water generally evaporates over the ocean and is carried eastward over the region toward the mountains.



As precipitation falls on our mountains, one of three things occurs to the water: it infiltrates into the ground and becomes part of the ground-water system; it "runs off" and becomes part of the surface-water system; or it is temporarily stored either as ice and snow or in puddles and ponds.

**S**urface-water runoff accounts for only about 1 percent of the total volume of water moved from the land back to the ocean every year by gravity. Because of our particular climate in Southern California, many surface rivers and streams flow only during and shortly after the rainy season. During particularly wet years, however, tremendous amounts of water can flow out of the mountains and back toward the sea.

**W**ater that does not flow as surface water infiltrates downward into the subsurface to form ground water. Ground water, like surface water, eventually completes the hydrological cycle by flowing back toward the sea where it can again

evaporate back into the atmosphere. Since ground water generally flows much more slowly than surface water, ground-water systems often require more careful study than surface river and stream systems. In this simple example of the hydrological cycle,

water moves from the oceans to the atmosphere by evaporation, from the atmosphere to the land through precipitation, and then flows from the land back into the ocean either as surface runoff in rivers and streams or ground water. Examining the process in more detail will reveal many different ways in which water moves about on Earth. A general understanding of the hydrological cycle can lead to a better overall understanding of one of our most precious resources — fresh, clean water.

### Ground WATER

### SUPERFUND INFORMATION

For information on the environmental cleanup effort at JPL, and for ideas on how you can become involved, please contact:

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