Living in a Freshwater World

We think of our home planet as the "water planet". As we gaze out in awe at the other planets in our solar system, we know we're unique in having nearly three-quarters of our planet covered in beautiful water. Life as we know it depends on water for its very survival.

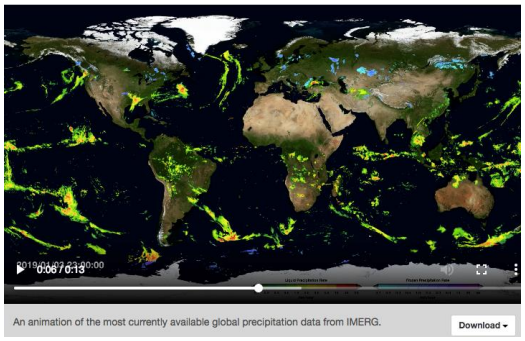
Where did Earth's water come from in the first place? Read "Water's Family Tree: Where Did it Come From?" to find out. Although 73% of our planet's surface is covered with water, less than 2.5% of that is actually freshwater. Learn more and find out the many ways in which freshwater resources are used on a daily basis by people around the world by watching "Show Me the Water". Read "Precious Freshness" to discover more about water conservation and distribution.

Only a very tiny fraction of Earth's water is easily accessible to us. While 2.5% is freshwater, most of it is locked up in glaciers and ice caps or stored deep underground in aquifers. However, one of the impacts of climate change that has been documented by scientists is that Earth's ice is melting at an accelerating rate. Earth-orbiting satellites allow us to see the big picture and to collect may different types of data and information about our planet and its climate on a global scale. Find out how one of these satellites, GRACE (Gravity Recovery and Climate Experiment), tracked freshwater movements from 2002 through 2016 to identify the regional trends and determine the causes of these trends.

Most of the freshwater that we use to meet our needs comes to us from precipitation. NASA satellites have been monitoring and measuring precipitation around the world since 1997. In 1997, NASA's Tropical Rainfall Measuring Mission (TRMM) was launched and it spent the next 17 years measuring global precipitation until it was decommissioned in 2015. During these years, data from this satellite helped improve our understanding of the distribution and variability of precipitation in the tropics, increased our understanding of weather and climate, and helped us determine when a tropical storm was likely to become a hurricane. Watch "TRMM at 15: The Reign of Rain", to learn more about this mission and the scientific discoveries that were made using TRMM and other data.

In 2014, the successor to TRMM was launched. The Global Precipitation Measurement (GPM) mission is an international network of satellites that provide the next-generation global observations of rain and snow. Read "Examining Precipitation on a Globe of Blue" to find out why we measure precipitation from

space instead of relying solely on ground-based measurements. You can watch an animation that shows the spatial coverage of all the worldwide rain gauges here. Click here to take a look at global precipitation data from last week.



The Global Precipitation Measurement (GPM) mission produces NASA's most comprehensive global rain and snowfall product to date, called the Integrated Multi-satellite Retrievals for GPM (IMERG). This visualization shows the most currently available precipitation data from IMERG, depicting how rain and snowstorms move around the planet. As scientists work to understand all the elements of Earth's climate and weather systems, and how they could change in the future, GPM provides a major step forward in providing comprehensive and consistent measurements of precipitation for scientists and a wide variety of user communities.

Watch "Anatomy of a Raindrop" to learn how scientists discovered that drops of rain are shaped more like hamburger buns than like teardrops and how that information is useful to our understanding of precipitation and how we can forecast the weather. See this overview of the engineering behind the GPM mission, which went from components and assembly drawings to a fully functioning satellite larger than a corporate airplane!

Data that NASA's Earth-orbiting satellites collect is also used to help us predict and respond to extreme events that are caused by either too much or too little precipitation. Watch "GPM: Too Much, Too Little" to see some of the ways in which GPM's global precipitation data is being used to better understand and model where and when severe floods, landslides, and drought may occur. Here is a new video that gives you a multi-dimensional view of a hurricane. See directions here to make a LEGO model of GPM's precipitation data that was collected during Hurricane Irma. Interested in making a few 3D models of GPM storm data? Click here for directions and 3D printer files.

The next time you take a drink of water or brush your teeth, think about how fascinating it is that that water could have been a raindrop a week ago. Equally amazing is the fact that NASA technology enables us to measure this precipitation globally. Watch "The Data Downpour" to learn more about remote sensing. Without freshwater, we would be mighty thirsty and life as we know it wouldn't even exist.

For additional resources, see the topics below:

- Earth's Water Cycle
- Earth's Freshwater Resources
- Extreme Events
- Understanding Earth: What's Up with Precipitation?