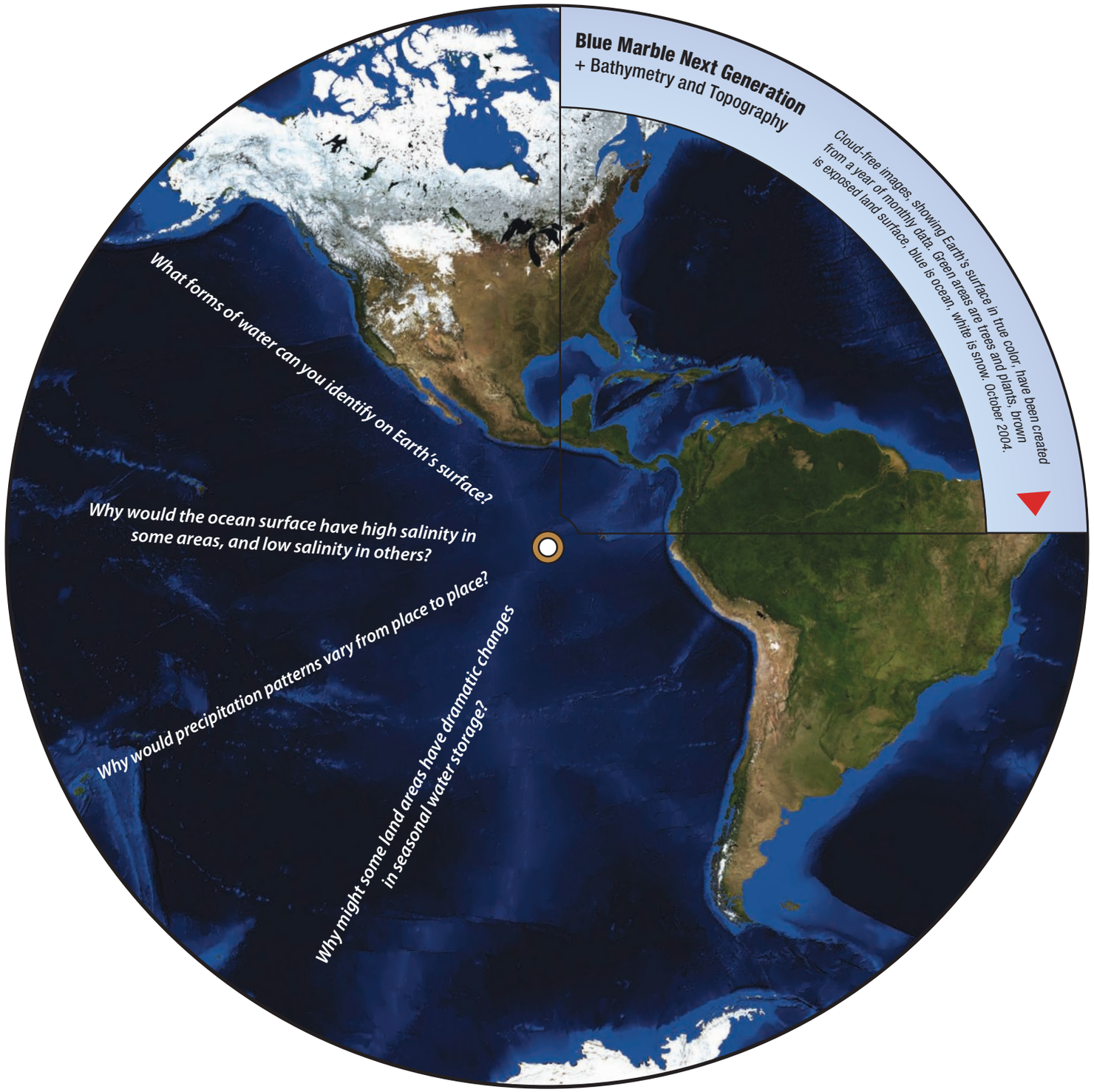
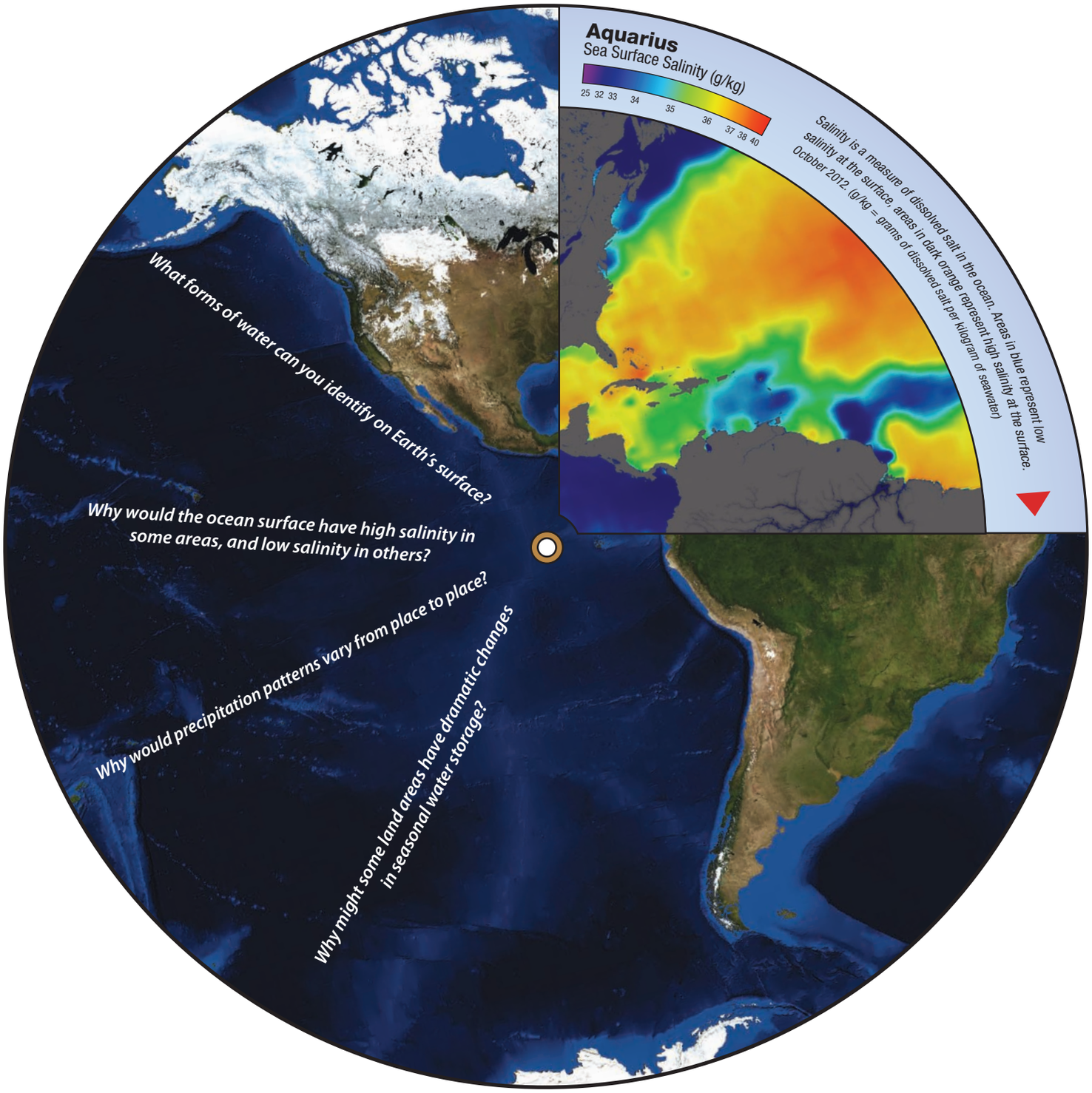

Blue Marble Next Generation
+ Bathymetry and Topography
Cloud-free images, showing Earth's surface in true color, have been created from a year of monthly data. Green areas are trees and plants, brown is exposed land surface, blue is ocean, white is snow. October 2004.
What forms of water can you identify on Earth's surface?
Why would the ocean surface have high salinity in some areas, and low salinity in others?
Why would precipitation patterns vary from place to place?
Why might some land areas have dramatic changes in seasonal water storage?


Aquarius
Sea Surface Salinity (g/kg)
25 32 33 34 35 36 37 38 40
Salinity is a measure of dissolved salt in the ocean. Areas in blue represent low salinity at the surface, areas in dark orange represent high salinity at the surface. October 2012. (g/kg = grams of dissolved salt per kilogram of seawater)
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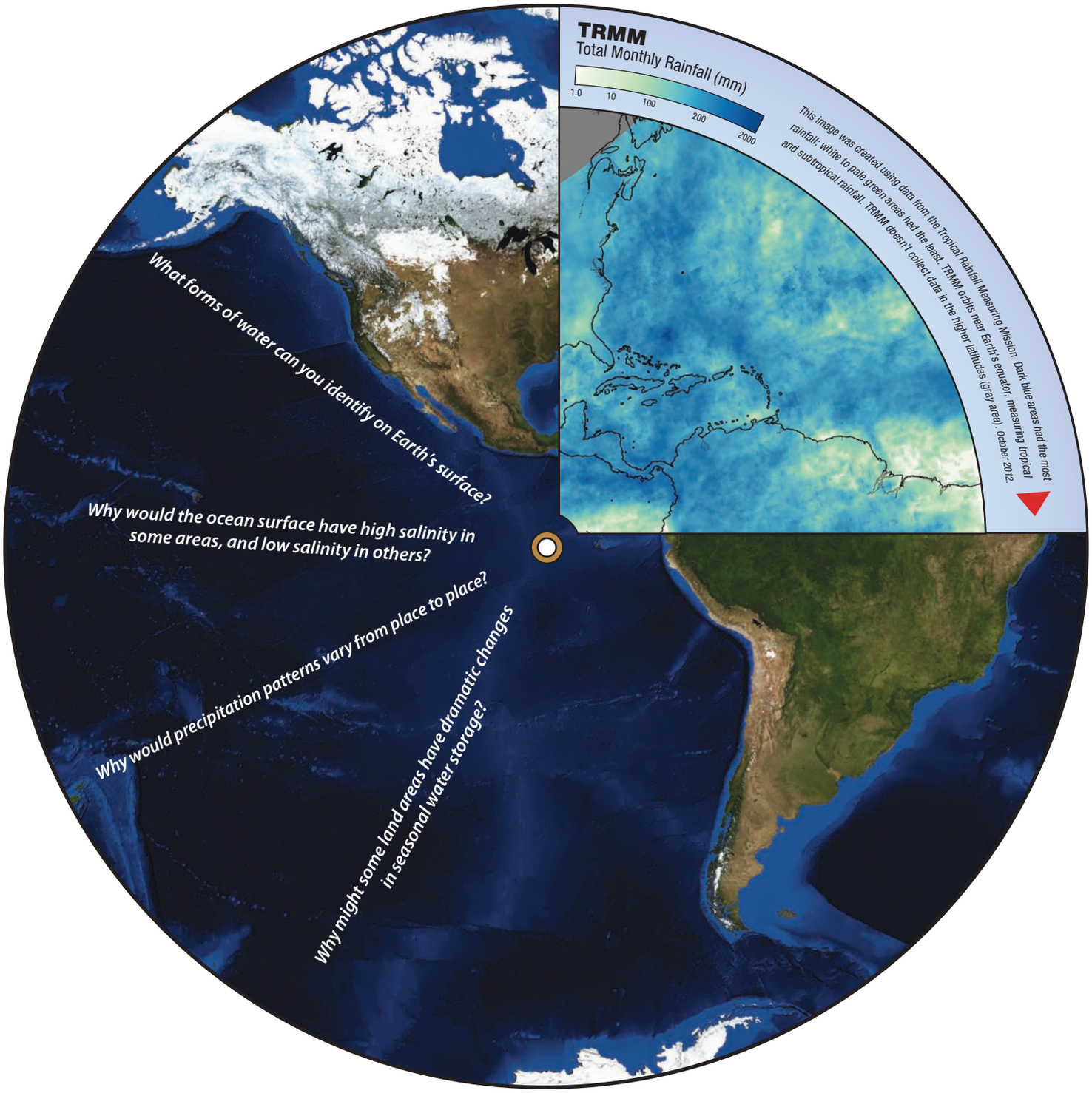
TRMM
Total Monthly Rainfall (mm)
1.0
10
100
200
2000
This image was created using data from the Tropical Rainfall Measuring Mission. Dark blue areas had the most rainfall; white to pale green areas had the least. TRMM orbits near Earth's equator, measuring tropical and subtropical rainfall. TRMM doesn't collect data in the higher latitudes (gray area). October 2012.
What forms of water can you identify on Earth's surface?
Why would the ocean surface have high salinity in some areas, and low salinity in others?
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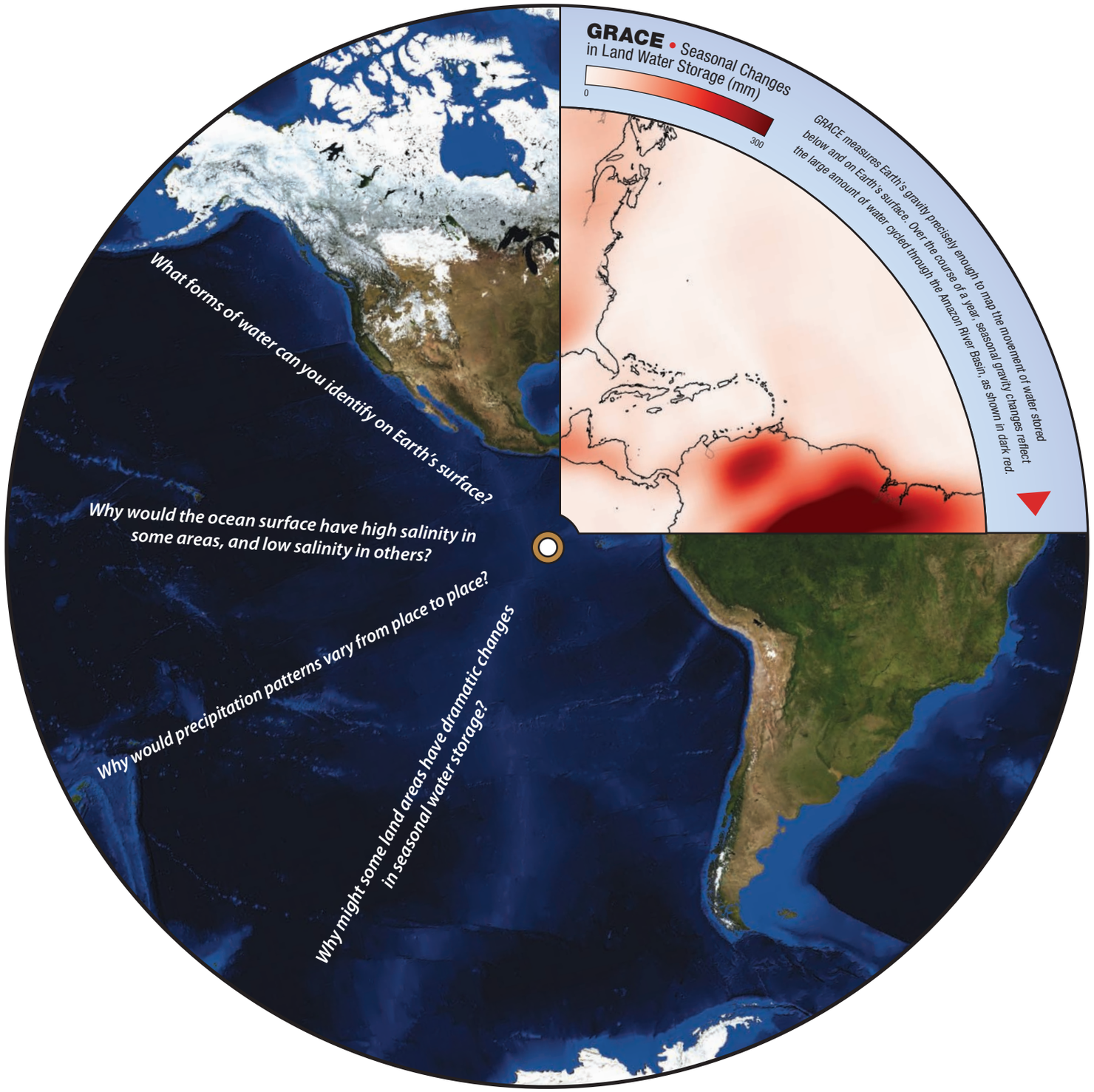
GRACE • Seasonal Changes in Land Water Storage (mm)
0
300
GRACE measures Earth's gravity precisely enough to map the movement of water stored below and on Earth's surface. Over the course of a year, seasonal gravity changes reflect the large amount of water cycled through the Amazon River Basin, as shown in dark red.
What forms of water can you identify on Earth's surface?
Why would the ocean surface have high salinity in some areas, and low salinity in others?
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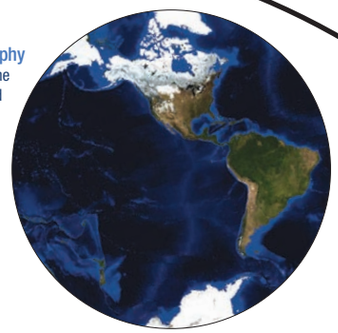
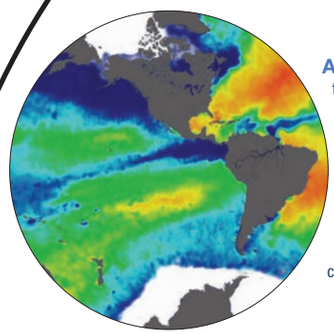
GRACE • Seasonal Changes
in Land Water Storage (mm)
300
0
GRACE measures Earth's gravity precisely enough to map the movement of water stored below and on Earth's surface. Over the course of a year, seasonal gravity changes reflect the large amount of water cycled through the Amazon River Basin, as shown in dark red.

Blue Marble Next Generation + Topography and Bathymetry • This image shows how the Earth's surface would look from space if our world had no clouds and no atmosphere. It's part of a set of images taken from NASA's Terra satellite, with one "blue marble" composite image created for each month in 2004. Clouds were removed from the satellite image to show the maximum land surface. Bathymetry (ocean depth) and topography data were added to the satellite image, and are not observations from space. *Image Credit: NASA's Earth Observatory.*



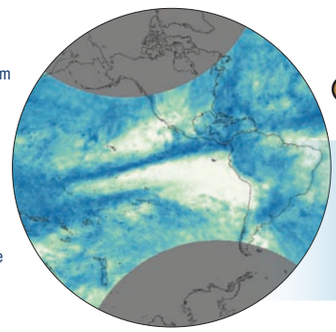


Aquarius/SAC-D • This joint US-Argentina mission measures the amount of salinity (dissolved salt) in the ocean surface. Salinity is key to studying the water cycle and ocean circulation, both of which are related to climate. Over decades, the amount of salt in ocean basins has been fairly stable. The water cycle operates on much faster time scales, however, causing changes in salinity patterns. Salinity decreases when freshwater enters the ocean from rivers, melting ice, rain, and snow. Processes that cause freshwater to exit the ocean—such as evaporation and formation of sea ice—raise salinity. Differences in dissolved salt content also play a major role in moving seawater, and the heat it carries, around the globe. *Image Credit: NASA/Goddard Space Flight Center.*

Explore Water in Our Earth System

Water moves continuously between our atmosphere, ocean and land. Flip to the other side and turn the wheel to explore some of the ways NASA scientists study water in our global Earth system. What connections can you find? See below for suggested answers to the questions on the front. Did you find others?

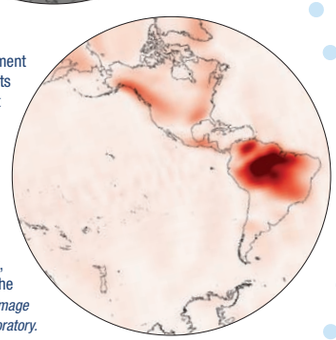
TRMM • This image was created using data from the US-Japanese Tropical Rainfall Monitoring Mission (TRMM). It shows how much rain fell in the world's tropical regions during October 2012. Dark blue areas show where a lot of rain has fallen. Areas that are white to pale green had the lowest amounts of rain. In 2014, NASA and the Japanese Space Agency launched the Global Precipitation Measurement (GPM) satellite mission. GPM will provide the next-generation observations of rain and snow worldwide every three hours. *Image Credit: NASA/Goddard Space Flight Center.*



DISCOVER Earth's Connected Systems through NASA images, data, activities and resources: http://bit.ly/NASAEarthSystem

KNOW YOUR EARTH: Test your knowledge of the water cycle! http://bit.ly/WaterCycleQuiz

GRACE • The Gravity Recovery and Climate Experiment (GRACE) is a joint U.S.-German mission. GRACE consists of two spacecraft flying in formation around the planet to measure tiny differences in Earth's gravity field over time. From this data, scientists can map seasonal gravity changes associated with changes in the amount of water stored on and below the ground. The largest variations over the course of a year occur in northern South America. Each year, between September and April, seasonal rains deliver large amounts of water to this region, followed by a drier period during which the amount of water decreases again. *Image Credit: NASA/Jet Propulsion Laboratory.*



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ANSWER KEY

Blue Marble • Earth truly is the water planet, with over 70% of Earth's surface covered by blue ocean. You can also see white bands of snow near the poles. **Aquarius Salinity** • A band of low salinity (blue) is seen along the equator. In the Pacific Ocean, low salinity is tied to tropical rainfall. The plume off the east coast of South America shows fresh water from the Amazon River flowing into the Atlantic. To the northeast, the large area of high salinity (orange) shows where evaporation leaves behind large amounts of dissolved salt. **TRMM Precipitation** • The tropics generally have more precipitation than other regions, shown in blue. This is because equatorial latitudes receive much more direct solar energy than higher latitudes, producing more evaporation. The warm, moist air rises, condenses into clouds, and falls back to Earth as rain. **GRACE Seasonal Land Water Storage** • This image shows how water stored below and on Earth's surface changes over time. The dark red area in South America represents the large amount of water cycled through the Amazon River Basin, for example, between rainy and dry seasons. During certain times, much of this fresh water flows into the Atlantic Ocean and lowers salinity.