National Aeronautics and Space Administration

BIOME BUDDIES

ICESat-2

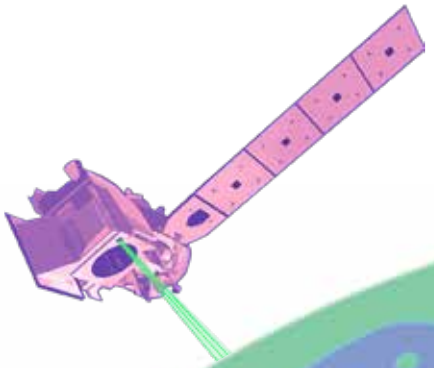
Ice, Cloud, and land Elevation Satellite 2

www.nasa.gov

EXPLORE EARTH SCIENCE WITH

BIOME BUDDIES

The Ice, Cloud and land Elevation Satellite 2, or ICESat-2, takes height measurements from space of Earth's surfaces such as ice, water, land, and even trees. Learn more about the ecosystems ICESat-2 measures!



SCIENTIST SPOTLIGHT

Dr. Rachel Louise Tilling

Associate Research Scientist

Meet Rachel, a polar scientist at NASA! Rachel studies changes in sea ice, which forms when salty ocean water freezes in the Arctic and Antarctic. From her desk at NASA, she can analyze data from satellites, but sometimes she travels to the polar regions to take measurements in person.

SCAN QR CODE TO LEARN MORE ABOUT RACHEL'S STORY AND HER TIME WITH PENGUINS!

EMPEROR PENGUIN

Emperor penguins are located in Antarctica, the continent with the world's coldest climate. A layer of thick blubber helps them insulate from the cold water when diving for food. On land, they are known for their waddle, but they can travel on their belly by sliding for miles at a time, called tobagganing.

SCAN QR CODE TO LISTEN TO SOME OF OUR PENGUIN FRIENDS!

DID YOU KNOW?

The emperor penguin is a flightless bird and the world's largest penguin species.

LIFE SPAN

The average life span in the wild for an emperor penguin is 15 to 20 years.

SATELLITE CONNECTION

ICESat-2 scientists have traveled to Antarctica to study the ice up close. These carefully collected measurements from the ground help improve satellite measurements, which track changes to the icy habitat of emperor penguins.

DID YOU KNOW NASA SATELLITES ARE USED TO FIND PENGUIN COLONIES FROM SPACE? SCAN QR CODE FOR THE EO KIDS MAGAZINE 'PEEKING AT PENGUINS, POOP FROM SPACE'

AQUATIC

BOTTLENOSE DOLPHIN

Bottlenose dolphins, one of the most social mammals, are found throughout the world in both offshore and coastal waters. Named for their short, thick snout (or rostrum), they are not endangered, but are protected under the Marine Mammal Protection Act (MMPA). Dolphins use echolocation (sound waves that bounce off an object and return) to hunt for fish.

SCAN QR CODE TO LEARN HOW TO MAKE YOUR OWN OCEAN IN A TUBE AT HOME!

DID YOU KNOW?

One of the main threats to bottlenose dolphins is getting caught in commercial fishing gear.

BATHYMETRY

ICESat-2 can measure the ocean floor beneath clear, shallow coastal waters.

SATELLITE CONNECTION

Dolphins sense their surroundings by detecting how sound reflects off objects, which is called echolocation. ICESat-2's instrument, ATLAS, uses a similar concept – but with laser light instead of sound – to measure Earth's surface.

BLACK-FOOTED FERRET

In 1981 the black-footed ferret was rediscovered in Wyoming after it was thought to be extinct. The color and markings of black-footed ferrets help them blend in and adapt to their environment. Their large paws and claws make it easier for them to dig, and their acute sense of smell helps them hunt underground at night.

SCAN QR CODE TO LEARN MORE ABOUT THE GRASSLAND BIOME!

DID YOU KNOW?

Grasslands, like the Great Plains of North America, are found on every continent except Antarctica!

VEGETATION

Grasses (prairie clover, salvia, oats, wheat, barley, coneflowers)

SATELLITE CONNECTION

ICESat-2 circles Earth every 90 minutes. As the satellite orbits, it measures different landcover across the world, including grasslands. These are open flat areas where trees are usually not found due to the lack of rainfall.

TOUCAN

There are two types of rainforests, tropical and temperate. Tropical rainforests are found closer to the equator where it is warm. Temperate rainforests are found near the cooler coastal areas further north or south of the equator. Toucans can be found throughout tropical rainforests of Central and South America.

SCAN QR CODE TO LEARN MORE ABOUT THE RAINFOREST BIOME!

DID YOU KNOW?

Toucans are omnivorous, which means they eat both plant and animal matter.

PRECIPITATION

Rainforests receive 80-400 inches (2,000 to 10,000 millimeters) of rain per year!

SATELLITE CONNECTION

ICESat-2 gathers height measurements of the world's trees and forests, which store carbon. Other Earth-observing satellites, such as Landsat, Terra, and Aqua, allow researchers to map the location and coverage of trees and forests.

SCAN THIS QR CODE TO LEARN HOW TO TAKE TREE HEIGHT OBSERVATIONS WITH THE GLOBE OBSERVER PROGRAM.

DESERT

ARMADILLO LIZARD

This spiny-tailed lizard is covered in hard scales that help defend it from predators. When threatened, the armadillo lizard will curl up in a ball and hold its tail in its mouth to protect the softer underbelly. Found in South Africa, this lizard likes shrublands and rocky areas where it can squeeze into tight spaces around rocks.

SCAN QR CODE TO LEARN MORE ABOUT THE DESERT BIOME!

DID YOU KNOW?

Desert biomes are the driest of all the biomes — it receives very little rainfall.

VEGETATION

Plants in the desert have adaptations to compensate for the lack of water.

SATELLITE CONNECTION

Prior to launch, ICESat-2 underwent rigorous testing at NASA's Goddard Space Flight Center.

Other NASA missions, like Artemis, will conduct test missions in the desert to prepare for missions to Mars.

OSPREY

Ospreys live close by the water feeding almost exclusively on fish. They make their nests in poles or dead trees. Once on the verge of extinction, their numbers have been increasing due to the elimination of DDT pesticides. When ospreys catch a fish, they grasp it with their talons then turn the fish to orient its head facing forward to be more aerodynamic flying through the air.

SCAN QR CODE TO LEARN HOW CLOUDS ARE FORMED!

DID YOU KNOW?

In North America, ospreys migrate south in the Fall, making a long journey of over 3,000 miles (5,000 km) or more.

TEMPERATURE

Clouds in the atmosphere help to moderate Earth's temperature.

SATELLITE CONNECTION

Clouds can get in the way of ICESat-2's view of Earth – but that's a good thing for some scientists. They use ICESat-2 data to study clouds and other particles in the atmosphere, above even where ospreys fly, to help understand air quality as well as climate and weather patterns.

PHO THE PHOTON

Meet Pho! He's one in a trillion. He travels at 186,000 miles per second, avoiding obstacles as he zooms toward Earth on an essential mission to measure the height of Earth's ice-covered regions to track melting and other changes. Pho also helps measure the height of other features of our planet, including trees and shrubs, lakes and oceans.

SCAN THE QR CODE TO WATCH PHOTON JUMP AND LEARN MORE ABOUT PHO!

DID YOU KNOW?

Pho was created as our mission mascot by students at Savannah College of Art and Design (SCAD).

REAL LASERS

ATLAS, ICESat-2's instrument, uses one laser that is split into 6 beams.

SATELLITE CONNECTION

ICESat-2 uses green lasers, which are made up of bits of light called photons. Trillions of photons leave ATLAS with each pulse; only about a dozen return to the satellite's telescope.

WHERE'S ICESAT-2? SCAN THE QR CODE FOR A LIVE ANIMATION OF THE SATELLITE IN ORBIT.

ARCTIC FOX

The furry white Arctic fox lives on both land and sea ice within the Arctic Circle. The thick fur coat of an Arctic fox acts like a blanket keeping the fox's body temperature warm in the cold Arctic tundra climate. Temperatures are so cold that there is a layer of permanently frozen ground below the surface, called permafrost.

SCAN QR CODE TO LEARN MORE ABOUT THE TUNDRA BIOME!

DID YOU KNOW?

Tundra comes from the Finnish (Finland) word tunturia, meaning "treeless plain."

TEMPERATURE

Temperatures usually range between -40°F (-40°C) and 64°F (18°C).

SATELLITE CONNECTION

ICESat-2 measures changes in land ice and sea ice. Melting land ice raises sea level. Sea ice, created when seawater freezes, is shrinking globally, which could interfere with ocean circulation patterns that buffer climate extremes.

ICESat-2

icesat-2.gsfc.nasa.gov

BIOME BUDDIES

READY TO EXPLORE THE BIOME IN YOUR BACKYARD?
SCAN THE QR CODE TO GET THE GLOBE OBSERVER APP.

Biome Buddies was designed through a collaborative partnership between the ICESat-2 program and students from the Savannah College of Art and Design's SCADpro initiative.

www.nasa.gov

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