5.2.2 NASA AND USGS

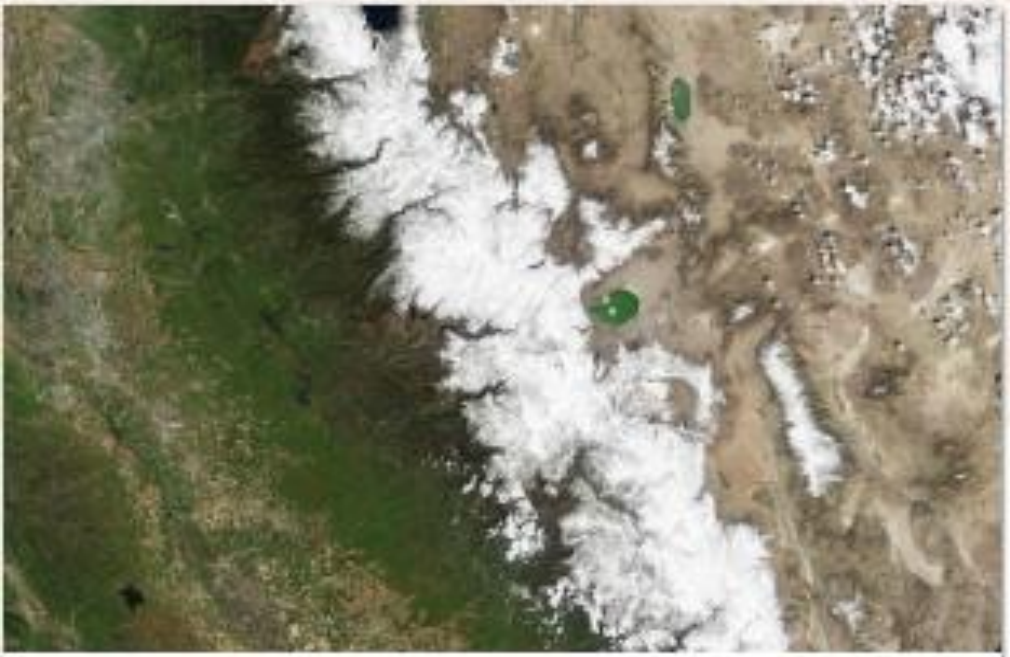
CHANGE IMAGERY RESOURCES

[NASA: Getting the Big Picture]

NASA | Getting the Big Picture

World Of Change

https://earthobservatory.nasa.gov/world-of-change

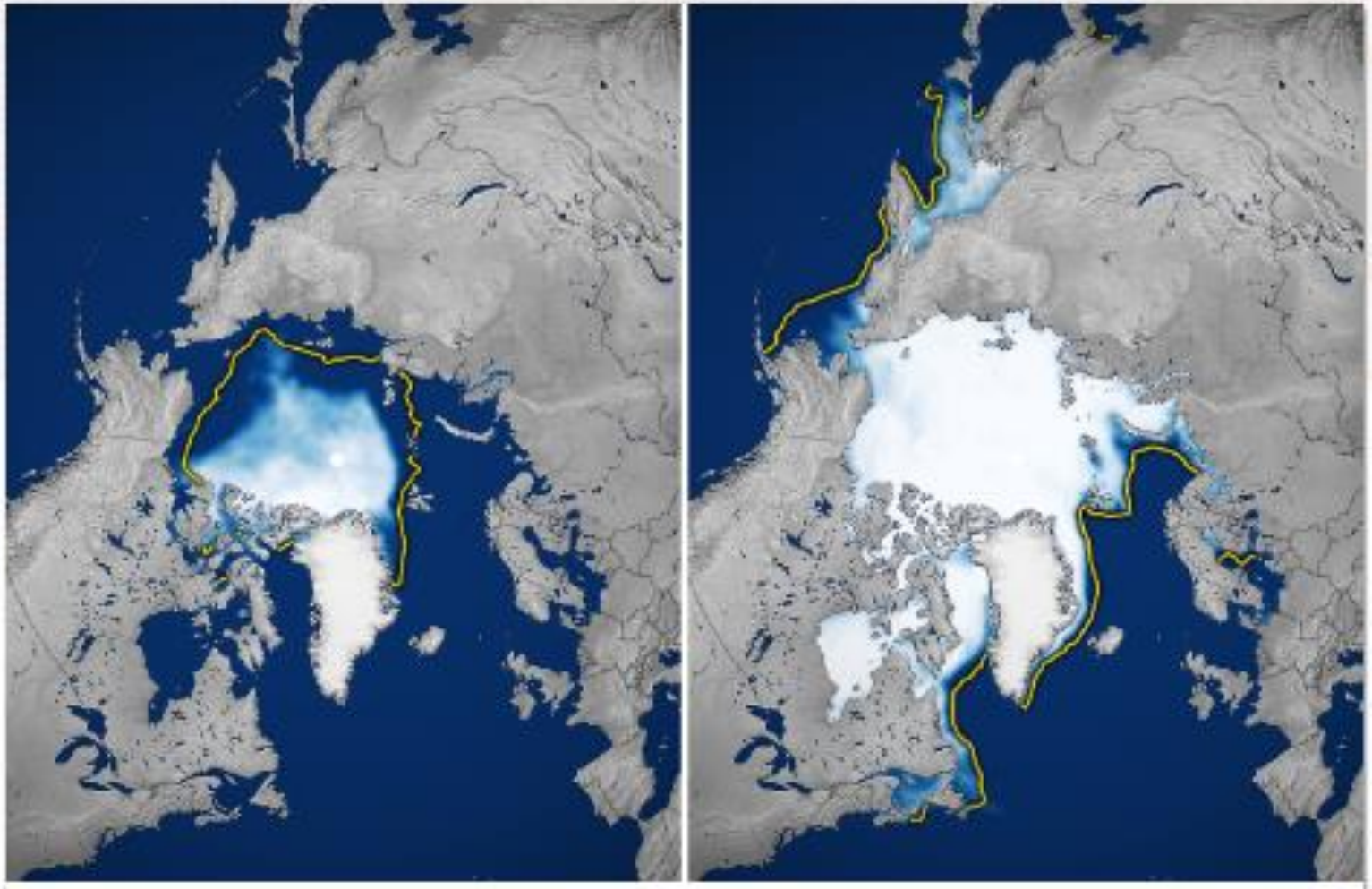


Updated Jun 10, 2020

World of Change: Snowpack in the Sierra Nevada

Wet and dry years cause the snow cover to fluctuate, but the overall trend has been downward for nearly a decade.

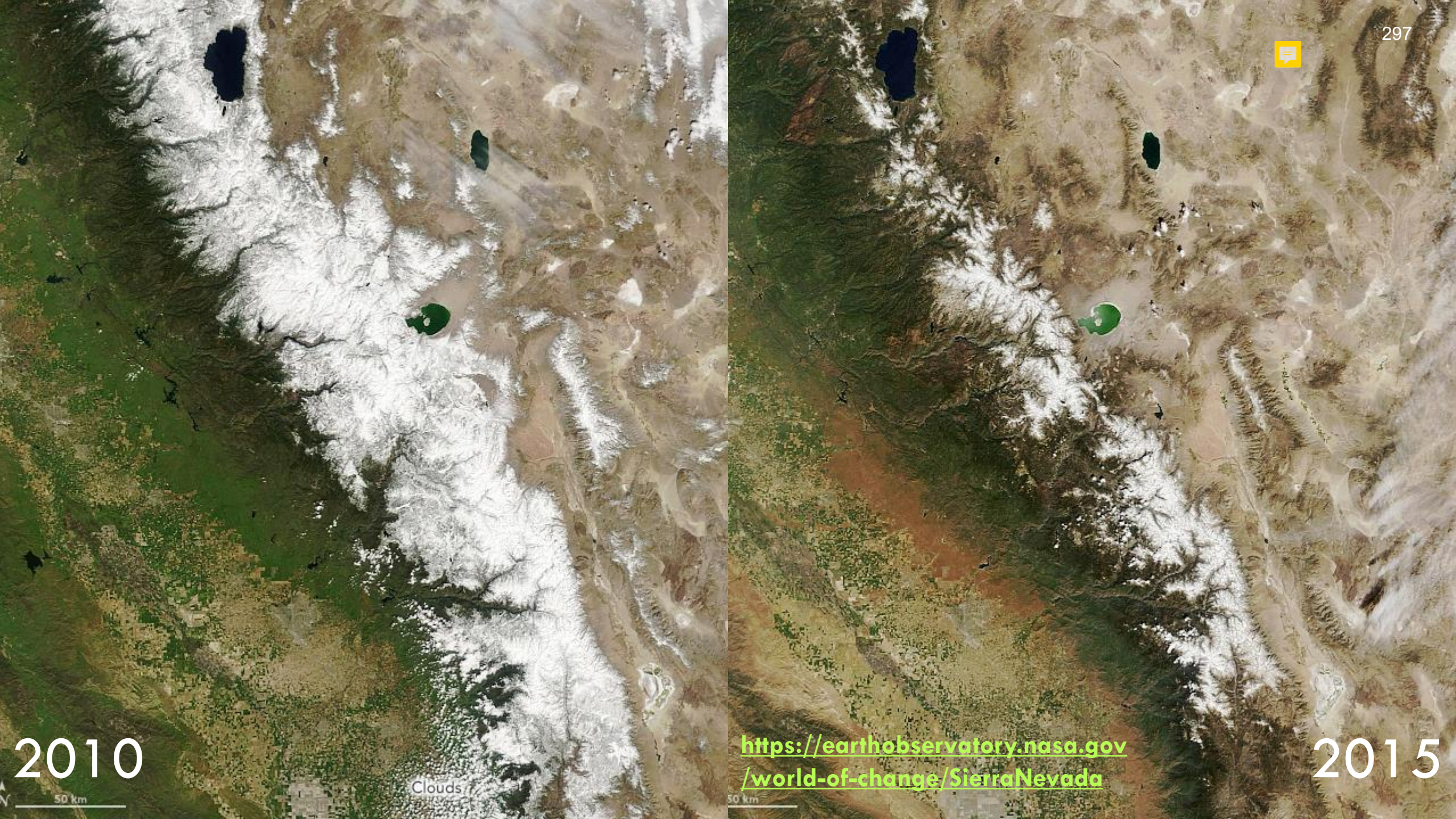
Water | Snow and Ice | World of Change



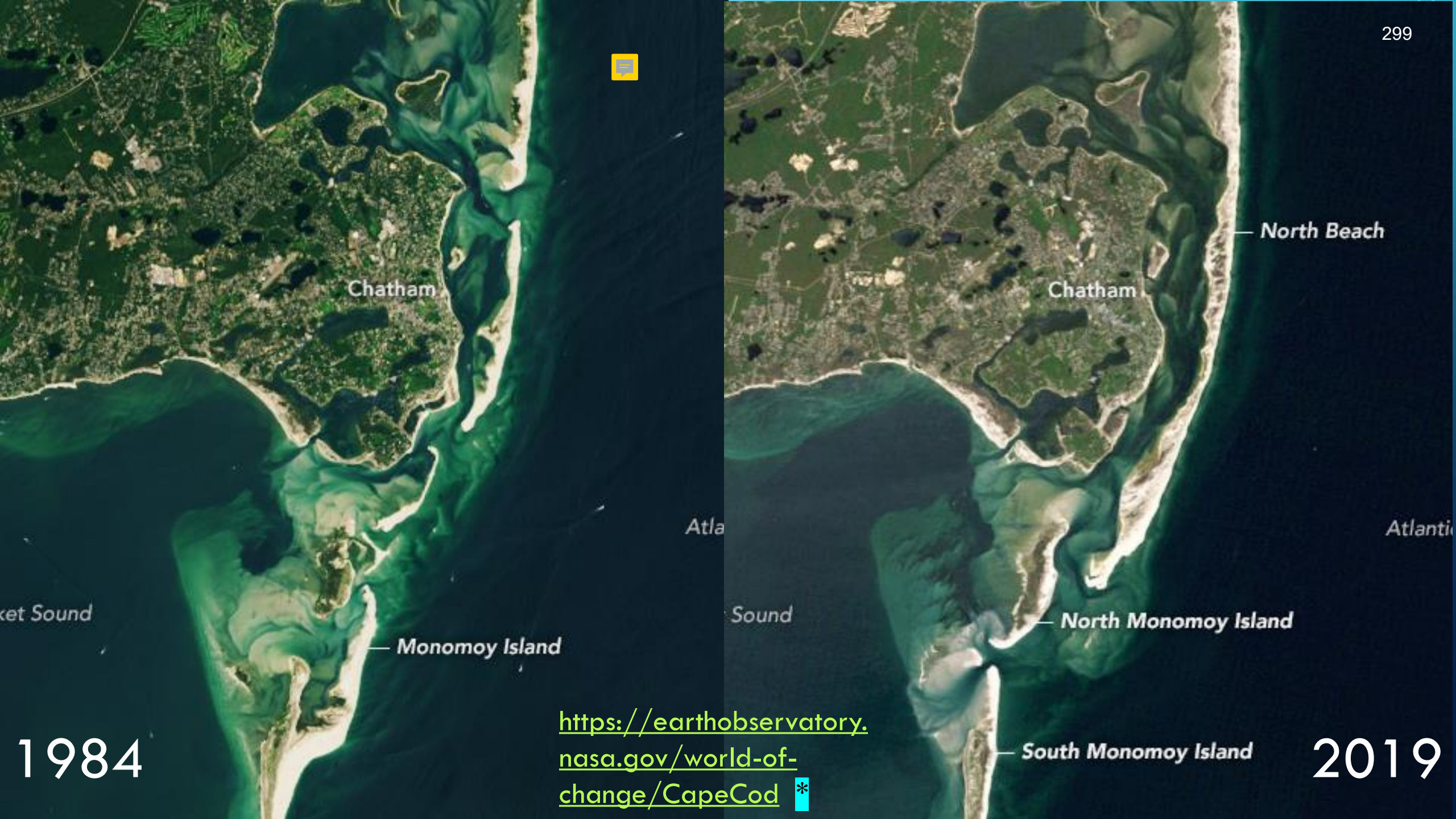
Updated Jun 9, 2020

World of Change: Arctic Sea Ice

Several record-setting summer lows, combined with poor wintertime recoveries, have


2010
Clouds
50 km
https://earthobservatory.nasa.gov
/world-of-change/SierraNevada
50 km
2015

https://earthobservatory.nasa.gov/world-of-change/AralSea



https://earthobservatory.nasa.gov/world-of-change/CapeCod *

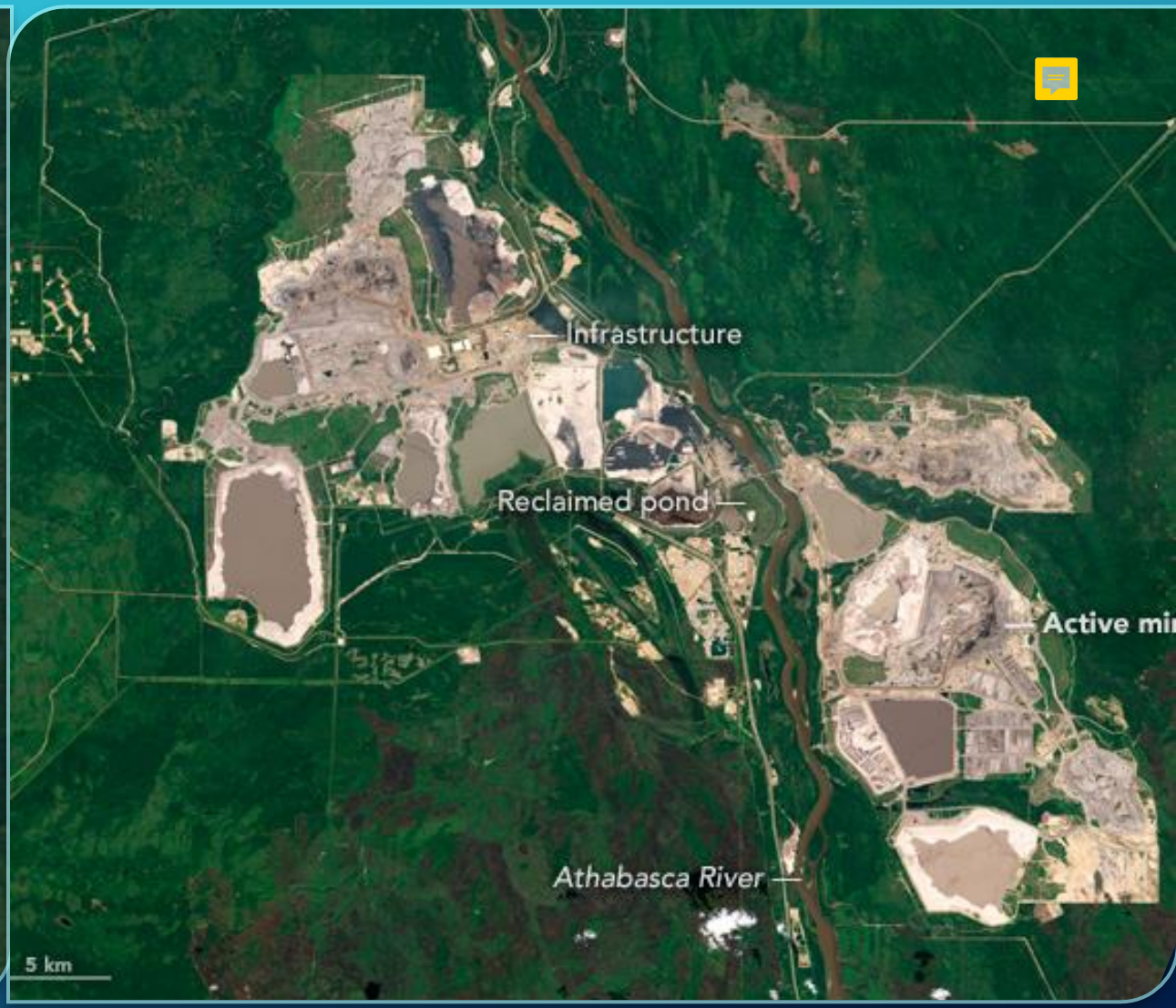
1984

2017

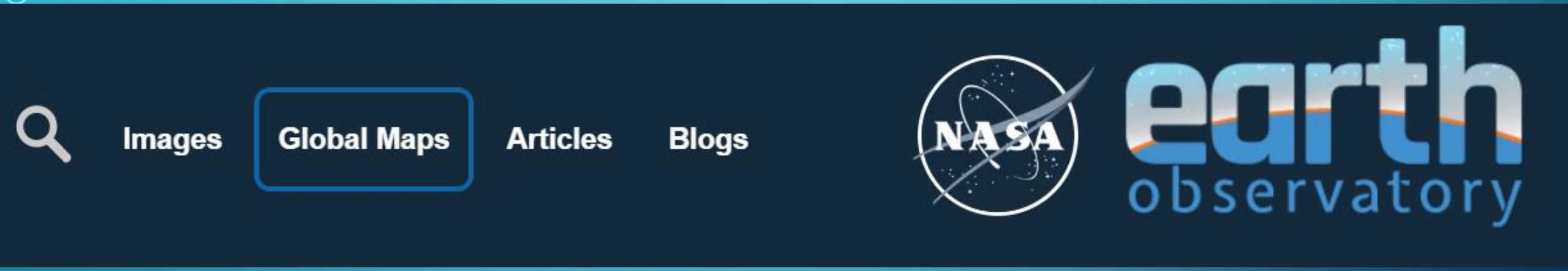
https://earthobservatory.nasa.gov/world-of-change/WaxLake*

1984

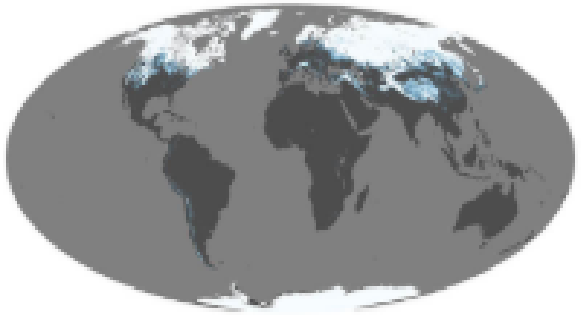
2016



https://earthobservatory.nasa.gov/world-of-change/Athabasca/show-all



https://earthobservatory.nasa.gov/global-maps



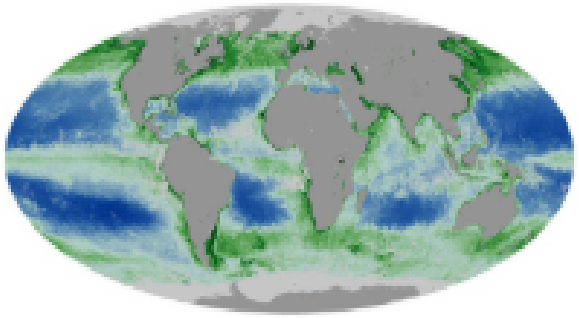
Global Maps

Mar 2000 – May 2020

Snow Cover

Snow and ice influence climate by reflecting sunlight back into space. When it melts, snow is a source of water for drinking and vegetation; too much snowmelt can lead to floods. These maps show average snow cover by month.

Snow and Ice



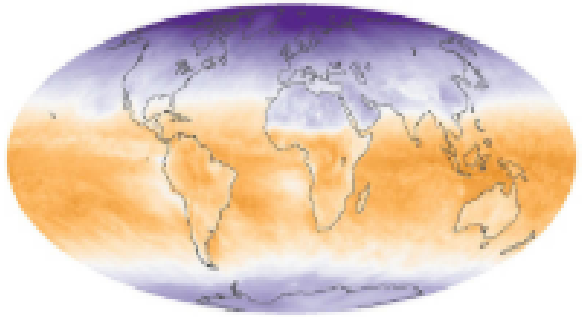
Global Maps

Jul 2002 – May 2020

Chlorophyll

Chlorophyll is used by algae and other phytoplankton--the grass of the sea--to convert sunlight and carbon dioxide into sugars. These maps show chlorophyll concentrations in the ocean, revealing where phytoplankton are thriving.

Life Water



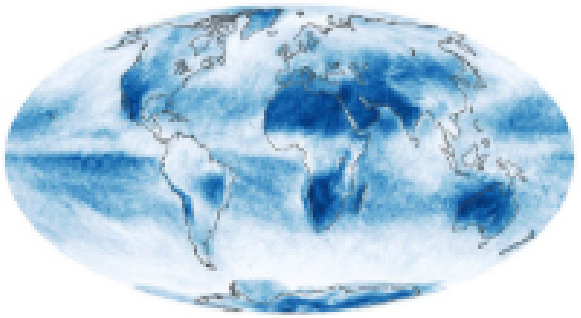
Global Maps

Jul 2006 – May 2020

Net Radiation

Net radiation is the balance between incoming and outgoing energy at the top of the atmosphere. It is the total energy available to influence climate after light and heat are reflected, absorbed, or emitted by clouds and land.

Heat



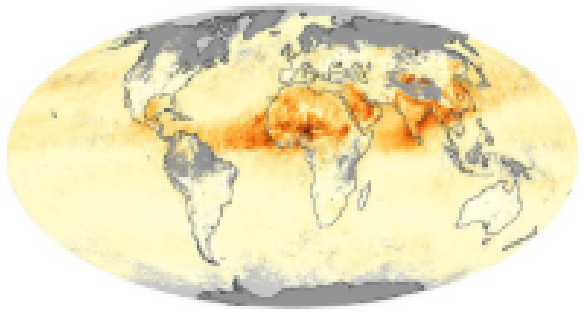
Global Maps

Feb 2000 – May 2020

Cloud Fraction

In addition to making rain and snow, clouds can have a warming or cooling influence depending on their altitude, type, and when they form. These maps show what fraction of an area was cloudy each month.

Atmosphere



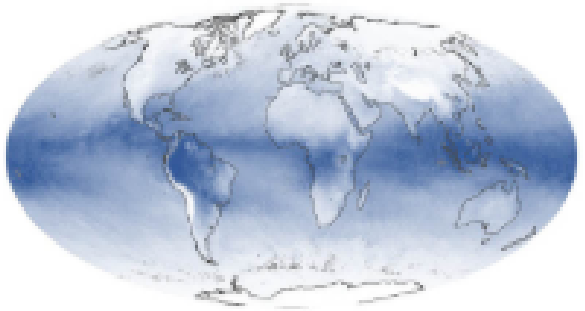
Global Maps

Mar 2000 – May 2020

Aerosol Optical Depth

Airborne aerosols can cause or prevent cloud formation and harm human health. These maps depict aerosol concentrations in the air based on how the tiny particles reflect or absorb visible and infrared light.

Atmosphere



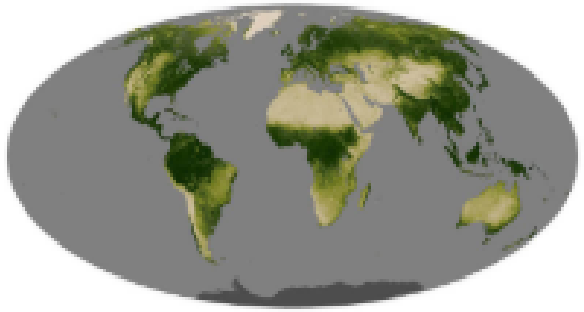
Global Maps

Jul 2002 – May 2020

Water Vapor

These maps show the average amount of water vapor in a column of atmosphere by month. Water vapor is the key precursor for rain and snow and one of the most important greenhouse gases in the atmosphere.

Atmosphere



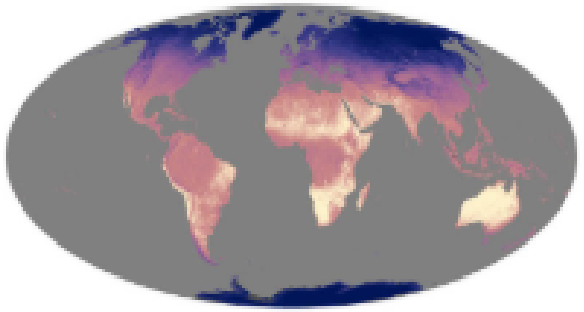
Global Maps

Mar 2000 – May 2020

Vegetation

Greenness is an important indicator of health for forests, grasslands, and farms. The greenness of a landscape, or vegetation index, depends on the number and type of plants, how leafy they are, and how healthy they are.

Land Life



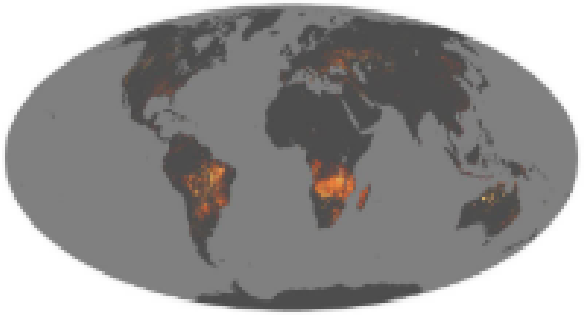
Global Maps

Feb 2000 – May 2020

Land Surface Temperature

Land surface temperatures rise and fall with the heat of the Sun, and they represent how hot or cold the surface would feel to touch. These maps show daytime land temperatures as measured from space.

Heat Land



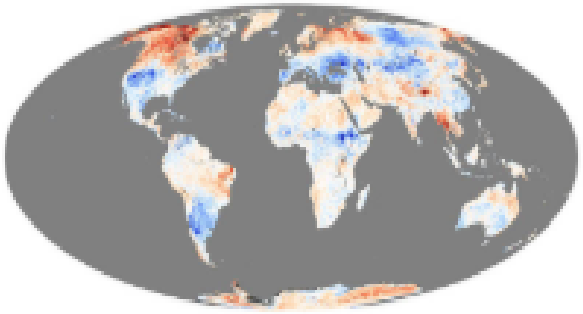
Global Maps

Mar 2000 – May 2020

Fire

Whether started by humans (farming, logging, or accidents) or by nature (lightning), fires are always burning somewhere on Earth. These maps show the locations of fires burning around the world each month.

Land



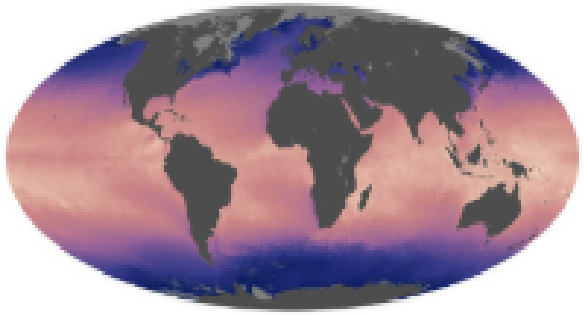
Global Maps

Feb 2000 – May 2020

Land Surface Temperature Anomaly

These maps depict anomalies in land surface temperatures (LSTs); that is, how much hotter or cooler a region was compared to the long-term average. LST anomalies can indicate heat waves or cold spells.

Heat Land



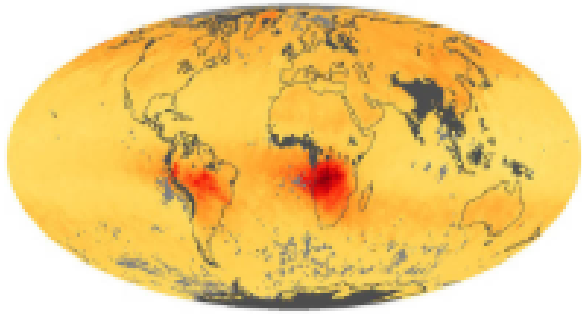
Global Maps

Jul 2002 – Feb 2020

Sea Surface Temperature

Ocean temperatures can influence weather, such as hurricane formation, and climate patterns, such as El Niño. These maps show the temperature at the surface of the world's seas and oceans.

Heat Water



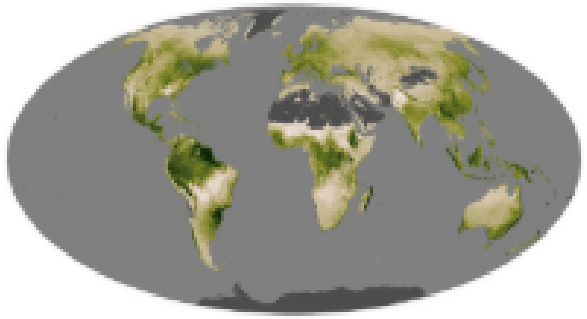
Global Maps

Mar 2000 – Feb 2017

Carbon Monoxide

When fuels such as coal, wood, and oil burn incompletely, they produce carbon monoxide. The gas is spread by winds and circulation. These maps show monthly averages of CO in the lower atmosphere.

Atmosphere



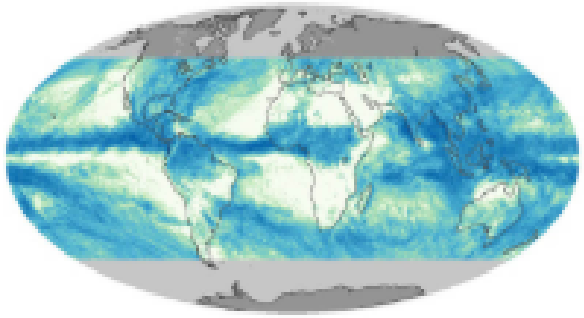
Global Maps

Feb 2000 – Nov 2016

Net Primary Productivity

These maps show the "metabolism" of Earth's plants and trees. Net primary productivity is the difference between the amount of carbon dioxide absorbed during photosynthesis minus the amount released by respiration.

Land | Life



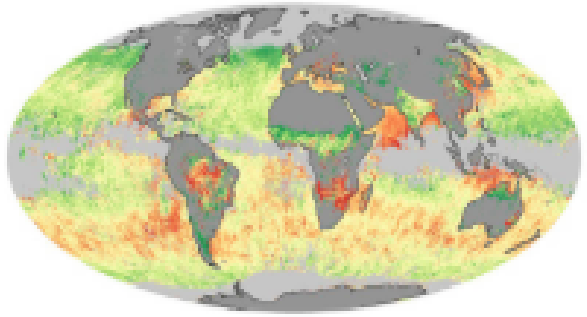
Global Maps

Jan 1998 – Aug 2016

Total Rainfall

These maps depict monthly total rainfall around the world. Rainfall is the primary source of fresh water for humans, plants, and animals. Rain also moves heat between the atmosphere, oceans, and land.

Atmosphere



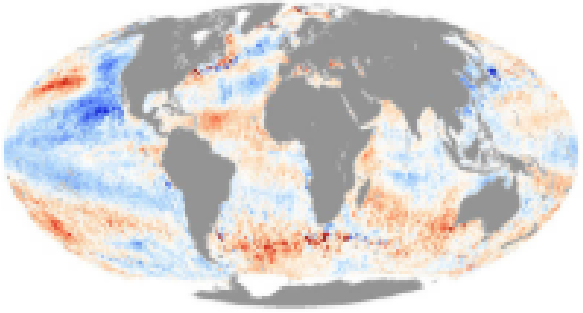
Global Maps

Jan 2005 – Sep 2016

Aerosol Size

Sea salt, volcanic ash, dust, wildfire smoke, and industrial pollution are types of airborne aerosols. Natural aerosols tend to be larger than human-made aerosols. These maps show when and where aerosols come from nature, humans, or both.

Atmosphere



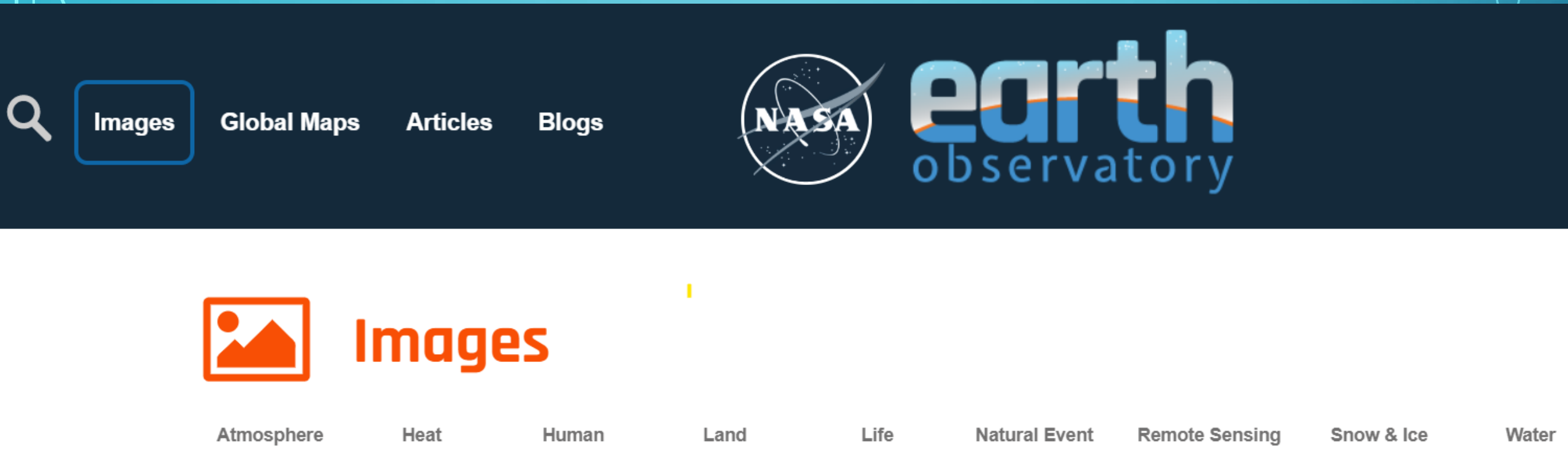
Global Maps

Jun 2002 – Sep 2011

Sea Surface Temperature Anomaly

These maps depict how much hotter or cooler an ocean basin was compared to the long-term average. Temperature anomalies can indicate changes in ocean circulation or the arrival of patterns like El Niño and La Niña.

Heat | Water



https://earthobservatory.nasa.gov/images

Images

Atmosphere Heat Human Land Life Natural Event Remote Sensing Snow & Ice Water

Change and Preservation Around Paranapanema

Human activity and natural beauty merge in south-central Brazil.

Published Apr 24, 2022

Image of the Day | Land | Water

Island Hopping in Tawi-Tawi

In this part of the southern Philippines, the aquatic life sustains the livelihoods of many islanders.

Published Apr 23, 2022

Image of the Day | Land | Water

Spring Fire on the Steppe

The fast-moving blaze charred grassland in eastern Mongolia.

Published Apr 22, 2022

A Salty Sanctuary in Baja California Sur

Laguna Ojo de Liebre, a lagoon on the Baja California Peninsula, is a whale sanctuary and the site of one of the largest saltworks in the world.

Published Apr 25, 2022

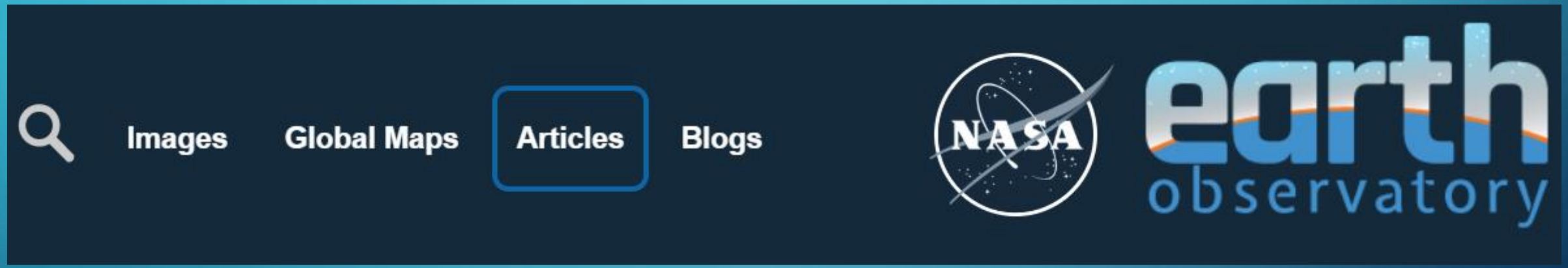
Spring in the Tennessee Valley

Greening valleys and sinuous reservoirs near Knoxville stand out in this April satellite image.

Published Apr 21, 2022

Images (nasa.gov)

- Atmosphere
- Heat
- Humans
- Land
- Life
- Natural Events
- Remote Sensing
- Snow & Ice
- Water



Articles (nasa.gov)

EO Explorer

Since 1999, Earth Observatory has published images and stories from all over our planet. Now you can explore more than 11,000 images in a different way: by location.

Published Jun 2, 2021

[EO Explorer (nasa.gov)]

Land Water Remote Sensing

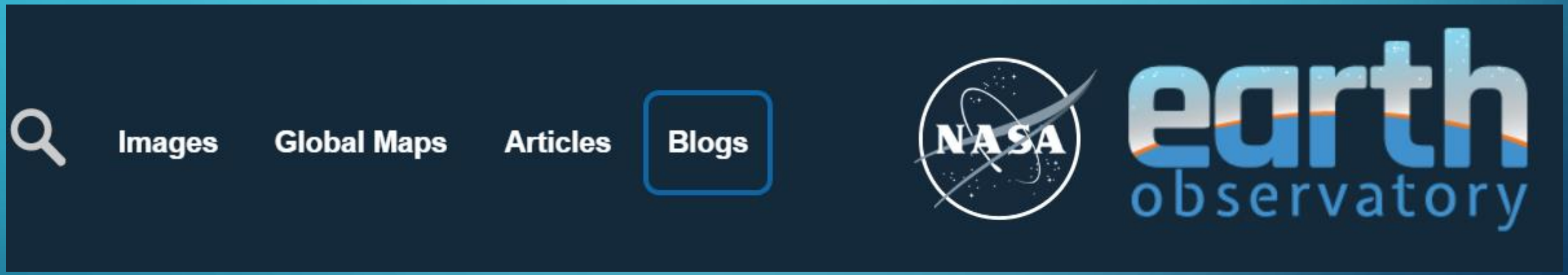
Earth – A Photo-Essay

NASA has a unique vantage point for observing the beauty and wonder of Earth and for making sense of it. The images in this book tell a story of a 4.5-billion-year-old planet where there is always something new to see.

Published Apr 28, 2021

Atmosphere Land Water Snow and Ice Remote Sensing

[Earth — A Photo-Essay (nasa.gov)]



[Earth Observatory Blogs (nasa.gov)]

Earth Observatory Blogs

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April Puzzler

Published 4/17/2022 in Earth Matters

Your challenge this month has a new twist: tell us what you see.

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EO Kids
Climate Q&A
Elegant Figures

Dust: A World Traveler

Dust: A True World Traveler (11 MB) – March 2022

How far can dust travel? Where does it come from? Explore the answers to these questions and make a model of how dust affects sky visibility in Dust a True World Traveler.

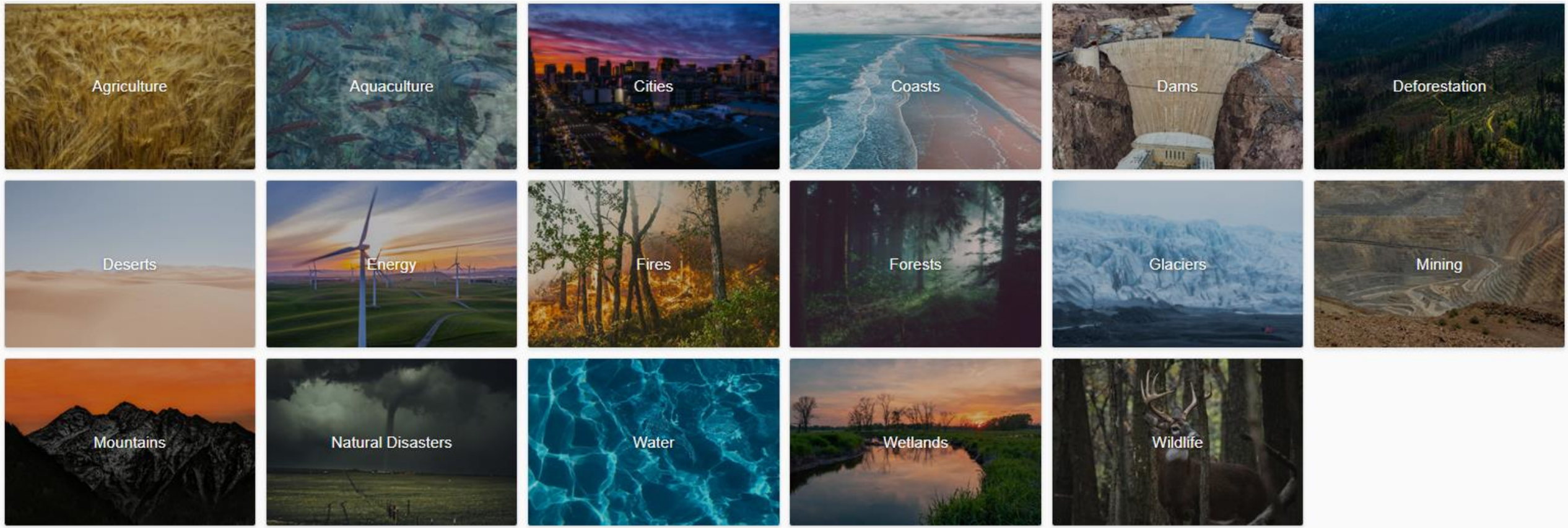
EO Kids is written for audiences aged 9 to 14. It is published with support from NASA's Landsat, Terra, and Aqua missions.

We would appreciate any comments or feedback you could provide to us about this new publication (e.g., content, style, format): Let us know what you think.

EO Kids (nasa.gov)

https://earthshots.usgs.gov/earthshots/

Agriculture Aquaculture Cities Coasts Dams Deforestation Deserts Energy Fires Forests Glaciers Mining Mountains Natural Disasters Water Wetlands Wildlife



https://earthshots.usgs.gov/earthshots/

Mountaintop coal mining is a major cause of land cover changes in the central Appalachian Mountains of the eastern United States. The landscape disturbance mountaintop mining causes is different from others (such as forestry, urbanization, or agriculture) in that it can extend deeply into the ground, disturbing even the bedrock. Landsat imagery from the 1970s has catalogued the changes.

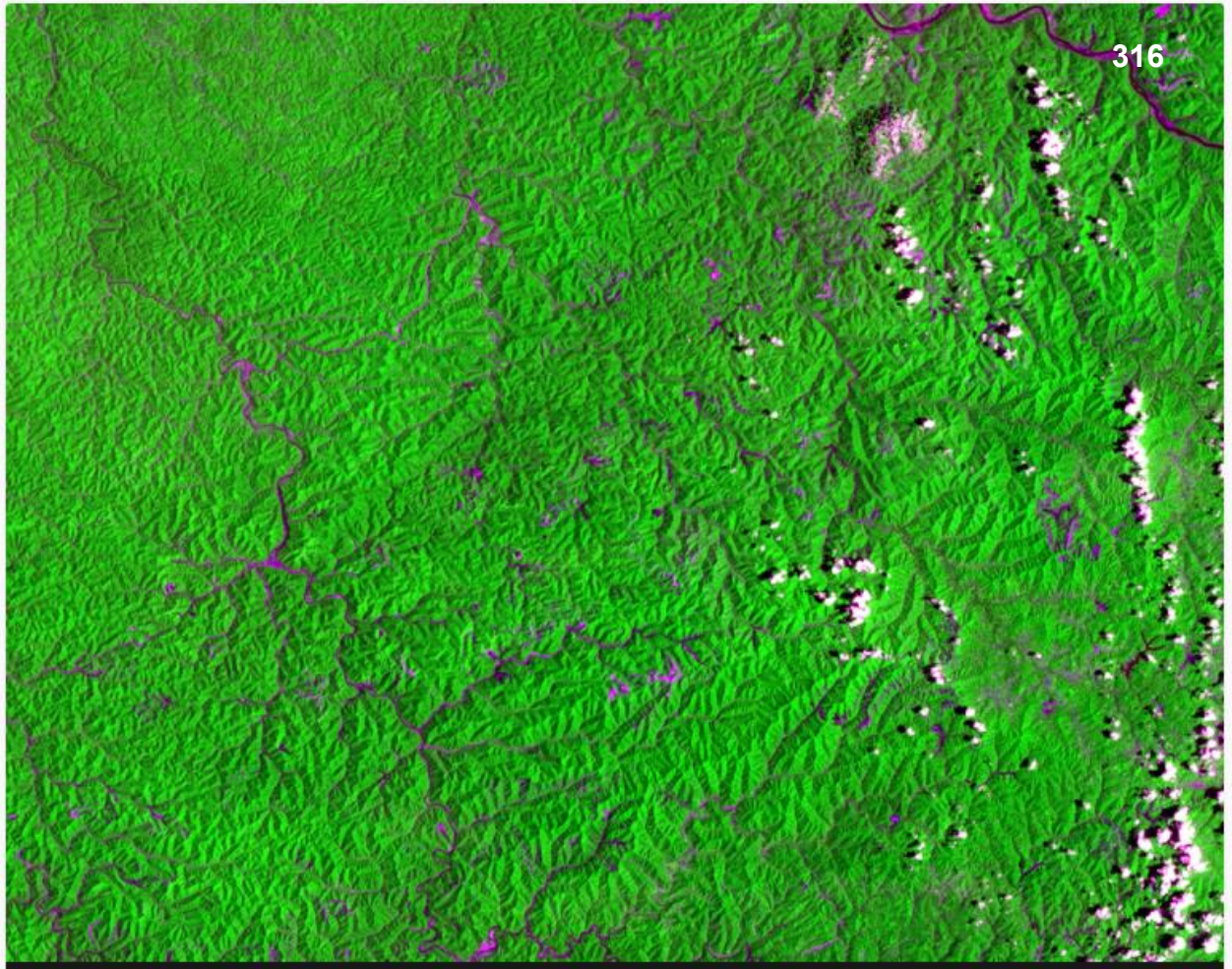
These false color images show the natural landscape of the area: forested mountains are bright green, and numerous streams and valleys give the land a wrinkled appearance. Mining areas are pink, and reclaimed mining land is usually light green.

The reason for the large-scale change caused by this type of mining is that one ton of coal is extracted for every 16 tons of terrain displaced. In the mountainous Appalachian landscape, the displaced material ends up in river valleys. More than just the look of the landscape changes—the drainage network itself is altered.

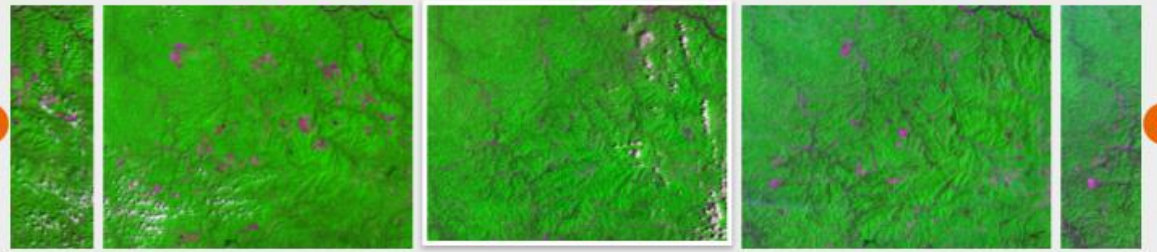
First mined in the 19th century, low-sulfur Appalachian coal can be extracted relatively cost-effectively by the mountaintop removal process. This method allows almost all of the coal in a seam to be removed. Understanding the hydrologic changes brought on by this mining practice is key to the future of the communities in the region.

View Related Imagery & Stories

Location

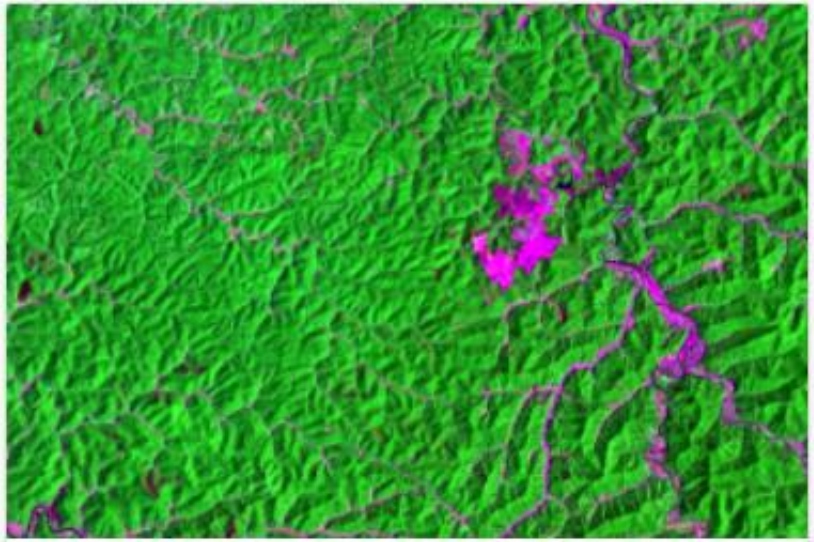


July 1, 1975, Landsat 1 (path/row 19/34) — Mountaintop mining, West Virginia, USA



[Mountaintop Mining, West Virginia, USA | Earth Resources Observation and Science (EROS) Center (usgs.gov)]

Mountaintop Mining, West Virginia, USA Additional Imagery & Stories



Hydrology

The effects on the hydrology in the region where mountaintop mining takes place is not well understood—how does this mining activity affect the moveme...

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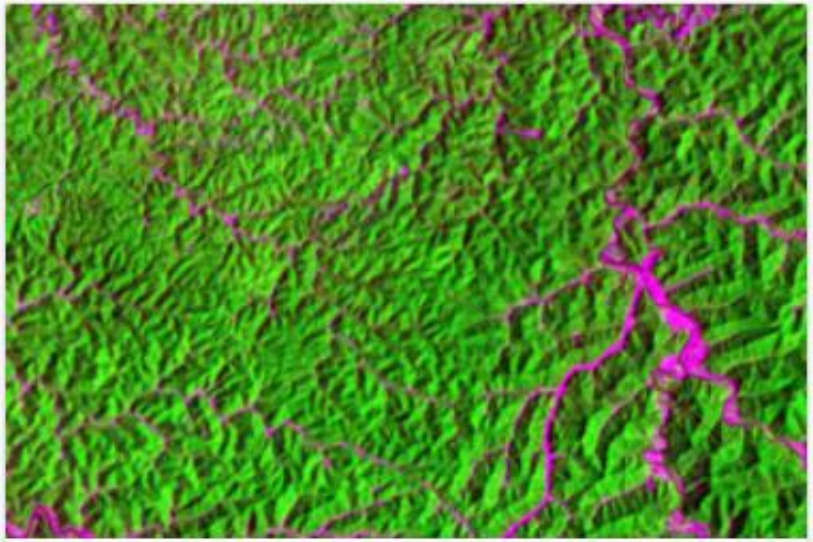

Mining Operations

Appalachian coal lies underground in thin seams, too thin for underground mine shafts. The only way to extract the coal profitably is with surface min...

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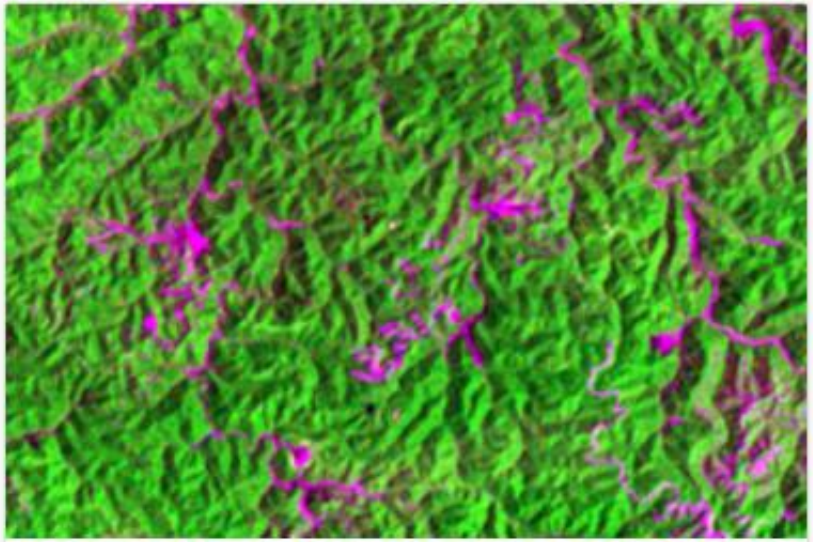


Reclamation

The Surface Mining Control and Reclamation Act of 1977 requires that mined lands be restored to an acceptable land cover. These images show some of th...

Read More

[Mountaintop Mining, West Virginia, USA | Earth Resources Observation and Science (EROS) Center (usgs.gov)]

In the Amazon basin, some rivers run wild. With no dams or levees to control them, they are free to meander—some more than others.

For example, the Rio Mamoré, which flows north across Bolivia, is one such wanderer. It flows from the Andes Mountains and across the Bolivian lowlands into Brazil. Watching this river meander in Landsat images over the past few decades shows us how much a river can meander under natural conditions. The Mamoré has a large sediment load, so it meanders more than most.

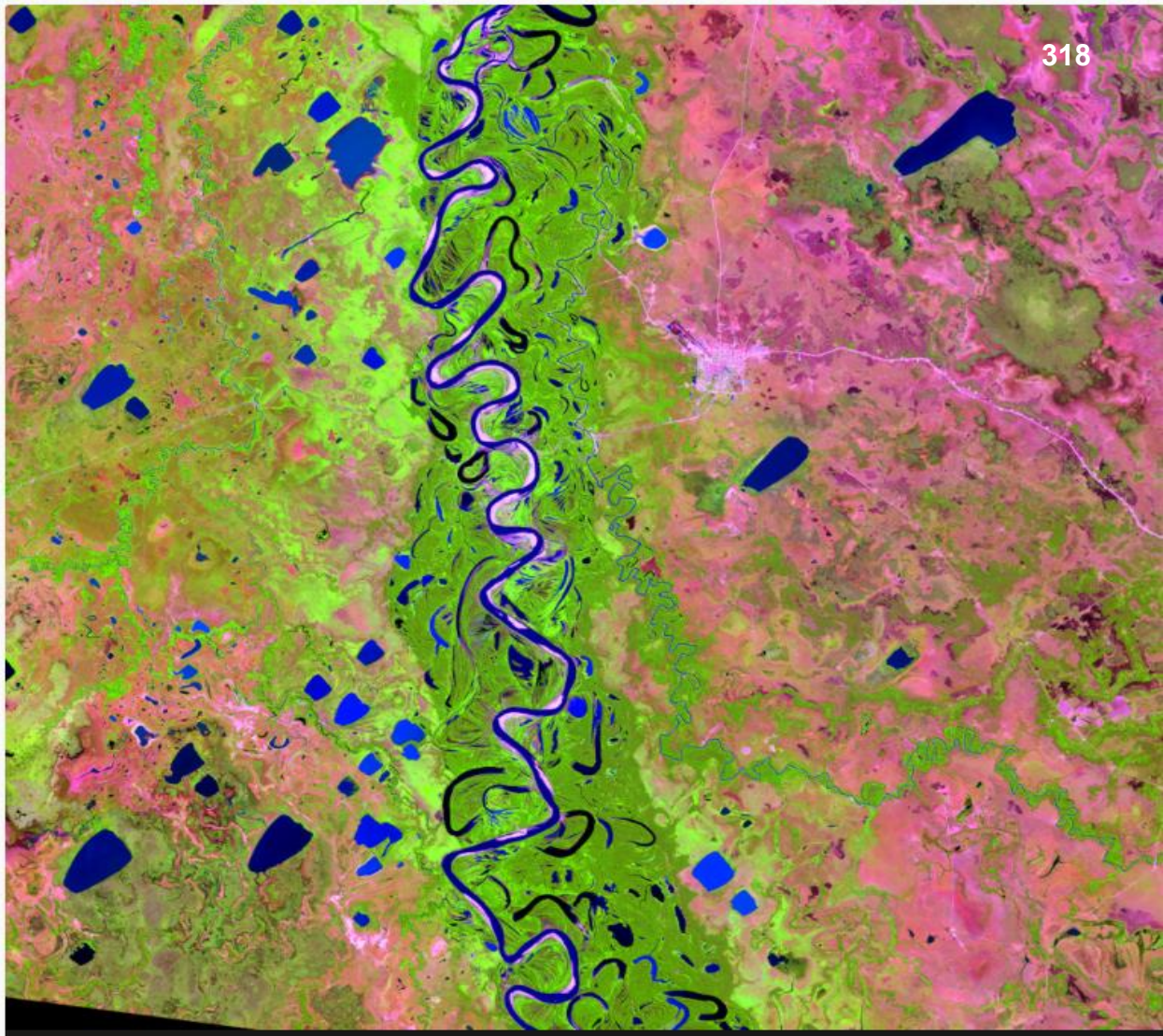
These meandering river dynamics are important for maintaining a healthy habitat. The floodplains here depend on the river migration to maintain the wetland habitats.

The growing city of Trinidad, with a population of over 100,000, can be seen in the upper right of these images, just east of the river.

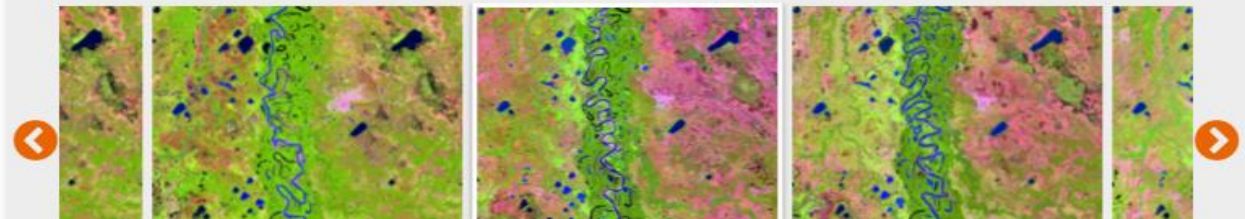
View Related Imagery & Stories

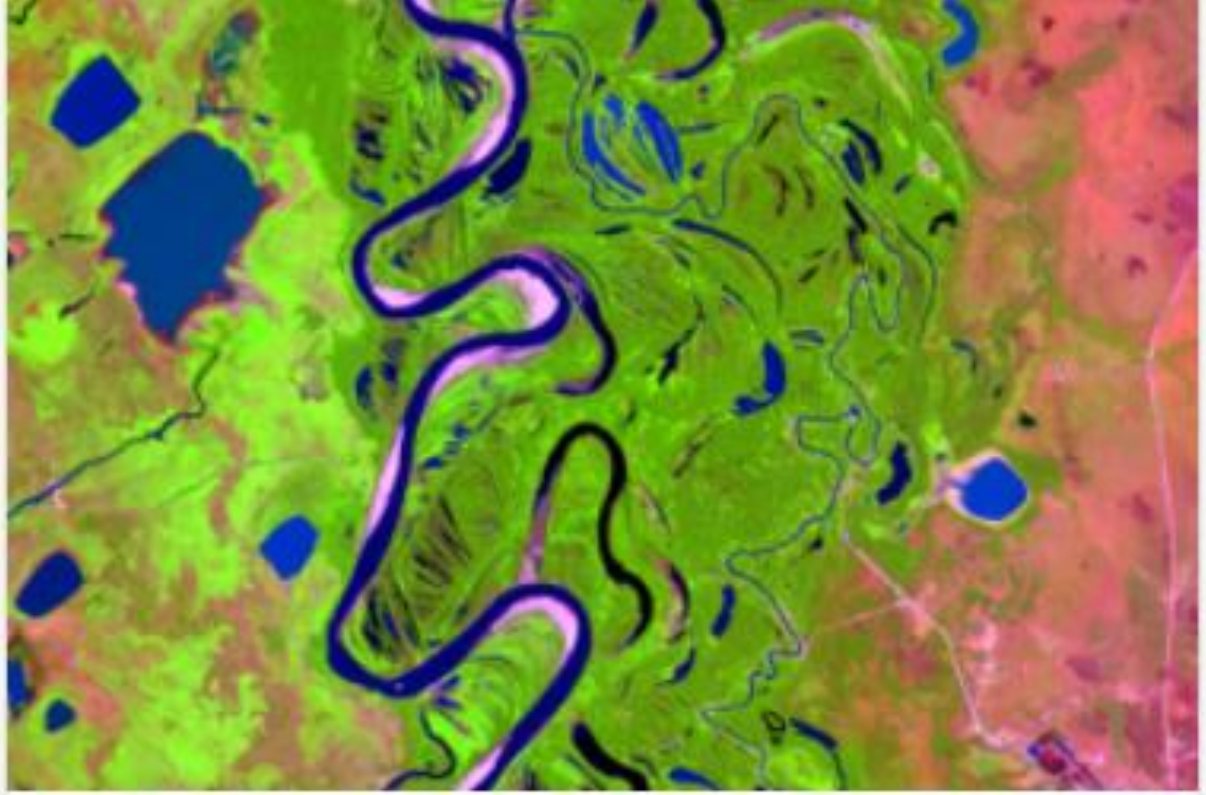
Location

[Mamoré River, Bolivia | Earth Resources Observation and Science (EROS) Center (usgs.gov)]



Aug. 11, 1984, Landsat 5 (path/row 232/70) — Mamoré River, Bolivia

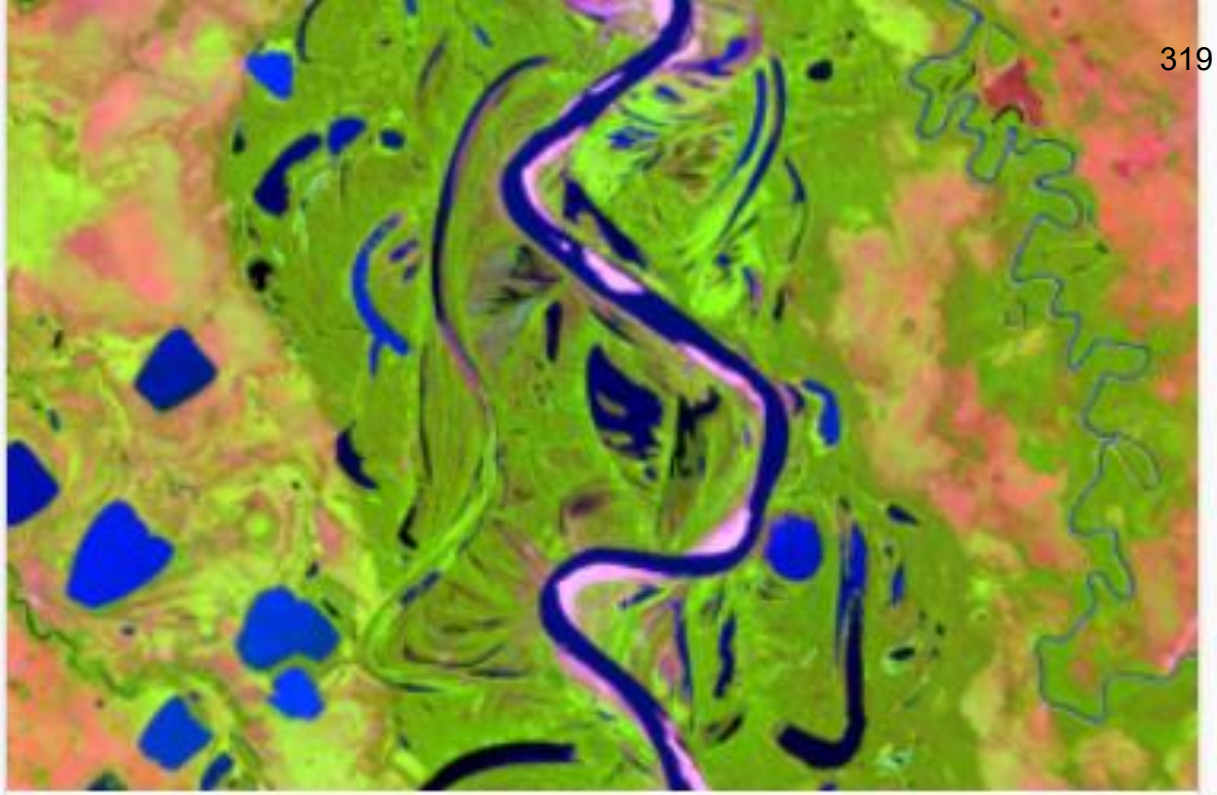




Oxbow Lakes

The more a river meanders, the more cutoffs form. Cutoffs form more frequently on rivers that have more sediment. Flanking the Mamoré River in these i...

Read More



Point Bars

The Mamoré River carries sediment from the rapidly eroding Bolivian Andes. The steep terrain coupled with high river discharge in the Andes causes a h...

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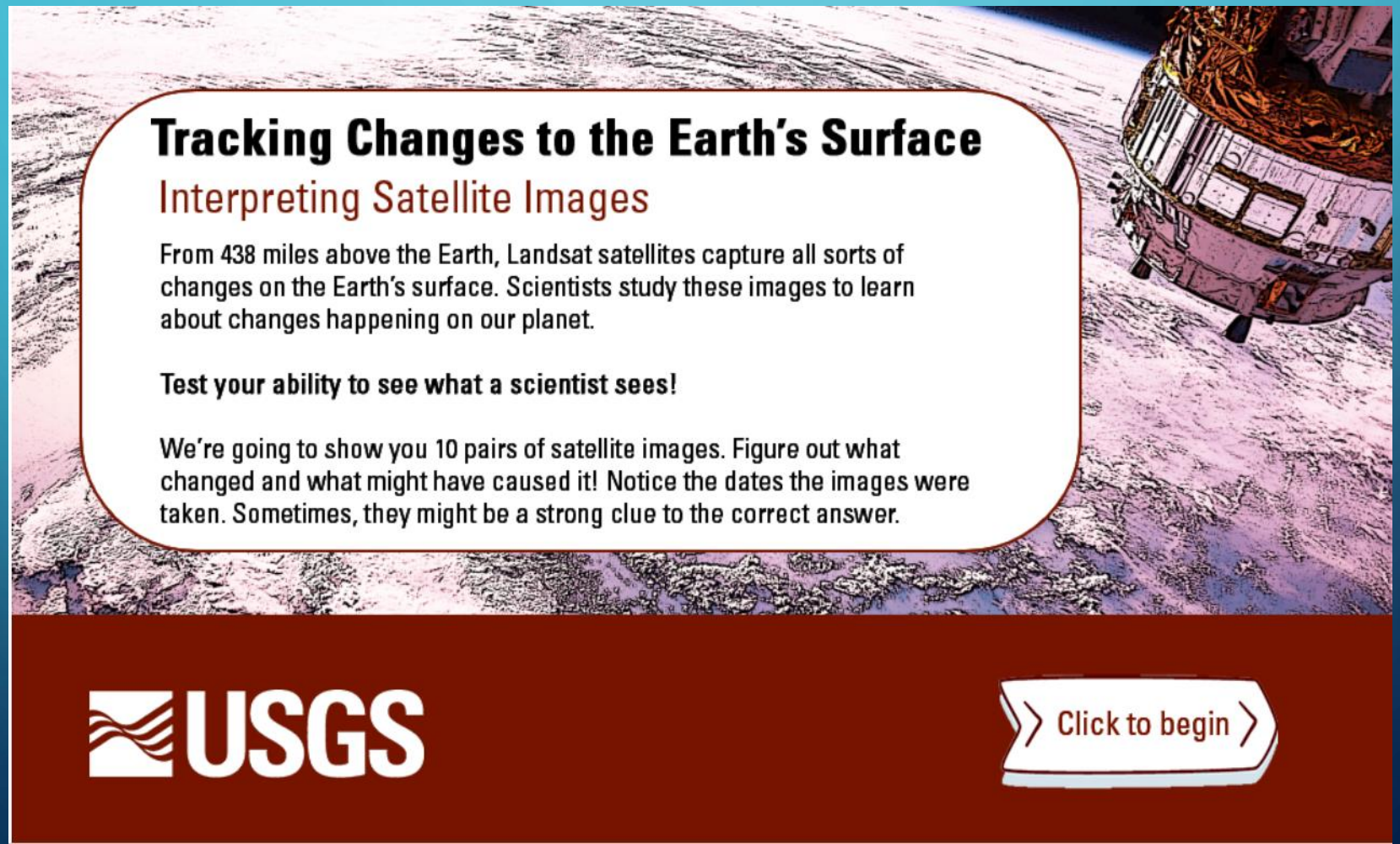
USGS SATELLITE IMAGES: CHANGE PAIR GAME

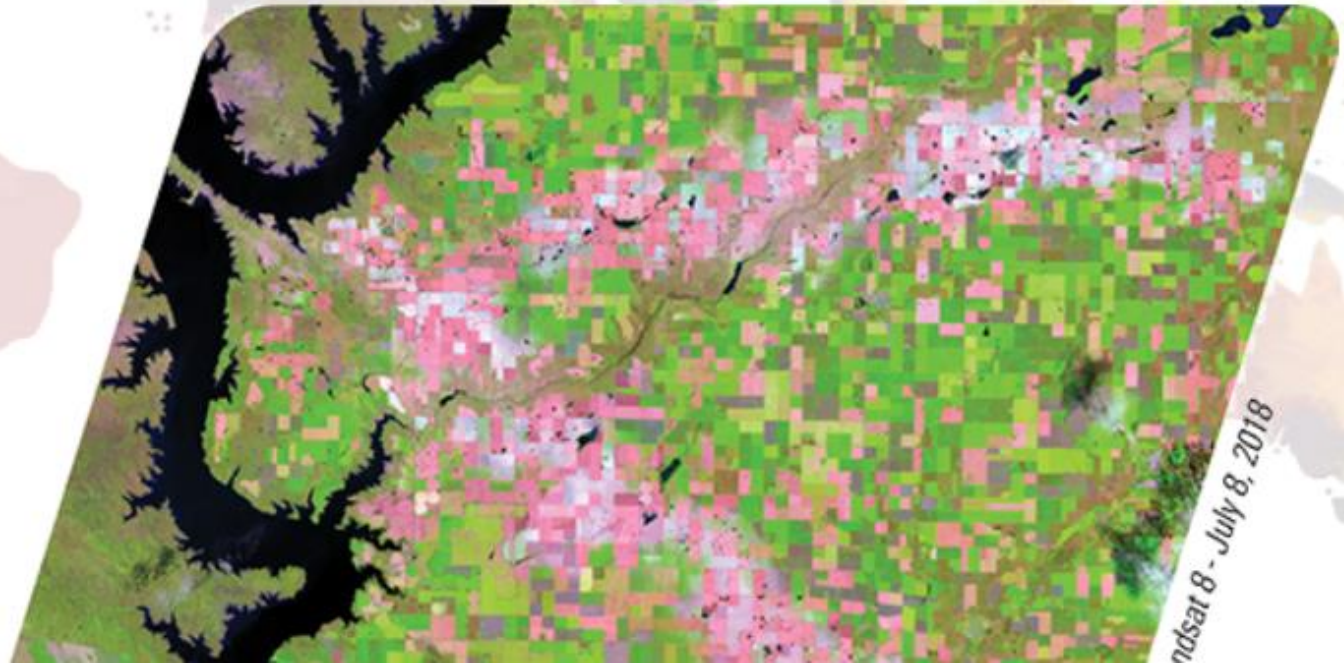
- https://eros.usgs.gov/sites/eros.usgs.gov/files/change-pair-game/index.php



What changed in this pair of Landsat images?

- A) Flooding
- B) Shrinking lake
- C) Hail storm damage
- D) Forest fire

Submit



Back