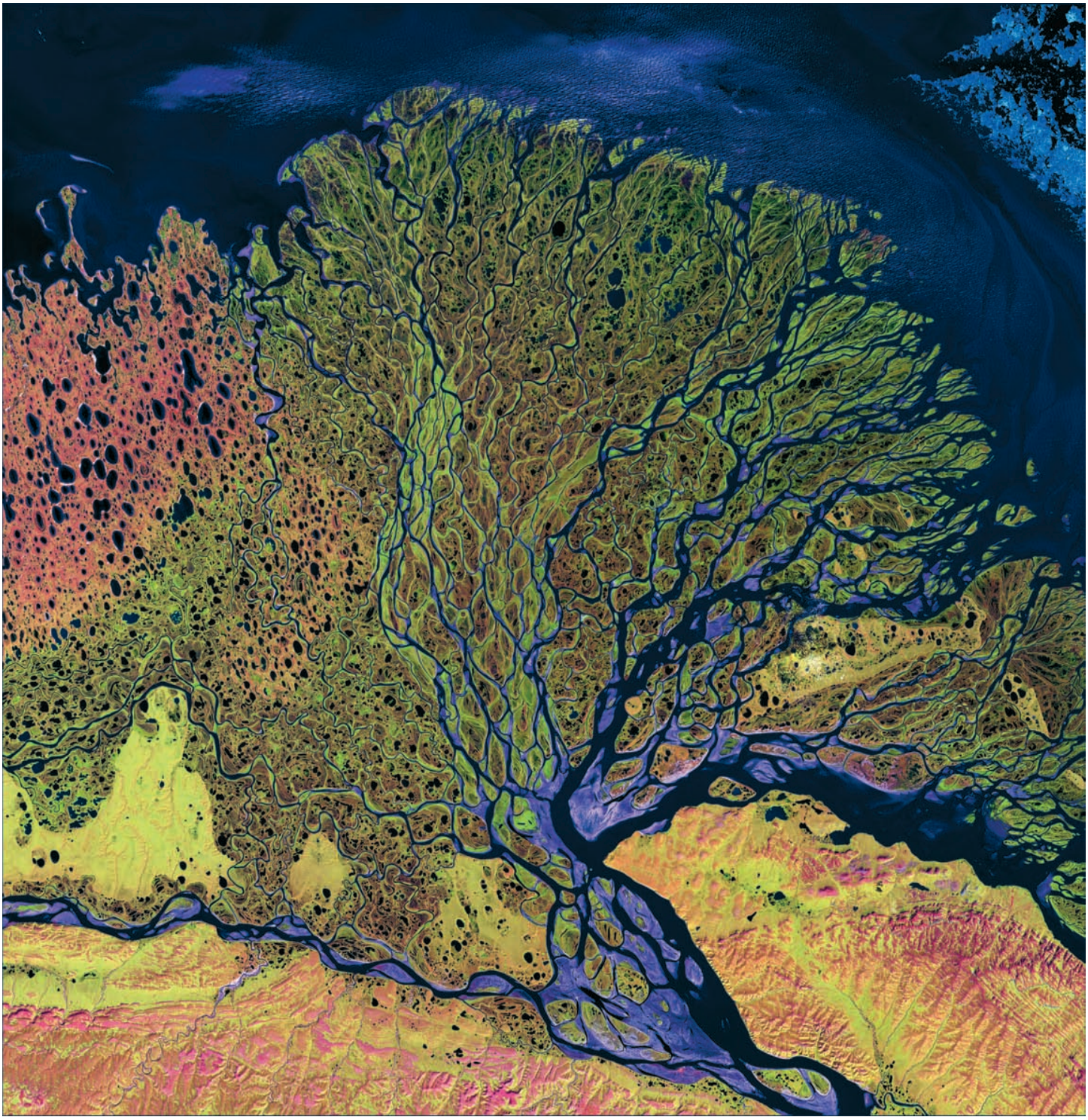
National Aeronautics and Space Administration

Blending Science and Art



Can you guess the subject of this colorful image? Is it ocean coral? Abstract art? A plant? Or perhaps a view through a microscope or a view from space? Answer on other side.

USGS science for a changing world

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Blending Science and Art with Landsat

Goddard Space Flight Center

Art, science, and technology intersect in fascinating ways in this intriguing Landsat 7 satellite image of the **Lena River Delta** in Siberia. In strangely beautiful colors, this image depicts Siberia's largest river where it meets the Laptev Sea near the Arctic Ocean. The Lena River Delta is an amazing 400 kilometers (about 250 miles) wide, extending far beyond the area shown here. It includes the Lena Delta Wildlife Refuge, whose labyrinthine waterways provide essential protection for a multitude of plant and animal species, including migratory swans, geese, songbirds, and birds of prey. On this image, 2.5 cm (one inch) equals approximately 24.3 km (15.1 mi). Knowing that, you can get a sense of the delta's vastness. In the image you can also distinguish vegetation (shades of green), sandy areas (shades of red), and water (purples and blues).

Creativity plays a key role in science. People have an ability to "see in the mind's eye," or to visualize new ideas. When we combine visualization with new ideas, we have powerful tools for creative thinking. All people have unique imaginative and intuitive abilities that can help us to excel in art, science, or other activities we may choose. Satellite technology allows us to view Earth in new ways that provide scientists and others with fascinating and important insights into our dynamic planet.

Scientists at the U.S. Geological Survey (USGS) created this particular image purely for its beauty. Artists and scientists share an interest in creativity and imagination. Many scientists will tell you their best work is highly creative, just like painting, sculpting, or writing poetry. Doing science also involves adventure, mystery, drama, risk, danger, and fun.

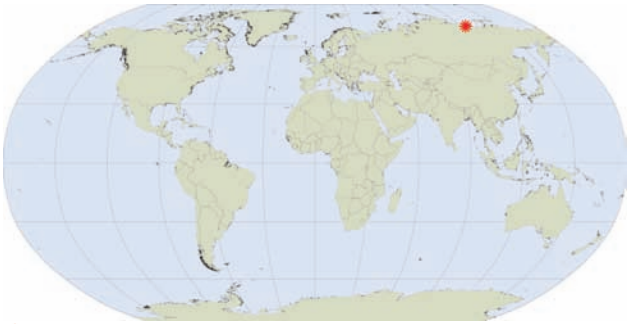
Landsat technology gives us "super-human vision." Some of the colors in this satellite image depict light we can't see with our eyes alone. Light travels in what are called electromagnetic waves. The lengths of these waves determine if our eyes perceive the light as a color, such as blue or red, or if we can see it at all. In fact, people can perceive only a very narrow range of all the wavelengths that occur in nature (the electromagnetic spectrum). For example, X-rays are too short for our eyes to detect, and infrared wavelengths are too long for us. Landsat sensors gather data about longer wavelengths of infrared that we can't see, as well as data about visible wavelengths. People combine the infrared and visible wavelength data from Landsat, and use special software to make images like this one of the Lena River Delta. So the colors of this image are not natural colors, that is, not the ones we would see with our eyes if we were orbiting Earth onboard the Landsat satellite. To learn more about wavelengths of light and energy, visit: http://imagers.gsfc.nasa.gov/ems/ems.html

Why would scientists use such "false" and vivid colors? Color is a powerful tool for conveying scientific ideas as well as beauty. Scientists who study the land with Landsat satellite data use color to distinguish between different kinds of surfaces. Some features stand out more clearly in images created from wavelengths we cannot perceive with our own eyes. The contrast between healthy vegetation and soil, for example, is most distinct in images created with data from near infrared wavelengths. Scientists also use color in pictures, charts, and graphs to point out important aspects of their work when presenting it to others.

Satellites have improved our understanding of Earth's interconnected systems of air, land, water, life, and ice. They provide an essential foundation for dealing with natural disasters, managing our natural resources, improving agricultural productivity, and solving a multitude of other problems to benefit society.

For example, researchers at NASA and USGS use colorful images like this one to study river deltas to understand how the Earth's water systems are changing. Landsat data help them to explore many questions. Is there more or less water in the river than the year before? Has the river changed its course? Have people made new buildings and roads nearby? If so, how might that affect water quality? How might it affect wildlife habitat?

The Landsat series of satellites has provided a continuous, consistent set of Earth science data to users all over the world since 1972. Landsat 7 is a collaborative effort between NASA and USGS.



The Lena River Delta is located on the Laptev Sea in Siberia.

For fun with a friend or a child. Without letting the other person know this image was made by a sensor on a satellite, invite her or him to tell you what they think the image shows. When you have an answer, have them explain to you what aspects of form and color helped to identify the image.

Now try this. Imagine the area around you in shades of gray. If you were adding color back to the scene, what objects would you color?

Consider why you chose those particular objects. Usually people will choose to color objects of personal meaning to them. In visual communication, people make color choices and designs according to what's most important for their own purposes. Scientists and students make choices about what's most important when they show scientific information to other people in the forms of maps, graphs, and other visual representations of data and ideas.

This image was taken from the Earth as Art online exhibit. For more images, ideas, stories, and learning resources, visit:

NASA Landsat program: http://landsat.gsfc.nasa.gov

USGS Landsat program: http://landsat.usgs.gov

Landsat in the Classroom:
http://landsat.gsfc.nasa.gov/education

Earth as Art exhibit:
http://earthasart.gsfc.nasa.gov
http://edc2.usgs.gov/imagegallery

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