

# Geography at the U.S. Geological Survey

USGS Geography confronts some of the most pressing natural resource and environmental issues of our Nation by observing and analyzing changes on the land.

The surface of the Earth is changing rapidly, at local, regional, national, even global scales, with significant repercussions for people, the economy, and the environment. Some changes to the land surface have natural causes, such as volcanic eruptions or drought, while other changes, such as resource extraction, agricultural practices, and urban growth, are human-induced processes. There are other types of change that are a combination of natural and human-induced factors; for

**Geography** – the science of place – is a bridging, integrating, and synthesizing field because place is a pivotal study element in all the natural sciences. We work to combine our talents with USGS scientists in other disciplines in pursuing the USGS mission – *Science for a Changing World*.

example, landslides and floods are fundamentally natural processes that are often intensified or accelerated by human land use practices.

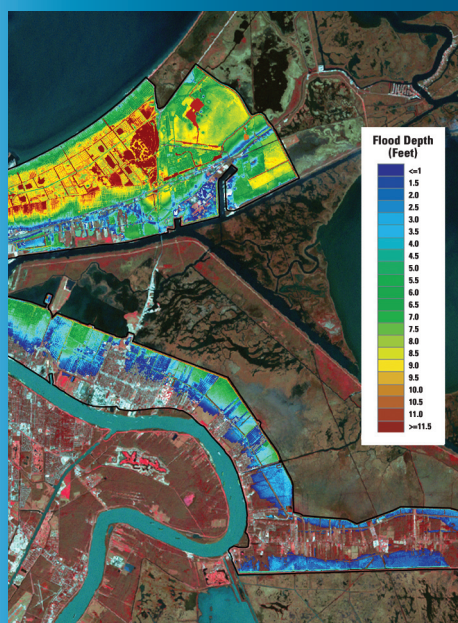
Land cover on the Earth's surface – the pattern of natural vegetation, agriculture, and urban areas that stems from both natural processes and human influences – provides a signature of environmental conditions.

Improved understanding about the implications of change in land cover assists decision makers in the fields of land use planning, land management, and natural resource conservation and use. The need for better information about the effects of land surface change is especially evident for changes that are brought about by wildfire, agricultural production, urbanization, forest logging, climate change, and other factors operating at broad regional scales.

## Geography and Hazards

Precise topographic measurements provided by Light Detection And Ranging (LiDAR) instruments are combined in this map with a backdrop of Landsat imagery to accurately depict the low relief environment of New Orleans, LA.

The risk of natural disaster is a function of place along with the social and individual actions of people. By understanding the vulnerability and resilience of human and environmental systems in the context of place, geographic science can link assessments of potential hazards with the development of risk reduction measures.



Land surface conditions are recorded, extensively and objectively, by remotely sensed data that are collected from sensors mounted on satellites or airplanes or positioned on the ground. Remotely sensed data routinely form the basis of natural resource studies – energy and minerals evaluations, assessments of natural hazards (earthquakes, volcanoes, and landslides), biological investigations, water resources analyses, and geographic and cartographic applications such as wildfire detection. As a world leader in providing current and historical remotely sensed data to

the national and international communities, USGS operates the Landsat 5 and 7 satellites and is working with the National Aeronautics and Space Administration (NASA) to implement future satellite missions that will expand the collection of remotely sensed data for Earth observation.

USGS Geography monitors land surface change by observing the Earth with remote sensing satellites, studies the connections between people and those changes with incisive geographic analysis, and provides individuals and society with relevant science information they can use to manage the consequences of those changes.

The following geography activities are conducted at five geographic science centers in Denver, CO; Menlo Park, CA; Reston, VA; Rolla, MO; and Sioux Falls, SD.

## **Earth Observation**

In addition to operating two remote sensing satellites – Landsat 5 and Landsat 7, USGS provides the Nation’s portal to the largest archive of remotely sensed land data in the world, supplying continuous access to current and historical land images worldwide. This information is broad, precise, impartial, and easily available. It serves many purposes from assessing the impact of natural disasters to gauging global agricultural production, from monitoring the impact of climate and other global changes to contributing to homeland security and defense.

## **Land Surface Analysis**

Land cover data are essential in a wide variety of investigations – from assessing ecosystem health and understanding spatial patterns of biodiversity to land use planning and land management. Human modification of land cover has important implications for environmental quality and natural hazards, as well as natural resource availability, quality, and use.

## **Science and Public Policy**

USGS develops methods and processes, such as decision support systems and economic models, that facilitate the use of USGS science information in public policy. USGS science findings can be enhanced by economic and social science perspectives for improved communication with government and community leaders.

### **For further information, please visit:**

U.S. Geological Survey – <http://www.usgs.gov/>

USGS Geography – <http://geography.usgs.gov/>

## **Geography and the Cycle of Fire**



USGS scientists use information gathered by satellites to create different kinds of fire hazard maps. Some show where vegetation is unseasonably dry. Others show where dead trees and other fuels have accumulated to dangerous levels. Still others reveal the extent of damage after a fire. These maps and related data models help fire fighters and land managers predict where wildfires may strike, prepare for fires before they happen, and accurately assess a fire’s impact.