LandSat

Scientists collecting calibration data.

Landsat data have helped to improve our understanding of Earth.

Thanks to Landsat, today we have a better understanding of things as diverse as coral reefs, tropical deforestation, and Antarctica’s glaciers.

The 30 m spatial resolution and 185 km swath of Landsat imagery fills an important scientific niche because the orbit swaths are wide enough for global coverage every season of the year, yet the images are detailed enough to characterize human-scale processes such as urban growth, agricultural irrigation, and deforestation.

By establishing baseline knowledge of Earth’s land areas over the last half century, Landsat allows scientists to evaluate environmental change over time. Often, this baseline knowledge is represented in the form of a map.

Landsat and cartography have a long history. In July of 1972, Dr. Paul Lowman, a pioneer of the Earth remote sensing concept at NASA’s Goddard Space Flight Center, drew the first map from a Landsat image.

Since that time, Landsat-derived maps have been used to aid in navigation of poorly charted areas (especially in the Arctic and Antarctic, where Landsat data were used to find unknown mountains in southern Victoria Land and at the head of the Lambert Glacier).

Landsat images have also been used to map faults and fracture zones. Landsat information has served as the basis for a series of tectonic activity maps, the first in 1977, the latest in 2003. Data have also been used to find unmapped volcanic fields.

The science of remote sensing itself has matured with the Landsat project. Many developments in Earth-observation from space, such as the Terra observatory, can be traced back to the Landsat program.

# Practical Uses

[](http://landsat.gsfc.nasa.gov/wp-content/uploads/2012/12/volcano2.jpg)

Accessing regrowth in a Hawaiian lava field.

### Applications

Landsat observations have found increasingly wide acceptance within the science and applications communities over the program’s lifetime.

As one measure, the Science Citation Index records well over 3,200 peer-reviewed articles making use of Landsat data since 1972, with significant increases in these citations over time. Similar discussions are found throughout the popular science literature.

Early applications of Landsat were largely confined to the remote sensing science community and often reported on new pathfinding uses of remote sensing. Today use of Landsat data has evolved, becoming not only a fundamental data source for addressing basic science questions but also has  come into its own as a valuable resource for decision makers in such diverse fields such as agriculture, forestry, land use, water resources and natural resource exploration.

Over the past three decades, Landsat has also played an increasing role in diverse applications such as human population census and monitoring the growth of global urbanization and deletion of coastal wetlands.  As human populations increasingly dominate the Earth’s land areas, understanding changes in land cover and land use from year to year becomes increasingly important for both decision makers and human occupants of the Earth.

Agricultural productivity evaluation and crop forecasting require satellite data because they can perform the swift and frequent inventories fundamental to accurate yield forecasting. Similarly, understanding current conditions of and changes in fresh water supplies also requires the systematic repeat coverage provided by the Landsat system.

NASA’s [Land-Cover and Land-Use Change Program (LCLUC)](http://lcluc.umd.edu/" \t "_new) uses Landsat data to develop socially relevant interdisciplinary science that can be applied to natural resource management questions, starting with agricultural land use change.