Using Remote Sensing to Monitor Global Climate Change Data

Source: Satellite Imaging Corporation
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Satellite Images for Environmental Monitoring

"Global change", "Greenhouse effect", "Global warming". The media are full of statements, concerns, guesses, and speculation about these phenomena, as scientists and policy makers around the world struggle to address recent scientific observations that indicate human activities impact our environment.

To preview an image of ASTER – Bhutan-Himalaya - Global Change:
http://news.satimagingcorp.com/wp-content/uploads/2007/05/aster_bhutan_glaciers.jpg

About the Image:

According to Jeffrey Kargel, a USGS scientist, glaciers in the Himalaya are wasting at alarming and accelerating rates, as indicated by comparisons of satellite and historic data, and as shown by the widespread, rapid growth of lakes on the glacier surfaces. According to a 2001 report by the Intergovernmental Panel on Climate Change, scientists estimate that surface temperatures could rise by 1.4deg Celsius to 5.8deg Celsius by the end of the century. The researchers have found a strong correlation between increasing temperatures and glacier retreat. Credit: Image provided by Jeffrey Kargel, USGS/NASA JPL/AGU

Environmental Monitoring

Over the last century the average temperature has climbed about 1 degree Fahrenheit (0.6 of a degree Celsius) around the world.

The spring ice thaw in the Northern Hemisphere occurs 9 days earlier than it did 150 years ago, and the fall freeze now typically starts 10 days later.

The Arctic Climate Impact Assessment (ACIA) report recently concluded that in Alaska, western Canada, and eastern Russia, average temperatures have increased as much as 4 to 7 degrees Fahrenheit (3 to 4 degrees Celsius) in the past 50 years. The rise is nearly twice the global average. The United Nations' Intergovernmental Panel on Climate Change (IPCC) projects that global temperatures will rise an additional 3 to10 degrees Fahrenheit (1.6 to 5.5 degrees Celsius) by century's end.

View an animated video of the cryosphere of Greenland and Canada:
http://www.esa.int/esaEO/SEMRLH12Z0F_planet_0.html

Satellite remote sensing is an evolving technology with the potential for contributing to studies of the human dimensions of global environmental change by making globally comprehensive evaluations of many human actions from multispectral satellite images from satellite sensors such as Landsat(15m) and ASTER(15m) . Satellite sensor data have proven to be useful to the atmospheric and ocean sciences communities. The land sciences community has made extensive use of satellite image data for mapping land cover, estimating geophysical and biophysical characteristics of terrain features, and monitoring changes in land cover. More recently, the scientific community has witnessed a growing demand for high resolution satellite imagery on investigating the human dimensions of global change from sensors such as

QuickBird(0.6m) and IKONOS(0.8m) resolution due to the quality and accuracy of detail of our ever changing planet.

Human actions involving biomass fuel consumption, land-use change, and agricultural activities all involve direct interaction with the global land surface. The extent of these interactions has prompted concern about the possible effects on the global physical, chemical, and biological systems. Large-scale changes in land use at rates unprecedented in human history are provoking considerable concern. Land-use change is frequently accompanied by alterations or changes in land cover, which may possibly contribute to subsequent environmental change. Evaluation of the static attributes of land cover (types, amount, and arrangement) and the dynamic attributes (types and rates of change) on satellite image data may allow the types of change to be regionalized and the proximate sources of change to be identified or inferred. This information, combined with results of case studies or surveys, can provide helpful input to informed evaluations of interactions among the various driving forces.

Beginning with the early use of aerial photography, remote sensing has been recognized as a valuable tool for viewing, analyzing, characterizing, and making decisions about our environment. In the past few decades, remote sensing technology has advanced on three fronts:

1) Predominantly military uses to a variety of environmental analysis applications that relate to land, ocean, and atmosphere issues.

2) Photographic systems to sensors that convert energy from many parts of the electromagnetic spectrum to electronic signals.

3) Aircraft to satellite platforms.

Today, we define satellite remote sensing as the use of satellite-borne sensors to observe, measure, and record the electromagnetic radiation reflected or emitted by the Earth and its environment for subsequent analysis and extraction of information.

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http://rst.gsfc.nasa.gov/Sect16/Sect16_2.html
http://www.ciesin.columbia.edu/TG/RS/RS-home.html

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