U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON SPACE AND AERONAUTICS

HEARING CHARTER

Remote Sensing Data: Applications and Benefits

Field Hearing

Centennial Hall
200 S. Cascade Avenue
Colorado Springs, Colorado

April 7, 2008

Purpose:

On Monday, April 7, 2008 at Centennial Hall, Colorado Springs, Colorado at 10:00 am – 12:00 pm, the House Committee on Science and Technology, Subcommittee on Space and Aeronautics will hold a hearing to examine the opportunities and challenges of using remote sensing data to benefit public and private sector activities including urban planning, natural resource management, national defense, and homeland security among other application areas.

Witnesses:

Witnesses scheduled to testify at the field hearing include the following:

Panel 1: Remote Sensing Data Users

Jack Byers
Deputy Director and Deputy State Engineer
Colorado Division of Water Resources

Simon Montagu
Customer Resource and Support Director
Denver Regional Council of Governments

Manuel Navarro
Fire Chief
City of Colorado Springs

Frank Sapio
Director
Forest Health Technology Enterprise Team
U.S. Department of Agriculture Forest Service

Panel 2: Commercial Remote Sensing Data Providers

Kevin Little
Director, Business Development, Intermap Technologies, Inc.

Matthew O'Connell
President and Chief Executive Officer, GeoEye, Inc.

Jill Smith
President and Chief Executive Officer, DigitalGlobe, Inc.

Data and images collected from aircraft and satellites provide information that can facilitate public and private operations and decision making to benefit society. In the aftermath of the terrorist attacks on September 11, 2001, remote sensing mages acquired from aircraft and from commercial and government remote sensing satellites aided in the emergency response and recovery operations at Ground Zero. Commercial remote sensing imagery has also been used by the U.S. military for the Afghanistan and Iraq wars. In August of 2007, a National Aeronautics and Space Administration (NASA) unmanned aerial vehicle used an infrared scanner to map wildfires in the western U.S. Data from Earth observing satellites are being combined with sources of information on the ground to manage natural resources and monitor changes in land and Earth systems. Aerial photography and images acquired from satellites are used by State and local governments to map floodplains and natural resources, among other applications.

The field hearing will address the opportunities and challenges of using remote sensing data to address public and private sector needs. Witnesses will testify on the ways that remote sensing data can assist public and private

sector users in Colorado, for instance, in identifying forests vulnerable to fire and insect infestation, managing water resources, planning urban development and road construction, and mapping floodplains. Commercial providers of remote sensing data will testify on the benefits of remote sensing data to State and local governments and on the role that commercial data can play in addressing these civil applications as well as those related to homeland security and national defense.

BACKGROUND

The ability to collect information and images of the Earth's land, atmosphere, and oceans from aircraft and satellites has been available for decades. The use of aerial photography grew during the 1930s and 1940s as a means of military reconnaissance. The first U.S. meteorological satellite was launched in 1960 and the first U.S. civil satellite to observe and monitor the land surface, Landsat, was launched in 1972. Over the last forty years, the U.S. government has helped advance the state of civil space-based remote sensing. Through NASA and the National Oceanic and Atmospheric Administration (NOAA), the U.S. government has launched an ongoing series of increasingly more capable Earth observing satellites to support an operational weather monitoring service and to conduct research to better understand the Earth's land, ocean, atmosphere, and biosphere, their relationships, and how the Earth system changes over time. In addition, the U.S. Geological Survey has been responsible for archiving and managing civil land remote sensing data. The Land Remote Sensing Policy Act of 1992 set commercial land remote sensing as a U.S. policy goal and included a process to license private remote sensing satellite operators. In the early 1990s the first licenses were issued to private remote sensing operators and by 1999 the first commercial remote sensing satellite was launched.

The advantages of remote sensing include the ability to collect information over large spatial areas; to characterize natural features or physical objects on the ground; to observe surface areas and objects on a systematic basis and monitor their changes over time; and the ability to integrate this data with other information to aid decision making. Remote sensing from airplanes or satellites can be collected at various spatial resolutions [spatial resolution refers to the smallest feature that can be resolved in an image]. High resolution remote sensing images can resolve smaller features—often less than a meter in size—whereas moderate or lower resolution images can

detect features in a size range of tens to hundreds of meters or larger. Remote sensing instruments may also acquire data in different spectral bands of the electromagnetic spectrum (e.g., infrared, near-infrared), which provides information, for example, to help classify and categorize vegetation. Data collected in the thermal infrared bands are especially useful for water management. Light detection and ranging (lidar) instruments provide topographic data that can form the basis of digital elevation models.

The needs of local government often require high resolution data, which has long been provided through aerial imagery. The advent of commercial high resolution remote sensing imagery in the late 1990s created another source of data that can serve local and regional governments. In addition, States have taken advantage of moderate resolution U.S. government-provided Landsat data to monitor natural resources, such as forests and wetlands that span large areas, to analyze the ecological systems of land and watershed areas, and to help protect wildlife habitats.

State and local governments can also benefit from remote sensing information to better monitor land use, assist in transportation planning, and deal with other infrastructure and public safety issues. In addition, commercial enterprises use the data to help support their businesses. For example, real estate companies use imagery to enhance the information provided on real estate property listings, and transportation companies may use remote sensing data to help route trucks.

Providers of remote sensing data

Remote sensing data for State and local applications is provided by both U.S. government agencies and by commercial providers. Landsat satellites, which have been developed and launched by NASA since 1972, are operated by the Department of Interior's U.S. Geological Survey (USGS) and the data are archived and managed by the USGS Center for Earth Resources Observation and Science (EROS) Data Center. The USGS manages and archives publicly available aerial photographs and lidar data, among other data sets. The USGS has responsibility for providing future space-based land observation data after NASA's launch of the Landsat Data Continuity Mission, which is planned for 2011.

NASA operates fourteen Earth observing research satellites from space to further our knowledge of the Earth system, including its atmosphere, oceans, land surface, and biosphere. Some of these spacecraft support applied uses by public and private organizations. The Terra and Aqua satellites, for example, collect data that support fire monitoring and the Quick Scatterometer (QuickSCAT) and Tropical Rainfall Measuring Mission provide data to help improve tropical cyclone and hurricane forecasting. In addition, within NASA's Earth Science Division, the Applied Sciences Program works with Federal agency partners and other organizations to apply NASA's Earth remote sensing data to decision support tools in the areas of agricultural efficiency, air quality, aviation, carbon management, coastal management, disaster management, ecological forecasting, energy management, homeland security, invasive species, public health and water management. Many of the agencies and organizations that use these tools provide services that extend to the State, local, and regional levels.

The Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) operates the nation's fleet of civil operational weather monitoring satellites, which provide data to inform the National Weather Service's forecasts. Future satellite systems in which NOAA is involved, including the National Polar-orbiting Operational Environmental Satellite System (NPOESS), will also collect global data on the Earth's weather, oceans, land and space environments. NOAA also operates data centers that archive geophysical, climate, ocean, and coastal data and provide information products to support scientific research and other purposes.

Multiple independent firms across the country provide services to collect aerial photography. Federal agencies also collect aerial imagery to support their services. United States commercial space remote sensing companies operate satellites and sell imagery and applications to customers in the public, private, and non-government sectors. The market for commercial remote sensing data has largely been in high resolution imagery. The Department of Defense has been a major user of commercial remote sensing imagery. Commercial remote sensing companies support applications including mapping, national security, environmental monitoring, urban planning, natural resource management, homeland defense, and emergency preparedness and disaster relief, among many other areas. Several non-U.S. companies also collect and sell space remote sensing data.

Digital information and communications technologies

The increasing capabilities of computers and communication technology have facilitated the development of remote sensing applications. Digital remote sensing data can be acquired from and disseminated over the Internet, and manipulated on desktop computers. Geographic information systems enable multiple sources of geographic information (such as locations of power plants and hospitals) to be integrated with remote sensing images. Global positioning data can be combined with remote sensing data sources to enable applications that rely on accurate locational information. In addition, software tools allow multiple sources of remote sensing data to be blended together to maximize the information content for remote sensing applications.

The availability of civil remote sensing data has led to the establishment of companies dedicated to processing and transforming remote sensing data into information products and applications for users. These companies create mapping products, such as topographical line maps and digital elevation models, three-dimensional visualization tools, among other remote sensing applications.