

2008-2018 Africa Remote Sensing Study Paper Number: 1021

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Abstract

The U.S. Geological Survey, (USGS) serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

In their continuing support of the Earth Sciences the USGS funded a comprehensive research study of the African international remote sensing market. This study was a follow on study completed by Global Marketing Insights, Inc. under a contract with the U.S. federal government agency, of the National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service Division for the U.S., Canada, Europe, and Asia in 2005, 2006 and 2007.

The market research study of the African Remote Sensing Market in aerial and satellite data technologies was completed in 2008 and includes a five and ten year analysis of the Political, Economic and Technical Trends impacting the African Remote Sensing Professions; Academic, Commercial and Government Users. Over 400 participants responded to the study through 15 in-country partners.

Individuals from the African Commercial, Government and Academic sectors of the Remote Sensing Profession participated in the study by logging onto www.empliant.com/USGS-remote-sensing-research. The following provides the research highlights of the technology and trend findings for the African Market in 2008-20018 versus the findings in the rest of the world.

Overview

Africa is a huge continent struggling with diverse political, cultural and technological barriers that have prevented a large percentage of the population from reaching an acceptable minimum standard of living. The recent study completed by Global Marketing Insights, Inc. shows an unmet demand for geographic information that could be used to improve the lives of millions of people, by advancing agriculture, urban development, and transportation and communication networks.

Conducted by the United States Geological Survey (USGS), the study included 377 online surveys and 20 personal interviews. The surveys and interviews provided a sample from three remote sensing sectors: Academic, Commercial End User, and Government. Although the survey was primarily answered by remote sensing professionals in Africa, some of the respondents were currently residing in other countries, such as the US and India, but had some connection to African remote sensing. KEY WORDS: Africa Sustainable Development Applications, Africa International Remote Sensing Study

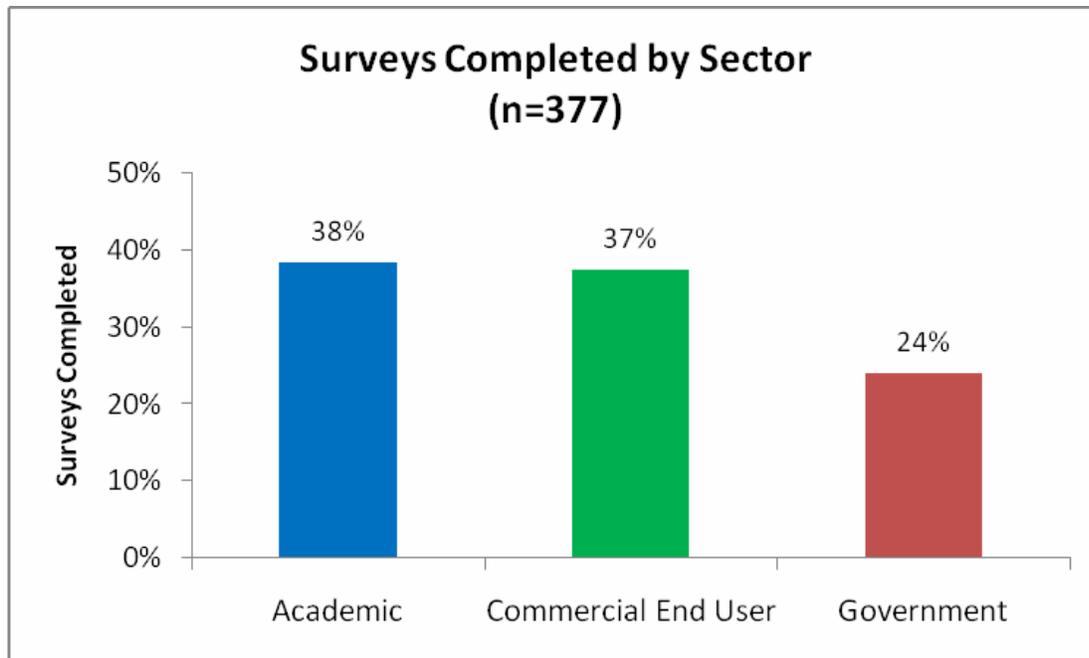


Chart 1: Of the 377 survey responses, 38% came from the Academic sector, 37% from Commercial End Users and 24% from Government agencies.

Introduction

Responses were received from over 30 countries in Africa, with the largest number coming from Nigeria (46), South Africa (37), and Kenya (28). An additional 42 respondents identified themselves as being from Africa without specifying a country.

In addition to general information about the use of remote sensing technology in Africa today, this study also included a 5- and 10-year analysis of the technical advances and the political, economic and environmental trends that will impact the remote sensing industry in the future. **

Interactive Map

Global Marketing Insights, Inc. is providing a web-enabled interactive map feature that will post summary statistics by country (See Figure 1). This map is hosted on the Global Marketing Insights, Inc. This feature allows a viewer to “click and view” the study highlights by country. If a viewer would like to complete a survey for a country which has not been represented they will be able to complete a survey from the map site. Project sponsors and Alliance Research Partners are listed in columns to the right of the main page and have links to their websites. The 2008 USGS Africa Remote Sensing Study Interactive Map can be found at: www.globalinsights.com or via <http://www.globalinsights.com/USGSIMap/results.htm> .

** GeoEye, Dulles, Virginia, and Arctic Slope Regional Corporation (ASRC), Greenbelt, Maryland, were project sponsors and there were also 13 in-country geospatial partners who actually hosted the survey website and encouraged users to complete the survey in-country.

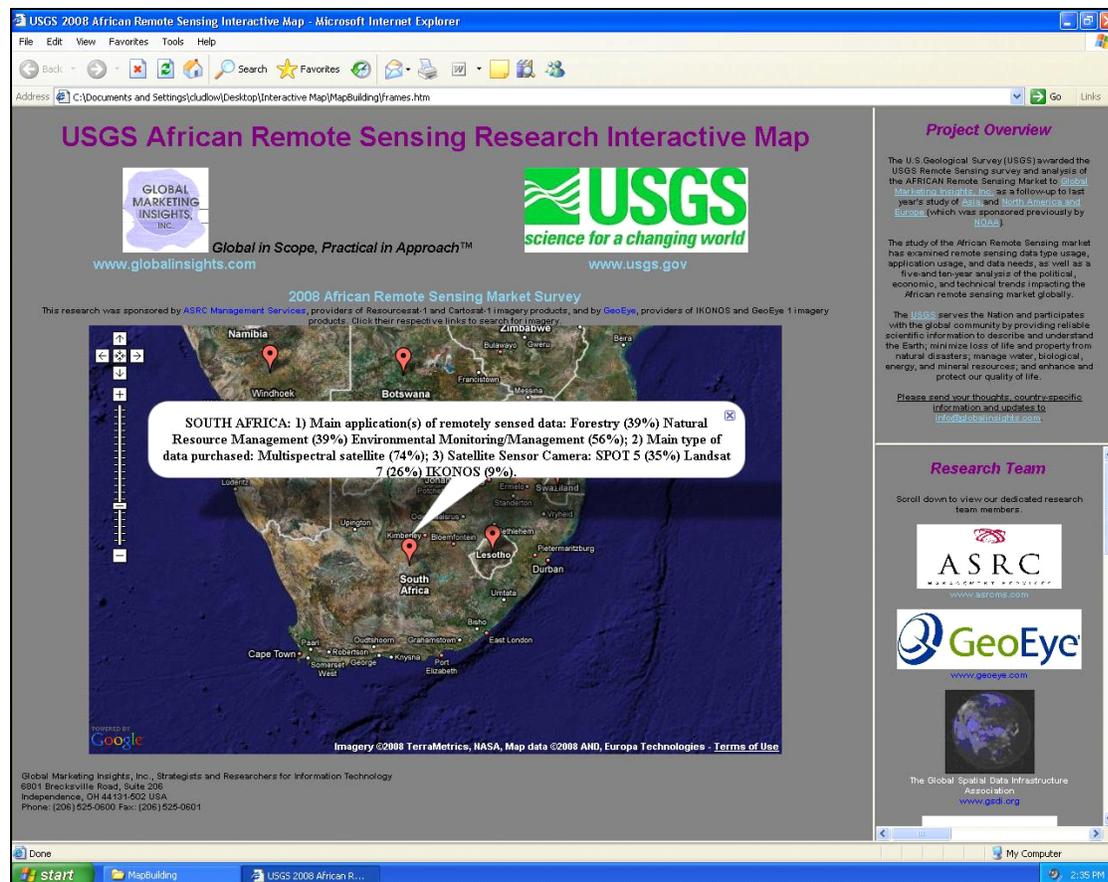


Figure 1: USGS 2008-2018 African Remote Sensing Study Interactive Map

Technical Advances in Five to Ten Years

All of the respondents were asked to identify the Technical Advances they see impacting their use of remote sensing in the years 2013 and 2018. In 2013, Greater Ground Resolution, Improved GPS Units and Easier to Use Processing Software were the top three advances selected. In 2018, Greater Ground Resolution continued to be of primary interest, followed by Better Processing Software (Less Noise) and Greater Computer Processing Speed.

Greater ground resolution would impact every application that is currently being supported by remote sensing, and improvements in the processing software would enhance the results and reduce the time necessary to analyze data. These selections reflect the feelings of African remote sensing professionals that they will be able to accomplish more as their access to higher levels of technology increases.

Political, Economic and Environmental Trends in Five to Ten Years

Based on the 377 survey responses, the Political, Economic and Environmental trends that are likely to have the greatest impact on the use of remote sensing over the next five years are Remote Sensing Data Becoming a Commodity, Climate Change (Global Warming), and Endangered Species and Natural Resources/Heritage Protection. The same categories were selected as having the largest impact ten years from now.

The importance of remote sensing data becoming a commodity is based on the assumption that commodities are easily accessible and less expensive than specialty items and professional services. Thus the survey respondents from the African remote sensing industry are expecting to be able to obtain more data for less money, and this will have a significant positive impact on their usage.

Climate change (global warming) could potentially have a major impact on agriculture and quality of life for millions of people, so it will continue to be a primary topic of research. Endangered species and natural resources/heritage protection is especially relevant in Africa due to the wildlife and antiquities that are unique to this continent. Preserving as much as possible is important from a global perspective, and remote sensing is a useful tool for repeated monitoring of conditions over large areas.

Development of the Remote Sensing Industry in Africa

The USGS funded this study because it recognizes the importance of continuously monitoring the needs and potential growth of the remote sensing and geospatial data industry in Africa. Their goal is to better understand the current status so they can more effectively assist with efforts to achieve sustainable development throughout the continent.

In addition to the interest shown by international government agencies in Africa, organizations such as The Gates Foundation, ESRI, and the Mapping Africa for Africa (MAFA) initiative of the United Nation's Economic Commission for Africa (UNECA) are starting to drive the process of developing geospatial data on the continent. Also there were several large conferences, GDEST 2008 and Map Africa 2008 held in South Africa, which helped raise awareness about the challenges faced by the remote sensing industry. AfricaGIS 2009, a biennial conference, will be held in October in Kampala City, Uganda.

The number of responses received in this recent survey was considerably larger than in previous studies conducted in the past few years. This could be attributed to the improving communications infrastructure and internet access throughout Africa, as well as a more vibrant and larger remote sensing industry overall.

Overview of the Survey Respondents

The survey asked general demographic questions about the respondents' level of experience, area of interest and employer.

The largest number of respondents identified themselves as GIS Analysts, followed by GIS Managers. The Commercial End Users had more experience, with 47% reporting more than 10 years, compared to 41% of the Government respondents and 35% of the Academic respondents.

Of the Government respondents, 61% were from a national/civilian agency and 19% were from a state/provincial agency. The majority (64%) of the Academic respondents were from public institutions, with GIS the most common specialty. The two largest business areas of Commercial End User respondents were Environmental/Engineering (26%) and Consulting (22%).

The Commercial End User organizations tended to be larger than the Academic groups and Government agencies. The number of employees involved in remote sensing was more than 25 for 43% of the commercial businesses, compared to less than 10 employees at 61% of the Government agencies, and less than 10 faculty and students for 43% of the Academic

respondents. However, encouraging growth in numbers is predicted—77% of Commercial respondents, 75% of Academic respondents and 56% of Government respondents anticipate growth in terms of employees over the next ten years.

Overview of the Africa Remote Sensing Market

The survey included a number of questions that, when analyzed together, provide a well-rounded picture of what types of data are preferred, how remote sensing data is being used, and in what areas data is lacking.

First, respondents were asked to identify their preferred spatial resolution and spectral region. For spatial resolution, Academic and Government respondents preferred to use 1–5 m data, followed by 5–120 m data, while the Commercial End Users most often selected 1–5 m data and 47–62 cm data (probably due to their interest in engineering applications that require higher resolution). Government satellites were the preferred source of data for Academic and Government respondents—with 62% of each sector searching out free sources, while Commercial End Users preferred commercial satellites.

For favorite spectral region, most respondents in all three sectors selected Visible (0.4 μm –0.7 μm), followed by Infrared (0.7 μm –100 μm). These preferences could change as more training becomes available in how to use the other spectral regions for analysis.

When asked what type of data they preferred, multispectral satellite data topped the list for 79% of the respondents, followed by aerial digital data and panchromatic satellite data.

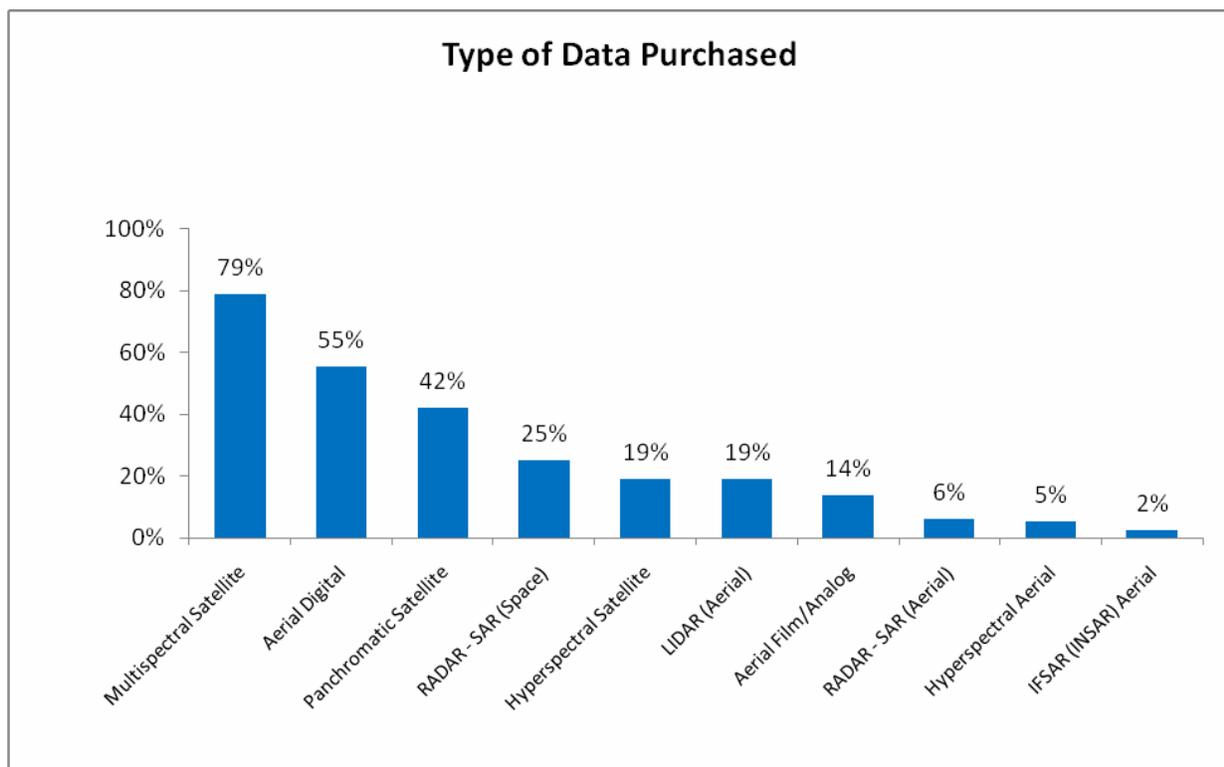


Chart 2: The most popular types of remote sensing data are multispectral satellite, aerial digital and panchromatic satellite.

When asked about their usage of imagery products—processed imagery, raw imagery, GIS data or value-added products—eight out of ten respondents reported using GIS data and processed imagery, while slightly more than half use raw imagery and value-added products.

Over one-third of the respondents in each sector do not use digital elevation data, primarily because of poor availability of data. Of those who do use digital elevation data, ground surveys and digitized cartographic data were most often cited as the source.

The survey respondents were asked to identify their primary applications for remote sensing data. The application most often identified was Environmental Monitoring/Management, followed by Natural Resource Management. Land Management/Development, Sustainable Development and Forestry complete the list of the top five applications. These applications are appropriate considering their preference for multispectral satellite data.

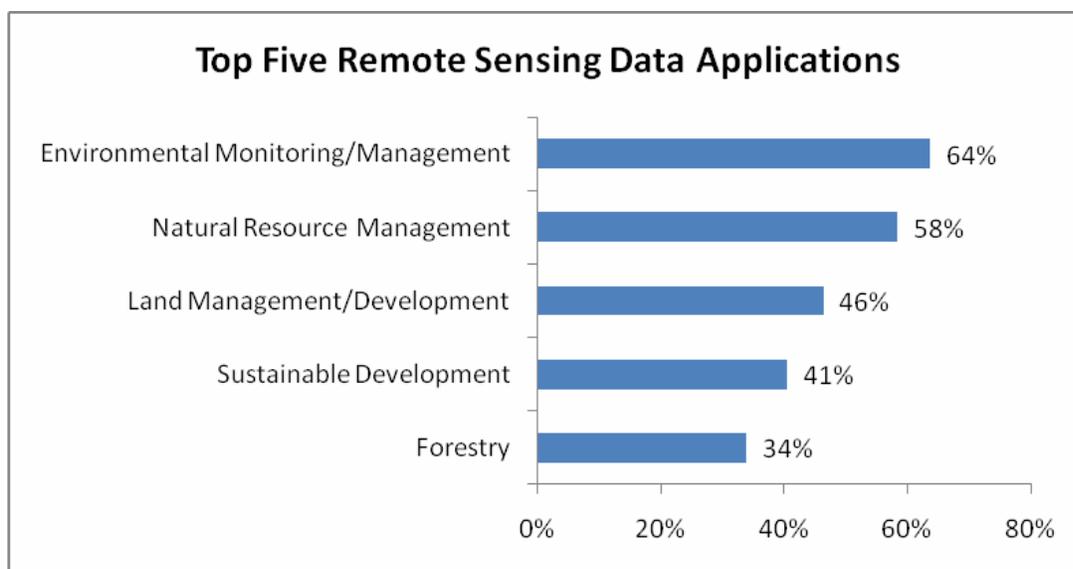


Chart 3: The top five applications selected in the survey reflect a strong desire to use remote sensing data to better manage the environment and natural resources.

In response to the question about their primary GIS software, ESRI was clearly the front runner in all sectors, with 65% of the respondents selecting ESRI. ESRI supports the remote sensing industry in Africa by hosting annual User Group Conferences. In October 2008 the ESRI Europe, Middle East and Africa User Conference was held in London, England. It provided the opportunity for attendees to learn about the use of GIS in nine different markets, including Utilities and Telecommunications.

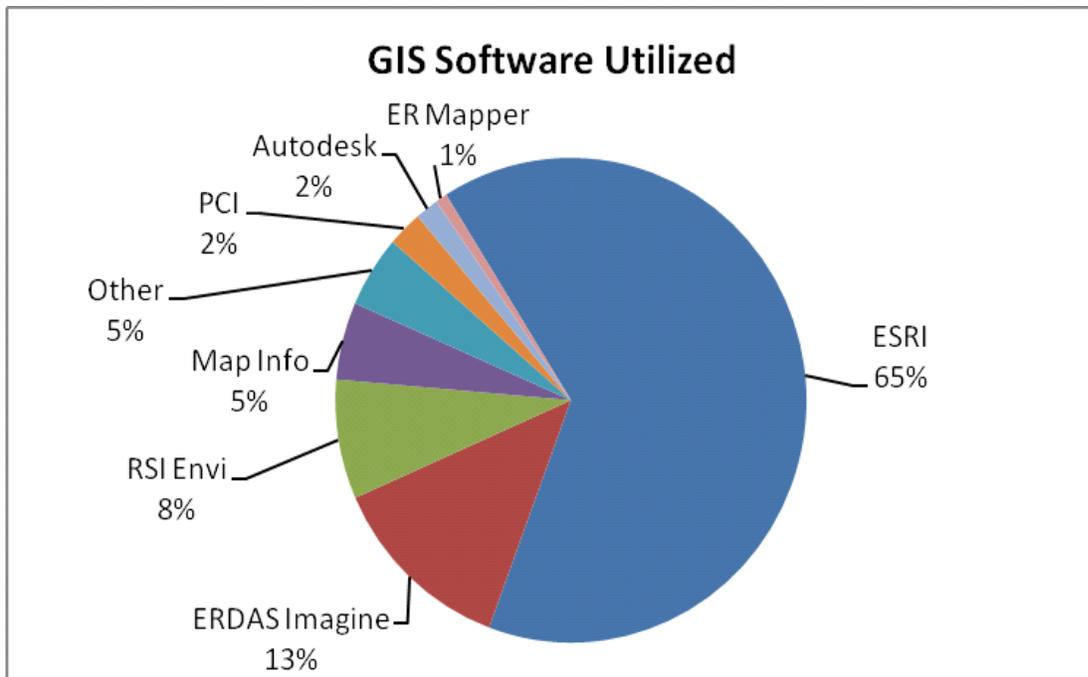


Chart 4: Nearly two-thirds of the respondents use ESRI as their primary GIS software.

Africa Compared to Western and Asian Remote Sensing Studies

In September 2005, Global Marketing Insights released a report titled *Survey and Analysis of Remote Sensing Market—Aerial and Spaceborne* based on 1,547 survey responses and 250 personal interviews from the US, Canada, Europe, Australia, South America and Central America. In February 2007, it released another report that concentrated on the Asian Remote Sensing market based on 408 completed surveys and 50 personal interviews.

The same questions about the impact of technical advances and political, economic and environmental trends were asked on the Western, Asian and African surveys. A general observation is that the Western respondents ranked more sophisticated advances, such as Technology Integration, higher than the Asian and African respondents, who tended to focus more on improvements in the existing resolution and accuracy.

Interest in Remote Sensing Data Becoming a Commodity appears to be universal throughout the remote sensing industry, regardless of geographic location. It was ranked highest or second highest by all sectors in all regions. In the Western study, Homeland Security ranked first for the Government sector. Global Warming was ranked as the most important trend by the Academic sector in Asia.

The primary application of remote sensing data in all regions was Environmental Monitoring/Management or Natural Resource Management. One notable difference in applications—over half of the African Government respondents listed Sustainable Development as a primary application, compared to only 24% of the Western Government respondents and 28% of the Asian Government respondents.

Key Indicators in Africa Study

The increasing global interest in the remote sensing and geospatial data industry in Africa will no doubt help to accelerate its development over the next five to ten years. As more organizations assist in the acquisition of data by African remote sensing professionals, their ability to monitor and manage their own surroundings with geospatial technology will improve. Better internet and telecommunication networks are already revolutionizing the industry by making data, training and research more easily accessible. Data usage has moved beyond basic data production and is delving into more advanced applications of value-added imagery products. The ongoing challenge for this part of the world is funding for quality data, training, software and hardware.

Over half of the African respondents selected Remote Sensing Becoming a Commodity as the trend to have the most impact on their use of remote sensing over the next five to ten years. This demonstrates that they are expecting the volume of data available to increase while prices decrease.

This reality is being hastened by the number of imaging satellites that have been launched in the past few years, and that are scheduled in the years to come. The African countries of Algeria, Egypt, Morocco and Nigeria each have successfully operated an earth observing satellite. The RapidEye constellation of five satellites, launched in August 2008, just announced the start of commercial operations in February 2009. The German system is capable of collecting 4 million sq km per day at 6.5 m GSD. Planned for launch in fall 2009, TanDEM-X is a German satellite that will fly in close formation with the currently operational TerraSAR-X to create a high-resolution global digital elevation model in the years to come. This could provide a wealth of data to the remote sensing industry in Africa, where adequate DEMs are lacking in many areas.

Next Steps

In addition to the USGS in order to better provide support for Earth Science project implementations in Africa, the 2008 Africa Remote Sensing Study is currently utilized by the Bill and Melinda Gates Foundation, ESRI, National Geospatial-Intelligence Agency. The next phase of this remote sensing study which began in 2005 with the US, Canada and Europe, continued in 2007 with Asia will now focus on South America.

This research will follow the same format as previous research and includes a five and ten year analysis of the Political, Economic, Environmental and Technical Trends impacting the South America Remote Sensing industry; Academic, Commercial and Government Users. A key segment of this research will be completed by collecting information from respondents on-line. The surveys not only collect key trend information impacting the remote sensing industry, but collect applications usage, and user data needs concerning Aerial Film, Aerial Digital, Aerial Sensors, and Satellite data as well.

The 2009 South America Remote Sensing Research surveys can be accessed by logging onto <http://www.empliant.com/SouthAmerica-remote-sensing-research> . A respondent simply clicks on the appropriate link based on their background in order to complete this brief survey. These surveys are targeted to the commercial end users and producers of these technologies; as well as academic and government users of remote sensing technologies. The final research project will be publicly available in 2010.

References

GIS Professional. *GIS in Africa Survey*. Issue No 24, October 2008, page 39.
www.gisprofessional.co.uk

Global Marketing Insights Inc. NOAA. *US, Canada, Europe Survey and Analysis of Remote Sensing Market Aerial and Spaceborne*. 2005 – 2015. www.globalinsights.com
<http://www.globalinsights.com/NOAA%20Remote%20Sensing%20Survey%20Analysis%20Locked%20NOAA%20PDF.pdf>

Global Marketing Insights Inc. NOAA. *Asian Survey and Analysis of the Remote Sensing Market Aerial and Spaceborne*. 2006 – 2016. www.globalinsights.com
<http://www.globalinsights.com/2006%20ASIA%20Remote%20Sensing%20FINAL%20Two%20Column.pdf>

Global Trends: NIC 2010 and 2015
http://www.dni.gov/nic/special_globaltrends2010.html#contents#contents

NASA and USAID Bring Earth-Observation Benefits to Africa Release: 08-307
http://www.nasa.gov/home/hqnews/2008nov/HQ_08-307_SERVIR-Africa.html

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