

NOAA Sponsored 2005-2015 International Remote Sensing Research Overview

Paper Number: 1045

Dr. Shawana P. Johnson
President

[Global Marketing Insights, Inc.](#)

6801 Brecksville Rd. Ste. 206

Independence, OH 44131

216-525-0600 phone

shawana@globalinsights.com

www.globalinsights.com

Abstract

Under a contract with the U.S. National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service Division, Global Marketing Insights, Inc. completed a comprehensive research study of international remote sensing markets for aerial and satellite data technologies.

This study includes a five- and 10-year analysis of the political, economic and technical trends impacting the remote sensing industry globally. A key aspect of this research was accomplished by on-line research surveys. The surveys encompass political and economic trend information impacting the remote sensing industry, as well as technology information concerning the Aerial Film, Aerial Digital, Aerial Sensors, Satellites, and Remote Sensing Hardware and Software sectors.

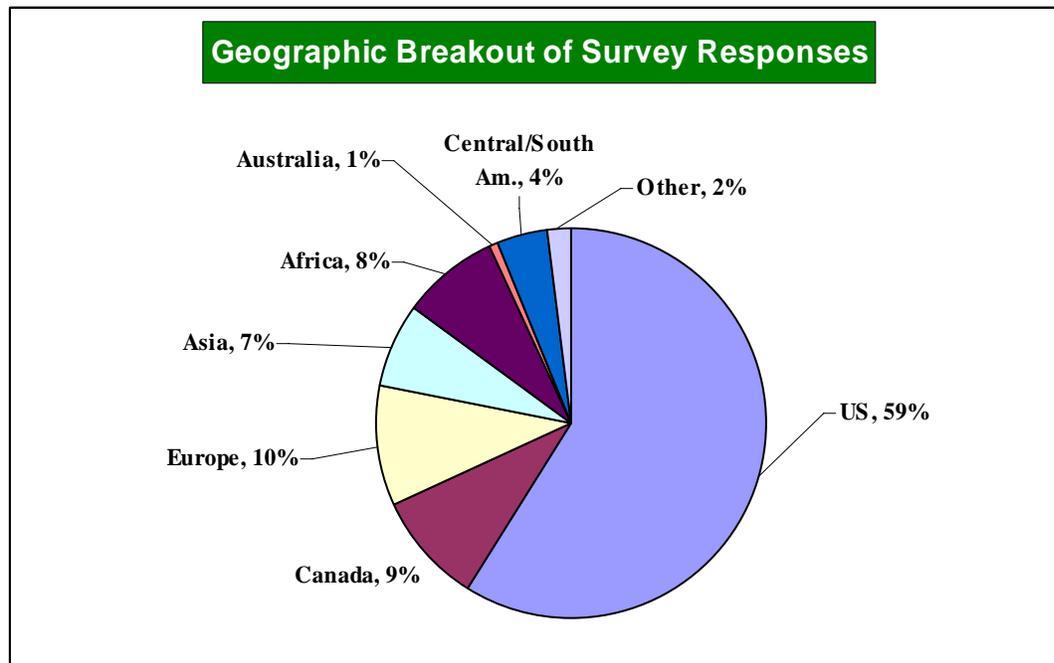
Over 1547 survey responses were completed on-line representing North and South America, Europe, Asia, Africa, and Australia. 250 personal interviews were also conducted.

This presentation provides the research highlights of the technology and trend findings.

Research Supports Growth Predictions in Industry

The future of geospatial technologies is looking better than ever. In a comprehensive review of the international remote sensing market for aerial and spaceborne sensors and associated geospatial technologies, growth of the industry over the next decade looks strong, with the Satellite sector expecting large demand internationally, and the Aerial Digital sector predicting the highest revenue growth of all the sectors worldwide.

Conducted by the National Oceanic and Atmospheric Administration, the study includes over 1,547 online surveys and 250 personal interviews. The surveys and interviews provide a sample from the following eight remote sensing project sectors: Aerial Film, Aerial Digital, Aerial Sensor, Satellite, Software/Hardware Providers, Commercial End User, Government End User and Academic End Users. Although the survey was focused on the U.S., Canada and Europe, the survey results also represented global input, with respondents from Africa, Asia, Australia, Central America and South America.



Of the 1,547 survey responses, 59% came from the US and 41% were international.

In addition to the remote sensing technology data usage, and budgetary data collected this study also includes a 5- and 10-year analysis of the political, economic and technical trends impacting the remote sensing industry globally. These factors will shape the development of the industry by influencing end user demand for data, data availability, pricing, and applications.

Technical, Environmental, Economic and Political Trends Impact Industry Development

All of the respondents were asked to identify the Technical Advances they see impacting their businesses in the years 2010 and 2015. In 2010, Technology Integration, Greater Ground Resolution, and Greater Horizontal and Vertical Accuracy were the top three advances selected. In 2015, Greater Ground Resolution continued to be a primary concern, however, Greater Computer Processing Speed, and Better Processing Software were the second and third most-frequently selected trends.

There was more diversity in the top selections for the 2015 technical advances than in 2010. The Software/Hardware sector chose Greater Computer Processing Speed, and the Academic sector chose Continued Increased Channels and Bands. These selections reflect the specific interests of each sector. For example, the ability to collect more channels and bands in the imagery would provide new opportunities for research in the academic world, while the software/hardware industry is focused on the speed and efficiency of their products.

Based on the 1,547 survey responses, the Political, Economic and Environmental trends that are likely to have the greatest impact over the next ten years include National Defense/Homeland Security, Endangered Species/Natural Resources/Heritage Protection, and Global Warming. Some of these trends could have negative effects on certain sectors, while having positive effects on others. It depends on whether the respondent is *producing* data and services or *using* data and services. For example, the increased interest in homeland security may result in restricted access data distribution, but the demand for data from the government will spur growth among data providers.

The geographic comparisons between sectors indicated more pronounced differences in the Political, Economic, and Environmental trends than in the Technical Advances. The US and Canada were most concerned about National Defense/Homeland Security, while the other sectors were split geographically between Remote Sensing Data Becoming a Commodity, Required Cadastral Mapping, Expansion of the European Union and Licensing Issues.

Geospatial companies throughout the industry will need to take into consideration trends in all of the areas mentioned and assess for themselves how to best meet the needs of their domestic and international customers.

Government and Commercial Usage of Data and Software Continue Upward Trend

Since government agencies represent a significant revenue source for many geospatial companies (and were also the largest sector responding to the survey, globally), the government sector was broken out by government units—Local, State/Provincial, Federal/National Civil, and Federal/National Defense—to provide added visibility into their needs. In 2010, Local, State/Provincial and Federal/National Defense selected National Defense/Homeland Security as having the largest impact on the way in which they operate. In 2015, the emphasis changed somewhat for the State/Provincial respondents. They selected, along with the Federal/National Civil unit, Global Warming and Endangered Species/Natural Resources/Heritage Protection as the most important impacts.

In 2010, 32% of Federal/National Defense respondents, 20% of Federal/National Civil, 13% of State/Provincial, and 18% of Local predicted budgets of \$50,000 or more. There was a slight increase in budgets projected by 2015, with the most significant change predicted by State/Provincial respondents which could represent the U.S. and Canadian government expectations for continued budget increases for Homeland Defense/ National Security programs.

Government Unit	% with Budget \$50,000 or More	
	2010	2015
Federal/National Defense	32%	34%
Federal/National Civil	20%	21%
State/Provincial	13%	18%
Local	18%	19%

Federal/National Defense agencies have the largest budgets throughout the government sector; however the number of State /Provincial budgets over \$50,000 is predicted to grow by 5% in 2015.

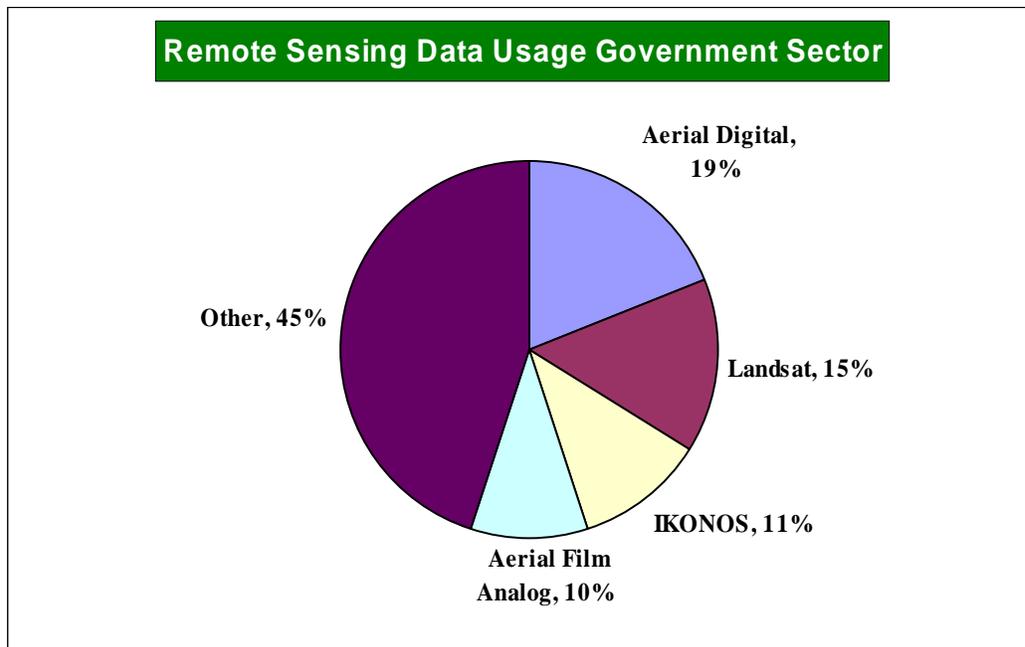
To indicate potential demand for geospatial data, sectors were asked to select which types of data they use from over twenty five choices. Among the Academic, Government, and Commercial sectors, the top three types of data selected as most used were GIS Data, Processed Imagery, and Digital Orthophotos. These types of data are commonly used in a variety of GIS applications, such as municipal planning, vegetation analysis, and transportation management.

Geospatial Data Usage	Commercial	Gov't	Academic
GIS Data	90%	90%	87%
Processed Imagery	80%	78%	79%
Digital Orthophotos	73%	75%	67%

Familiarity and easier accessibility makes use of these types of geospatial data the most widespread.

The least used types of data are Unprocessed LiDAR and Unprocessed Hyperspectral, with usage percentages ranging from 11% to 22% in all of the sectors. These findings are in line with the fact that these data sets are still somewhat new and processing LiDAR and Hyperspectral data requires different training and technology.

Raw imagery usage ranged from a high of 65% (Academic) to a low of 45% (Government). Unprocessed imagery is more appropriate for use by academics in research, while government employees are more likely to purchase processed data to use in their project applications.



19% of government end users purchase digital aerial imagery with Landsat and IKONOS the most often purchased satellite imagery selected from over twenty satellite choices.

In responses about software preferences, ESRI was clearly the software of choice, not only for the government end users, but in all sectors and in all geographic areas. ESRI response rates averaged 87.3% across all sectors, and 86% among government end users.

Most Frequently Used Software	% Response
ESRI	86%
AutoDesk	25%
MapInfo	16%
RSI ENVI	14%
Other	15%

Among government end users, 86% of respondents most frequently use ESRI software.

Strong Growth Predictions in All Remote Sensing Sectors

Overall, the aerial and spaceborne sectors indicate steady growth during the coming decade. The Aerial Digital, Aerial Sensor, Aerial Film, and Satellite sectors were asked to project their revenues in 2005, 2010, and 2015, broken out between US and international sources, and by department and company. The Aerial Digital respondents predicted particularly strong revenue growth, with 26% of the respondents selecting the US company revenue category of “greater than \$10 million” in 2005, increasing to 58% in 2015, and 25% selecting the international company revenue category of “greater than \$10 million” in 2005, increasing to 44% in 2015.

The companies in the Aerial Digital and Aerial Sensor sectors overall selected larger revenue levels than Aerial Film and Satellite. By the year 2010 the Aerial Digital and Aerial Sensor sectors project an increase in market demand for their products and services, as indicated by increasing revenue and employee projections.

The international market is a key market for the Satellite sector. In 2005, 22% of the Satellite sector respondents selected the international departmental category of “greater than \$5 million” in revenue, and 30% of the respondents selected the international company revenue category of “greater than \$5 million.” However the Aerial Digital sector projects an increase in international activity, so by 2010, their percentages of high-earning departments and companies are similar to those of the Satellite sector.

Future Technology Impacts and Developments

The ongoing challenge in the remote sensing industry is to make high quality data accessible to more users—for an affordable price. The use of maps, aerial photos, and digital aerial and satellite imagery has already evolved dramatically during the past three decades—from primarily scientific and academic applications to commercial use in the media and on the internet. Widespread consumer application of geospatial data has evaded the remote sensing industry thus far, but there are several technology developments that have the potential to broaden the access and use of geospatial data. NOAA focused part of their analysis on the impact of related geospatial technologies on the remote sensing industry over the next ten years with 250 personal interview respondents selecting the following top three impacts.

One way of increasing the supply of remotely sensed data is through increased use of microsattellites. Until recently, remote sensing satellite programs were thought to be too expensive for most developing countries (India being the major exception). However, advancements in microsattellite technology have made the cost more affordable, and a growing number of countries are acquiring their own satellites, many through technology transfers or collaborative agreements with academic research institutions in other countries. Developing countries benefit from the less expensive access to remote sensing assets. It is a matter of national pride to have a space program and allows workers to be trained to establish a new high-tech industry, while also providing some independence from foreign data sources.

Advances in the development of microsattellite technology may begin to address the recurring concern of the survey respondents for greater revisit capability of satellites to insure greater data availability at reduced prices.

Remote sensing technology developers have also refined the use of the spectrum to expand detection limits in wavebands, spectral resolution, and spatial resolution. Spectral imaging involves dividing the electromagnetic spectrum into narrow spectral bands, primarily in ultraviolet, visible, and shortwave, mid-wave, and long-wave infrared. Multispectral imaging provides few bands, hyperspectral more bands, and ultraspectral many bands. Spectral imaging data allows extraction of features not detectable in conventional imagery.

As developments in hyperspectral and advanced imaging technologies continue they are likely to yield a cross-fertilization of technologies that will also find their way back into the traditional remote sensing arena. As part of the entire imaging science field, remote sensing can be expected to continue to grow and expand its overall customer base as these technologies are incorporated and new applications emerge from their use.

Just in the past few years, the value of remotely sensed data has been recognized by several heavy-hitters in the web services/search industry. Microsoft and Google, with combined annual revenue of over \$42 billion, have developed online mapping services called “MSN Virtual Earth” and “Google Earth,” respectively. The competition to capture the loyalty of consumers through fast, easy, up-to-date keyword searches linked to geographic data and maps has advanced awareness and demand more than any other trend recently. Others like Yahoo Maps have also recently entered the line up to provide online mapping services.

Microsattellites, hyperspectral and advanced imaging, and online mapping services are just a few of the technology improvements focused on broadening the access to and use of geospatial data. Combining improved data capabilities and lower cost data with mapping tools that are more user-friendly are a few of the ingredients needed for demand to grow from areas outside of the traditional mapping market, thereby helping increase the size of the entire remote sensing industry.

NOAA Continues Remote Sensing Research to Focus on Asia

In addition to continuing to work with the previously collected survey data, NOAA will study the remote sensing industry trends and activities in more than 20 Asian countries, including Australia.

“With so much business activity now occurring in the entire Asian region, it is a wise decision for NOAA to expand the remote sensing survey to include Asia,” said Kay Weston, Chief Satellite Activities Branch. The online survey which can be completed in less than 8 minutes is posted at www.empliant.com/NOAA-remote-sensing-research. The survey respondents should be individuals involved in the remote sensing industry within Asia or specifically doing remote sensing-related business in Asia. Additional Research Network Partners are being sought to host the survey website link on their sites and to initiate emails to their Asian databases encouraging respondents to complete the surveys. As with the previous study, Research Network Partners will be recognized in all the material relating to the study and will receive the first release of the study sometime in January of 2007.

Countries targeted by the survey include China, Japan, Russia, Mongolia, Hong Kong, Singapore, South Korea, Brunei, Philippines, Nepal, India, Bhutan, Bangladesh, Myanmar, Laos, Thailand, Taiwan, Cambodia, Vietnam, Malaysia, Indonesia, Sri Lanka, and Australia.

Global Marketing Insights, Inc. (the NOAA contractor responsible for the study) will collect online surveys from now through the fall of 2006 when data analysis will begin. The final report will be prepared and delivered to NOAA in late 2006. As with the current study, the results will be made publicly available.

Contact Sherry Loy in the Ohio Office, 216-525-0600, sherryloy@globalinsights.com, about being a Research Network Partner for the Asian study and for more information about custom analysis of the existing research data. The final report is also posted as a PDF for downloading by the public at www.licensing.NOAA.gov and at www.globalinsights.com.