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Courtesy of Space Imaging Inc

"With the launch of the IKONOS satellite in September 1999, we really have entered a new era of high-resolution, satellite remote sensing," observes Gene Dial, Director of Product Engineering at Space Imaging. "For the first time in history, we have a hi-res satellite available for anyone to use."

Careers in Geoscience and Remote Sensing

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The use of geospatial technology is changing the way business is conducted throughout the world. It is revolutionizing everything from air traffic control to forest management and mobile communication networks. Not surprisingly, the industry is experiencing solid growth: According to a 2004 survey published jointly by the American Society for Photogrammetry and Remote Sensing (ASPRS) and NASA, revenues in the geospatial information industry are projected to grow from $2.4 billion in 2001 to well over $3 billion in 2005. As the use of geospatial data increases across all market sectors, the industry is expected to grow by 9% to 14% per year beyond 2010. Advances in aerial and satellite-based imagery, geographical information systems (GIS), and Global Positioning Systems (GPS) are driving the boom.

Already, more than 170,000 people in the United States work in the geospatial information industry in the government, academic, and commercial sectors. Talk to folks in the geoscience community about career opportunities, and they'll tell you that job prospects in their field are good.

"Opportunities are definitely growing and the job market is looking good. I would put it on par with an engineering-type of degree concerning the job environment," says Karen Schuckman, President of the American Society for Photogrammetry and Remote Sensing in Washington, D.C. "It's definitely not a dot-com type of job, but if you're looking for a long-term future, the technology is really evolving quickly, creating more and more opportunities."

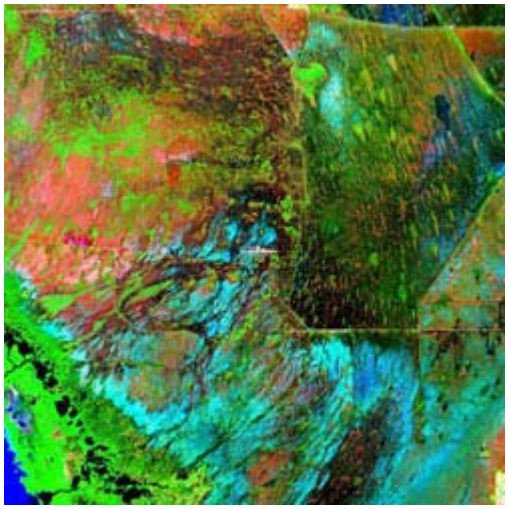

Image of the Florida Everglades taken by Landsat 7 satellite, February 2000(Courtesy: U.S. Geological Survey)

Satellite Imagery for Uncle Sam

Government agencies are the biggest users of this kind of data and service, with mapping, national defense, and global security among the most important current applications. Since 9/11, the United States Geospatial Intelligence Foundation and Department of Homeland Security have worked--and spent--to increase their capacity for aerial and space-based surveillance. "There will be a lot of sensors set up everywhere, detecting all kinds of nefarious activities," explains Schuckman. "We are going to need to know where all of these sensors are and their relationship to each other."

Even though GIS work is done all across the government--conducting emergency responses, collecting weather data, and assisting tactical maneuvers on the battlefield--a large portion of government GIS work is centered at NASA, USGS, and NOAA, where agency scientists study issues like land cover, global warming, and deforestation. But regardless of where in the government a geospatial worker is employed, Schuckman believes the work is likely to center on managing contractors and analyzing data.

Undergraduate Training

Given the current growth in the market, government and businesses are ready to hire, but finding well-trained employees and contractors has been a challenge in the past. Managers in the private sector surveyed by ASPRS/NASA alluded to ". . . a shortage of trained workers emerging from educational programs, and the lack of the required skill sets among many of the graduates." With some exceptions, only the larger universities offer remote sensing education because of the high cost of the technology and a shortage of expertise. Hoping to raise the professional bar, universities and colleges across the continent are starting to offer more remote sensing/GIS specific programs and hiring knowledgeable faculty.

To increase the number of properly trained workers entering the industry, new, concentrated 1-year educational programs are being put into place. Gaining in popularity are non-degree, supplemental certificate programs in geospatial sciences, designed for graduates of other disciplines who would like to get training. This can lead to technician positions within local or state government agencies or small mapping businesses. Entry-level work can include assisting in the design and implementation of new imaging and geospatial information procedures and systems. The ASPRS/NASA survey estimates that student enrollment in certificate programs has increased six fold in the last decade.

GIS/remote sensing courses are still easier to find, however, within degree programs in departments like geography, natural resource management, forestry, and civil engineering. Most workers in the GIS/Remote sensing field today have a B.Sc. in disciplines ranging from agriculture to meteorology. A few campuses, like the University of Georgia, have dedicated centers for applied geospatial studies. "Many people have another area of expertise, and they're looking at remote sensing and mapping to enable them," explains Marguerite Madden, Director of the Center for Remote Sensing and Mapping Science (CRMS) at the University of Georgia in Athens, Georgia.

Image of the Namib Desert in Namibia taken by Landsat 7 satellite, August 2000(Courtesy: U.S. Geological Survey)

"Undergraduate students coming out of here are getting pretty good jobs where they can be making starting salaries between $30 thousand and $40 thousand a year," adds Madden.

Graduate Training

At the University of Georgia, CRMS is located within the Department of Geography where the focus is on applying geospatial information to topics in ecology, forestry, geography, geology, and hydrology. Of 70 Masters- and Ph.D.-level students in the department, about one-third use remote sensing and GIS. The ASPRS/NASA survey indicates that in the U.S., the number of M.Sc. and Ph.D. graduates has nearly doubled in the last decade.

Many students enter advanced-degree programs with an undergraduate degree in one of these other disciplines and end up completing a M.Sc. or Ph.D. degree in geography. The ASPRS/NASA survey also shows that most workers entering the field today are coming in with degrees in geography; geology and environmental science are the second and third most popular undergraduate degrees. This type of cross-training, Madden says, where students learn how to use geospatial science tools in a variety of different areas, is sought by employers and usually translates into good jobs.

Those with graduate degrees land well-paid positions at resource agencies at state or federal governments, NGO's, or private consulting firms. A growing market for Ph.D. graduates is academia; more and more GIS experts are landing faculty positions at state universities or community colleges, in a variety of disciplines. In contrast to those departments at the University of Georgia, most departments at state universities and community colleges don't have staff trained to teach this field, making these skills a valuable commodity. "If you take a look at the jobs in academia, a lot of them want to see GIS and remote sensing coursework on resumes."

Making a Buck

Since the early 1990's, federal policies regarding civilian use of high-resolution satellite data have loosened up enough to allow commercial services to pop up. An entire market has emerged around acquiring and selling space-based remote sensing data and is attracting an increasing number of graduates.

Currently, three U.S. companies run high-resolution commercial Earth observation satellites: Space Imaging, Digital Globe, and Orb Image. The IKONOS satellite--the world's first commercial satellite with 1-meter spatial resolution--is owned and operated by Space Imaging. "With the launch of the IKONOS satellite in September 1999, we really have entered a new era of high-resolution, satellite remote sensing," observes Gene Dial, Director of Product Engineering at Space Imaging. "For the first time in history, we have a hi-res satellite available for anyone to use."

An explosion has occurred in the demand for aerial and satellite imagery, says Dial. While he sees a good mix of both platform types--airborne and satellite--used in the industry, aerial imagery is more economical and remains more popular with municipal and state level government agencies. Satellite imagery however, is vital in remote parts of the world, where it remains too difficult to fly planes.

When it comes to jobs in the commercial sector, Dial believes that opportunities are not limited to companies who own satellites and aerial platforms. Third-party firms buy the data and software from larger companies like Space Imaging, and deliver their own product. "There's many 'value added' shops that buy the raw imagery from us and do the mapping and analysis," adds Dial.

Ground Floor

At Space Imaging, many applicants for jobs in their Production division, where they create image-based products for customers, have bachelor's degrees in geography with specific training in remote sensing. In the Engineering division--where new products and technologies are developed and customized--most of the scientists have advanced degrees in fields ranging from computer science to mathematics to engineering. They develop software and work on advancing the technology of remote sensing.

For those wanting to break into the business side of the industry, Dial suggests reading some of the trade publications and GIS magazines. In many cases, the magazines will reveal who's getting contracts and therefore who's hiring.

A great way to stay informed about the latest in student funding, education, and training, as well as the current trends in all job sectors, is to join the American Society for Photogrammetry and Remote Sensing. Based in Washington, D.C, this scientific society represents GIS-related employees and entities in education, industry, and government. Its main goals are to offer technical education on specific products and technologies through workshops and publications, and provide an open forum for networking through regional and national conferences, where issues concerning the geospatial science community are openly discussed.

For students looking for their next career opportunities, says Schuckman, it is vital to attend conferences, get to know who the big players are, and get yourself known in the industry. "These are jobs that you don't find in the newspaper or on Monster.com; these are jobs that you have to know the people and network," says Schuckman.

Geospatial Science Web References

U.S.-based leading satellite imagery firms

- Space Imaging
- Digital Globe
- Orbimage

Government agencies

- NASA- Remote Sensing Portal
- Geospatial Intelligence Foundation
- U.S. Geological Survey - Geography

For a listing of programs, grants, and jobs in over 50 universities and other institutions across the U.S., check out the University Consortium for Geographic Information Science (UCGIS)

Read ASPRS/NASA 10 Year Industry Forecast Survey

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