

GEOSPATIAL INFORMATION PRODUCTS FOR COMMERCIAL AND CONSUMER MARKETS

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ABSTRACT

The challenge of translating high technology, satellite imagery into geospatial products that can be used by market niche commercial and consumer end users requires that the image science portion of the product be completed prior to the integration of the product into the end user's application. ORBIMAGE is currently operating two imaging satellites, OrbView-1 and OrbView-2, and is in the process of building two more satellites for launch in second quarter 1999, and early 2000. OrbView-3 will have one meter panchromatic and four meter multispectral imaging capability, and OrbView-4 will add eight meter hyperspectral imaging in addition to the high resolution panchromatic and multispectral capability. The vast majority of end users neither have the technical ability nor then desire to perform geometric and radiometric operations on the imagery, but instead, need geospatial information input into their own applications. To accomplish this objective, ORBIMAGE has developed OrbNet, an integrated architecture of on-site processing and strategic VAR partnerships to create market niche products. Distribution of these products is accomplished via Internet, overnight shipments, satellite communications, and by facsimile transmissions as defined by end user requirements. The first phase of this architecture is now operational.

1. INTRODUCTION

Information, not imagery, is the key to the successful integration of remotely sensed products into the commercial and consumer markets. End users of geospatial information rarely understand or care about the sources of the information. They are not photogrammetrists, image analysts, or cartographers. They are insurance analysts, real estate developers, agricultural consultants, city planners, hikers, and the like. They choose not to spend the resources to learn the technologies that drive the production of geospatial information. They are too busy doing their own job. And they do not have the luxury of trying to make sense out of incomplete information.

Commercial and consumer users of geospatial information require easy to use, and easy to understand products that are usually derived from a variety of sources such as different image types, elevation data, property and zoning boundaries, ground samples, etc. The more that these diverse data types can be combined into a single useful product, the more it will be used. And rarely will all of the information required by the commercial or consumer end user be found in a single image source.

In order to support the commercial and consumer market customers, tools are required that accurately geoposition and co-register imagery from multiple sensors, derive information from multiple sources, and create products that are tailored for niche market applications.

For example, the OrbView-2 high definition colour imaging satellite provides for the first time, daily global colour coverage of the entire earth. Research scientists are using this one kilometre resolution imagery to prepare daily, weekly, and monthly global maps of landmass vegetation and ocean colour. But commercial users need

information that has been processed to a higher degree of information extraction.

ORBIMAGE has created its OrbNet Data Processing System that has been designed as an electronic hub to receive raw imagery, to perform system corrections, to create various levels of information products, and to rapidly distribute the products either to Value Added Resellers (VAR's) for enhanced product generation, or directly to end users who have highly critical time-dependent applications. After the information products have been created, they are catalogued on OrbNet for world-wide web-based electronic browsing and ordering.

2. SEASTAR FISHERIES INFORMATION SERVICE

ORBIMAGE's SeaStar Fisheries Information Service is the first of its kind in the world. It uses imagery gathered from the OrbView-2 satellite to create Fish Finding Maps that display the ocean's changing surface colour. These subtle variations in ocean colour, stretching for hundreds of miles, indicate the boundary between phytoplankton-rich water and deep, clear-water areas where surface dwelling fish such as tuna, mackerel, and swordfish normally feed. Using the daily Fish Finding Map, a fishing vessel's search time for productive fishing areas is minimised, thereby reducing fleet costs and improving operating efficiency. Commercial fishing vessels spend 80% of their time at sea looking for fish such as tuna. But ocean colour imagery that depicts phyto-plankton boundaries, combined with sea surface temperatures, provides the necessary data to delineate high probability of fish areas.

ORBIMAGE oceanographers interactively combine ocean colour information from OrbView-2 along with temperature data derived from the Advanced Very High Resolution Radiometer (AVHRR) satellite imagery to

generate fish finding maps within 18 hours of image acquisition.

Currently, several fleets of fishing vessels are receiving SeaStar Fish Finding Maps. On a daily basis, ship captains e-mail or fax requests for fish finding maps for the next day's fishing directly into OrbNet. By 6:00 a.m. local time, the Fish Finding Maps are transmitted directly to the fishing vessels' on-board personal computers via the INMARSAT global satellite communications network. The end user never sees a satellite image, only the fish finding map. Very "high-tech" satellite imagery is converted to a very "low-tech" product that is yielding highly valuable results.

Using display software provided by ORBIMAGE, the fishing vessel captain is provided with the most up-to-date image-derived products over the Atlantic, Pacific or Indian Oceans. In addition, ORBIMAGE's oceanographers provide recommendations for the most productive fishing areas. The maps are also available via facsimile transmission or over the Internet at <http://www.orbimage.com>.

3. THE NEXT PHASE

As additional markets are defined, and as newer satellites become operational, OrbNet will be expanded to process and distribute imagery and image-based products to support customers in a manner similar to that of ORBIMAGE's SeaStar Fisheries Information Service.

Beginning in 1999, the launch of high resolution satellites such as OrbView-3 will provide global coverage in three days or less with one meter panchromatic and four meter multispectral imagery. And in the year 2000, OrbView-4 will add one meter panchromatic, four meter multispectral, and eight meter hyperspectral imagery to the mix. These two satellites alone will offer the ability to image anywhere on the earth every day.

In addition to the high resolution satellites, a number of medium resolution panchromatic, multi-spectral, and Synthetic Aperture Radar (SAR) satellites will be in orbit. And one must not forget that satellite platforms are not ideally suited to satisfy certain imaging requirements such as very long corridors, and broad areas at high resolution that must be acquired on the same day. New digital aerial sensors are being developed that compliment the satellite platforms.

Using the array of commercial satellites and aerial sensors, OrbNet will have the flexibility to acquire what imagery is needed, where it is needed, and when it is needed. And the system will also be able to process imagery from multiple sensors in an efficient and accurate manner. Single sensor processing systems will find little utility in this age where current and accurate information takes precedence over "pretty" pictures. OrbNet will use image formats and metadata that conforms to international standards so that the imagery can be ingested into sensor independent processing and display environments. OrbNet will offer images and metadata in a form that VAR's can use in multi-sensor solutions, rather than trying to prohibit

the use of competitor's imagery by forcing VAR's to accept image products that have been processed to such a degree that they have proprietary formats or are unsuitable for multi-sensor processing.

ORBIMAGE feels that it is critical to utilize the on-going expertise of market specific VAR's in understanding what information products are required to support commercial and consumer users. Many new types of information products can be built from this new class of sensors. It is incumbent upon the VAR's to take an active role in translating user needs to image acquisitions and processing developments.

4. THE FUTURE

The remote sensing community is moving from the traditional model of selling images of predefined footprints to one where world-wide autonomous sensors can generate automatic image tasking requests to be relayed via Low Earth Orbiting communication satellites to imaging satellite command and control centres. The sophisticated photogrammetrist and image analyst will still be needed, but will have a much smaller role as more and more processes become automated.

VAR's and developers of processing systems must be challenged to provide the conduits between the source data and the user information. For many applications, the time between image acquisition and information usage is critical. As the resolution of the imagery improves, the perishability of the imagery increases. Systems and products are being developed that are designed to support commercial and consumer markets on a subscription basis so that current information is always available.

The commercial high resolution satellite era has arrived. The processing, product generation, and distribution mechanisms required to satisfy information demand must keep pace with the source in order to create a sustainable marketplace.

