



**Agriculture, Climate and Environmental Monitoring**



**Space technology innovation and utilization supports Florida's more than nine million acres of farmland, influences many more millions of square kilometers of ocean and wetlands and opens an amazing window on Florida's future.**

**Inward focus on the Earth creates a unique capability to collect highly valuable, marketable data on climate and the environment, and provides research advantages in the areas of food production. Remote monitoring of ocean and marine life, forecasting crop yields, collecting data on water quality issues and gauging environmental conditions and trends can help agribusiness create more productive, sustainable and profitable operations.**

**The Market Horizon**

Florida's leadership in core industries of agriculture, life sciences and environmental custodianship is poised to fully intersect with aerospace sectors to provide astounding opportunities for research, business development and environmental monitoring. In the areas of Earth observation, data collection, modeling and research, we can establish the state as a world leader in related sciences and industries using satellite technologies and the International Space Station as a National Laboratory.

For the U.S. Department of Agriculture and others, the ISS offers access to a micro gravity environment for ground breaking biotechnology and biomedical discoveries. The ISS National Laboratory is outfitted with "Ag-Cam"—a multi-spectral camera delivering remote observation benefits direct to Florida agribusiness (and others across the globe). Innovation in electronics for small satellites is paving the way for the collection of improved data of increased variety at more frequent monitoring intervals and significantly reduced cost.



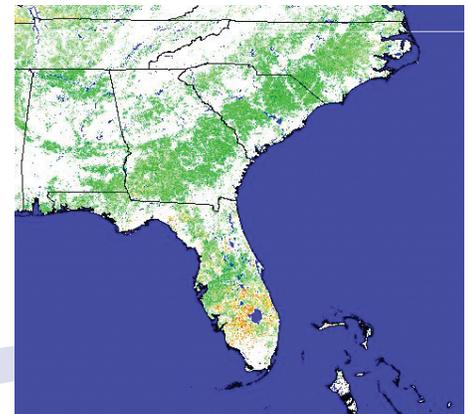
Earth observation from space helps us understand the U.S. Exclusive Economic Zone (EEZ), a marine area stretching outward to 200 nautical miles, designated for exploration and use of valuable marine resources. Florida is positioned to offer innovative and comprehensive approaches to fisheries management and other solutions supported by space programs in the maintenance of this 11 million square kilometer national economic and ecological resource.

**Timing**

- Within 24 months: Sustainable activity built on existing assets can be obtained
- Within 24-36 months: Activities by federal agencies such as NOAA, National Marines Fisheries Service, DoD and NSF can be captured
- ISS will be open as National Lab sometime after 2011

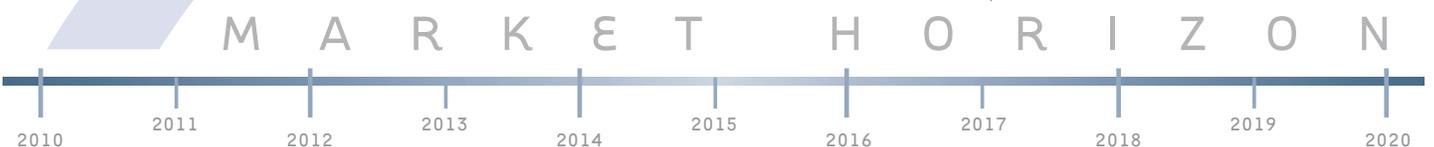
**Florida's Edge**

- Florida has more than nine million agricultural acres that produce in excess of \$7 billion in products annually
- Florida has tremendous agriculture and marine shoreline test beds for research and end-user programs.
- Wetlands monitoring is becoming crucial to climate and agriculture interests: activities in these areas will require launch vehicles, ground operations and ongoing research
- Florida has burgeoning biotech clusters and existing agriculture and marine R&D stature and capabilities
- Florida has extensive aerospace infrastructure including the science gateway to the ISS, the Space Life Sciences Laboratory
- Major state and international research partnerships can be built on Florida's existing capabilities, facilities and expertise



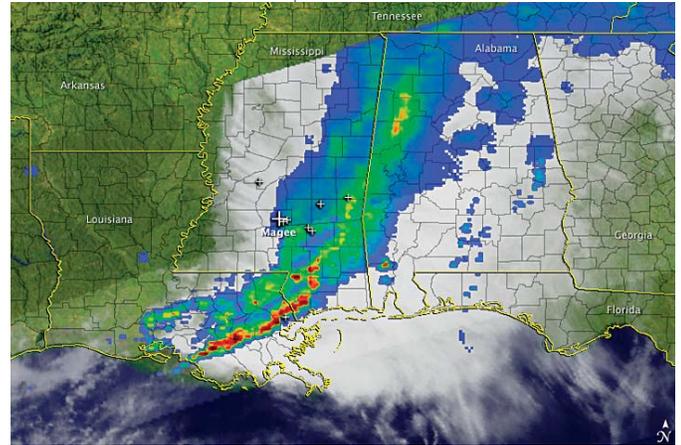
Normalized Difference Vegetation Index (NDVI) from the Spot 4 satellite's VEGETATION sensor allows the USDA and other organizations to monitor, trend and predict growth, seasons and production of crops throughout the nation. In this image, 10-day NDVI data is compared to the 7-year average and differences are indicated by color—green for an increase in vegetation, red for decrease. Image credit: Spot Image S.A.

Above left: Hurricane image as seen by NASA's Terra satellite's Moderate Resolution Imaging Spectroradiometer (MODIS). MODIS captures data in 36 spectral bands, allowing it to selectively view discrete meteorological phenomena, making it very helpful in weather forecasting. Image credit: Jeff Schmaltz, MODIS Rapid Response Team



**Targets for Florida**

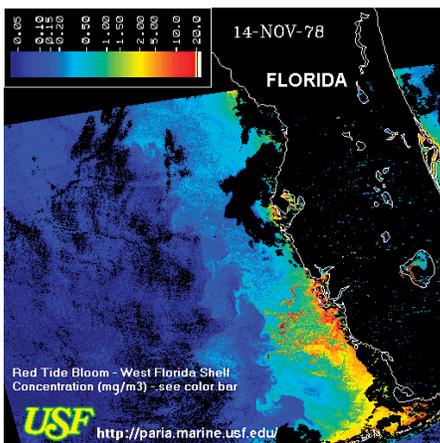
- Florida becomes the lead space-related agriculture business and research state
- Sizable return on investment in the Space Life Sciences Laboratory is realized
- Environmental data processing businesses cluster along I-4 Corridor
- New jobs and new investment associated with agriculture, environment and life sciences clusters emerge
- Florida agriculture interests show improved crop output, innovations in sustainable farming and increases in annual sales of the state’s agricultural products
- Florida’s EEZ becomes a focus of Earth observation research



The Tropical Rainfall Measuring Mission (TRMM) satellite, a joint mission between NASA and the Japan Aerospace Agency, measures precipitation, cloud properties and lightning. It is an important tool for accurately determining the spatial and temporal variation of tropical rainfall around the globe. In this image, the most intense storms are shown in dark red and the white crosses indicate tornado reports. Image credit: NASA

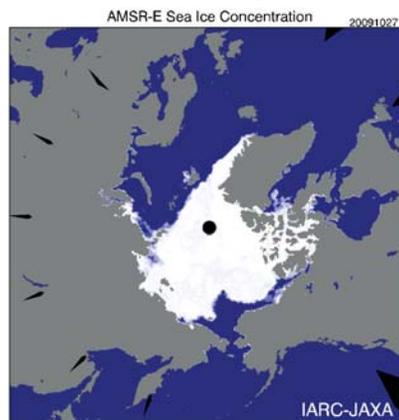
**Tactical Development Strategies**

- Promote continued agricultural research by UF and FAMU as only land grant agricultural universities in the state using the Space Life Sciences Lab with experience flying research on the International Space Station
- Facilitate university/industry working groups
- Coordinate program and proposal development among state entities
- Develop special incentives for space-related agriculture and environmental companies
- Aggressively market Florida assets to federal agencies, other governments and agriculture firms



The Remote Sensing Group at USF uses data obtained by satellite sensors to better understand the world’s oceans and apply that knowledge on a local, regional and global scale. The image here shows chlorophyll concentration on the west coast of Florida, which can be used to predict outbreaks of red tide. Image credit: Remote Sensing Group at USF

There are many ways to monitor climate change. This image shows arctic sea ice as measured by the Aqua satellite’s Advanced Microwave Scanning Radiometer-EOS. Scientists use this data to compare the shrinking and growth of polar ice to historical levels. Image credit: IARC-JAXA



**Space Florida** was created to strengthen Florida’s position as the global leader in aerospace research, investment, exploration and commerce. As Florida’s aerospace development organization, Space Florida is dedicated to attracting and expanding the next generation of space industry businesses. Created by the State of Florida as a special district in May 2006, Space Florida serves space-related functions in all three aerospace sectors: civil, military and commercial. Florida’s attributes include its superlative workforce, proven infrastructure and unparalleled record of achievement.

