

The University Consortium for Geographic Information Science

Research Priorities



INCORPORATING REMOTELY SENSED DATA AND INFORMATION IN GISCIENCE

THE PRIORITY

Over the past five years there has been an increase in the number and type of sensors, data availability, and potential new applications that can provide remotely sensed data and information for use in GIScience.

DESCRIPTION OF RESEARCH CHALLENGE

The science and technology of remotely-acquired data and information, often termed remote sensing, is a research theme that offers new potential for research and development in many innovative directions. In the last five years, this area has undergone a revolution in terms of the number and type of sensors, data availability, potential new applications, and governmental and commercialization activities. There has been a massive increase in our ability to acquire radiometrically sensitive, geospatially-referenced sensor data from aircraft, satellite and undersea instrument platforms. Furthermore, new innovations in sensor systems are being developed to exploit various types of acoustic and electro-

magnetic (EM) data, including interferometric radar, infrared detector arrays, thermal, LIDAR (LIght Detection And Ranging), and other laser illumination techniques. Many new sensors are being developed that acquire EM data in novel ways, such as the acquisition of hundreds of narrow band spectra, termed hyperspectral remote sensing.

The wide range of uses for remotely-acquired data is changing as well. In the past, most research efforts were on terrestrial landscapes, but the structure and composition of the atmosphere and hydrosphere of the Earth are being recognized as increasingly important to the quality of life and survival of humans. The submerged portions of our planet (71% of the Earth's total surface) are the focus of recent development of sophisticated sensors for ocean data collection and management. These sensors hold tremendous potential for mapping and interpreting the ocean environment in unprecedented detail.

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The UCGIS is a non-profit organization of universities and other research institutions dedicated to advancing the understanding of geographic processes and spatial relationships through improved theory, methods, technology, and data.

IMPORTANCE OF RESEARCH CHALLENGE

The increased capabilities of sensing from remote aerial and satellite platforms have increased the potential for surveillance that impinges on the constitutional rights of individual privacy. In a broader context, the transparency of remotely-acquired data across national borders has major policy implications that need to be recognized and analyzed.

EMINENT RESEARCH QUESTIONS

Can new methods be developed and tested by which advances in sensor systems, data sources and analysis procedures can be utilized with the other capabilities of geographic information science: global positioning systems (GPS), measuring systems, visualization, data mining, real-time geographic information systems (GIS), and other geospatial scientific advancements? Can the UCGIS develop and implement the capacity to serve as an unbiased evaluator of new sensor technologies, digital sensor calibration, and comparative data analyses? This capability is needed to ensure that informed use and procurement keep pace with the technological advancements. What are the social, legal and policy implications of new sensor surveillance capabilities as they relate to individual rights of privacy, social adjustments and global transparency? How can the conversion of military remote sensing assets to civilian uses in the environmental, agricultural, natural hazards and other domains be fostered? How can one or more existing data sources of modern ancillary geospatial data be leveraged to make the massive amounts of historical remote sensing data available for research on global environmental change?

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