

Multisource Data Modeling in Natural Resources and Land Cover Mapping

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Satellite remote sensing has long been applied in variety of mapping tasks. The spatial and thematic accuracy of satellite-derived mapping products, however, are usually less than satisfied. Many modeling procedures have been explored to improve the performance of using satellite data in mapping endeavors. With many recent launches of high spatial resolution space-borne remote sensors and rapidly growing high quality aerial remote sensing products, multisource spatial data modeling plays an increasingly important role in improved natural resources and land cover mapping. Integration of data from multiple sources, however, remains as challenge in both mapping practice and research. In this paper, challenges and solutions that we have experienced in multisource spatial data integration and modeling will be discussed. Case studies of natural resource mapping in metropolitan Chicago and land cover mapping in southern New England will be introduced. Funded by the National Aeronautics and Space Administration (NASA), the main objectives of the Chicago project were to: (1) develop a current vegetation map of the Chicago Wilderness to make quantitative goal setting possible for the region's Biodiversity Recovery Plan, and (2) to obtain patterns of land-cover changes and their impact on the vitality of natural communities under threat. Landsat Thematic Mapper data, digital multispectral videography data, GIS data, census data and associated ground references were applied to produce vegetation and land cover maps. Land-cover maps of the region in 1972, 1985, and 1997 were derived from multitemporal remote sensing data. Change detection analysis was conducted as well. Satellite images provide striking visual comparisons of land use and health, as well as banks of geographically referenced data to make quantitative tracking of trends possible. The data provide biological foundation of quantitative goals for regional biodiversity restoration. In the other effort, integration of multisource spatial data in land-cover mapping in the southern New England was explored. The data integration include the use of Landsat 7 Enhanced Thematic Mapper Plus (ETM+), Airborne Terrestrial Application Sensor (ATLAS) multispectral data, digital orthophoto, digital elevation model data, as well as recent land-use and land-cover map of the state derived from manual interpretation of aerial photos. With the ETM+ as the base data, the latest land cover map for the state of Rhode Island was obtained. It's approved that multisource spatial data modeling is the key in improved regional mapping efforts. Detailed modeling procedures and data analysis will be addressed in the full paper.