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Accuracy of Land Cover Maps Derived From Remotely Sensed Data

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Accuracy of Land Cover Maps Derived From Remotely Sensed Data

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STUDY SITE

INTRODUCTION

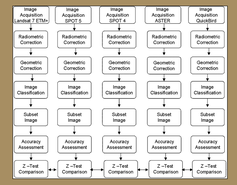
Accurate knowledge of land cover and land cover change is essential for a wide range of objectives. Since the 1970's, remotely sensed data have been used increasingly as a means to classify and characterize the earth's land use and land cover. This project compares the accuracy of results of classifying data from mid-level to very high spatial resolutions (Landsat ETM+, SPOT 4, ASTER, SPOT 5, QuickBird). Data from all of these sensors were classified for both urban and rural settings. The project examines accuracy levels between spatial and spectral resolution.

OBJECTIVES

Compare the accuracy of classified maps between satellites of varying spatial and spectral resolutions. Data include 30 meter (Landsat ETM +), 20 meter (SPOT 4), 15 meter (ASTER VNIR), 10 meter (SPOT 5), and 2.44 meters (QuickBird). Two tested hypotheses are:

1. H_0 – Spatial resolution of remotely sensed data does not affect the accuracy of classified maps.
2. H_0 – Spectral resolution of remotely sensed images does not affect the accuracy of classified maps.

METHODOLOGY



RESULTS

Spatial resolution results indicate that QuickBird, with the highest spatial resolution performed significantly poorer, in terms of providing accurate classification, than any other sensor with respect to the rural environment. It also was significantly worse than Landsat ETM+ in providing accurate classification in the urban environment. In terms of spectral resolution, the results when testing for accuracy in classification using only the three bands common to all sensors (green, red, near-infrared) there was essentially no difference between any of the sensors. This outcome supports the hypothesis that spectral resolution plays an important role in land cover accuracy more than spatial resolution.

DATA

Landsat ETM+, 8 bit, January, 2003

Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)
1 (Blue)	0.45 - 0.52	30
2 (Green)	0.52 - 0.60	30
3 (Red)	0.63 - 0.69	30
4 (Near – IR)	0.76 - 0.90	30
5 (Mid – IR)	1.55 - 1.75	30
7 (Mid – IR)	2.08 - 2.35	30

SPOT 4, 8 bit, January, 2003

Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)
1(Green)	0.50-0.59	20
2 (Red)	0.61-0.68	20
3 (Near-IR)	0.78-0.89	20
4 (Mid –IR)	1.58-1.75	20

ASTER VNIR, 8 bit, February, 2003

Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)
1 (green)	0.52-0.60	15
2 (red)	0.63-0.69	15
3 (near-IR)	0.76-0.86	15

SPOT 5, 8 bit, February, 2003

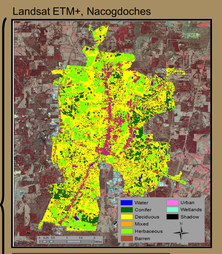
Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)
1(Green)	0.50-0.59	10
2 (Red)	0.61-0.68	10
3 (Near-IR)	0.78-0.89	10
4 (Mid –IR)	1.58-1.75	10

QuickBird, 11 bit, January, 2003

Spectral Bands	Wavelength Interval (µm)	Spatial Resolution (m)
1 (Blue)	0.45-0.52	2.44
2 (Green)	0.52-0.60	2.44
3 (Red)	0.63-0.69	2.44
4 (Near – IR)	0.76-0.90	2.44

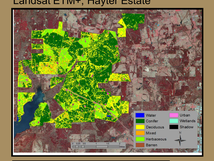
SPATIAL

Landsat ETM+, Nacogdoches



Error Matrix

Landsat ETM+, Hayter Estate



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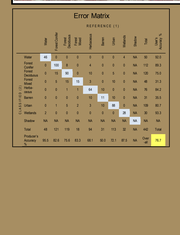
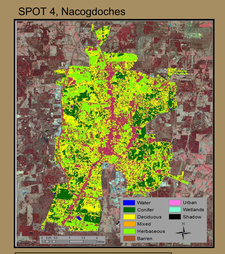


SPOT 4, Nacogdoches



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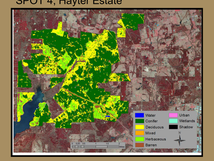

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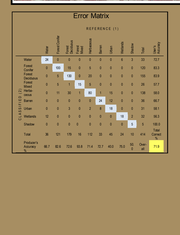
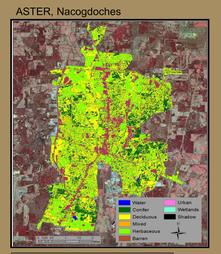


ASTER, Nacogdoches



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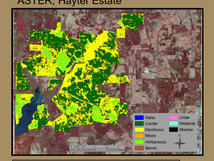

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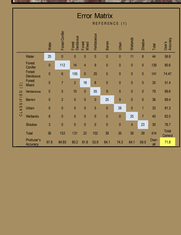
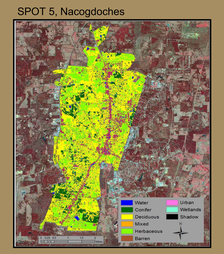


SPOT 5, Nacogdoches



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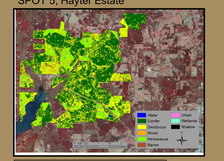

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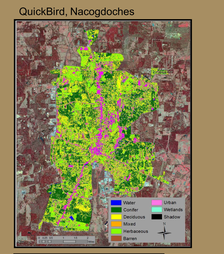
QuickBird, Nacogdoches



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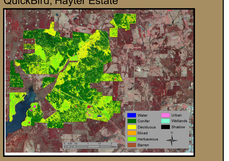
QuickBird, Hayter Estate



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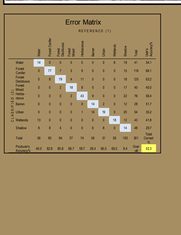
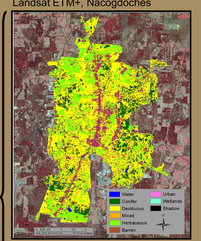


SPECTRAL

Landsat ETM+, Nacogdoches



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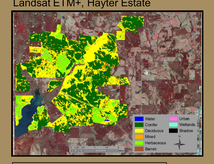
Landsat ETM+, Hayter Estate



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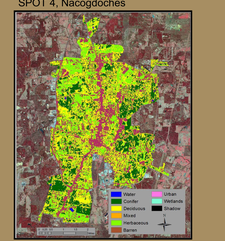
SPOT 4, Nacogdoches



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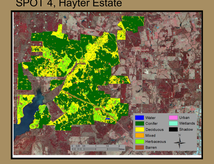

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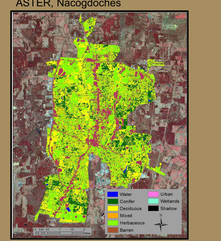
ASTER, Nacogdoches



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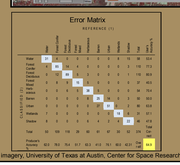

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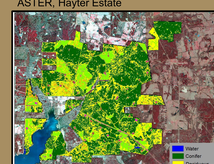

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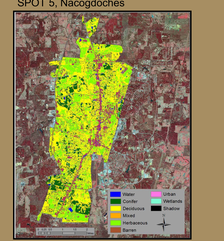
SPOT 5, Nacogdoches



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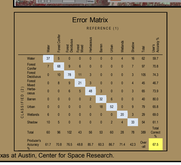

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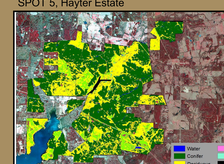
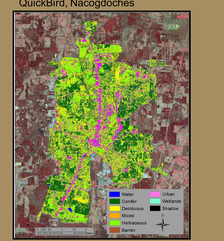


Error Matrix

QuickBird, Nacogdoches



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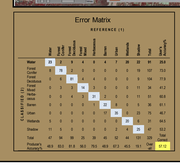
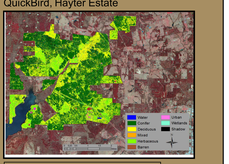


QuickBird, Hayter Estate



Error Matrix

Data source: Landsat ETM+ imagery, USGS; SPOT 4 imagery, Stephen F. Austin State University, Forest Resources Institute; ASTE R imagery, University of Texas at Austin, Center for Space Research, SPOT 5 imagery, Stephen F. Austin State University, Forest Resources Institute; QuickBird imagery, University of Texas at Austin, Center for Space Research.

March 27, 2003
Posted P. Dragon