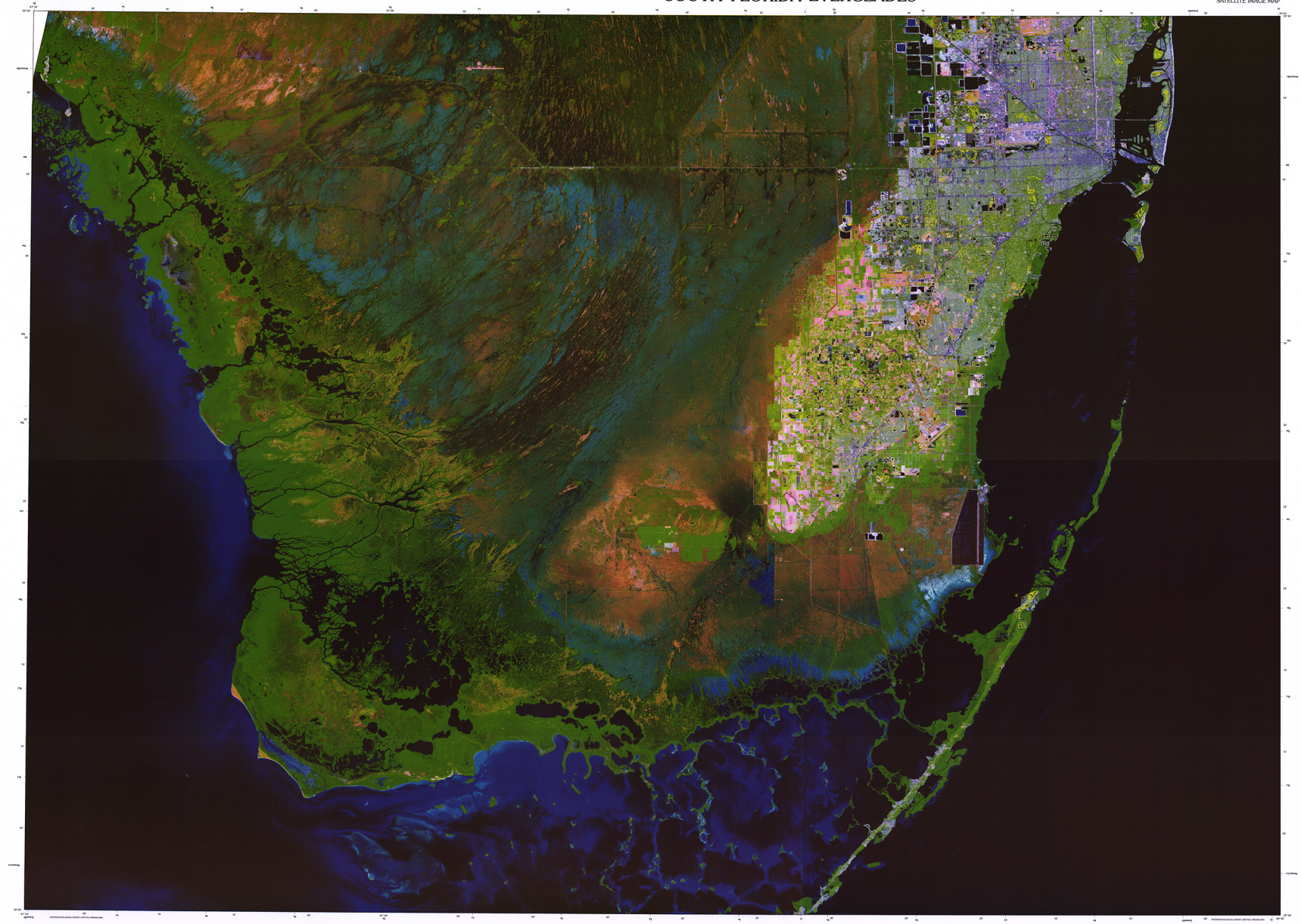
USGS science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

SOUTH FLORIDA EVERGLADES

SOUTH FLORIDA
SATELLITE IMAGE MAP



PROJECT DESCRIPTION

This satellite image map is one product of the U.S. Geological Survey (USGS) Land Characteristics from Remote Sensing Project, funded through the USGS Place-Based Studies Program with support from the Everglades National Park. The objective of this project is to develop and apply innovative remote sensing and geographic information system techniques to map the distribution of vegetation, vegetation characteristics, and related hydrologic variables through space and over time. The mapping and description of vegetation characteristics and their variations are necessary to accurately simulate surface hydrology and other surface processes in South Florida and to monitor land surface changes. As part of this research, data from many airborne and satellite imaging systems have been georeferenced and processed to facilitate data fusion and analysis. This image map was created using image fusion techniques developed as part of this project.

DATA DESCRIPTION

The satellite images (path 15, Rows 42,43) were recorded February 5, 2000, by the enhanced thematic mapper (ETM) sensor on the Landsat 7 satellite. It records seven multispectral bands and one panchromatic channel. This image map includes spectral bands 3 (630-690 nanometers, red), 4 (775-900 nanometers, near infrared), and 5 (1550-1750 nanometers, middle infrared), and the new panchromatic band (520-900 nanometers, green to near infrared). The spatial resolution of the input data is 30 m by 30 m for the multispectral bands and 15 m by 15 m for the panchromatic band. During its georeferencing, the panchromatic data were resampled to 7.5 m by 7.5 m resolution and filtered to enhance tonal differences. Then, the spatial information in the panchromatic data was combined with the color information of the multispectral data through a wavelet transform-based image fusion technique (Lemeshewsky, 1999). This data fusion process attempts to preserve the spectral fidelity while sharpening the spatial resolution. The tones output from this process were further enhanced through histogram evaluation and contrast stretching. Panchromatic enhanced multispectral bands 5, 4, and 3 are shown in red, green, and blue, respectively, on the image map. This image map meets National Mapping Accuracy Standards for 1:100,000- scale maps.

IMAGE INTERPRETATION

The combination of a number of surface characteristics, such as vegetation type, vegetation density, soil, water depth, and periphyton (algae and bacteria), dictates the amount and composition of light reflected to the satellite sensor and, therefore, the brightness, texture, and color shown in the image. Image map subsets that illustrate some of the common surface cover types using additions to floral assemblages suggested by Gunderson (1994) are provided below. Where appropriate, water conditions at the time of imaging and soil type (Leighty et al., 1954; Gallatin et al., 1958) are also noted:

- Rockland pine forest, dry, marl soil
- Tree island/slough, wet, peat soil
- Mangrove forest
- Sparse sawgrass marsh/periphyton, shallow water, peat soil
- Sparse sawgrass marsh/periphyton, shallow water, marl soil
- Wet prairie, deep water, peat soil
- Wet prairie, dry, marl soil
- Cypress forest
- Urban
- Agriculture

REFERENCES

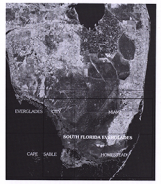
Gallatin, M.H., Bulford, J.K., Evans, C.B., Gulberry, H.S., Hinton, J.J., Powell, D.P., Truett, E., Watts, W.L., Wilson, G.C., and Leighty, R.G., 1958, Soil Survey (Detailed Reconnaissance) of Dade County Florida, Series 1947, No. 4: Soil Conservation Service. 56 p.

Gunderson, L.H., 1994, Vegetation of the Everglades: Determinants of community composition, in The Everglades: The Ecosystem and Its Restoration, Davis, S.M., and Ogden, J.C., eds: Delray Beach, St Lucie Press, p. 323-340.

Leighty, R.G., Mason, M.B., Swanson, G.A., Caldwell, R.E., Henderson, J.R., Olsen, O.C., and Wilson, G.C., 1954, Soil Survey (Detailed Reconnaissance) of Collier County Florida, Series 1942, No. 5: Soil Conservation Service, 72 p.

Lemeshewsky, G.P., 1999, Multispectral multisensor image fusion using wavelet transforms: Visual Information Processing, SPIE 3716, Park, S., and Jolley, R., eds., p. 214-222.

IMAGE MAP LOCATION AND CORRESPONDING
1:100 000 - SCALE MAPS INDEX



USGS science for a changing world

FOR SALE BY THE U.S. GEOLOGICAL SURVEY
FOR RESTON, FAIRVIEW, CHEVROLET, MIDDLE

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I - 2742
(EASTERN SECTION)

SOUTH FLORIDA EVERGLADES
Satellite image map
1:100 000 SCALE

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I - 2742
(WESTERN SECTION)

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SCALE 1: 100 000

Universal Transverse Mercator projection
and 10 000 - meter grid, zone 17
World Geodetic System 1984