

## **Surface Characterization Data for the Arm SGP CART Site New 1998-1999 Acquisitions and Products**

*A. T. Ciaella  
Brookhaven National Laboratory  
Upton, New York*

The External Data Center (XDC), located at Brookhaven National Laboratory, is responsible for providing data to the Atmospheric Radiation Measurement (ARM) Program that is generated outside of the program and is in the same area as the ARM Cloud and Radiation Testbed (CART) sites. Surface characterization data is a subset of the XDC. It is geographic information (often visual) about the CART sites. These data had been maintained exclusively in a Geographic Information System (GIS) called Arc/Info. This year we also added the image processing system capabilities found in ERDAS Imagine software.

The new acquisitions for the 1998-1999 fiscal year covered the Southern Great Plains (SGP) CART site. They include a county soil data base for the Walnut River Watershed, several Landsat-5 Thematic Mapper (TM) scenes, data provided by the Landsat Pathfinder Science Working Group, and an Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) image. In addition, the XDC assisted in a ground calibration of LANDSAT-5 TM and produced an unsupervised classification of the SGP Central Facility (CF-1).

The Walnut River Watershed Soil Product is a combination of four separate layers of information combined in the Arc/Info GIS (Figure 1). One layer is the available water capacity (inches/layer) for each of five soil depths by soil mapping unit in vector and raster format from the Soil Survey Geographic (SSURGO) data base produced by the National Resources Conservation Service. (The figure shows the available water capacity for the top soil layer only.) Another layer is the ARM SGP CART site facilities drawn as a point (vector) coverage. The county boundary lines and the Walnut River Watershed boundary lines make up the third and fourth data layers.

Figure 2 depicts the Landsat-5 TM images as small thumbnail sketches provided by Bob Cahalan of the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC). The dates of the scenes are 941106, 950720, 951024, 960417, 960722, and 970623. The Landsat TM data include seven spectral bands—band 1: 0.45  $\mu\text{m}$  to 0.52  $\mu\text{m}$ ; band 2: 0.52  $\mu\text{m}$  to 0.60  $\mu\text{m}$ ; band 3: 0.63  $\mu\text{m}$  to 0.69  $\mu\text{m}$ ; band 4: 0.76  $\mu\text{m}$  to 0.90  $\mu\text{m}$ ; band 5: 1.55  $\mu\text{m}$  to 1.75  $\mu\text{m}$ ; band 6: 10.40  $\mu\text{m}$  to 12.50  $\mu\text{m}$ ; and band 7: 2.08  $\mu\text{m}$  to 2.35  $\mu\text{m}$ . These data are collected using a 30-m instantaneous field of view (IFOV), except band 6 (thermal) with a 120 IFOV. Each thumbnail sketch is a composite of three spectral bands with band 7 colored in red, band 4 in green, and band 2 in blue. The images are radiometrically and geometrically corrected and aligned to the Space Oblique Mercator projection.

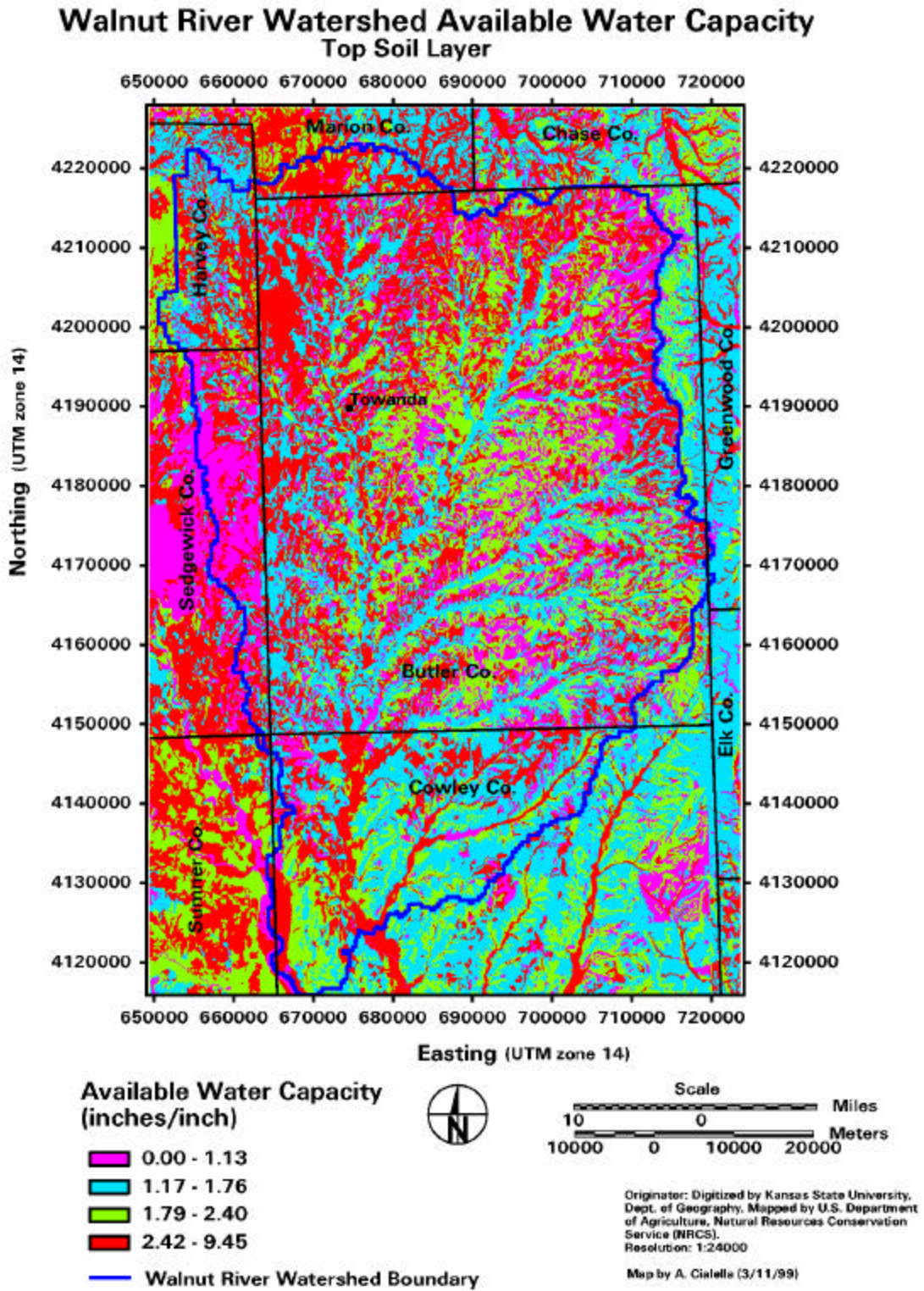
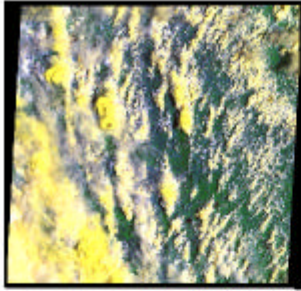


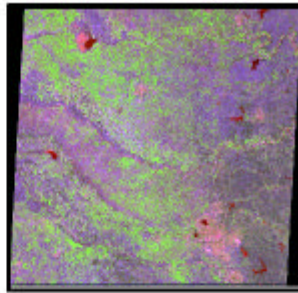
Figure 1. Walnut River Watershed soil product.

### SGP LandSat TM Thumbnail Sketches

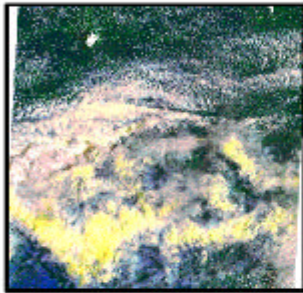
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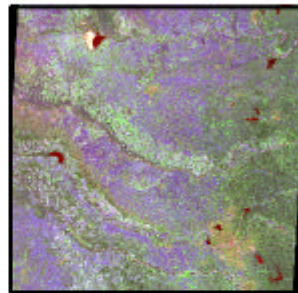
941106 16:22 GMT



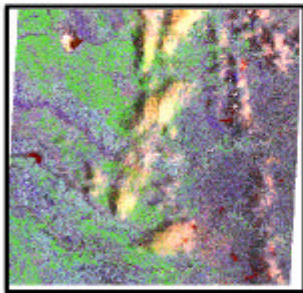
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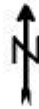
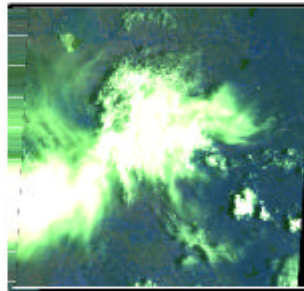
951024 16:07 GMT



960417 16:17 GMT



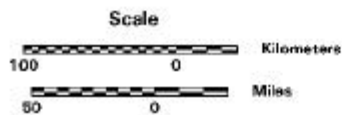
960722 16:22 GMT



Coming soon...

990309

SOURCE: Bob Cahalon, NASA/GSFC  
RESOLUTION: 30 meters  
PROJECTION: Space Oblique Mercator  
PATH/ROW: 28/35  
BANDS: 7,4,2 (R,G,B)



Map by: A. Cialella  
Date: 3/13/99

Figure 2. Landsat – 5 TM thumbnail sketches.

The ARM SGP CART site has been chosen by the Landsat Pathfinder Science Working Group as a Global Land Cover Test Site (GLCTS). As such, ARM has received a land use/land cover map (Figure 3), a Digital Elevation Model (DEM) at 90-m resolution, two Multispectral Scanner (MSS) scenes, three Landsat TM scenes, and several Advanced Very High Resolution Radiometer (AVHRR) scenes. These comprise Phase I of the project. Phase 2 will produce enhancements to the satellite images including image co-registration and geo-referencing, atmospheric and radiometric corrections of Landsat data, and topographic corrections. Further information can be found at the following Web site address: <http://glcts.maxey.dri.edu/glcts>

The images in Figure 4 will be used in a calibration effort for the Landsat-5 TM sensor. The bottom right image is of Kaw Lake, located northeast of the central facility. The pixels within this image will be used as known brightness values on the ground. Certain pixels within the image on the left will be chosen for the SGP site calibration. See Halthore et al. (this proceedings).

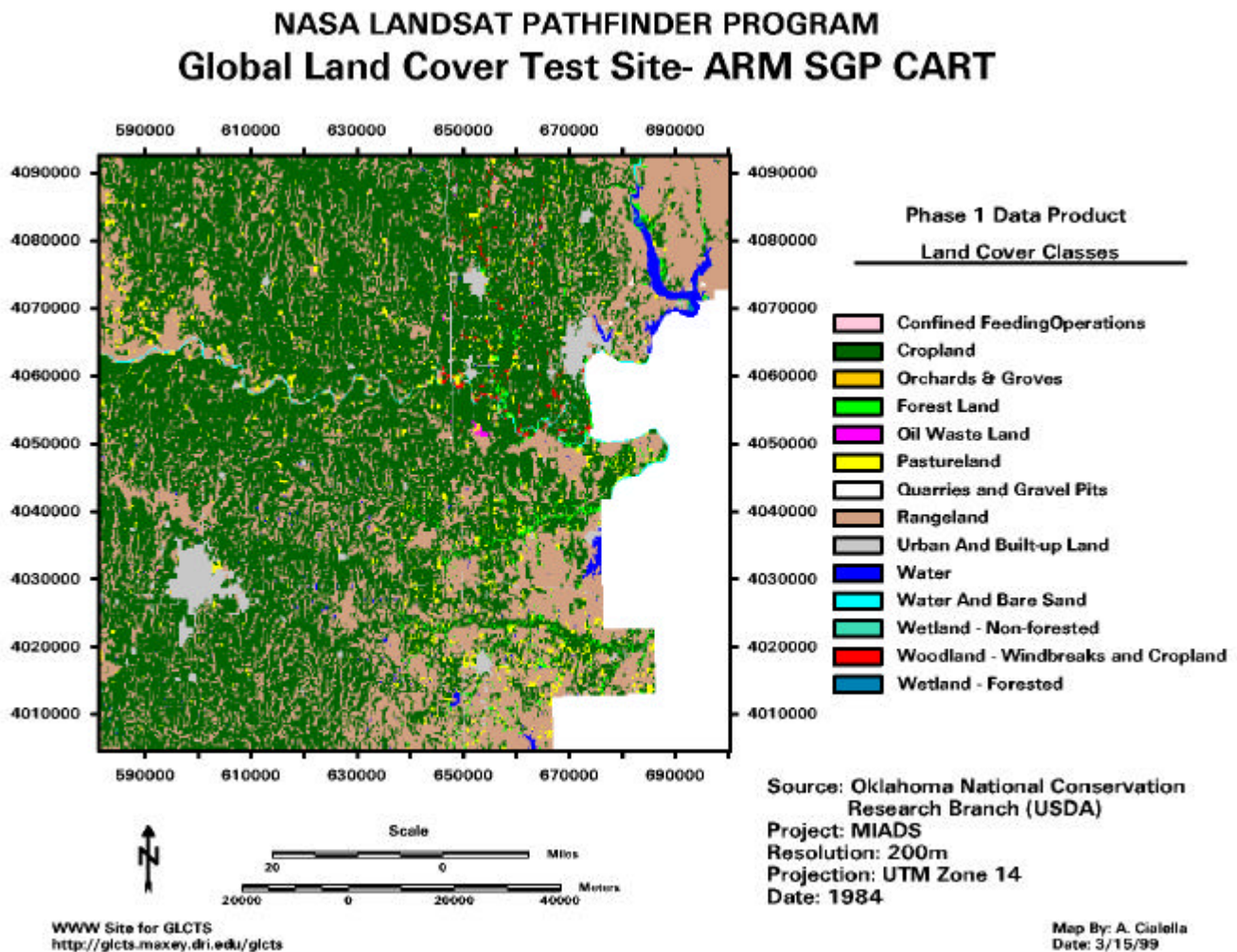
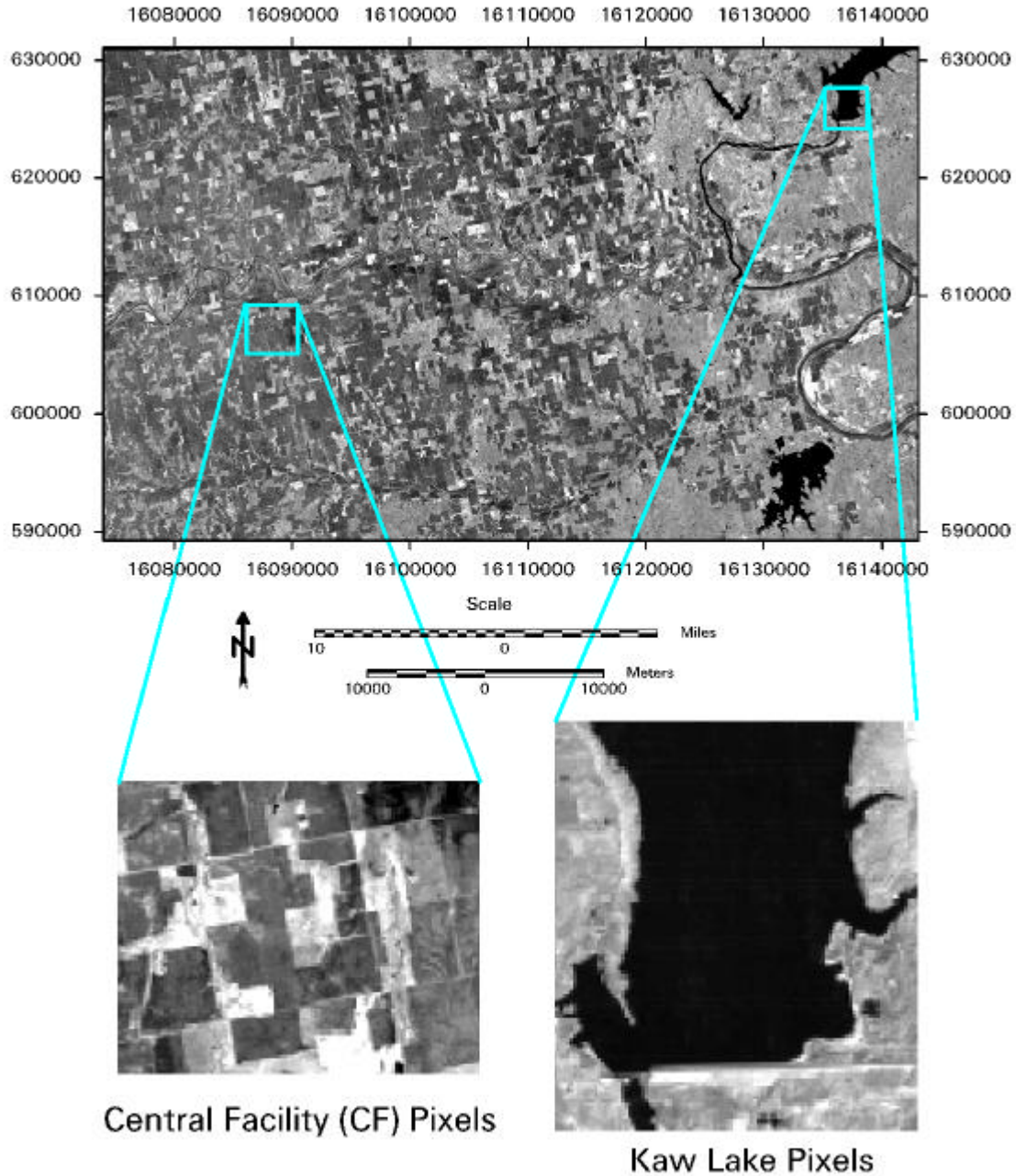


Figure 3. GLCTS land use/land cover map.

# GROUND CALIBRATION OF LANDSAT TM 970927 06:38 GMT



All images display channel 4 (0.76 - 0.90 )

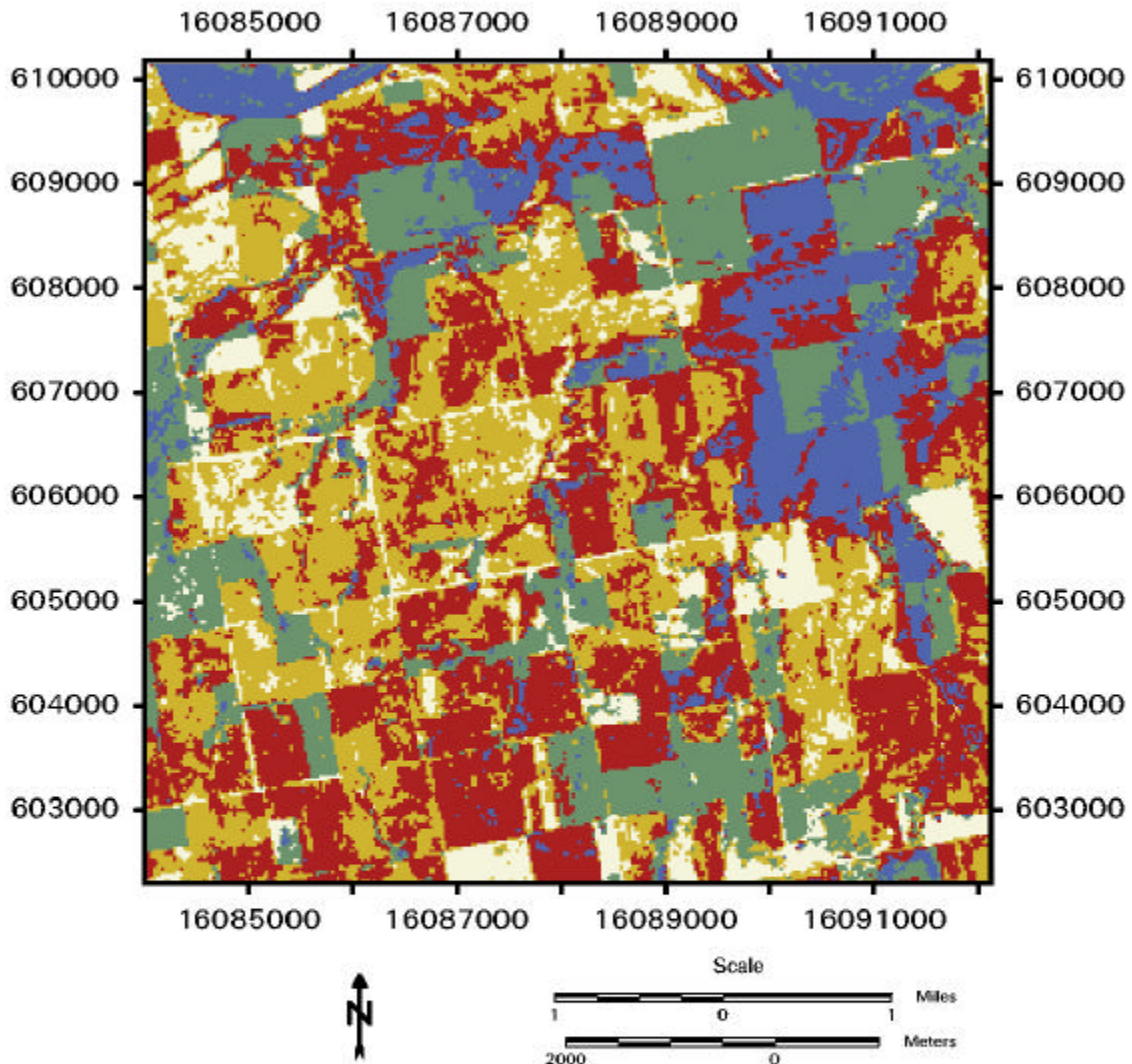
Map By: A. Cialella  
Date: 3/16/99

**Figure 4.** Landsat-5 TM calibration study.

An unsupervised land use/land cover classification was produced using ERDAS Imagine image processing software (Figure 5). The software uses the isodata algorithm of classification. Five classes were chosen based on their spectral information. The classes of water, trees and scrub brush, pasture and grassland, cropland, and bare soil and roads were labeled using ancillary information from site maps, an AVIRIS image (Figure 6) and knowledgeable sources. (For additional information about AVIRIS data see <http://makalu.jpl.nasa.gov>.)

All newly acquired and previous surface characterization images can be found at <http://www.xdc.arm.gov>.

## UNSUPERVISED CLASSIFICATION OF CENTRAL FACILITY LANDSAT TM SCENE 970927



### Land Use/ Land Cover Classes

-  water
-  trees, scrub brush
-  pasture, grassland
-  cropland
-  bare soil, roads

Source: Bob Cahalon, NASA/GSFC  
Resolution: 30m  
Bands: 7,4,2  
Classification Algorithm: isodata  
No. of Classes: 5

Map By: A. Cialella  
Date: 3/18/99

Figure 5. Central facility unsupervised classification.



**08/10/97 17:35 GMT**

 **Central Facility (CF)**



**Bands: Red, Green, Blue Visible**  
**Source: Sally Westmoreland, Photo Research Inc.**  
**Atmospheric Correction: Bob Green, JPL**  
**Resolution: 20m**

**Map By: A. Cialella**  
**Date: 3/15/99**

**Figure 6. AVIRIS.**