

## **Grassland Prototype Validation Exercise (PROVE) at the Jornada Experimental Range near Las Cruces, New Mexico, May 23-24, 1997**

### **Coordinates for Study Transects (Jornada PROVE)**

Data originator/contact was Andrew Hyman, Center for Remote Sensing, Boston University, 725 Common wealth Ave., Boston, Massachusetts 02215,

Coordinates at each end of the transects were measured with a Trimble Global Positioning System (GPS) unit. Coordinates are given in UTM for zone North 13 using NAD83 (continental US) and NAD27 (western US). Data were caveated as follows: "as I am not familiar with the Trimble Pathfinder package, I am assuming that if the datum is changed, the necessary projection corrections will be automatically made."

Data

PROJECT,SITE,TRANSECT,DATUM\_SOURCE,X1,Y1,X2,Y2

JORNADA, Grassland, 150 m, NAD83, 3607361.947m N, 326982.995m E,  
3607362.871m N, 327132.937m E

JORNADA, Tower, long 1 km east, NAD83, 3609243.392m N, 325632.584m E,  
3609246.509m N, 324569.161m E

JORNADA, Tower, short north, NAD83, 3609245.467m N, 324517.904 E,  
3609368.268m N, 324539.561m E

JORNADA, Tower, short south, NAD83, 3609245.467m N, 324517.904 E,  
3609127.612m N, 324500.795m E

JORNADA, Tower, short east, NAD83, 3609245.467m N, 324517.904 E, 3609221.886m  
N, 324517.904m E

JORNADA, Tower, base of Tower, NAD83, 3609245.467m N, 324517.904 E

JORNADA, Grassland, 150 m, NAD27, 3607158.826 m N, 327032.732m E,  
3607159.724m N, 327182.674m E

JORNADA, Tower, long 1 km east, NAD27, 3609040.235m N, 325682.328m E,  
3609043.352m N, 324618.910m E

JORNADA, Tower, short north, NAD27, 3609042.310m N, 324567.654 E,  
3609165.111m N, 324589.311m E

JORNADA, Tower, short south, NAD27, 3609042.310m N, 324567.654 E,  
3608924.456m N, 324550.545m E

JORNADA, Tower, short east, NAD27, 3609042.310m N, 324567.654 E, 3609018.728m  
N, 324687.041m E

JORNADA, Tower, base of Tower, NAD27, 3609042.310m N, 324567.654 E

### **Leaf area index data: Asner (Jornada PROVE)**

Effective LAI measurements were made at the tower transects (N, S, E, W) Component LAI measurements were made at randomly picked sites at both the mesquite and the tower site. Each LAI measurement is the mean of 4 separate measurements.

Data originator/contact is Gregory P. Asner, University of Colorado, asner@khroma.colorado.edu.

Extremely flat valley with three distinct areas of land-cover: grassland, shrubland (mesquite), and transitional (mixed grass and shrub). Semi-arid, average leaf area index (LAI) is roughly 0.5

Measurements were made with a Licor LAI-2000

### **Destructive measurements of leaf area index (Jornada PROVE)**

Data originator/contact is Laura Rocchio, Goddard Space Flight Center, ler@kratmos.gsfc.nasa.gov.

Measurements were made with a Licor LAI-3000

Detailed Summary of Sampling and Measurement Provided by Laura Rocchio, Goddard Space Flight Center

#### **Mesquite**

- The selected mesquite bush was photographed and measured in the field prior to destruction. Side-shots as well as overhead shots were taken.
- A cubic meter of the plant was then cut-down. The plant was cut into convenient-sized branches using both saws and clippers. The field materials were then bagged and transported to an air conditioned laboratory for analysis.
- The small leaves of the plant were stripped off. We originally attempted to cut the leaves from the stems, but we found that it was easier and faster to strip the leaves off using our thumb and pointer fingers.
- Small piles of the separated leaves were made.
- A 50 cm<sup>2</sup> calibration disk was run through the LAI prior to putting the leaves through. The LAI-3000 calculated the LAI area to be 50.04 centimeters<sup>2</sup>. The disk was periodically run through the LAI-3000 in between leaf piles, however, we failed to record many of these readings. No corrections were made for any of the slight off-sets. In the future it would be advised to record the periodic calibration disk measurements.

- Two people would slowly spread the piles of leaves onto the LAI-3000, making sure that the leaf overlap was minimized. The conveyer belt of the LAI-3000 generated a lot of static electricity and a portion of the leaves would often stick to the bottom and top conveyer belts of the LAI-3000. To ensure that these leaves were not counted multiple times, one person had to constantly brush off the conveyer belt as it came back around using a small brush.
- This process was continued until all of the leaves had been sent through the LAI-3000.
- The LAI-3000 cumulatively measured the leaf area. Because of either machine or operator error a few of the piles had to be reprocessed. Therefore, we found it wise to process and record the area of the piles individually, and to keep the pile size relatively small.
- The cubic meter of the mesquite bush required approximately 6 hours to measure with the LAI-3000. This was done within 24 hours of the harvest.
- Each pile of leaves was weighted prior to being put through the LAI-3000. The leaves were weighted again 24 hours later. The original intention was to oven-dry the leaves and attempt to establish a relationship between leaf surface area and dry weight, however, the leaves were not oven-dried and the 24-hour air drying time was considered insufficient. Apparently other researchers have used the oven-drying approach.
- The total projected leaf areas of the piles were summed, and this area was divided by one square meter to obtain the LAI.
- The woody portion of the mesquite bush, which could not be measured with the LAI-3000, was photographed on a white tarp of fixed sized. These portions of stem were broken into fairly linear portions so they would lie relatively flat. Overhead shots were taken of the stems and a projected area was calculated using a dark to light pixel ratio. The cylindrical area of these stems were also calculated and made available.

## **Yucca**

- Prior to destruction, side and overhead photographs were taken of the yucca.
- The tallest vertical height of the yucca was recorded, as well as, several radial measurements. These measurements were initially used to give the projected area of the yucca bush.
- Green yucca leaves were cut off of the husk (as close to the husk as possible) and were sent through the LAI-3000 one-by-one. The projected area figures were summed to yield leaf area.
- The calibration disk was sent through the LAI-3000, but this value was not recorded. In the future it would be advised to record the given area for the disk and to run the disk through more often.
- The non-green portions of the yucca were photographed on the tarp and their area was figured out in the same fashion as the woody mesquite stems. This included all of the dead leaves of the yucca, which were calculated as part of the "stem area index," SAI rather than LAI. The husk of the yucca was photographed separately so that the area could later be estimated.

- The overhead shots of the yucca indicated that the shape of the yucca was more rectangular than circular, so the ground area under the yucca was recalculated using the overhead photography instead of the original radial measurements.
- The sum of green leaf area was then divided by this area to yield LAI.
- The sum of the non-green area was also summed and divided by this value to yield a SAI.
- Due to poor picture quality the area of the yucca husk was not included in the calculations.

### **Mormon Tea**

- Prior to destruction the Mormon Tea was photographed from above and from one side.
- The height of the bush was measured as well as radial measurements in order to calculate the projected ground area. \*\* Note.. if this is done again, it would be wise to only cut down one cubic meter of the bush if the base area is greater than 1 meter on each side. This would make calculations simpler and more accurate.
- The green portions of the Mormon Tea were broken-off and sent through the LAI-3000. The green portions of the stem were visually distinctive from the brown, more woody sections of the stem. The area of this portion of the bush was tabulated as the leaf area. This value was divided by the circular under-bush ground area to get the LAI.
- The calibration disk was run through four times the values were: 50.4 cm<sup>2</sup>, 50.24 cm<sup>2</sup>, 50.12 cm<sup>2</sup>, and 50.3 cm<sup>2</sup>. The offset was continuously between +1 and +4 mm<sup>2</sup>. No corrections were made based on these values.
- The non-green portion of the Mormon Tea and the woody branches were photographed on the tarp, and area was figured out in the same manner as the non-green yucca and woody mesquite. This area was also divided by the circular under-bush ground area to get the SAI.

### **Leaf area index data by USDA: Rango (Jornada PROVE)**

Data originator/contact is A. Rango, USDA Jornada Experimental Range, Las Cruces, New Mexico.

USDA used a LICOR LAI-2000 at the Tower site along the 1 Km transect (5/27) and along the 150 m ARS transects at the grassland (5/25) and Mesquite sites (5/26).