Name _____ GL 1883
NASA Data Part 2 – Productivity Due: 1-Mar

Data Description

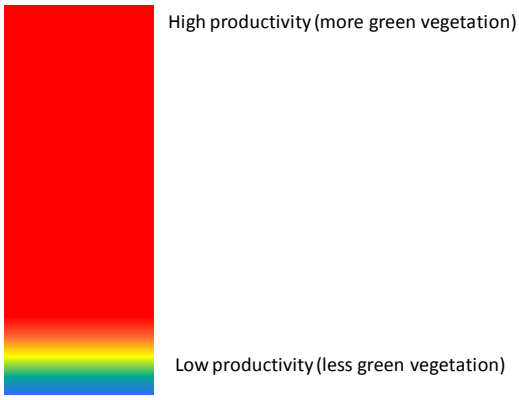
Landsat Data has been prepared for each participating campus. Using the 30 yr Landsat period from 1975 to 2005, data can be used to examine changes in land cover, abundance of vegetation in the summer (peak abundance) and relate changes to climate conditions. Each Landsat scene covers an area approximately 185 km x 185 km and the data is provided in a digital format. Landsat data from 1975 to 2005 was acquired for each campus location. Data consisted of an image from 1975, and one each from 1990, 2000 and 2005. Summer images were selected to acquire data near the time of maximum vegetation cover. CAVEAT: data was not acquired at the exact same dates each time due to cloud cover or other data problems – so take into consideration any seasonal differences among data sets when interpreting the results.

- **Landsat 1975** data was acquired by the **Multispectral Scanner (MSS)**, the Landsat imager of that period, at 80m x 80m resolution. There were only 4 spectral bands, 2 in the visible spectrum (green and red bands) and 2 in the near-infrared spectrum.
- All Landsat data after 1984 are from the **Thematic Mapper (TM)** instrument. It has 30m x 30m pixels and has 6 reflected solar bands, 3 in the visible spectrum and 3 in the infrared spectrum.

In addition to the satellite images, climate data for the location of each institution is provided to facilitate interpretations of land cover change over time using minimum, maximum, and mean monthly temperature and precipitation values.

<u>Productivity</u>

For each Landsat scene we computed a standardized metric of plant productivity commonly used in remote sensing – the Normalized Difference Vegetation Index (NDVI). ***NDVI is a measure of the relative abundance of vegetation (sometimes biomass, other times closer to leaf area or canopy cover). While changes in the growth form or functional type of vegetation may not express linear changes, changes in health of a vegetation type (e.g., forest) is observed by the changes in tone between dates. The main reason NDVI is the most widely used measure of remotely sensed data is because it is very sensitive to variation in plant cover in the intermediate ranges of cover (about the density of a woodland or near canopy closure). Areas of bright red denote locations with high densities of vegetation while areas with dark blue denote locates with the least productive vegetation.*** See scale at right. It is also widely used because it is easy to produce:



- (Landsat band 4-Landsat band 3) / (Landsat Band 4 + Landsat Band 3).
  Where Band 4 is in the near-infrared spectrum and Band 3 is in the red part of the visible spectrum.

Objectives

- To introduce you to the basic concepts of interpretation of remote sensing data.
- To begin working with ***<u>local</u>*** remote sensing data to detect changes in land cover over time.

Assignment – Complete the following and turn in a typed sheet with responses the three points below. No e-submissions.

1. Interpret productivity (color palette) for the years of 1975, 1990, 2000, and 2005. *(hint - you can open multiple windows and compare them side-by-side).* **Do not rearrange PPT slides.**

2. Describe any significant changes in productivity on the local landscape between 1975 and 2005. Keep in mind, changes could occur at the hands of climate or human activity. Phrase your response in terms of Northern, Southern, Eastern, Western (or combinations) sections of the images and proximity to major cities and/or bodies of water.

3. Discuss the similarities between your interpretations made regarding vegetation patterns and plant health/biomass/cover in NASA Part 1 and the interpretations you made above regarding productivity in NASA Part 2.