Name _____ GL 1883

NASA Data Part 3b – Drought Stress/Wildfire Risk, Productivity, and Climate Due: 23-Apr

Data Description

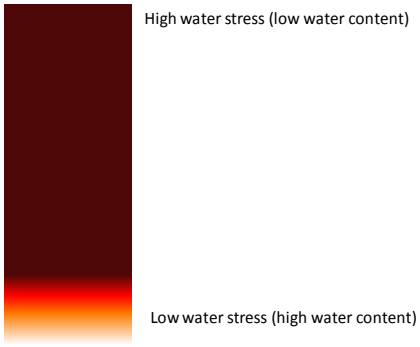
Landsat Data has been prepared for each participating campus. Using the 30 yr Landsat period from 1975 to 2005, data can be used to examine changes in land cover, abundance of vegetation in the summer (peak abundance) and relate changes to climate conditions. Each Landsat scene covers an area approximately 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 on the exact same date each year due to cloud cover or other data problems however, were collected within the same very small time frame.

- **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>Drought Stress/Wildfire Risk</u>

For each Landsat scene we also computed a standardized metric commonly used to assess plant drought stress – The Normalized Burn Ratio (NBR). NBR has the same structure as NDVI but uses Landsat TM Bands 4 and 5 (therefore it can't be produced by the MSS and does not exist for 1975). ***It is sensitive to changes in water content of the vegetation and to wildfire risk (as dry vegetation has greater fire risk). Areas that appear as white are considered to be wet. Other versions of the NBR exist in wildfire science and are often utilized immediately following wildfires to assess burn severity.***



Objectives

- To work with ***<u>local</u>*** remote sensing data to detect changes in land cover over time.
- To determine relationships between productivity and drought.
- To examine relationships between topography and vegetation.
- To determine relative differences in climate between 1990 and 2005.
- To assess short-term and long-term controls on vegetation and water resources.

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

1. Interpret drought stress/wildfire risk for the years of 1990 and 2005. When referring to locations on the remote sensing images, please reference using the column-row coordinate system (e.g. cell B2, NOT 2B).

2. How would you describe the relationship between productivity and NBR? Explain.

3. How would you describe the relationship between productivity/NBR and topography? Explain. Feel free to visit GoogleEarth or GoogleMaps to familiarize yourself with the area in more detail.

4. Which year (1990 or 2005) shows evidence of **long-term** water shortage in the greater Las Vegas area? Explain.

5. Do the productivity and NBR images (for the year selected above) support your answer for #4? What factors might explain this?

6. How would you characterize changes in land use/land cover in the Las Vegas metropolitan area? Explain.