

Sonora 2008 Field Campaign International Research Experience for Students (IRES)

Exercise 4: Topography and Vegetation Relations using Remote Sensing Data

Remote sensing from satellite platforms offers a means to view the Earth's surface over large regions and at multiple times. Many uses of remote sensing data are currently feasible, including estimating the soil moisture content of the surface, the vegetation greenness of plant canopies and the albedo of the landscape. We can study the spatial variations in the remote sensing fields to understand how ecosystems vary at different elevations in the Rio Sonora basin.

In this exercise, we want to quantify the vegetation patterns with elevation using two different remote sensing products: (1) surface topography from the ASTER Digital Elevation Model (DEM) and (2) land cover classification from the LandSat sensor. These data sets were acquired on different satellite platforms and have varying spatial resolutions: ASTER DEM at 28 meters and LandSat Land Cove at 30 meters. Our focus will be on the Sierra Los Locos Basin (~100 square kilometers) in the Rio San Miguel. We want to determine how vegetation type varies with elevation and its properties.

1. Utilize the dataset provided in the zip files (ASTER_DEM_SLL.zip and Landsat_LANDCOVER_SLL.zip with their respective Readme files) to make maps of the spatial variation in topography and land cover classification using a GIS software. Prior to the subsequent analysis, the two data sets need to be resampled to a common resolution and grid spacing.
2. Develop and investigate if a relationship exists between vegetation type and elevation. How does elevation affect ecosystem distribution? Are the patterns clear or is there substantial noise in the relation? Do other terrain attributes such as surface slope and aspect help to understand vegetation patterns? Develop your own interpretations and then discuss with your fellow students.
3. Discuss the potential environmental factors (e.g., temperature, precipitation) that may affect the organization of vegetation communities with elevation. Why do think certain plants are only found at particular elevation? Is this a coincidence? What are the underlying principles that result in these observations? Think and discuss with the group.