1. Create Maps With R Geospatial Classes and Graphics Tools (*Making Maps*)
2. Read and write ESRI Shape Files (*ESRI*)
3. Display T Spatial Objects with Google Maps and Google Earth (*KML*)
4. Read and Display Data from GPS Devices Using R (*GPX*)
5. Overlay Points on Satellite Image / Extract Pixel Values (*Raster*)

Overlay Points on Satellite Image / Extract Pixel Values
Part 5

- This example demonstrates the use of the R geospatial classes to assign remotely-sensed temperature measurements to georeferenced points, (e.g., study area point locations) on the Earth surface.
- Also demonstrated: methods for reading, creating, writing, displaying, and aligning the spatial projections of geospatial data files.

- Ecologists often employ large-scale environmental measurements (e.g., temperature, elevation, NDVI) from remote sensing satellites to supplement direct measurements within their study areas.
- In such cases, the scientist obtains the appropriate satellite image covering the study area, identifies geo-referenced features (e.g., with associated geographic coordinates) within the study area, and then assigns the spatially corresponding image pixel values to each of the features.

- For the pixel-to-point assignment to be correct, the point and image files must share the same spatial frame of reference; e.g., both files must share the same map projection.
- Many times, one or both of the input data sets will need to be converted to a new frame of reference in order to bring all study data sets into alignment.

- Until recently, this type of operation required Geographic Information System (GIS) software to accomplish.
- But with the advent of the R Language's spatial data classes and methods, ecologists need only to acquire their study data in an R-compatible file format, import the data into R, and perform the desired analysis.

- This example demonstrates the assignment of temperature measurements from a MODIS satellite image to a set of study area points located in the Hawaiian Islands.

1) Read input files into R Spatial data objects.
2) Display the satellite image, creating custom gray/color scales for the image .
3) If necessary, transform one or more of the input files into a new spatial frame of reference (i.e., map projection) to make it compatible with the other file.
4) Perform Point Overlay operation: Assign to each point location the spatially corresponding satellite image pixel value.
5) Write the point locations, along with assigned MODIS surface temperature values, to a new ESRI Shape File, as well as a separate Comma Separated Value file.

- At the R command prompt, enter 'source("./OverlayPointsOnRasters.r")'.
- Enter the command 'PointGridOverlay()'.
- When graphic/map is displayed, press any key to complete script execution.