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Spectral curves and sensor bands

Center for Biodiversity and Conservation

Biodiversity Informatics Facility

The mission of the Biodiversity Informatics Facility is to be a leader in the development, application, and promotion of rigorous biodiversity informatics methods and tools to provide new insights in conservation, ecology, and evolution.

The Biodiversity Informatics Facility applies information technologies to collect, organize and analyze biological and environmental data from expeditions, remote sensing, natural history collections, modeling and databases. Through research that applies cutting-edge spatial analysis technologies, we aim to discover new insights and develop new methods in ecology, evolution and conservation biology. Through training initiatives and the development and distribution of software and scripts, we aim to strengthen the capacity of students, educators, researchers, conservation practitioners, and the broader public to study and better understand biodiversity.

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This guide illustrates how different satellite sensors measure the intensity of different wavelengths (colors) of light. By overlaying spectral curves from different features, you can see how different sensors sample information from feature's spectral curve. For example, the Landsat 4 MSS sensor only provides four values that can be used to differentiate one feature from another and the Sentinel 2A MSI sensor uses 12 values. In other words, the MSI sensor provides more data points along the spectral curve and this can be useful in differentiating similar features.

The Spectral Characteristics Viewer maintained by the USGS (https://landsat.usgs.gov/spectral-characteristics-viewer) can be used to view the spectral reflectance curves for different materials and satellite sensor band placement for different sensors. Instruction on how to use the tool are displayed above the spectral plots. Read the simple instructions and experiment with different sensor bands and spectra from different materials. Compare spectra from vegetation with water and minerals to see how reflectance characteristics differ with between objects. Also, note how the fundamental shape of spectral curves for different types of vegetation doesn't change much. To differentiate between two types of vegetation it's important to use image bands that correspond to portions of the two spectral curves where the difference in reflectance is greatest.