What are the best spectral bands to use for my study?

Answer:

This is a common question considered by all users of remotely sensed data. The level of detail (spatial resolution) is often the most interesting aspect of viewing a satellite image, but less appreciated is how changes in irradiative energy reflected by different surface materials are used to identify features of interest.

Landsat 8 Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS)

Band	Wavelength	Useful for mapping
Band 1 – coastal aerosol	0.43 - 0.45	coastal and aerosol studies
Band 2 – blue	0.45 - 0.51	Bathymetric mapping, distinguishing soil from vegetation and deciduous from coniferous vegetation
Band 3 - green	0.53 - 0.59	Emphasizes peak vegetation, which is useful for assessing plant vigor
Band 4 - red	0.64 - 0.67	Discriminates vegetation slopes
Band 5 - Near Infrared (NIR)	0.85-0.88	Emphasizes biomass content and shorelines
Band 6 - Short-wave Infrared (SWIR) 1	1.57 - 1.65	Discriminates moisture content of soil and vegetation; penetrates thin clouds
Band 7 - Short-wave Infrared (SWIR) 2	2.11 - 2.29	Improved moisture content of soil and vegetation and thin cloud penetration
Band 8 - Panchromatic	0.50 - 0.68	15 meter resolution, sharper image definition
Band 9 – Cirrus	1.36 - 1.38	Improved detection of cirrus cloud contamination
Band 10 – TIRS 1	10.60 – 11.19	100 meter resolution, thermal mapping and estimated soil moisture
Band 11 – TIRS 2	11.5 - 12.51	100 meter resolution, Improved thermal mapping and estimated soil moisture

Landsat 4-5 Thematic Mapper (TM) and Landsat 7 Enhanced Thematic Mapper Plus (ETM+)

	Wavelength	Useful for mapping

Band		
Band 1 - blue	0.45 - 0.52	Bathymetric mapping, distinguishing soil from vegetation and deciduous from coniferous vegetation
Band 2 - green	0.52 - 0.60	Emphasizes peak vegetation, which is useful for assessing plant vigor
Band 3 - red	0.63 - 0.69	Discriminates vegetation slopes
Band 4 - Near Infrared	0.77 - 0.90	Emphasizes biomass content and shorelines
Band 5 - Short-wave Infrared	1.55 - 1.75	Discriminates moisture content of soil and vegetation; penetrates thin clouds
Band 6 - Thermal Infrared	10.40 - 12.50	Thermal mapping and estimated soil moisture
Band 7 - Short-wave Infrared	2.09 - 2.35	Hydrothermally altered rocks associated with mineral deposits
Band 8 - Panchromatic (Landsat 7 only)	0.52 - 0.90	15 meter resolution, sharper image definition

Landsat Multi Spectral Scanner (MSS)

Landsat MSS 1, 2,3 Spectral Bands	Landsat MSS 4,5 Spectral Bands	Wavelength	Useful for mapping
Band 4 - green	Band 1 - green	0.5 - 0.6	Sediment-laden water, delineates areas of shallow water
Band 5 - red	Band 2 - red	0.6 - 0.7	Cultural features
Band 6 - Near Infrared	Band 3 - Near Infrared	0.7 - 0.8	Vegetation boundary between land and water, and landforms
Band 7 - Near Infrared	Band 4 - Near Infrared	0.8 - 1.1	Penetrates atmospheric haze best, emphasizes vegetation, boundary between land and water, and landforms

The Spectral Characteristics Viewer is an interactive tool developed by scientists at the USGS Earth Resources Observation and Science (EROS) Center to visualize how the bands, or channels, of different satellite sensors measure the intensity of

the many wavelengths (colors) of light. This is also known as the relative spectral response (RSR). By overlaying the spectral curves from different features (spectra), one can determine which bands of the selected sensor will work for the application.