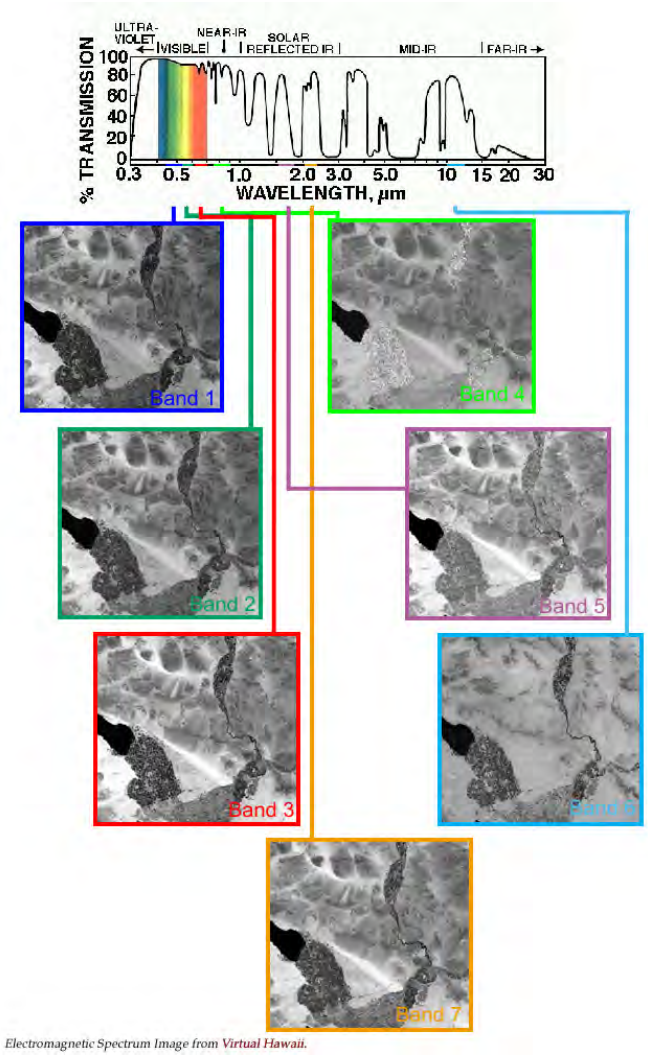
Landsat

Spectral Bands

Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper Plus (ETM) + Bands

Band	Name	Band Width (λ, µm)	Spatial Resolution
1	Blue	0.45-0.515	30 m
2	Green	0.525-0.605	30 m
3	Red	0.63-0.69	30 m
4	Near Infrared	0.75-0.90	30 m
5	Shortwave IR-1	1.55-1.75	30 m
6	Thermal IR	10.4-12.5	60 m / 120 m*
7	Shortwave IR-2	2.09-2.35	30 m
8*	Panchromatic	0.52-0.9	15 m



Electromagnetic Spectrum Image from Virtual Hawaii.

Notes:

TM and ETM + sensors have 8 bit quantization.

The values above are the specifically the spectral ranges for the ETM + sensor; the TM sensor spectral ranges vary just slightly for some bands.

* The thermal band on Landsat 7 (ETM + sensor) has a spatial resolution of 60 m; it is 120 m on Landsats 5 and 4 (TM sensors).

* Only Landsat 7 has a 15 m panchromatic "sharpening band."

Landsats 1–3 had a four band MultiSpectral Scanner (MSS) sensor.

For more information on Landsat MSS, TM, and ETM + sensors, visit:
http://landsat.gsfc.nasa.gov/about/etm + .html
http://landsat.gsfc.nasa.gov/about/tm.html
http://landsat.gsfc.nasa.gov/about/mss.html

For further information about the Landsat Program:
http://landsat.usgs.gov
http://landsat.gsfc.nasa.gov

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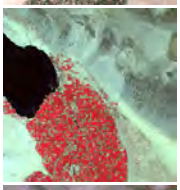
True Color: For the true color rendition, band 1 is displayed in the blue color, band 2 is displayed in the green color, and band 3 is displayed in the red color. The resulting image is fairly close to realistic - as though you took the picture with your camera and were riding in the satellite. But it is also pretty dull - there is little contrast and features in the image are hard to distinguish.



False-Color, also called Near Infrared or NIR: In this image, band 2 is displayed in blue, band 3 is displayed in green, and band 4 is displayed in red. This rendition looks rather strange - vegetation jumps out as a bright red because green vegetation readily reflects infrared light energy! It is similar to pictures taken from aircraft when using infrared film; very useful for studying vegetation.

Short-Wavelength Infrared (SWIR) or "Pseudo Natural Color": In this SWIR image, band 2 is displayed in blue, band 4 is displayed in green, and band 7 (or 5) is displayed in red. This rendition looks like a jazzed up true color rendition - one with more striking colors.
Source: Chuck Wende, NASA; https://zulu.ssc.nasa.gov/mrsid/tutorial/Landsat%20Tutorial-V1.html

Ground Cover Type:	In Natural Color (3,2,1), appears:	In False Color: (4,3,2), appears:	In Pseudo Natural Color (7,4,2), appears:
Trees and bushes	Olive Green	Red	Shades of green
Crops	Medium to light green	Pink to red	Shades of green
Wetland Vegetation	Dark green to black	Dark red	Shades of green
Water	Shades of blue and green	Shades of blue	Black to dark blue
Urban areas	White to light blue	Blue to gray	Lavender
Bare soil	White to light gray	Blue to gray	Magenta, Lavender, or pale pink

Band #	EMS λ	About
1	Blue light	scattered by the atmosphere and illuminates material in shadows better than longer wavelengths; penetrates clear water better than other colors; absorbed by chlorophyll, so plants don't show up very brightly in this band; useful for soil/vegetation discrimination, forest type mapping, and identifying man-made features
2	Green light	penetrates clear water fairly well, gives excellent contrast between clear and turbid (muddy) water; helps find oil on the surface of water, and vegetation (plant life); reflects more green light than any other visible color; man-made features are still visible
3	Red light	limited water penetration; reflects well from dead foliage, but not well from live foliage with chlorophyll; useful for identifying vegetation types, soils, and urban (city and town) features
4	Near IR (NIR)	good for mapping shorelines and biomass content; very good at detecting and analyzing vegetation
5	Shortwave IR (SWIR)	limited cloud penetration; provides good contrast between different types of vegetation; useful for measuring the moisture content of soil and vegetation; helps differentiate between snow and clouds
6	Thermal IR (TIR or LWIR)	useful to observe temperature and its effects, such as daily and seasonal variations; useful to identify some vegetation density, moisture, and cover type; ETM + TIR has 60-meter pixels; TIR pixels on Landsat-5 are 120 meters
7	Another SWIR	limited cloud penetration; provides good contrast between different types of vegetation; useful for measuring the moisture content of soil and vegetation; helps differentiate between snow and clouds
8	Panchromatic ("pan")	on Landsat 7 only, has 15 m resolution, used to "sharpen" images