From: Campbell Text

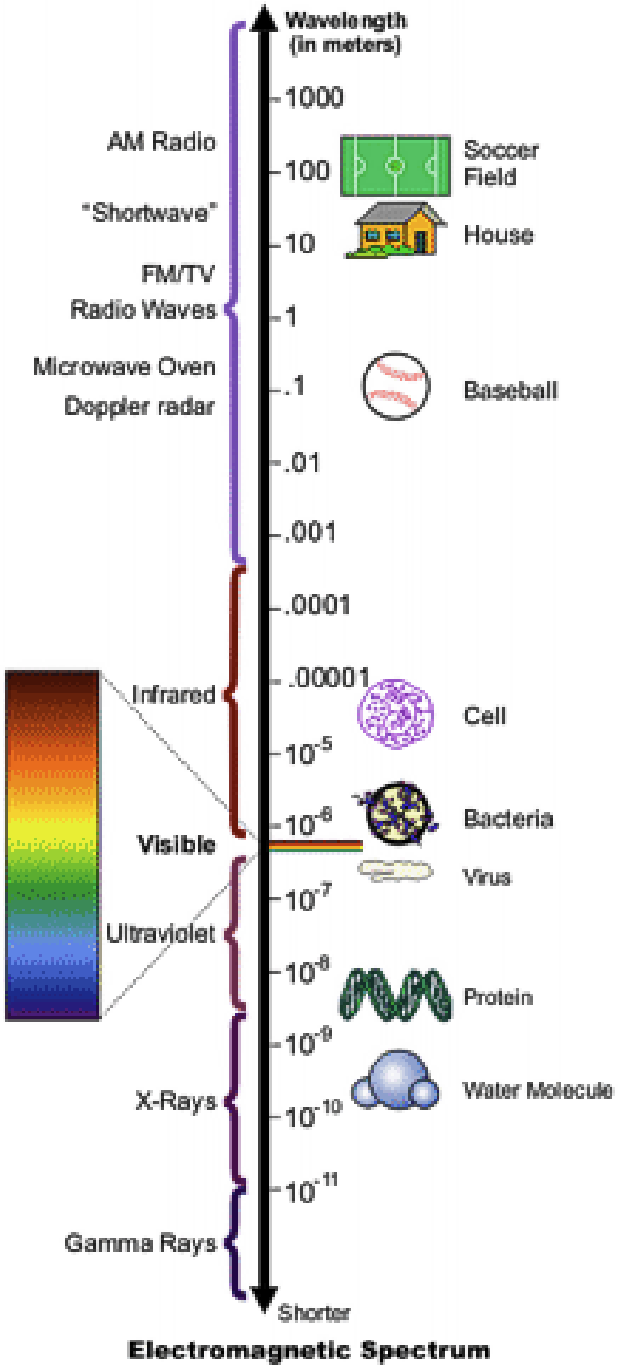
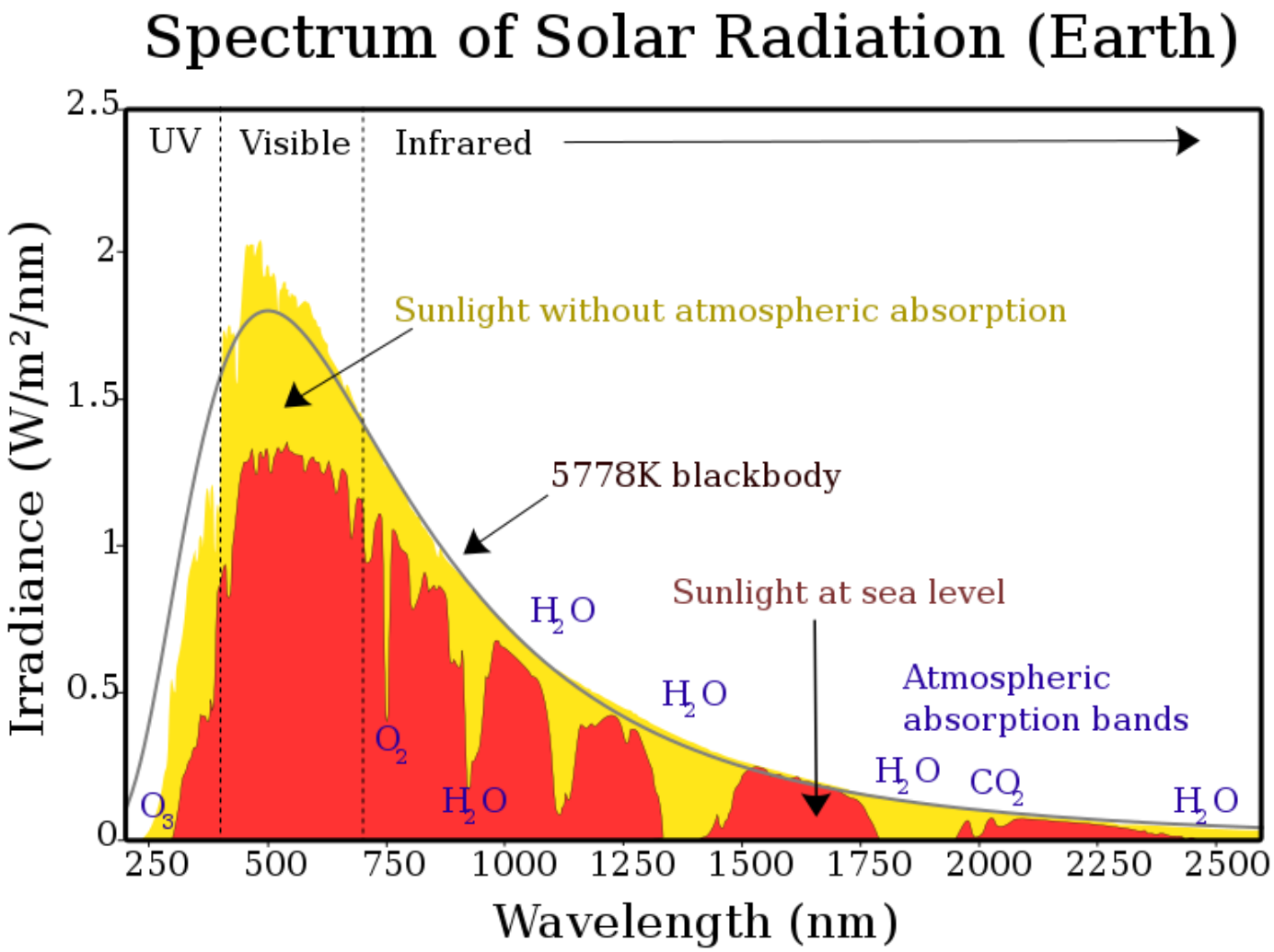


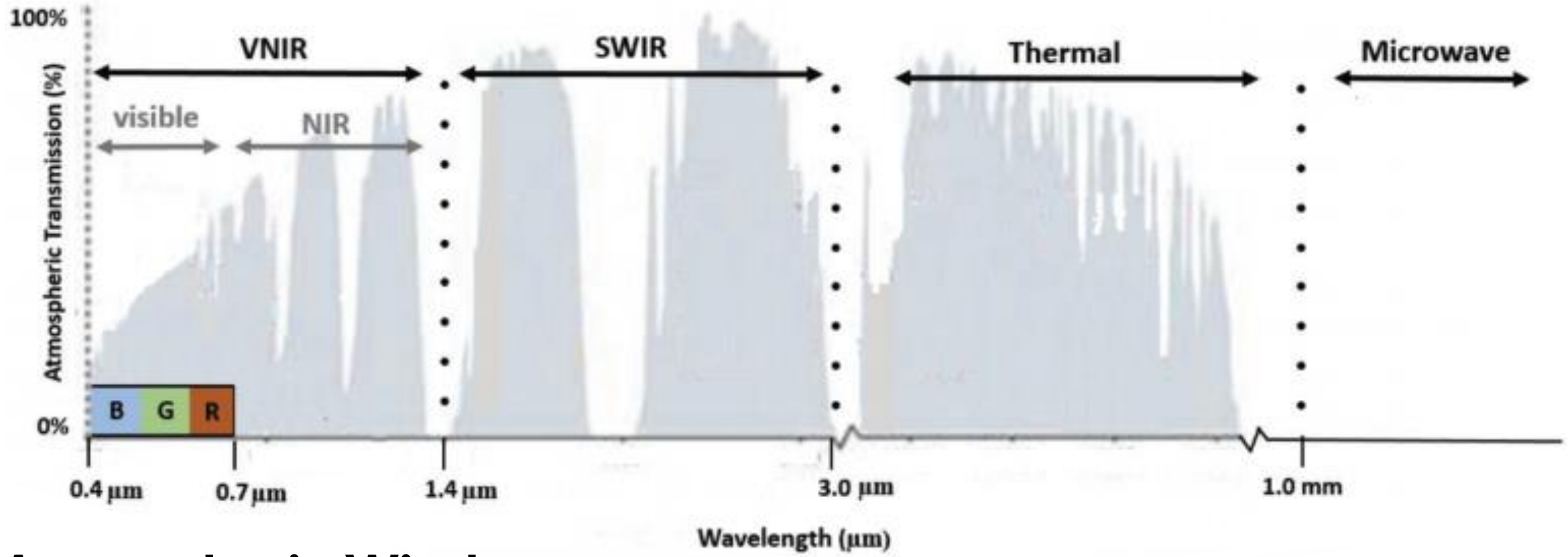
TABLE 2.3 Principal Divisions of the Electromagnetic Spectrum

Division	Limits
Gamma rays	< 0.03 nm
X-rays	0.03–300 nm
Ultraviolet radiation	0.30–0.38 μm
Visible light	0.38–0.72 μm
Infrared radiation	
Near infrared	0.72–1.30 μm
Mid infrared	1.30–3.00 μm
Far infrared	7.0–1,000 μm (1 mm)
Microwave radiation	1 mm–30 cm
Radio	≥ 30 cm

EM spectrum

Why is 400-700nm visible?





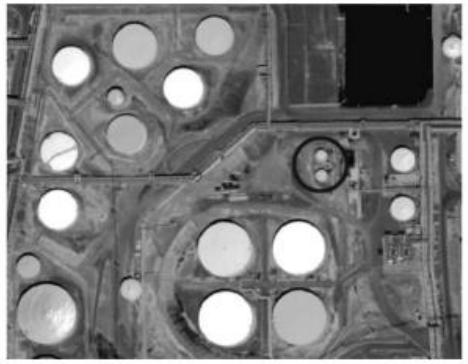
Atmospheric Window

- **Important for remote sensing:**
  - Visible (380-720 nm)
  - NIR (700-1400nm)
  - VNIR (400-1400 nm) Visual and Near InfraRed
  - SWIR (700-2500 nm) Short Wave InfraRed
  - Thermal (8000-14000nm)

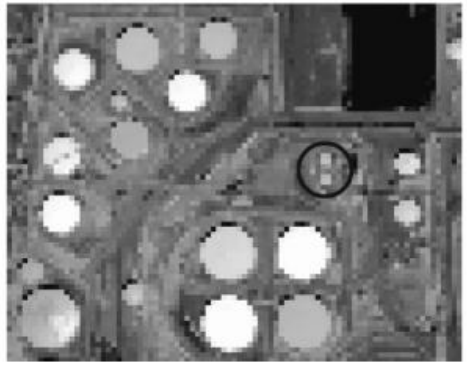
Spatial Resolution

Spatial resolution is the ability to distinguish between two closely spaced objects on an image.

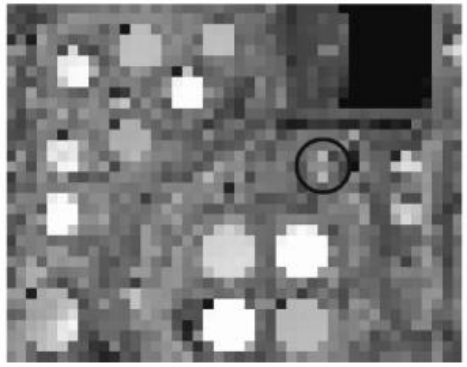
A. 0.6 m pixels.



B. 5.0 m pixels.

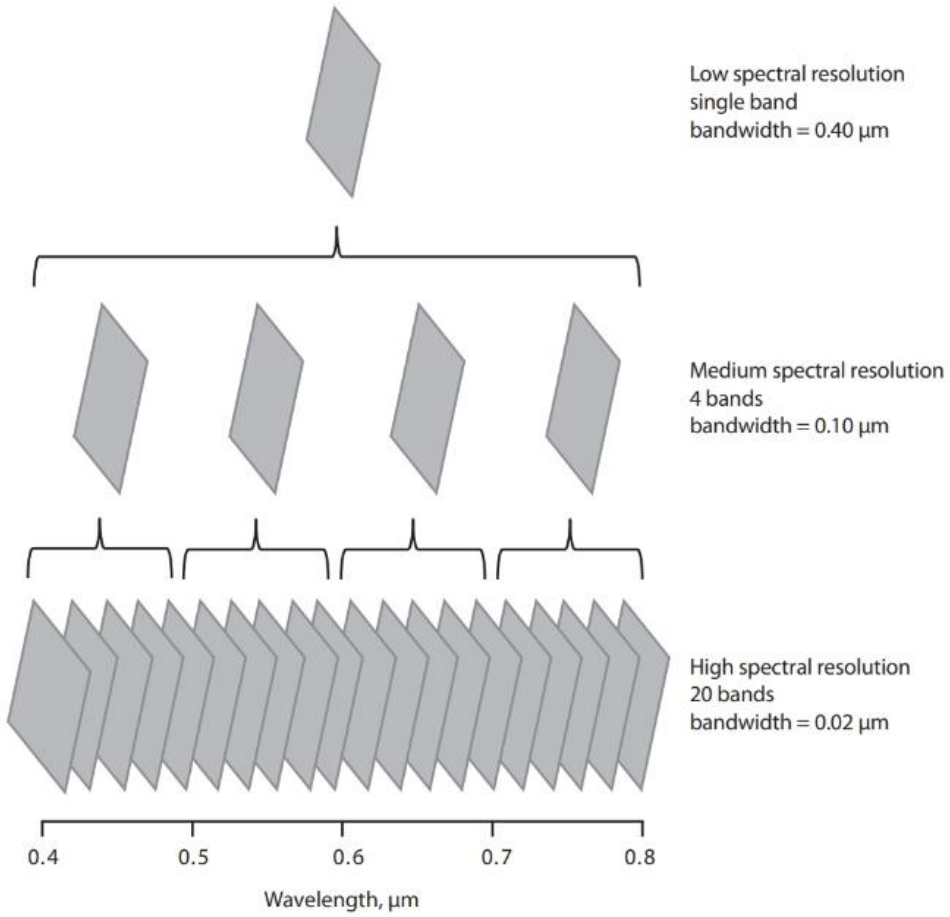


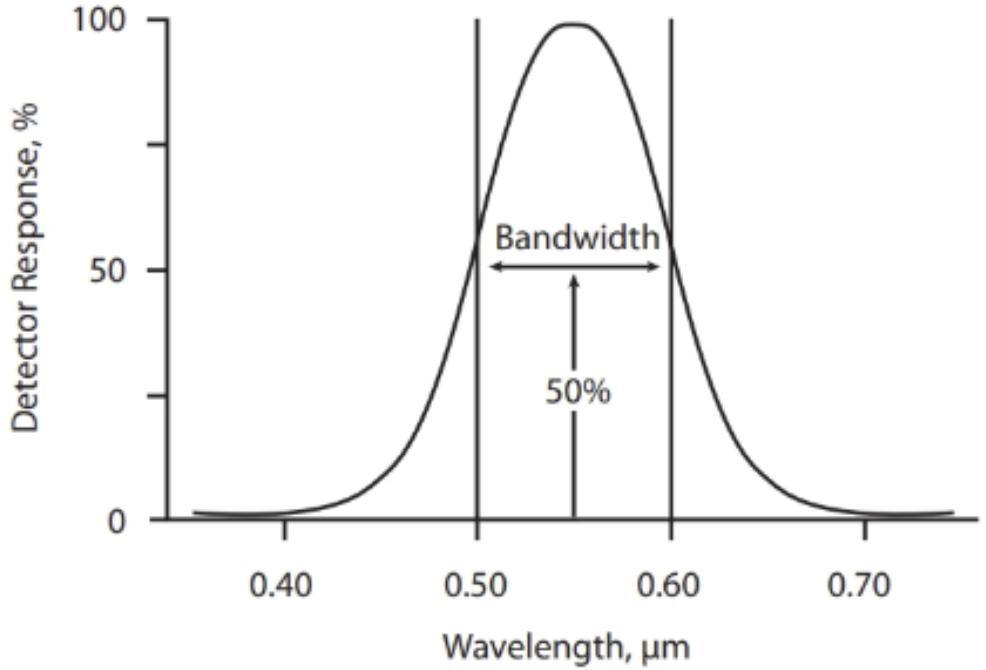
C. 10.0 m pixels.



0 100 m

Spectral Resolution





Data Level	Description
Level 0	Reconstructed, unprocessed instrument and payload data at full resolution, with any and all communications artifacts (e.g., synchronization frames, communications headers, duplicate data) removed. (In most cases, NASA's EOS Data and Operations System [EDOS] provides these data to the DAACs as production data sets for processing by the Science Data Processing Segment [SDPS] or by one of the SIPS to produce higher-level products.)
Level 1A	Level 1A (L1A) data are reconstructed, unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and georeferencing parameters (e.g., platform ephemeris) computed and appended but not applied to L0 data.
Level 1B	L1B data are L1A data that have been processed to sensor units (not all instruments have L1B source data).
Level 1C*	L1C data are L1B data that include new variables to describe the spectra. These variables allow the user to identify which L1C channels have been copied directly from the L1B and which have been synthesized from L1B and why.
Level 2	Derived geophysical variables at the same resolution and location as L1 source data.
Level 2A*	L2A data contains information derived from the geolocated sensor data, such asground elevation, highest and lowest surface return elevations, energy quantile heights (“relative height” metrics), and other waveform-derived metrics describing the intercepted surface.
Level 2B*	L2B data are L2A data that have been processed to sensor units (not all instruments will have a L2B equivalent).
Level 3	Variables mapped on uniform space-time grid scales, usually with some completeness and consistency.
Level 3A*	L3A data are generally periodic summaries (weekly, ten-day, monthly) of L2 products.
Level 4	Model output or results from analyses of lower-level data (e.g., variables derived from multiple measurements).

Typical Landsat Collection 2 Product Generation TIMELINE

Landsat 7 ETM+
Auxiliary data GEOS-5, OMI/ TOMS, NCEP REANALYSIS, and other static inputs

ACQUISITION

4-6 HOURS
Downlink & Level-1 Real-Time processing

Level-1 Real Time

24-26 DAYS
Reprocessing Level-1 with refined bumper mode parameters to Tier 1/Tier 2

Level-1 Tier 1/Tier 2

24 HOURS
Level-2 processing

Level-2
Surface Reflectance/ Surface Temperature

4 DAYS
AUXILIARY DATA

25-27 DAYS

(GEOS-5 FP/FP-IT)

Landsat 8 OLI/TIRS
Auxiliary data GEOS-5, MODIS CMA and CMG, and other static inputs

ACQUISITION

4-6 HOURS
Downlink & Level-1 Real-Time processing

Level-1 Real Time

14-16 DAYS
Reprocessing Level-1 with refined TIRS line-of-sight model parameters to Tier 1/Tier 2

Level-1 Tier 1/Tier 2

24 HOURS
Level-2 processing

Level-2
Surface Reflectance/ Surface Temperature

2 DAYS
AUXILIARY DATA

15-17 DAYS

(GEOS-5 FP/FP-IT)

Landsat 9 OLI-2/TIRS-2
Auxiliary data GEOS-5, MODIS CMA and CMG, and other static inputs

ACQUISITION

4-6 HOURS
Downlink & Level-1 processing

Level-1 Tier 1/Tier 2

24 HOURS
Level-2 processing

Level-2
Surface Reflectance/ Surface Temperature

2 DAYS
AUXILIARY DATA

3 DAYS