

# Remote Sensing and Geographic Information System

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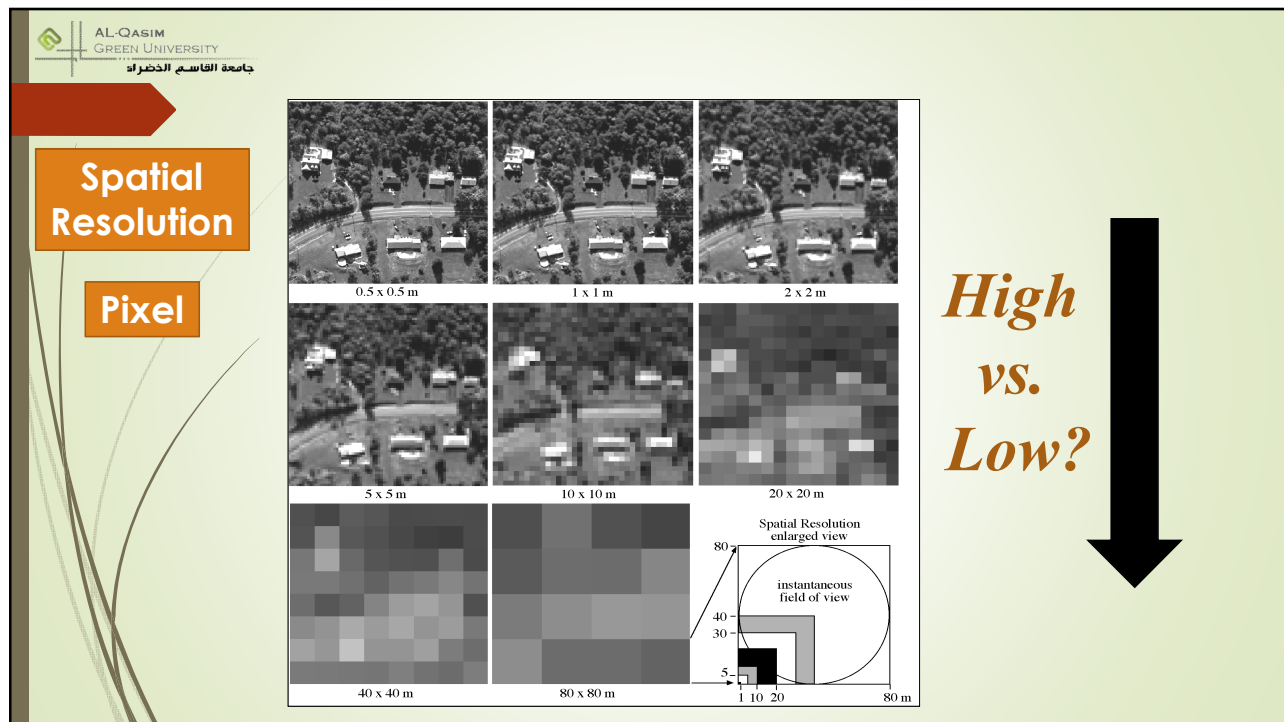
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## Resolution

There are four types of resolution all remote sensing systems have:

1. Spatial resolution
2. Spectral resolution
3. Temporal resolution
4. Radiometric



**Spatial Resolution** describes how much detail in a photographic image is visible to the human eye. The ability to "resolve," or separate, small details is one way of describing what we call spatial resolution.

**Based on the spatial resolution, satellite systems can be classified as follows.**

1. **Low resolution systems**
2. **Medium resolution systems**
3. **High resolution systems**
4. **Very high resolution systems**

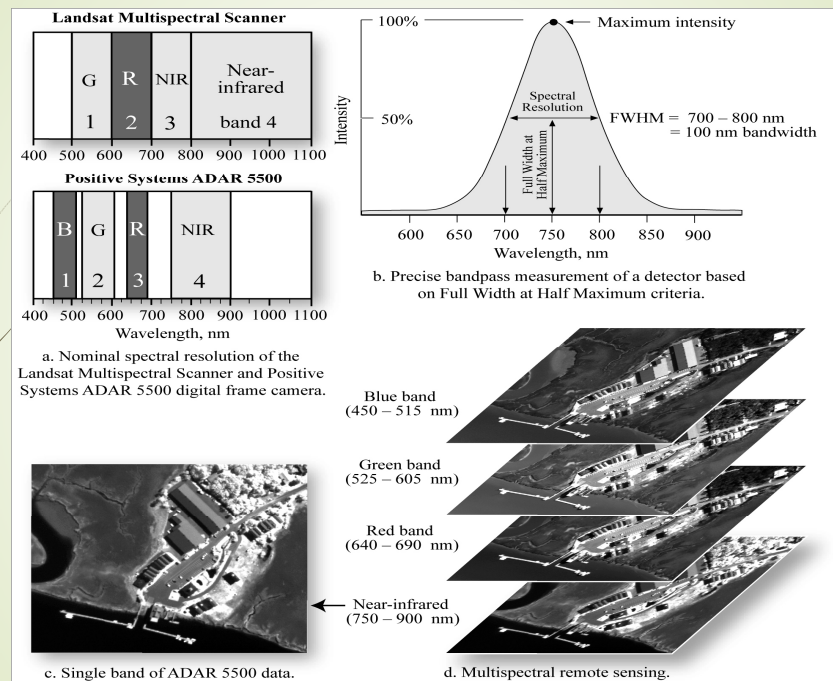
## Spatial resolution

- ☐ The earth surface area covered by a pixel of an image is known as spatial resolution
- ☐ Large area covered by a pixel means low spatial resolution and vice versa

## Spectral resolution

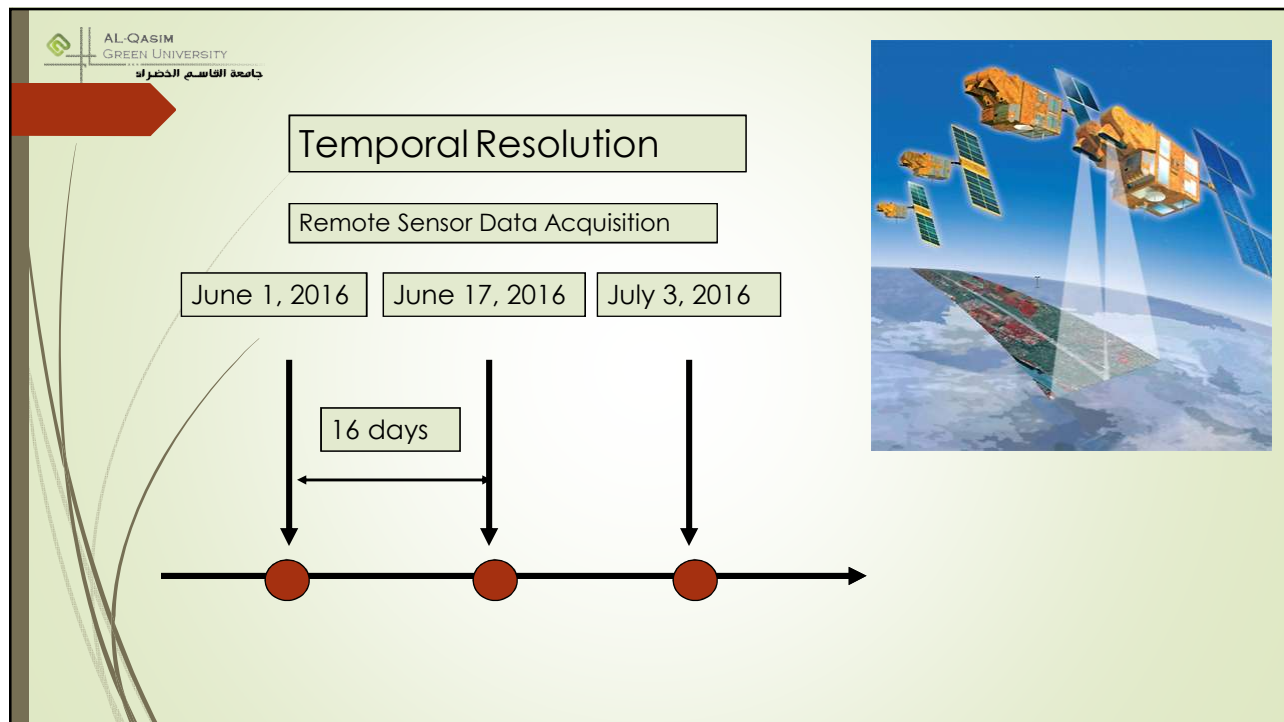
- ☐ Is the ability to resolve spectral features and bands into their separate components
- ☐ More number of bands in a specified bandwidth means higher spectral resolution and vice versa
- ☐ Number of spectral bands (red, green, blue, NIR, Mid-IR, thermal, etc.)
- ☐ Width of each band
- ☐ Certain spectral bands (or combinations) are good for identifying specific ground features
- ☐ Panchromatic – 1 band (B&W)
- ☐ Color – 3 bands (RGB)
- ☐ Multispectral – 4+ bands (e.g. RGBNIR)
- ☐ Hyperspectral – hundreds of bands

## Spectral Resolution



## Temporal Resolution

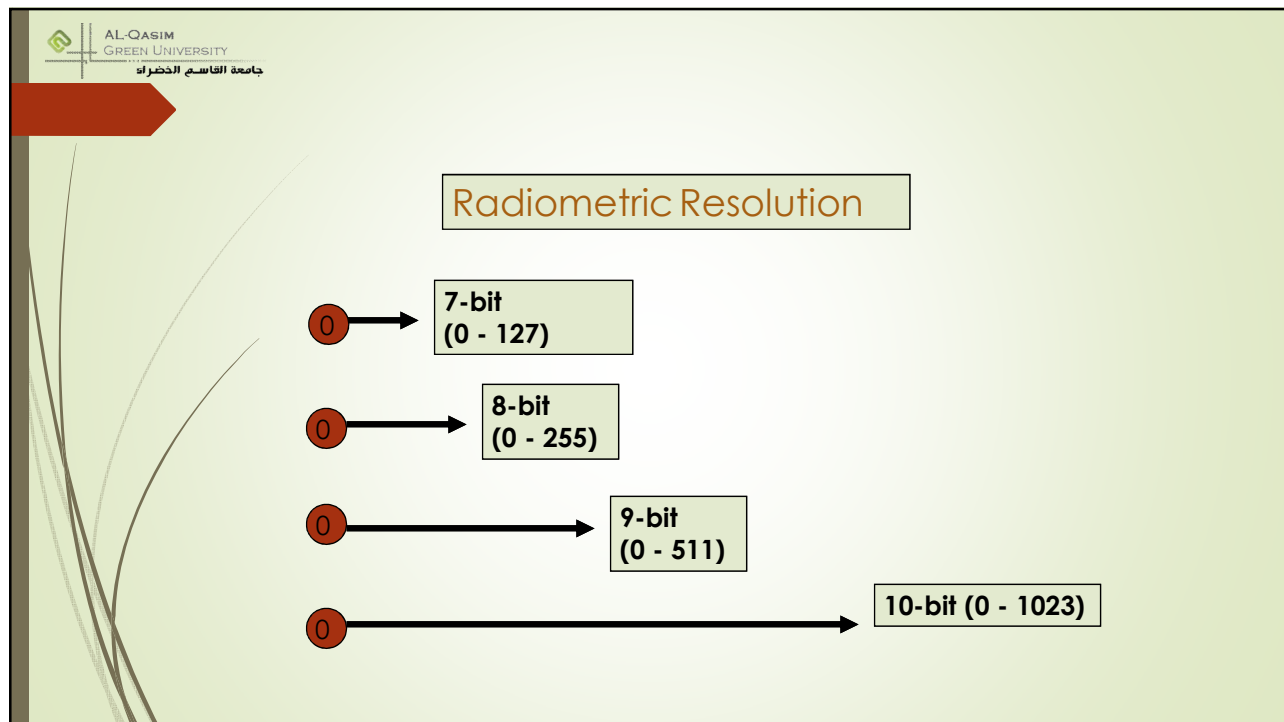
- ❑ Frequency at which images are recorded/ captured in a specific place on the earth.
- ❑ The more frequently it is captured, the better or finer the temporal resolution is said to be
- ❑ For example, a sensor that captures an image of an agriculture land twice a day has better temporal resolution than a sensor that only captures that same image once a week.



## Radiometric Resolution

Every time an image is acquired by a sensor, its sensitivity to the magnitude of the electromagnetic energy determines the radiometric resolution.

The finer the radiometric resolution of a sensor, the more sensitive it is to detecting small differences in reflected or emitted energy.



### Resolution of some Multispectral Sensors

	Spatial	Spectral	Temporal
AVHRR	1.1 × 1.1 km	5 bands	twice daily
Modis *	250 × 250 m	36 bands	daily
Landsat	30 × 30 m	6 bands	16 days
Aster	15 × 15 m	4 bands	?
SPOT 5	10 × 10 m	4 bands	by order
Hyper-Spectral	4 × 4 m	128 bands	air craft
IKONOS	4 × 4 m	4 bands	by order