Phil's remote sensing learning diary

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Preface

Hello, I am Phil from South Korea. This is my learning diary for CASA0023 Remotely Sensing Cities and Environments.

To learn more about the module, visit https://andrewmaclachlan.github.io/CASA0023/00-course_info.html

1 Week 1

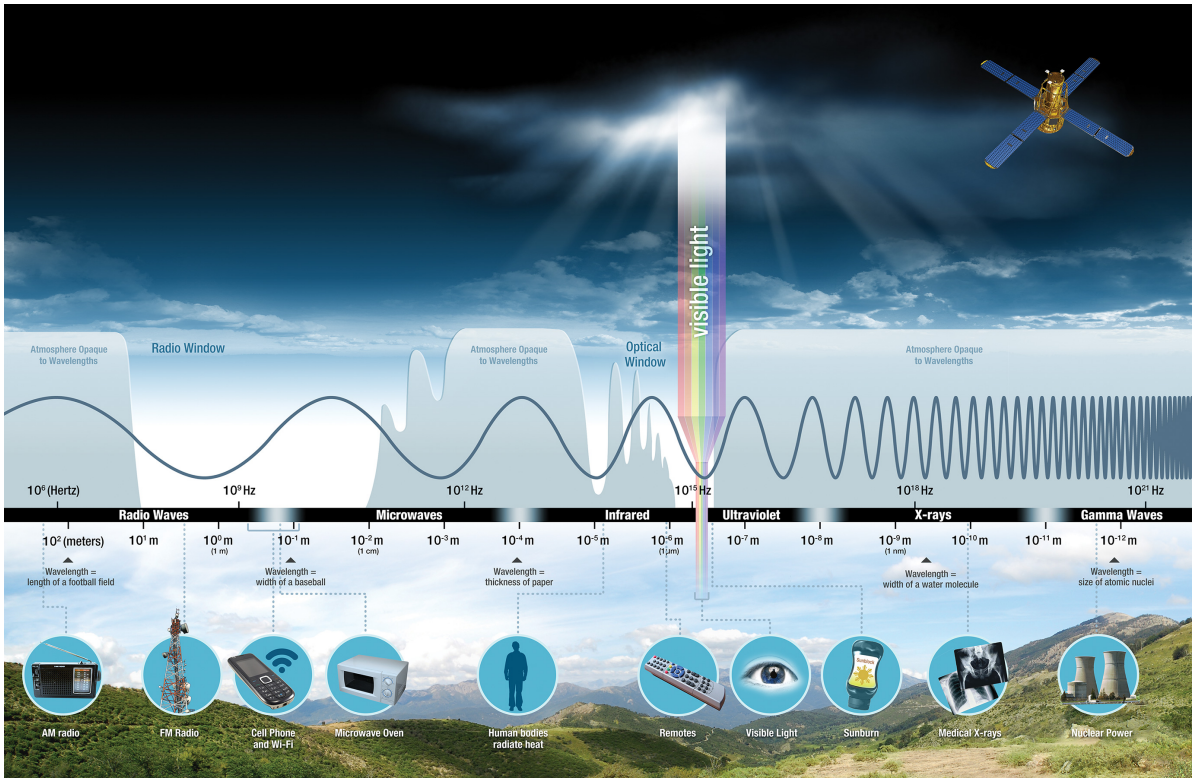
1.1 Summary

Definition of Remote Sensing

According to NASA, remote sensing refers to **information obtained at a distance**. These sensors are placed on satellites or aircrafts and they detect and document reflected or emitted energy.

What kinds of energy?

TO cut it short, the answer is **Dlectromagnetic Radiation (EMR)**. This energy travels in different forms of waves through the atmosphere. While human eyes only detects visible light, the sensors can utilise the full range of the electromagnetic spectrum to collect data.

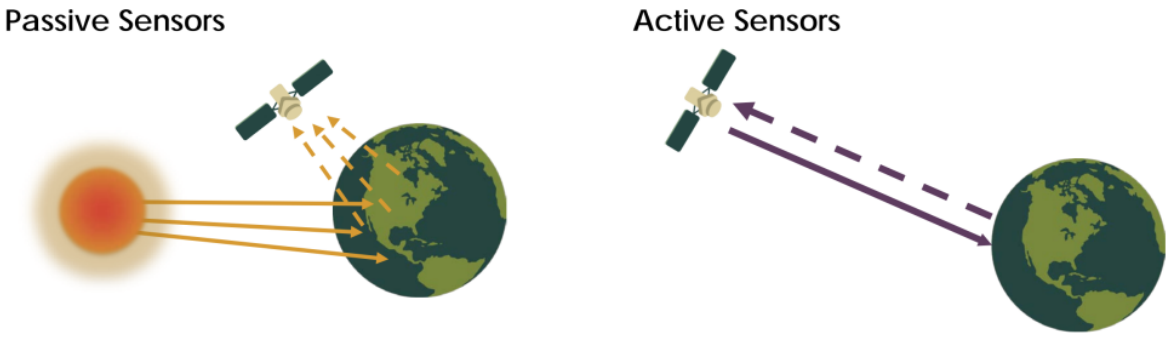


Electromagnetic Spectrum (Source: NASA Science)

Sensor Types

There are two types of remote sensors: active and passive sensors.

- Active sensor:
  - emits electromagnetic energy and receives the reflected energy
  - can observe areas under most conditions as most active sensors operate in the microwave band of the electromagnetic spectrum
  - requires power source - solar energy
  - affected by space weather - solar flares
- Passive sensor:
  - usually detects reflected energy
  - used for measuring physical attributes, such as land/sea surface temperature and vegetation cover
  - has limitations in observing areas in the presence of dense cloud cover



Passive and Active Sensors (Source: NASA)

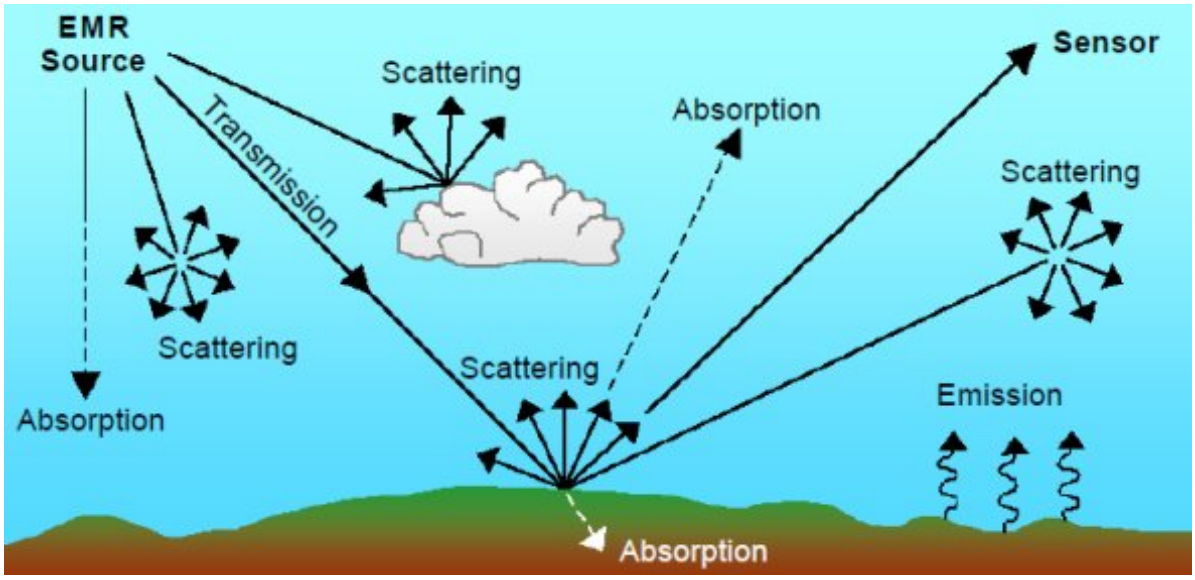
Does EMR interact with other factors?

Yes, these radiations are often influenced by Earth's surface and atmospheric conditions, which might distort the original information.

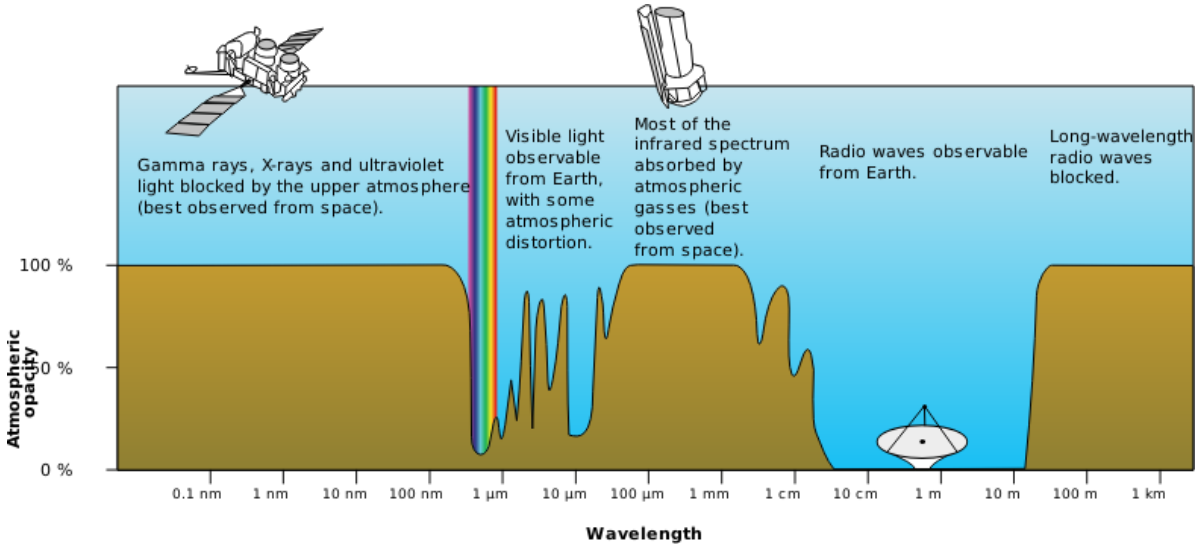
EMR's interaction with surface and atmosphere (Source: Daneshgar, 2015)

4 Resolutions of Remote Sensing Data

- Spatial resolution: sizes of the raster cells
- Spectral resolution:



- Values for each wavelength across the electromagnetic spectrum creates a spectral sign
- Every object has its own unique spectral signature, thus it can be used for identifyin
- But spectral resolution is often affected by atmospheric particles which absorb parts



Atmospheric Electromagnetic Opacity (Source: GIS Geography)

- Temporal resolution: frequency of the recorded data
- Radiometric resolution: sensor's ability to detect subtle differences in energy which determines the quality of images

1.2 Application

Remote sensing is widely used in various fields of domain, such as forestry, urban planning and so on (Aggarwal 2004). In the context of climate change, monitoring forest degradation can be done using remote sensing. According to Lambin (1999), combining different types of resolution - spectral, spatial and temporal - enables a comprehensive forest monitoring. Rosenqvist et al. (2003) acknowledged the role of remote sensing in assisting with achieving the requirements of Kyoto Protocol by quantifying the land cover change and biomass stocks.

1.3 Personal reflection

As a person who is interested in urban green spaces, the spectral resolution was an interesting concept. Vegetation shows a huge spike in near infrared radiation. This questions me whether the health of urban parks in a city (bad and good) can result in a difference in reflectance rate. Little and Summy (2012) discovered that different reflectance was detected between healthy and stressed leaves. I reckon this can be a good indicator of monitoring urban green space's health apart from physical measuring. This will be more cost- and time-efficient.

2 Week 2

Week 2 Presentation URL:

https://phily5051.github.io/CASA0023_wk2_slides/#1

References

Aggarwal, Shefali. 2004. "Principles of Remote Sensing." *Satellite Remote Sensing and GIS Applications in Agricultural Meteorology* 23 (2): 2328.

Lambin, Eric F. 1999. "Monitoring Forest Degradation in Tropical Regions by Remote Sensing: Some Methodological Issues." *Global Ecology and Biogeography* 8 (3-4): 191198.

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