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RSG - C1 Assignment

(1) Available Bands of Landset-8:-

- Coastal Aerosol (Band 1):
  0.433 - 0.453 μm
- Blue (Band 2):-
  0.450 - 0.512 μm
- Green (Band 3):-
  0.526 - 0.600 μm
- Red (Band 4): 0.630 - 0.680 μm
- Near-Infrared (Band 5):
  : 0.769 - 0.892 μm
- Near-Infrared (Band 6)
  : 1.566 - 1.651 μm.
- Shortwave Infrared (Band 7)
  : 2.100 - 2.300 μm
- Panchromatic (Band 8):
  : 0.500 - 0.680 μm
- Cirrus (Band 9)
  : 1.360 - 1.380 μm

Sentinel-2 :-

- Aerosol : 0.443 – 0.490 μm
- Blue :- 0.490 – 0.530 μm
- Green :- 0.530 – 0.570 μm
- Red :- 0.630 – 0.680 μm
- Red-edge 1 :- 0.7 – 0.74 μm
- Red-edge 2 :- 0.74 – 0.78 μm
- Red-edge 3 :- 0.78 – 0.89 μm
- Near infrared :- 0.770 – 0.890 μm
- Near infrared :- 0.940 – 0.960 μm
- Water vapor :- 0.96 – 1.02 μm
- Shortwave infrared 1 :- 1.56 – 1.67 μm
- Shortwave infrared 4 :- 2.090 – 2.220 μm
- Cirrus : 1.37 – 1.38 μm.
- Aerosol : 0.842 – 0.872 μm

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Technical Differences:-

Feature	Landsat-8	Sentinel-2
Spatial Resolution	30m	10m
Temporal Resolution	16 days	5 days
Spectral Bands	9	13
Spectral Coverage	similar coverage in visible, near infrared, shortwave infrared	Sentinel-2 has additional red-edge and water vapor bands
Suitability	Regional-scale monitoring, land cover studies, vegetation analysis	Higher-resolution for detailed studies, urban mapping, water quality monitoring

(2) Not all wavelengths of light can penetrate the Earth's atmosphere equally. Most of the radiation is absorbed by atmospheric gases like oxygen, nitrogen and water vapor. However, there are specific regions in the electromagnetic spectrum where absorption is minimal, allowing light to pass through. The region called "atmospheric windows".

Therefore, imaging the Earth's surface from space is restricted to these specific wavelengths within atmospheric windows. Choosing the appropriate window depends on the desired information.

e.g.:
Visible light window (0.4 - 0.7 μm)
This allows capturing natural color images suitable for land cover studies, vegetation analysis and visual interpretation.

(3)

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Active Vs. Passive Sensors;
Image Appearance.

- Active Sensors:-
  These emit their own radiation and analyze the reflected or scattered signal to create an image. Examples include radar, LiDAR, and sonar.

  ↳ Image Appearance:-
  Actively generated images often high spatial resoln and can penetrate clouds and darkness. However, they may have artificial textures or colors imposed due to the specific type of radiation used.

- passive sensors:-
  These rely on capturing naturally occuring radiation such as sunlight reflected from the Earth's surface. Comman examples include optical cameras and thermal infrared sensors.

↳ Image appearance:-
Passive images show the natural colors and textures of Earth's surface. However they are limited by sunlight availability and can be obscured by clouds or darkness.

④ Ground Data Collection and Prerequisites :-

It involves gathering information about the Earth's surface directly at ground level. This data is crucial for validating, calibrating and interpreting remotely sensed data acquired from satellites and other airborne platforms.

Prerequisites:- for ground surveys:

- Clear definition of objectives: Specify the specific information you want to collect and how it will be used.

- Appropriate methods:- Choose the right data collection method based on the terrain, accessibility, and desired data type.
- Representative sampling:- ensure the collected data accurately reflects the larger area under study.
- Quality control:- Implement procedures to ensure the accuracy and precision of collected data.
- Documentation:- Clearly document the methods, location, and conditions under which the data was collected.