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0.1 Abiotic Data Variables

0.1.1 Ocean Data Variables

Ocean Wave Spectrum, see *https* : *//geo.libretexts.org/Bookshelves/Oceanography/Introduction*$_t o_P$

0.2 Abiotic Data Sources

0.2.1 Copernicus

Satellite Data

Copernicus stores data that is obtained from the usage of its 5 different **Sentinel Satellites**. Each of these satellites collect different forms of data and all of this can be accessed through the Copernicus API

- **Sentinel-1**, provides radar imagaging that collects data that pertains to
  - Landscape topography
  - Multi-purpose imagery of both land and ocean
  - Ocean Surface winds
  - Ocean topography and currents
  - Ocean wave height and spectrum
  - Sea ice cover, edge and thickness
  - Snow cover, edge and depth
  - Soil moisture and vegetation

  The following data is measured from S-1

  - SAR (Synthetic Aperture Radar) transmits microwave signals at an angle and measures the backscatter echo. The brightness amplitude and phase information is being recorded. General variables that affect these measurements are
    - Surface Roughness
    - Dielectric constants of scattering material
  - Polarimetry, in which the polarization of EM radiation is studied. Applications for polarimetric data are
    - Crop identification, condition monitoring and soil moisture in agriculture
    - Biomassn estimation, species identification and fire scar mapping in forestry
    - Sea ice identification, coastal wind field measurements, oil spill detection in oceanography
  - Interferometry, measuring the phase difference between two complex radar SAR observations from the same area. Applications of the interferometry are
    - Geophysical monitoring of natural hazards

    * Time series analysis of surface deformations
    * Glacier motion analysis
    * Elevation mapping

- **Sentinel-2**, a pair of satellites that perform multi-spectral imagaging. These satellites are phased at 180 degrees and samples at 13 different spectral bands. The spectral bands can be divided into 3 different groups based on their spatial resolution

    – 10m resolution band that contains 4 different bands in the visible part of the EM spectrum

        * Blue light (∼493 nm)
        * Green light (∼560 nm)
        * Red light (∼665 nm)
        * near IR light (∼833 nm)

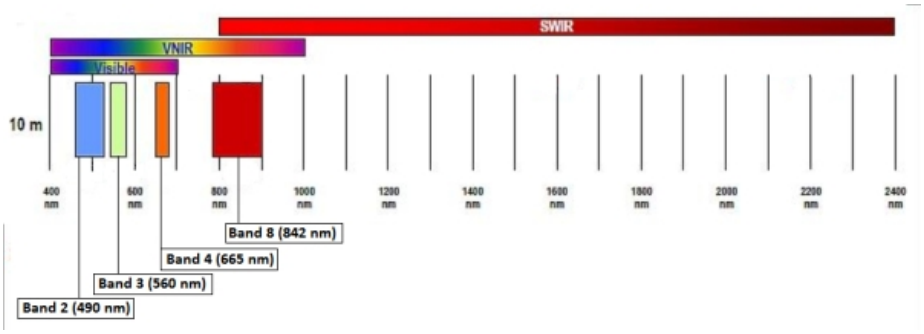

Figure 1: Overview of the 10m spectral resolution band

    – 20m resolution band that contains 6 different bands mainly in the IR region of the EM spectrum

        * 4 narrow bands in visible-near IR (vnIR) (∼704nm,∼740nm, ∼783nm and ∼865nm), aimed at vegetation detection
        * 2 wider bands in shot-wave IR (swIR) (∼1610nm and ∼2190nm) aimed at snow/ice/cloud detection or vegation moisture stress assessment

    – 60m resolution band that cointains 3 different bands that is focused on cloud screening and atmospheric correction (∼443nm for aerosols and ∼945nm for water vapour) and cirrus detection (∼1374nm)

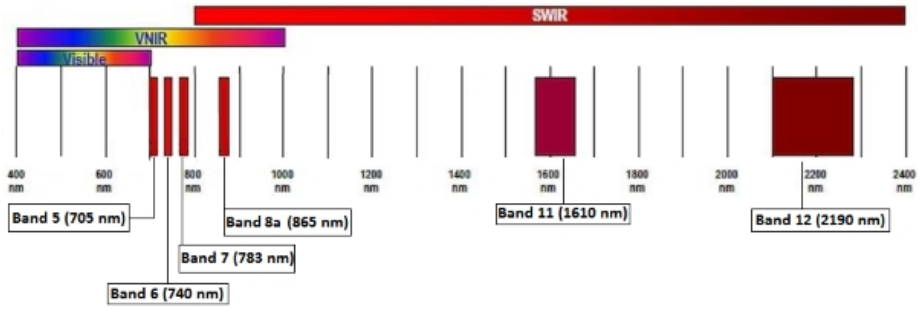

Figure 2: Overview of the 20m spectral resolution band

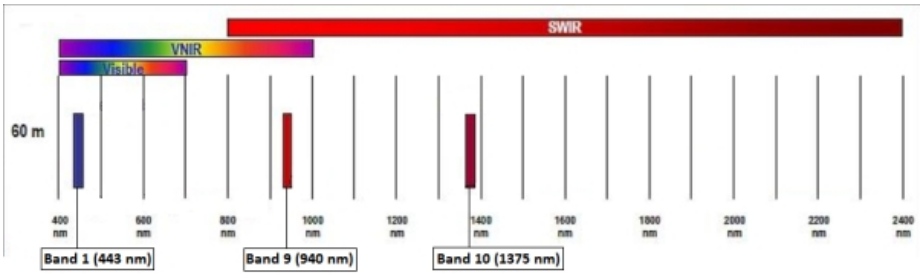

Figure 3: Overview of the 60m spectral resolution band