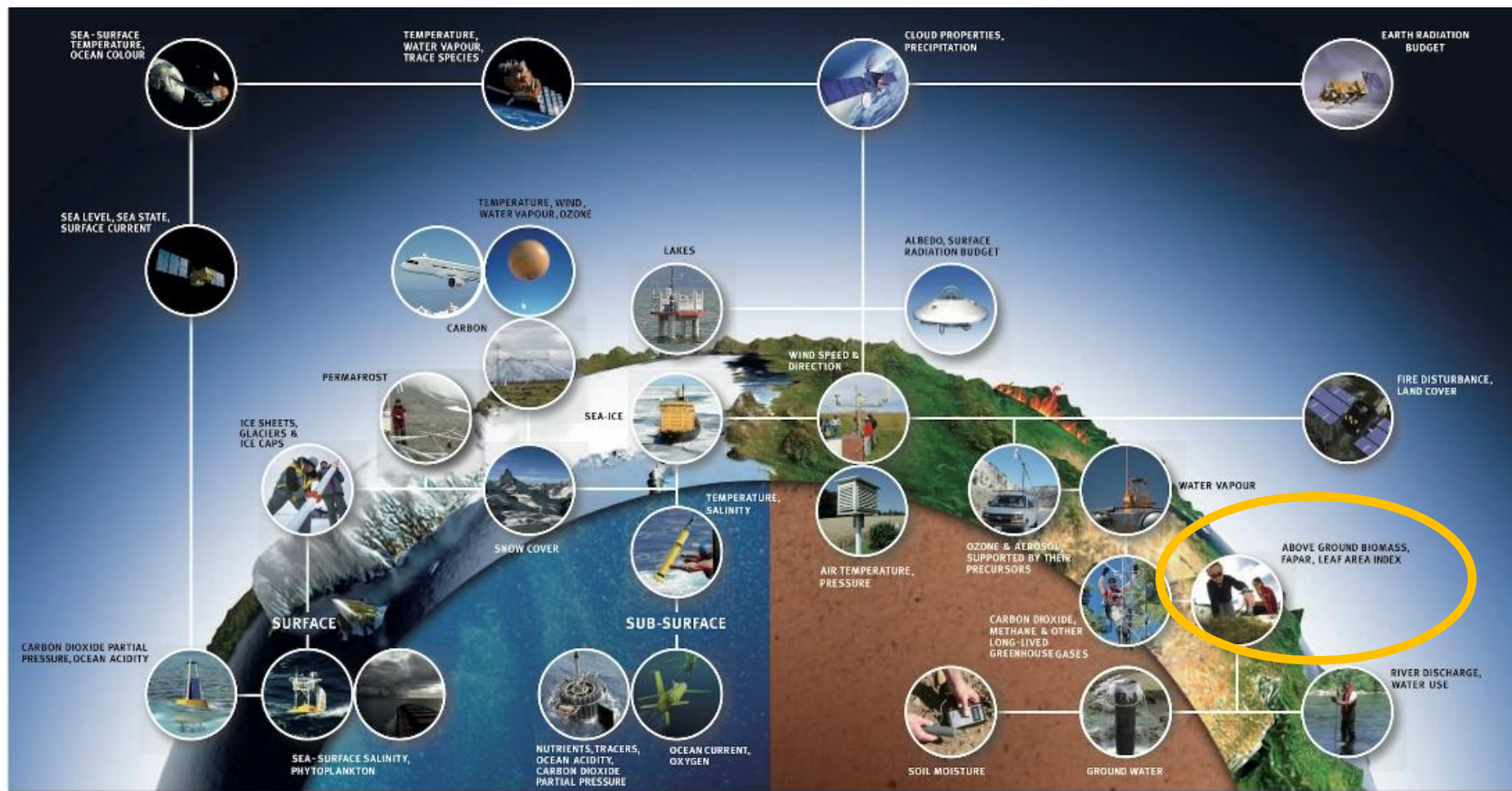


# Active Learning with Google Earth Engine



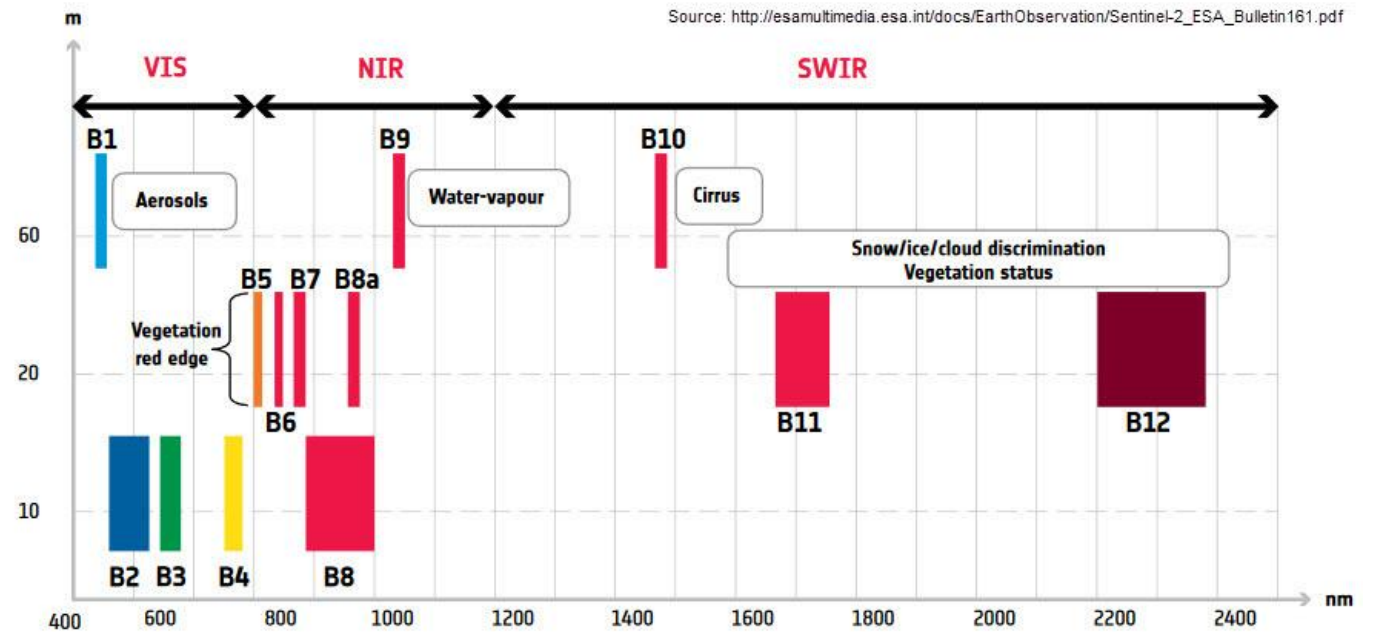
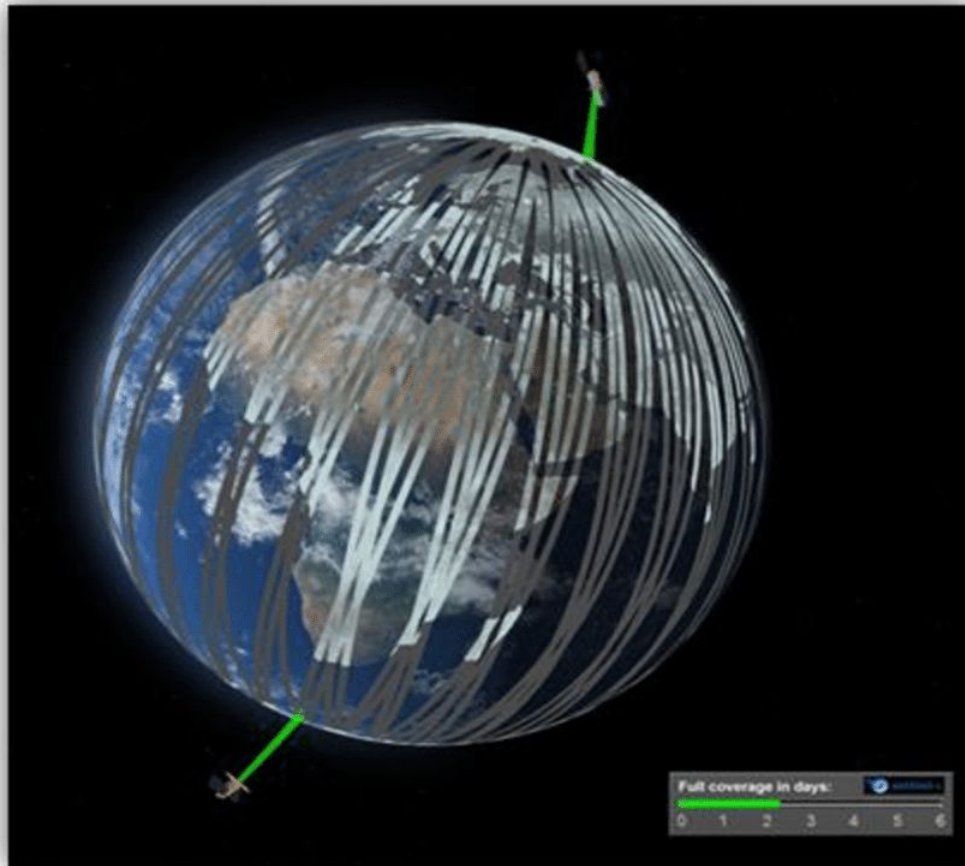
Kate Harvey

# Global Climate Observing System (GCOS): ECVs



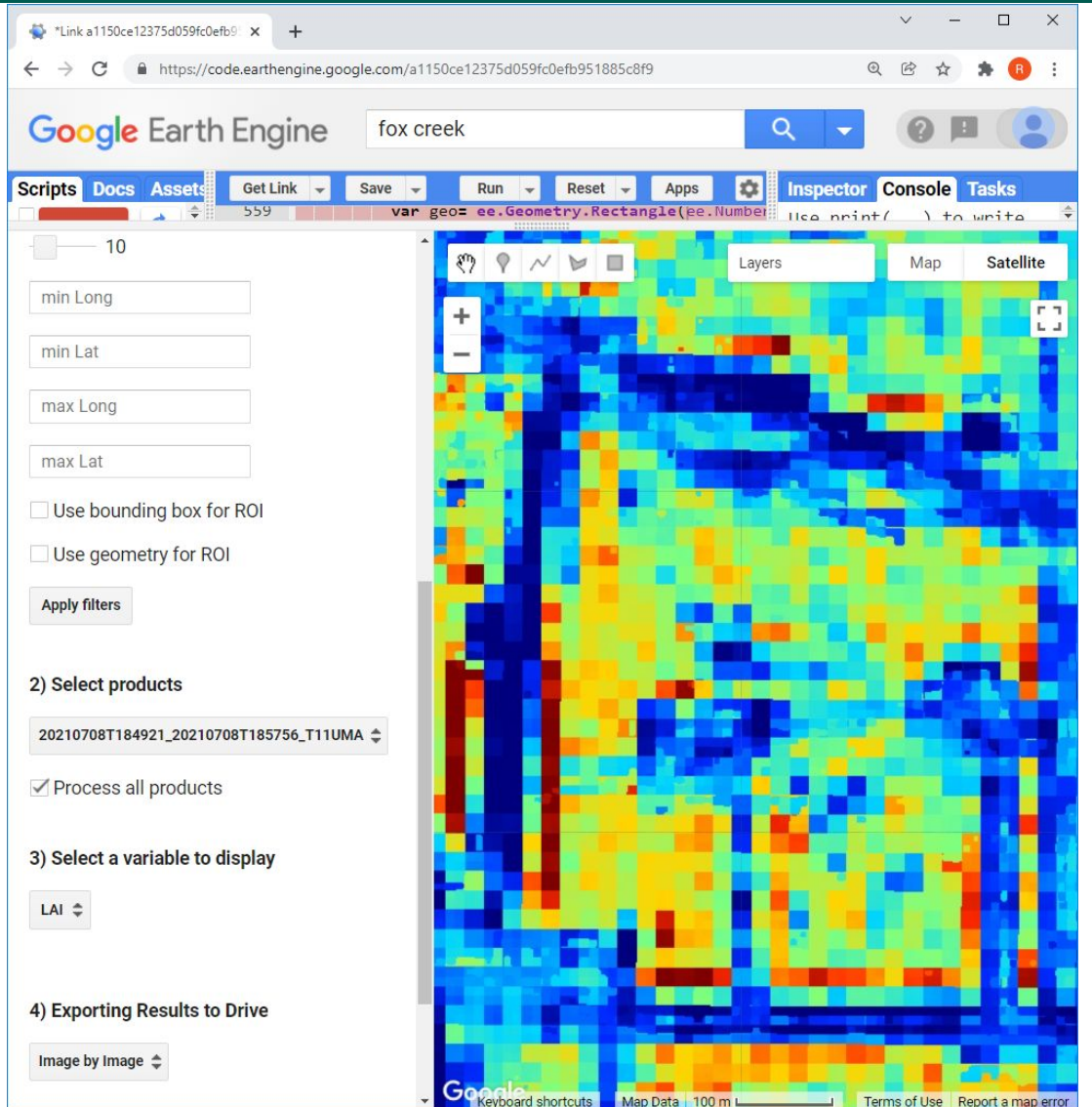
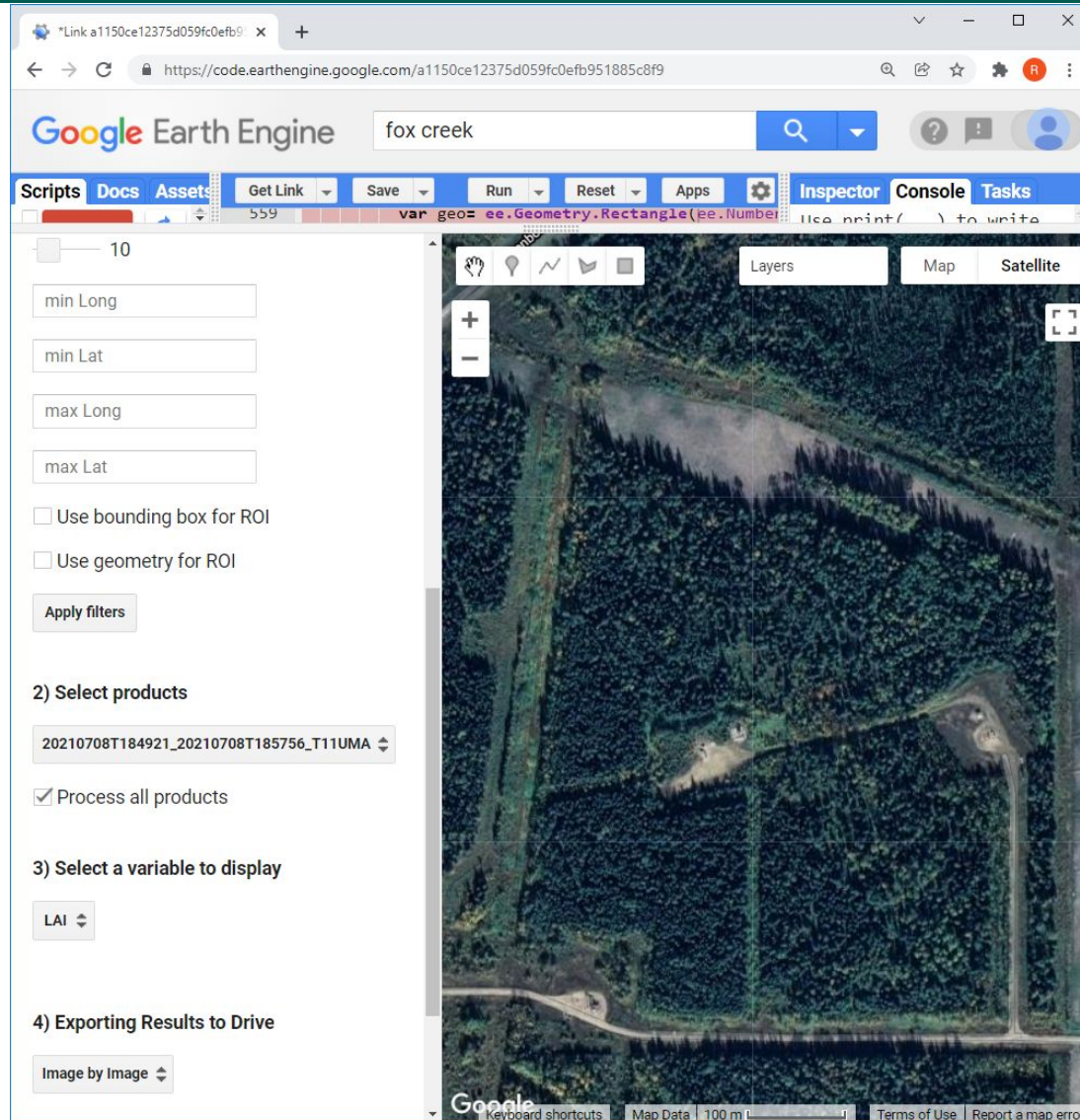
<https://gcos.wmo.int/en/essential-climate-variables>

# Sentinel 2 Mission Multispectral Instrument (MSI)



↑ Spatial resolution versus wavelength: Sentinel-2's span of 13 spectral bands, from the visible and the near-infrared to the shortwave infrared at different spatial resolutions ranging from 10 to 60 m on the ground, takes land monitoring to an unprecedented level





LEAF TOOLBOX (github/rfernand387/LEAF-Toolbox) Applies Simplified Level 2 Prototype Processor Using 20m S2 MSI bands

# Question:

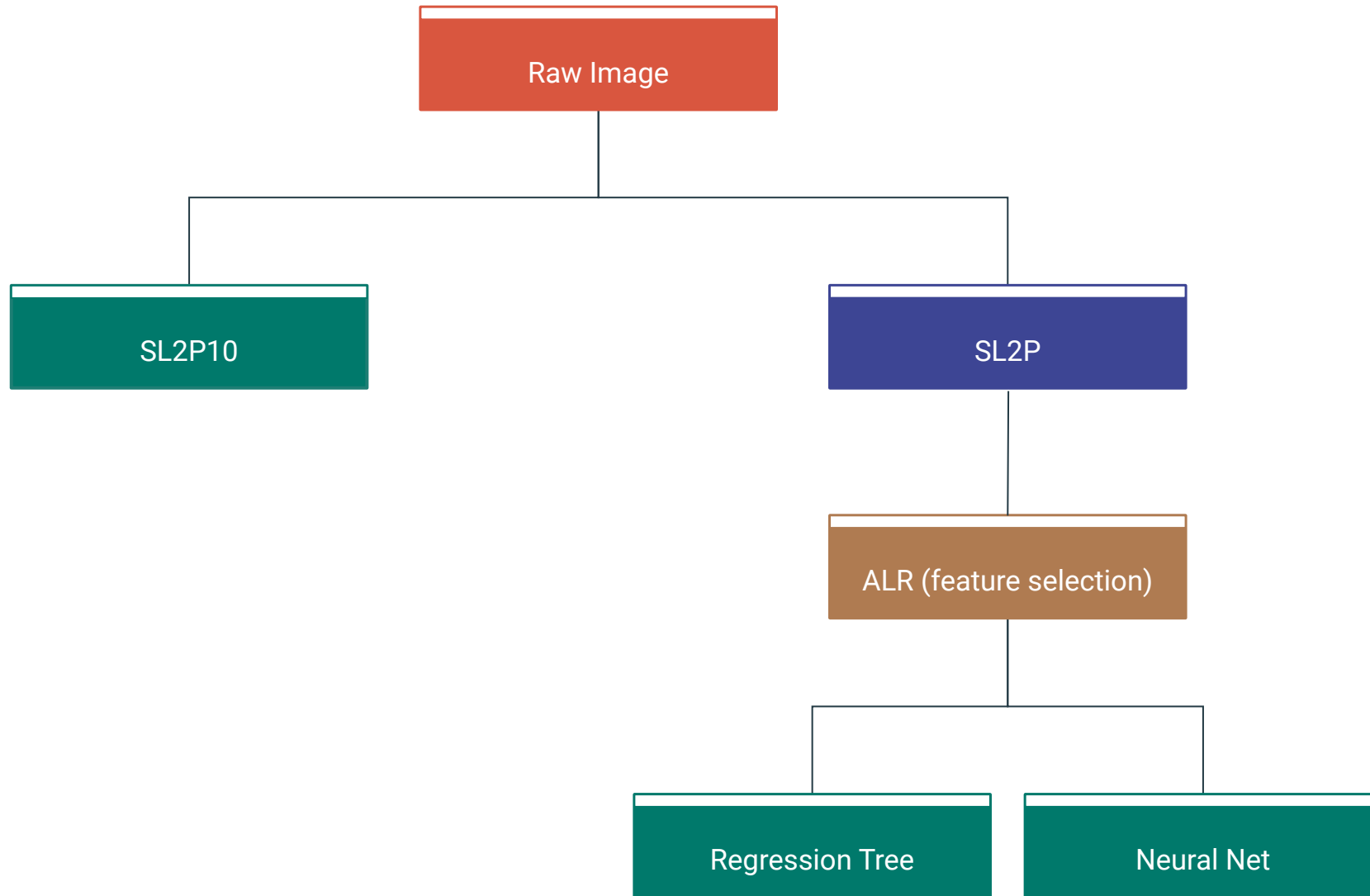
Can predictions be made using only the data from 10 m bands?

# Approach

- What is Active Learning? (also called Reinforcement Learning)

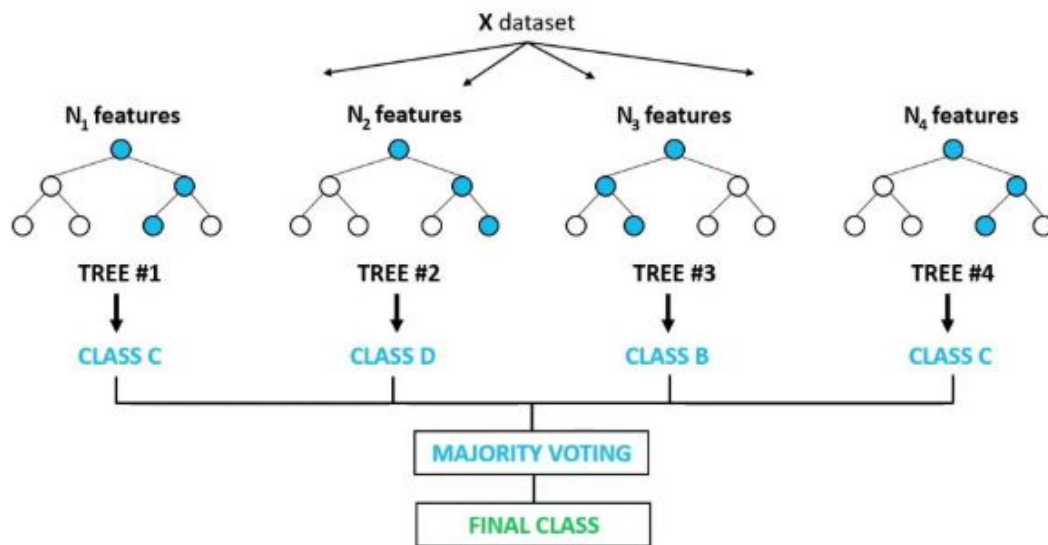


Band	Resolution	Central Wavelength	Description
B1	60 m	443 nm	Ultra blue (Coastal and Aerosol)
B2	10 m	490 nm	Blue
B3	10 m	560 nm	Green
B4	10 m	665 nm	Red
B5	20 m	705 nm	Visible and Near Infrared (VNIR)
B6	20 m	740 nm	Visible and Near Infrared (VNIR)
B7	20 m	783 nm	Visible and Near Infrared (VNIR)
B8	10 m	842 nm	Visible and Near Infrared (VNIR)
B8a	20 m	865 nm	Visible and Near Infrared (VNIR)
B9	60 m	940 nm	Short Wave Infrared (SWIR)
B10	60 m	1375 nm	Short Wave Infrared (SWIR)
B11	20 m	1610 nm	Short Wave Infrared (SWIR)
B12	20 m	2190 nm	Short Wave Infrared (SWIR)



# Testing

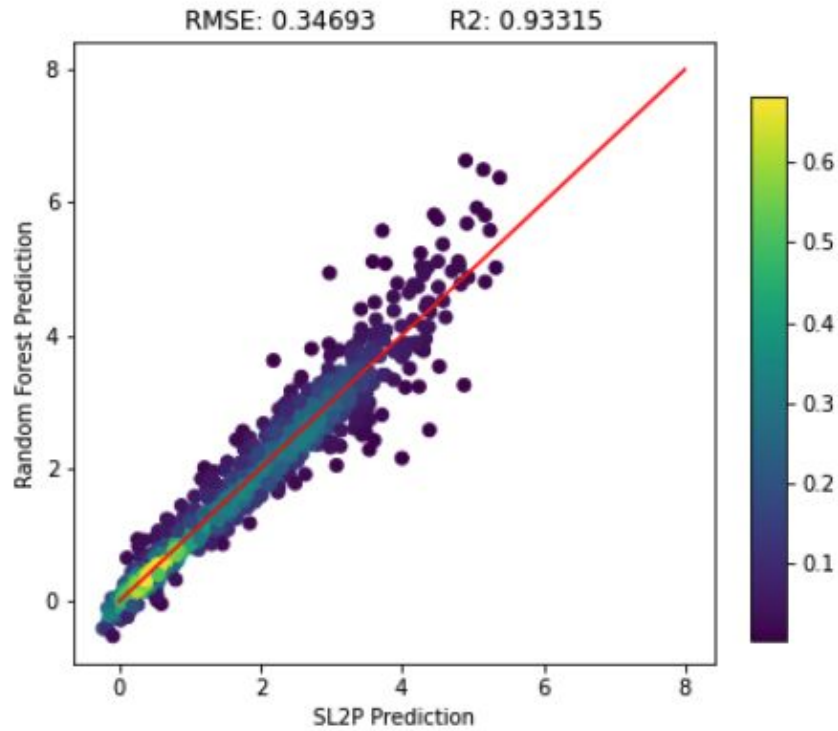
## Random Forest Classifier



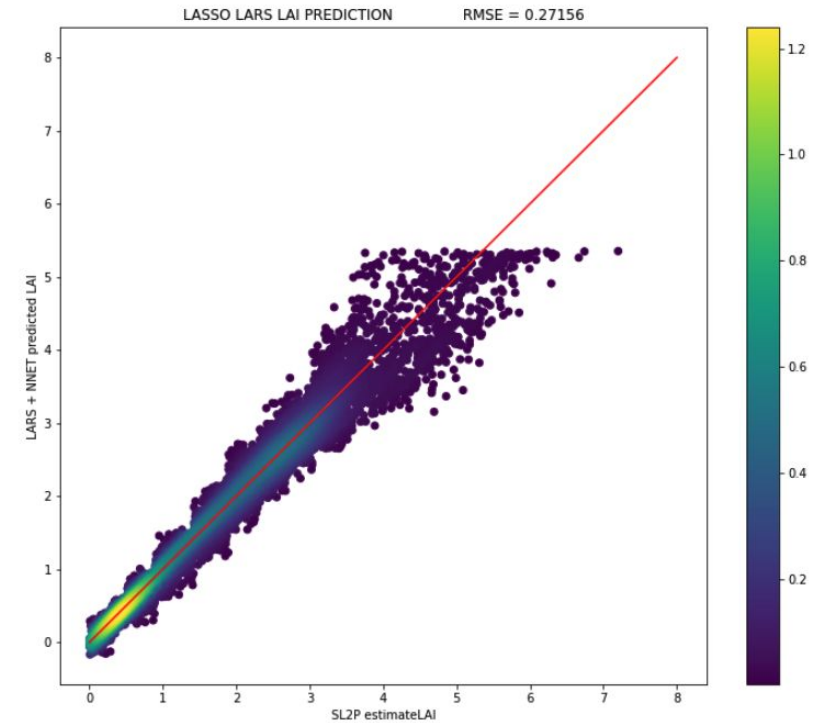
- Three main variables:
  - Leaf area index (LAI)
  - Fraction of absorbed photosynthetically active radiation (fAPAR)
  - Fraction of canopy cover (fCOVER)



# Results



SL2P vs. Regression Tree



SL2P vs. Neural Net

RMSE: ~0.15 - 0.3

## Example – Fox Creek, AB



20 m product



10 m product

# Summary & Next Steps