# S2A 60m DATASET

## Multi-spectral approach

# SET UP SECTION

- R code github SCRIPT
- Dataset: S2A_MSIL2A_20230710T110621_N0509_R137_T29SQB_20230710T172204.SAFE

```
#### SETUP #####
setwd("C:/Rio Tinto program/60m script")
install.packages("raster")
install.packages("rasterVis")
install.packages("ggplot2")
install.packages("rgdal")
install.packages("rgeos")
install.packages("jpeg")
install.packages("viridis")
library(raster)
library(rasterVis)
library(ggplot2)
library(rgdal)
library(rgeos)
library(jpeg)
library(viridis)
```

Install the required packages and load them into R.

Dont forget to set a working directory in the folder you'll be adding your files to.

# Clean dataset

- NDVI calculation

```
NDVI_60 <- (rt23_60[[8]]-rt23_60[[4]])/(rt23_60[[8]]+rt23_60[[4]])
NDVI_60
plot(NDVI_60, col = viridis(100))

threshold_60 <- 0.35
mask_60 <- NDVI_60 > threshold_60
plot(mask_60)
getValues(mask_60)
rt23_60_masked <- rt23_60
rt23_60_masked[mask_60==TRUE] <- NA
plotRGB(rt23_60_masked, 4,3,2, stretch = "lin") # dense vegetation
```

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- Retrivall of reflectance values

*L2A_SR = (L2A_DN + BOA_ADD_OFFSET) / QUANTIFICATION_VALUE*

```
BOA <- -1000
QV <- 10000
rt23_60_masked_SR <- (rt23_60_masked + BOA)/QV
rt23_60_masked_SR
getValues(rt23_60_masked_SR)
plot(rt23_60_masked_SR[[8]]) # plot 8a band for quick n easy look.

rt23_60_masked_SR[rt23_60_masked_SR < 0] <- NA # remove incoherent negative numbers
rt23_60_masked_SR
```

# SPECTRUM EXTRACTION

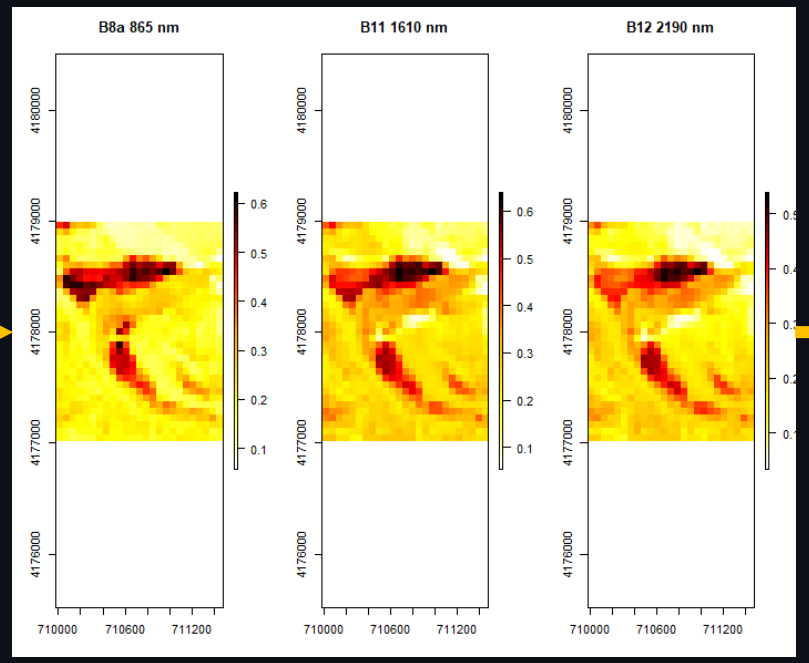
```
ext2 <- c(710000,711500,4177000,4179000) # the cr
rt23_60_interest <- crop(rt23_60_masked_SR,ext2)
```

Extraction of the sub-area of interest.

```
par(mfrow = c(1, 3))
SWIRbands_60 <- c(8,10,11) # this is needed becau
plot(rt23_60_interest[[SWIRbands_60]],
     col=IR_c)
dev.off()
plotRGB(rt23_60_interest,11,10,8,stretch="lin")
dev.off()
```

Plotting the 3 bands (B8a, B11, B12) nmI wanted to highlight.

I've choosen these bands because I still wanted to keep NIR as in the 10m resolution, but deepen the analysis to further SWIR.




And this is RGB with bands 11,10,8a.

# SPECTRUM EXTRACTION

```r
for(i in 1:11) {
  means_rt23_60_interest[i] <- mean(getValues(rt23_60_interest[[i]]),na.rm=T)
}
means_rt23_60_interest
```

---

```r
plot(1:length(spectrum_cover), means_rt23_60_interest,
     main = "Value of mean reflectance for the interest area", # Create a
     type = "b", pch = 19,
     xlab = "wavelength",
     ylab = "Reflectance Value",
     xaxt = "n")
axis(1, at = 1:length(spectrum_cover), labels = spectrum_cover, las = 2)

dev.off()
```

Calculation of the mean of reflectance (coord «z» of each pixel) and plot.