

## 12TH ESA TRAINING COURSE ON EARTH OBSERVATION 2022: SNAP FOR LAI TIME SERIES PRODUCTION

Sentinel-2 data:

- S2A\_MSIL2A\_20200407T104021\_N0214\_R008\_T31UFS\_20200407T113125
- S2A\_MSIL2A\_20200410T105031\_N0214\_R051\_T31UFS\_20200410T120853
- S2A\_MSIL2A\_20200417T104021\_N0214\_R008\_T31UFS\_20200417T112906
- S2A\_MSIL2A\_20200420T105031\_N0214\_R051\_T31UFS\_20200420T134306
- S2A\_MSIL2A\_20200507T104031\_N0214\_R008\_T31UFS\_20200507T133648
- S2A\_MSIL2A\_20200805T104031\_N0214\_R008\_T31UFS\_20200805T121101
- S2A\_MSIL2A\_20200808T105031\_N0214\_R051\_T31UFS\_20200808T115957
- S2A\_MSIL2A\_20200914T104031\_N0214\_R008\_T31UFS\_20200914T133417
- S2A\_MSIL2A\_20200917T105031\_N0214\_R051\_T31UFS\_20200917T134757
- S2A\_MSIL2A\_20201106T105241\_N0214\_R051\_T31UFS\_20201106T134121
- S2B\_MSIL2A\_20200405T104619\_N0214\_R051\_T31UFS\_20200405T134034
- S2B\_MSIL2A\_20200422T103619\_N0214\_R008\_T31UFS\_20200422T140230
- S2B\_MSIL2A\_20200515T104619\_N0214\_R051\_T31UFS\_20200515T135604
- S2B\_MSIL2A\_20200601T103629\_N0214\_R008\_T31UFS\_20200601T135554
- S2B\_MSIL2A\_20200731T103629\_N0214\_R008\_T31UFS\_20200731T140558
- S2B\_MSIL2A\_20200919T103649\_N0214\_R008\_T31UFS\_20200919T133717
- S2B\_MSIL2A\_20200922T104649\_N0214\_R051\_T31UFS\_20200927T135033

### 1. Load S2 images

- 1.1. Drag and drop one of the images into the Product Explorer window
- 1.2. Alternatively, Import / Optical Sensors / Sentinel-2 / S2-MSI L2A, open the folder of **one** of the S2 images and select the MTD\_MS1L2A.xml file

### 2. Open S2 images

- 2.1. From Product Explorer, right click on the name of your S2 image
- 2.2. Open RGB Image Window
- 2.3. Keep the Sentinel-2 MSI Natural Colours display

### 3. Resample S2 images

- 3.1. Raster / Geometric / Resampling, with the following parameters:
- 3.2. Define size of resampled product: select "By Pixel resolution (in m)" and enter 10m
- 3.3. Upsampling method: Nearest
- 3.4. In the I/O Parameters tab, uncheck the "Save as" option
- 3.5. Click Run

### 4. Reprojection S2 images

- 4.1. Raster / Geometric / Reprojection, with the following parameters:
- 4.2. Projection: Geographic Lat/Lon (WGS84)
- 4.3. Keep "Preserve the resolution" checked
- 4.4. In the I/O Parameters tab, uncheck the "Save as" option
- 4.5. Click Run

### 5. Subset

- 5.1. In the Product Explorer window, select the last output you generated ( “\_resampled\_reprojected”)
- 5.2. Raster / Subset
- 5.3. Pixel coordinates:



- 5.4. Select all the bands from B1 to sun\_azimuth
- 5.5. Click OK

## 6. Open the newly created S2 subset

- 6.1. From Product Explorer, right click on the S2 subset
- 6.2. Open RGB Image Window
- 6.3. Keep the Sentinel-2 MSI Natural Colours display

## 7. Export to Google Earth

- 7.1. When the subset is displayed, right click anywhere in the image
- 7.2. Export View as Google Earth KMZ

## 8. Calculate NDVI with Band Maths

- 8.1. From Product Explorer, click on the S2 subset
- 8.2. Raster / Band Maths
- 8.3. Name: NDVI
- 8.4. Unselect “Virtual”
- 8.5. Click on Edit Expression and enter:  $(B8-B4) / (B8+B4)$
- 8.6. Click OK
- 8.7. The NDVI band is now found in the subset S2 image, under the Band folder.
- 8.8. Colour Manipulation tab: clicking on the numbers of the horizontal axis, select Blue for the minimum (0), orange for intermediate values (0.5) and green for maximum values (1)

## 9. Split display

- 9.1. You should have the S2 subset displayed and the NDVI product displayed
- 9.2. From the top menu, select Tile Horizontally
- 9.3. In the Navigation tab, ensure your mouse is synchronised across different windows

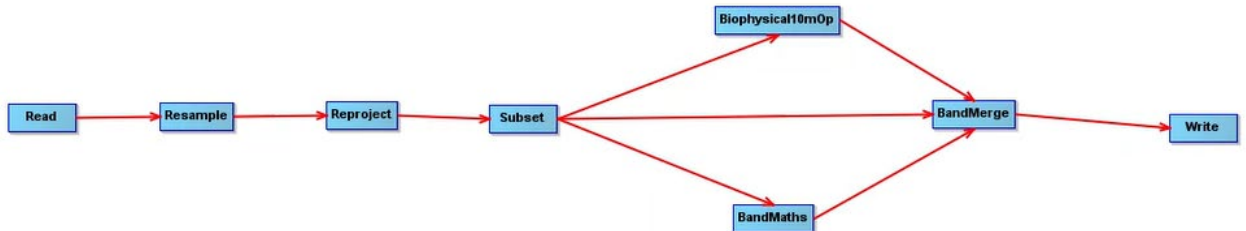
## 10. Calculate LAI

- 10.1. From Product Explorer, click on the S2 subset
- 10.2. Optical / Thematic Land Processing / Biophysical Processor (LAI, ...) / Biophysical Processor S2\_10m
- 10.3. Keep default parameters and click Run
- 10.4. Display the LAI band of the newly created product
- 10.5. Tile Horizontally
- 10.6. For the LAI, repeat the same colour manipulation step as for NDVI

The same steps can be done for series of data using graphs and batch processing:

## 11. Create Graph

11.1. Tools / Graph Builder and add the modules in this order:



11.2. Keep the same parameters for each of them as indicated in the steps above

11.3. Save the graph

## 12. Batch Processing

12.1. Tools / Batch processing and add the zip files

12.2. Load the graph

12.3. Click Run (this step could take around 10min)

Note - The exercise from Baptiste Delhez needs the list of data below to be processed in SNAP as indicated in this SNAP practical, and the outputs generated are used for the Jupyter Notebook practical.

- S2A\_MSIL2A\_20200207T104211\_N0214\_R008\_T31UFS\_20200207T122428
- S2A\_MSIL2A\_20200318T104021\_N0214\_R008\_T31UFS\_20200318T121430
- S2A\_MSIL2A\_20200328T104021\_N0214\_R008\_T31UFS\_20200328T142124
- S2A\_MSIL2A\_20200407T104021\_N0214\_R008\_T31UFS\_20200407T113125
- S2A\_MSIL2A\_20200410T105031\_N0214\_R051\_T31UFS\_20200410T120853
- S2A\_MSIL2A\_20200417T104021\_N0214\_R008\_T31UFS\_20200417T112906
- S2A\_MSIL2A\_20200420T105031\_N0214\_R051\_T31UFS\_20200420T134306
- S2A\_MSIL2A\_20200507T104031\_N0214\_R008\_T31UFS\_20200507T133648
- S2A\_MSIL2A\_20200805T104031\_N0214\_R008\_T31UFS\_20200805T121101
- S2A\_MSIL2A\_20200808T105031\_N0214\_R051\_T31UFS\_20200808T115957
- S2A\_MSIL2A\_20200914T104031\_N0214\_R008\_T31UFS\_20200914T133417
- S2A\_MSIL2A\_20200917T105031\_N0214\_R051\_T31UFS\_20200917T134757
- S2A\_MSIL2A\_20201106T105241\_N0214\_R051\_T31UFS\_20201106T134121
- S2B\_MSIL2A\_20200106T105339\_N0213\_R051\_T31UFS\_20200106T121433
- S2B\_MSIL2A\_20200116T105309\_N0213\_R051\_T31UFS\_20200116T122813
- S2B\_MSIL2A\_20200126T105229\_N0213\_R051\_T31UFS\_20200126T114431
- S2B\_MSIL2A\_20200323T103639\_N0214\_R008\_T31UFS\_20200323T151634
- S2B\_MSIL2A\_20200326T104639\_N0214\_R051\_T31UFS\_20200326T141923
- S2B\_MSIL2A\_20200405T104619\_N0214\_R051\_T31UFS\_20200405T134034
- S2B\_MSIL2A\_20200422T103619\_N0214\_R008\_T31UFS\_20200422T140230
- S2B\_MSIL2A\_20200515T104619\_N0214\_R051\_T31UFS\_20200515T135604
- S2B\_MSIL2A\_20200601T103629\_N0214\_R008\_T31UFS\_20200601T135554
- S2B\_MSIL2A\_20200731T103629\_N0214\_R008\_T31UFS\_20200731T140558
- S2B\_MSIL2A\_20200919T103649\_N0214\_R008\_T31UFS\_20200919T133717
- S2B\_MSIL2A\_20200922T104649\_N0214\_R051\_T31UFS\_20200927T135033
- S2B\_MSIL2A\_20201118T104329\_N0214\_R008\_T31UFS\_20201118T123717
- S2B\_MSIL2A\_20201121T105349\_N0214\_R051\_T31UFS\_20201121T124541
- S2B\_MSIL2A\_20201218T104349\_N0214\_R008\_T31UFS\_20201218T124059