
Climate Change Initiative Extension (CCI+) Phase 1
New Essential Climate Variables (NEW ECVS)
High Resolution Land Cover ECV (HR_LandCover_cci)

Climate Research Data Package
(CRDP)

Prepared by:

Università degli Studi di Trento
Fondazione Bruno Kessler
Università degli Studi di Pavia
Università degli Studi di Genova
Université Catholique de Louvain
Politecnico di Milano
Université de Versailles Saint Quentin
CREAF
e-GEOS s.p.a.
Planetek Italia
GeoVille



UNIVERSITÀ
DEGLI STUDI
DI TRENTO



FONDAZIONE
BRUNO KESSLER



UCLouvain



L S C E



e-geos
AN ASI / TELESPAZIO COMPANY

planetek
italia

GeoVille

	Ref	CCI_HRLC_Ph1-CRDP		 high resolution land cover cci
	Issue	Date	Page	
	3.rev.0	02/11/2020	1	

Changelog

Issue	Changes	Date
1.0	First version.	29/10/2019
2.0	Updated version.	22/04/2020
2.1	Re-issued upload with content changes related to legend. No data is affected by this change.	20/04/2020
2.2	Updated version with products available for Annual Review #2.	23/11/2020
2.3	Updated version according to CCI_HRLC_Ph1_AR2 RID-ESA.xlsx	07/12/2020
3.0	Update version with products available for Final Review.	02/11/2022

Detailed Change Record

Issue	RID	Description of discrepancy	Sections	Change
2.3	FR-01	From ESA laptop it does not work as it is, in order to access to it, should be sftp://rslab.disi.unitn.it	1.1	Address updated.
	FR-02	The process to download and check the dataset is time-consuming. A viewer to check the dataset could be useful.	1.1	Added an important note regarding the viewer tool, which is not available for the AR2 delivery, but will be available for final products in the next deliveries as tool of the CCI Portal interface.

	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	2	 high resolution land cover cci

Contents

1	Introduction.....	3
1.1	Package access	3
2	CRDP package description.....	3
2.1	Package tree	4
2.1.1	Naming convention.....	4
2.1.2	Static products folders	4
2.1.3	Dynamic products folders	5
2.1.4	Change detection products folders.....	5
3	QGis data visualization procedures.....	6
3.1	Classification products.....	6
3.2	Posterior products	11
3.3	Input Quality index	15
3.4	Change detection products	15
3.4.1	Year of change.....	18
3.4.2	Probability of change	18
3.4.3	Reliability.....	19
3.4.4	PCC	20

	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	3	 high resolution land cover cci

1 Introduction

This Climate Research Data Package (CRDP) is a release note describing the structure of the directory containing the fully characterized HRLC products composing the main output of the project activity.

The latest version of the data package is presented in this note and it reflects the maturity of the processing pipeline outcome.

1.1 Package access

The final issue of the HRLC (raw) data package can be downloaded from the project FTP site (the same location made available to ESA by the Consortium for sharing documentation and data from the project activity). Below we report details for connection:

FTP site	
Address	sftp://rslab.disi.unitn.it
User	cci-hrlc
Password	<i>*password available only to ESA officers</i>
Data repository	
Data location	sharedData\products_v2

IMPORTANT NOTES:

- This repository is not intended as a public repository.
- The FTP site is currently setup for managing low traffic of data, therefore access to the site should be only limited to ESA's needs for review of the files.
- The service for accessing the data and navigating them in a viewer mode is the CCI Portal.

2 CRDP package description

The production associated to the Final Review includes the full series of products: HRLC static, HRLC dynamic, and HRLC change detection products, all of them both in single tiles (including input quality index) and full mosaics.

The FTP data repository contains the main folders as indicated below:

products_v2:

- siberia_static
- siberia_dynamic
- siberia_change_detection
- amazon_static
- amazon_dynamic
- amazon_change_detection
- africa_static
- africa_dynamic
- africa_change_detection
- _qgis_legends

The **products_v2** folder also includes this document.

	Ref	CCI_HRLC_Ph1-CRDP		 high resolution land cover cci
Issue	Date	Page		
3.rev.0	02/11/2020	4		

2.1 Package tree

2.1.1 Naming convention

The following unique naming convention is used

ESACCI-HRLC-L4-{**product_type**}-{**product_id**}-{**tiling_id**} - {**spatial_res**} - {**temporal_freq**} - {**epoch**} - fv01.0.{**file_extension**}

where fields take values according to the following criteria:

field	values	explanation	notes
product_type	MAP	Classification product (CL01)	For internal purposes
	UNCERT	Uncertainty product (CL02,PS01,PS02,IQIX)	
	CHANGE	Change detection product (CDET)	
product_id	CL01		For internal purposes
	CL02		
	PS01		
	PS02		
	IQIX		
	CDET		
tiling_id	<A>NN<T>MMXXX	For tile products	
	<A>NN<MOSAIC>	For mosaic products	
spatial_res	10m / 30m	Spatial resolution	
temporal_freq	P1Y / P5Y	Temporal resolution, in years	
epoch	YYYY	Epoch of the product (e.g., 1990,2000,2019)	
file_extension	.tif / .nc	File format (.tif for tile products and .nc for mosaic products)	

with

NN	01	Africa
	02	Amazon
	03	Siberia
MMXXX	tiling nomenclature a 100x100 km ² tile in the MGRS format: e.g., 45XVC	

2.1.2 Static products folders

Directory structure of static products:

```
/siberia_static
  /2019
    ... (files)
/amazon_static
```

	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	5	 high resolution land cover cci

```
/2019
    ... (files)
/africa_static
    /2019
        ... (files)
```

2.1.3 Dynamic products folders

Directory structure of dynamic products:

```
/siberia_static_2019
    /{year}
        ... (files)
        ... (files)
/amazon_static
    /{year}
        ... (files)
        ... (files)
/africa_static
    /{year}
        ... (files)
        ... (files)
```

For year=1990,1995,2000,2005,2010,2015,2019.

2.1.4 Change detection products folders

Directory structure of change detection products:

```
/siberia_change_detection
    /{year}
        ... (files)
        ... (files)
/amazon_change_detection
    /{year}
        ... (files)
        ... (files)
/africa_change_detection
    /{year}
        ... (files)
        ... (files)
```

For year=1990,1995,2000,2005,2010,2015,2019.

	Ref	CCI_HRLC_Ph1-CRDP			high resolution land cover cci
	Issue	Date		Page	
	3.rev.0	02/11/2020		6	

3 QGis data visualization procedures

This section gives a tutorial on how to visualize each specific product among those delivered:

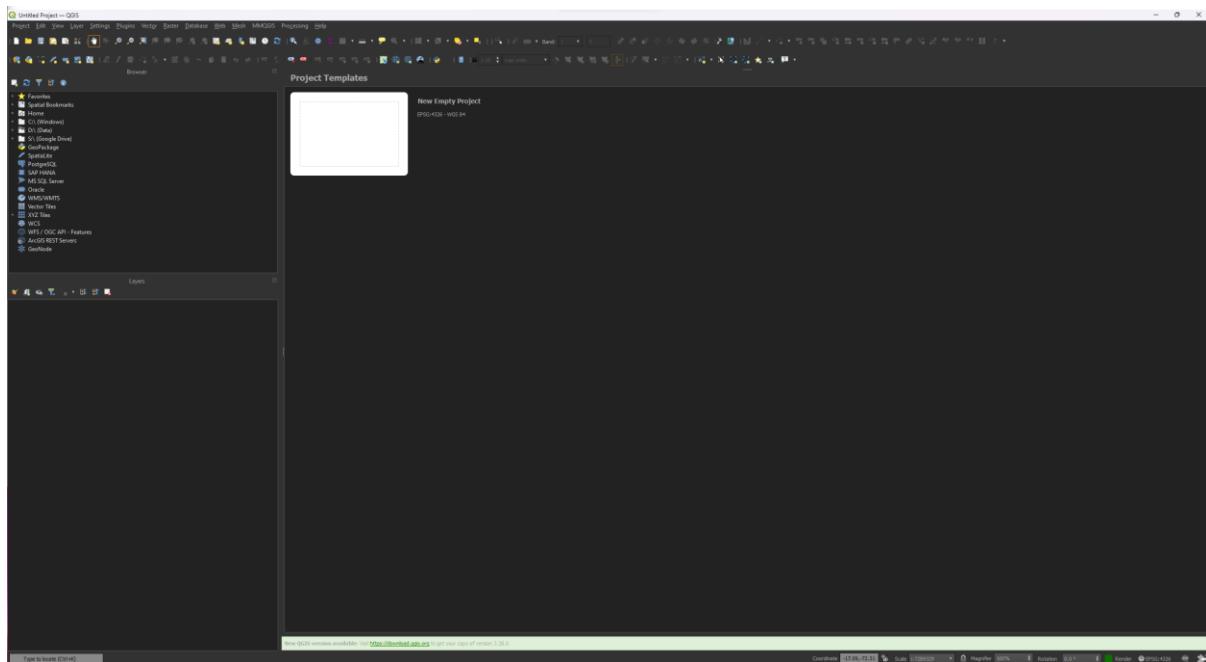
- Classification products (tiles and mosaics)
- Posterior products (tiles)
- Input quality index (tiles)
- Change detection products

To visualize data in a color format that matches with that of project deliverable documents QGis legend files are made available in the **products_v2/_qgis_legends** folder. The following procedures refer to them.

3.1 Classification products

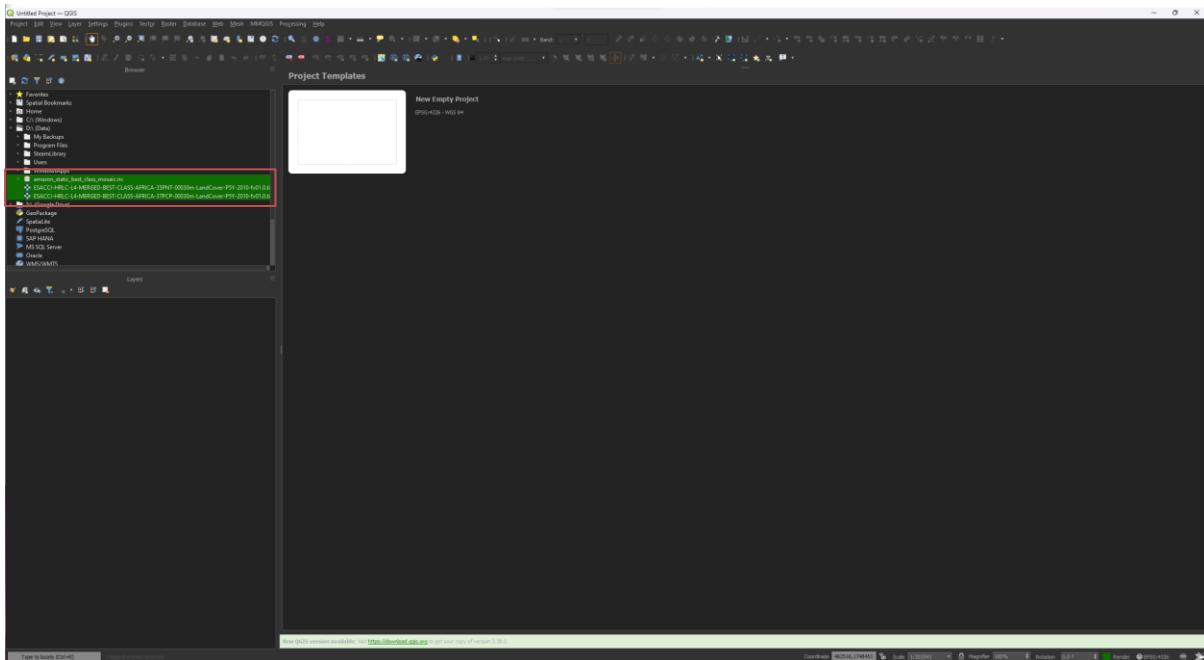
The following procedure is related to the visualization of the best-class and second-best class layers with the proper color legend. Note that the NetCDF mosaics are available only for the best class.

Open QGis

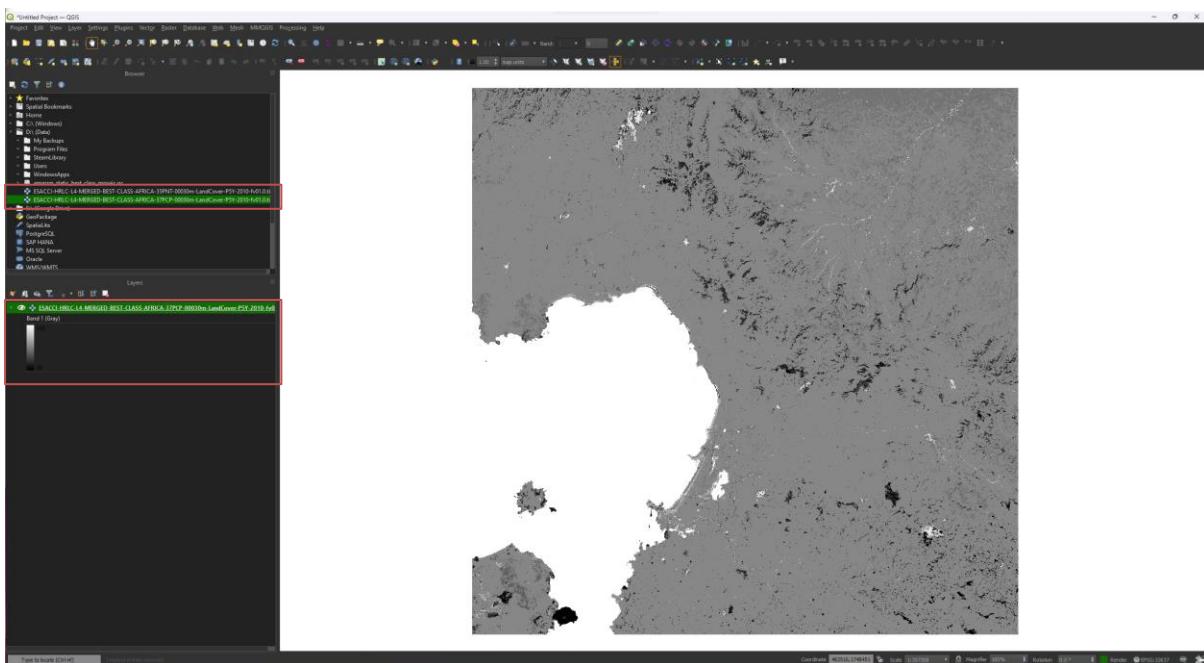


	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	7	

Using the Browser panel, navigate to the folder that contains the data to visualize.

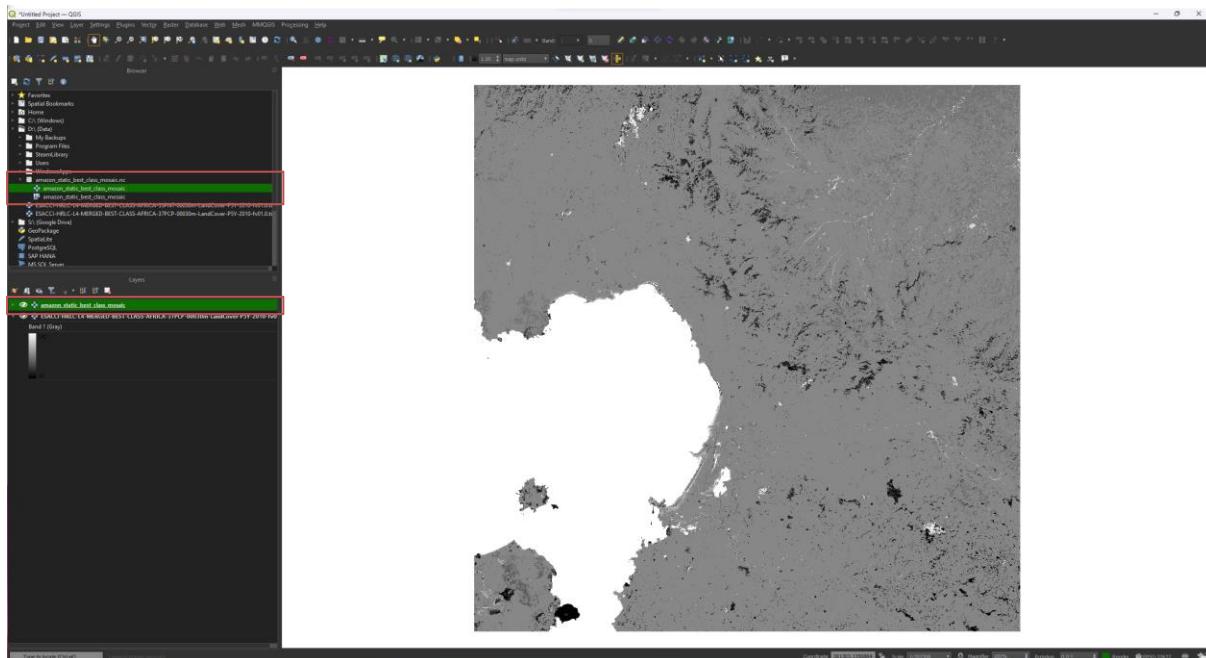
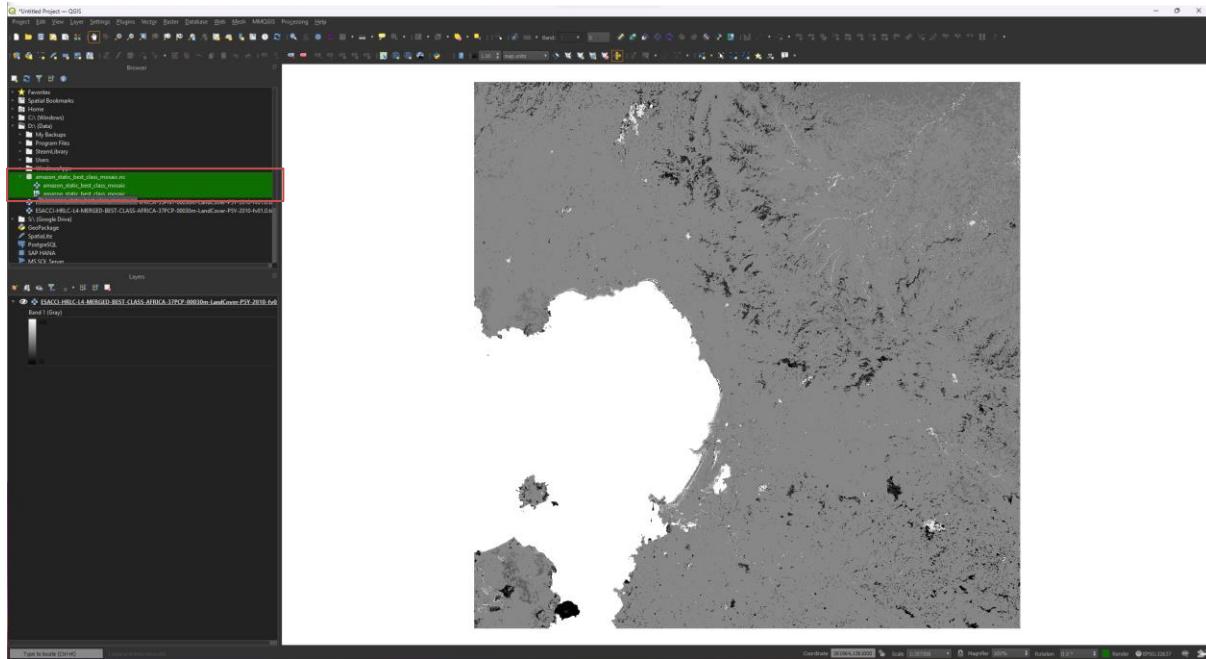


In the case of Geo TIFF files for single MGRS tiles, double click on the file to load the layer in QGis.

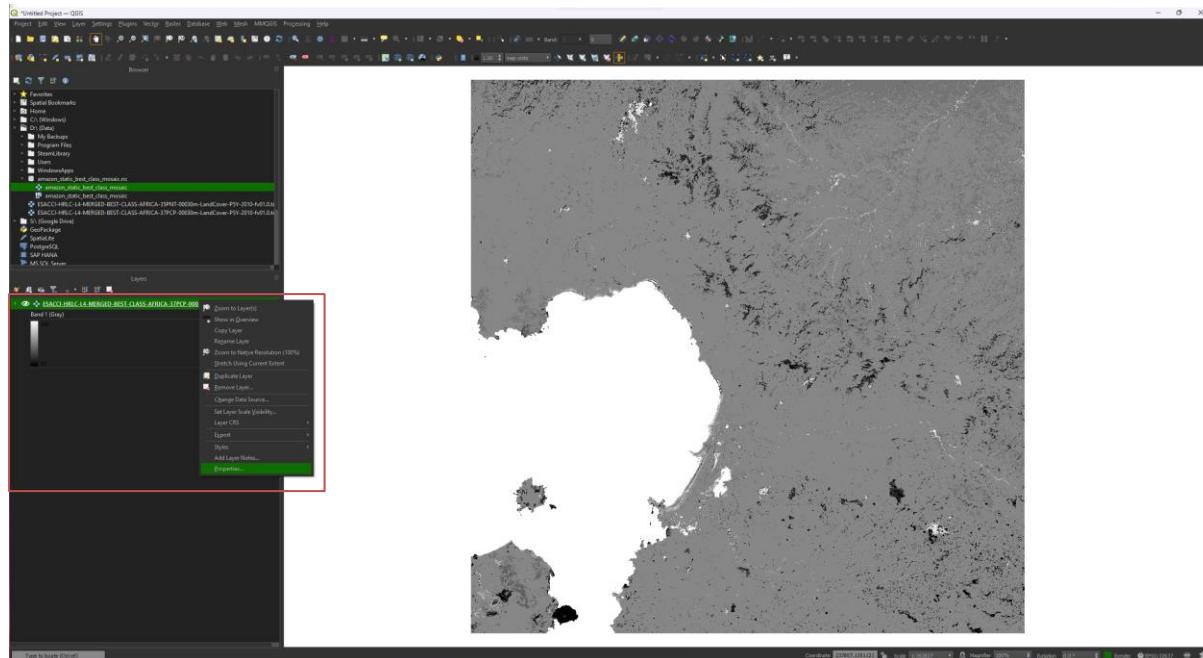


	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	8	

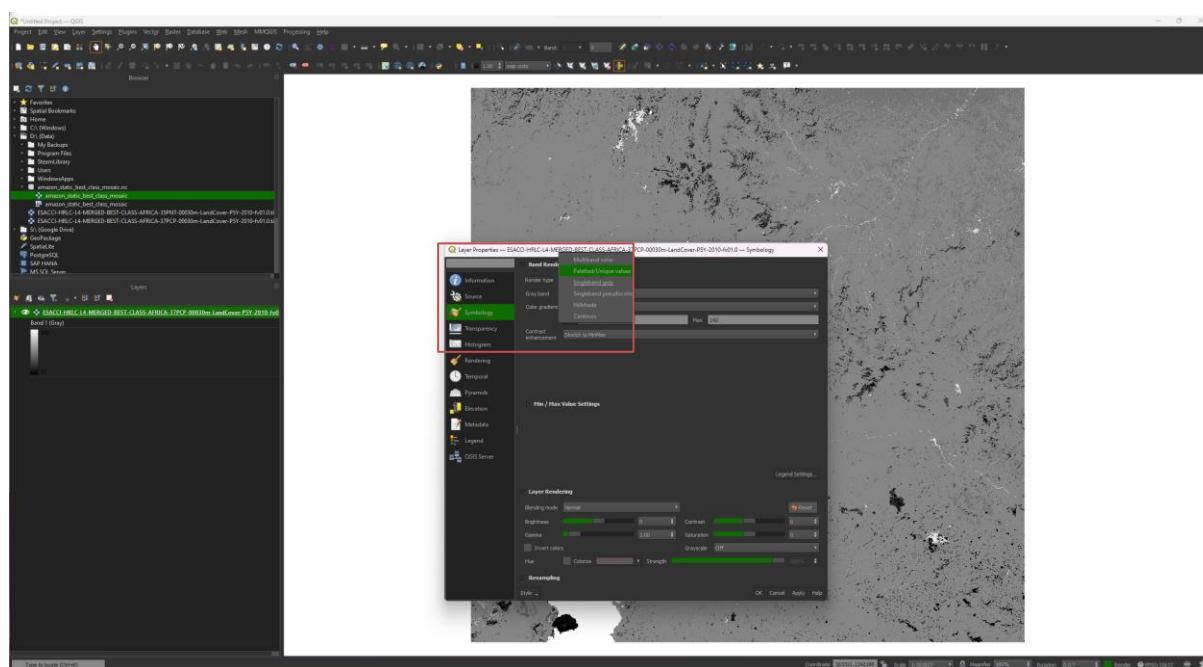
In the case of a NetCDF mosaic, double click on the file. The Browser panel will show two layers under the filename. Double click on the first one.



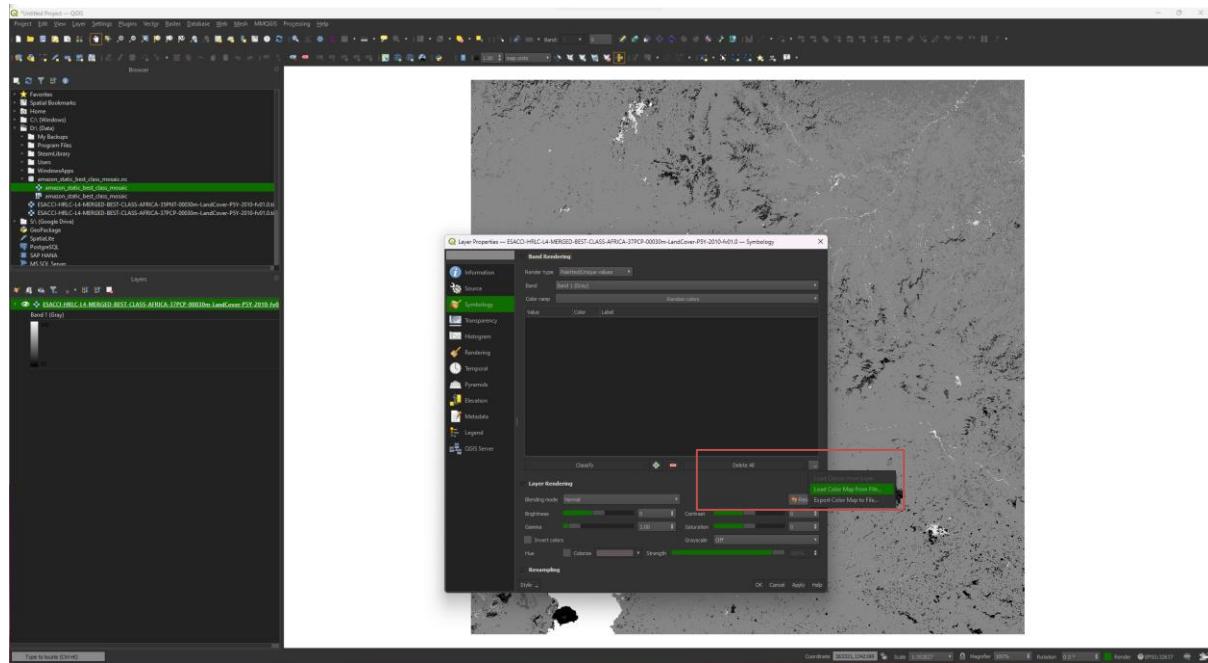
To load the color map, right click on the layer > *Properties*.



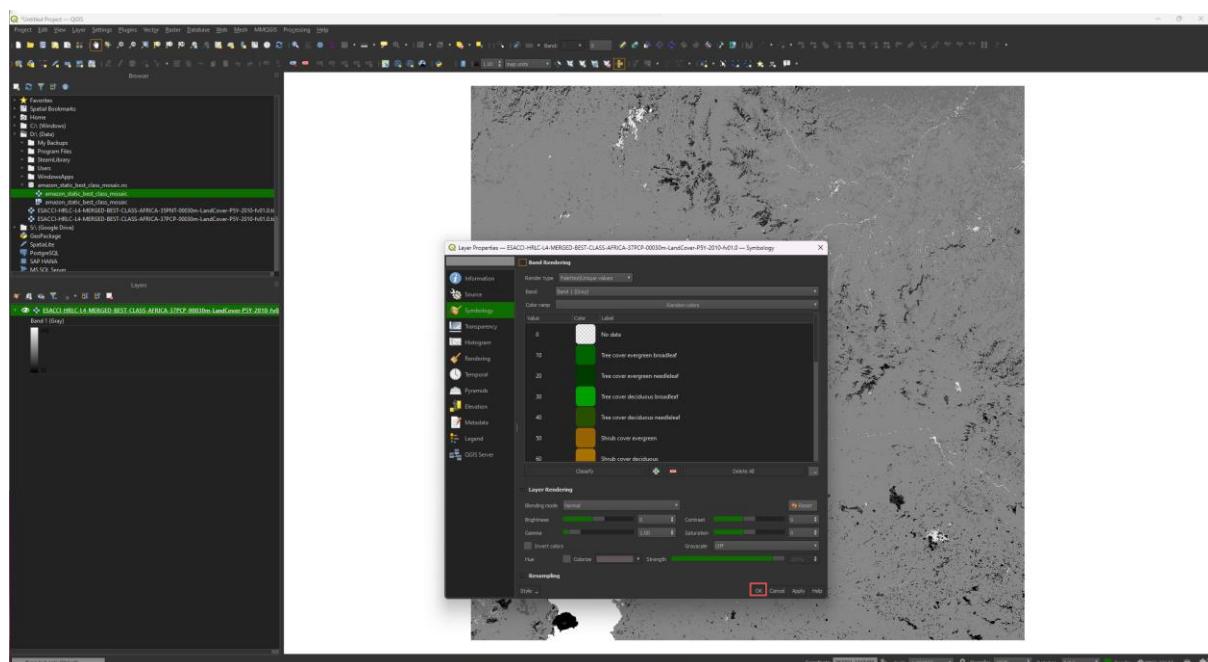
In the *Symbology* section, select *Palette/Unique values* as *Render type*.



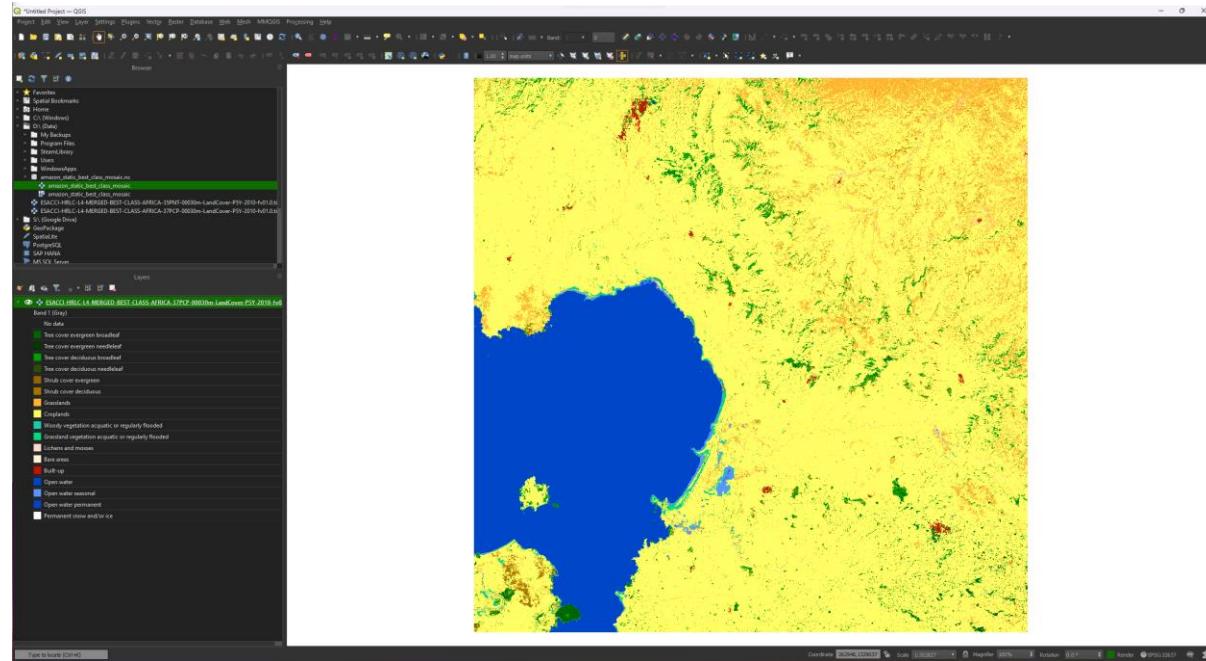
Then, click on the small arrow near the *Delete All* button > *Select Load Color Map from File*.



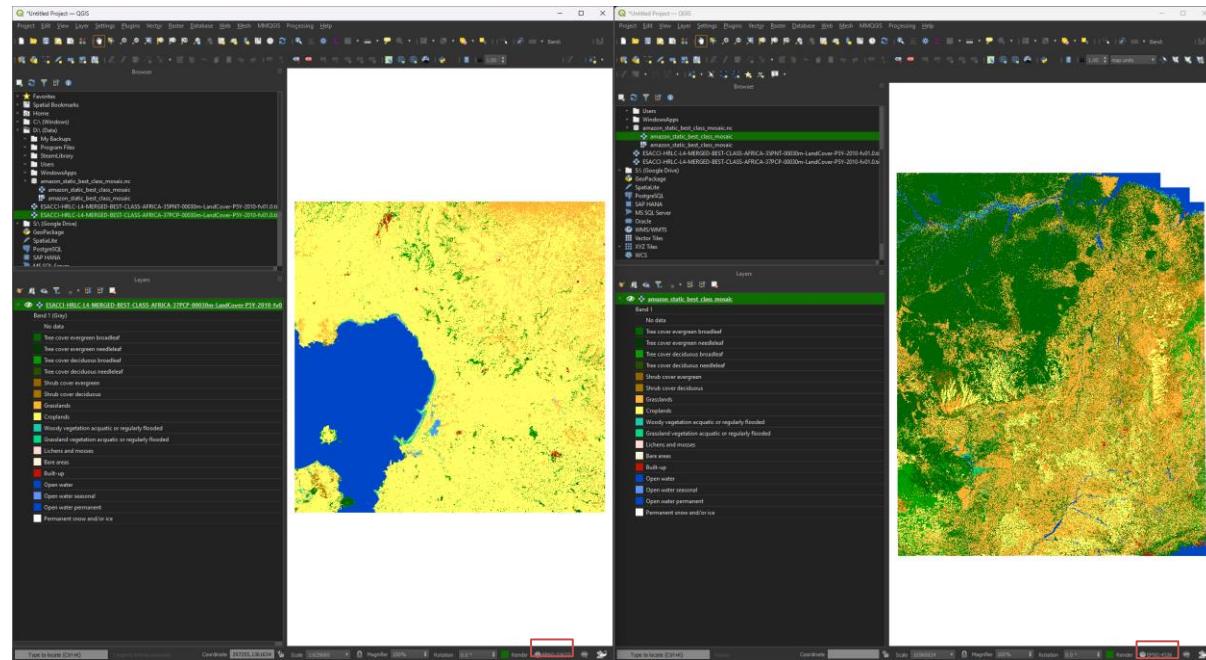
Browse to the location of [CCI_HRLC color map LC.txt](#) and select it.



Click OK. Now the color map and legend are applied.



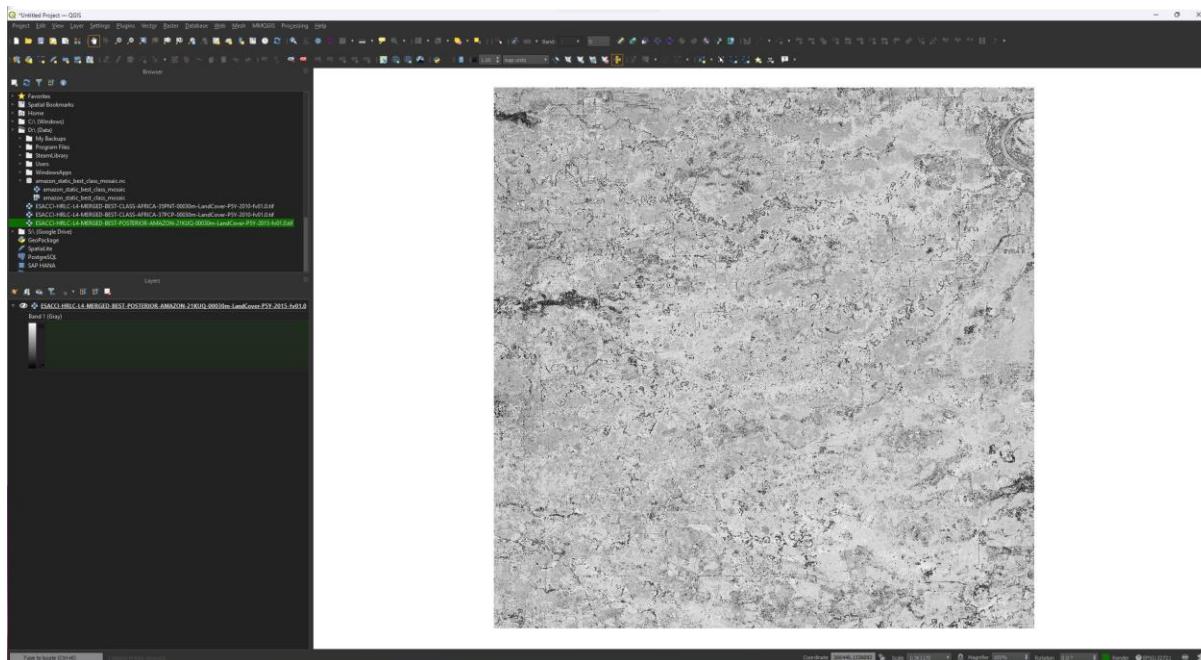
Note that the Geo TIFF files contain rasters in the CRS corresponding to the related MGRS tile. The NetCDF mosaics instead are in the WGS84 CRS.



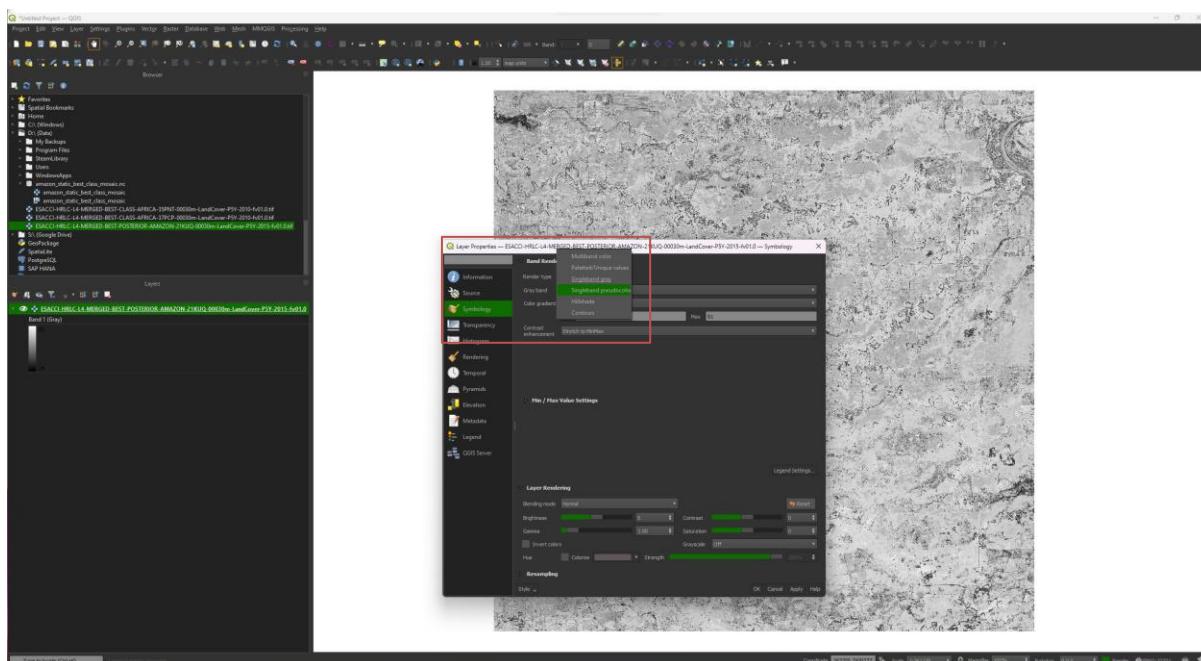
3.2 Posterior products

Follow the same procedure used to open the Geo TIFF file of a MGRS tile for a classification product.

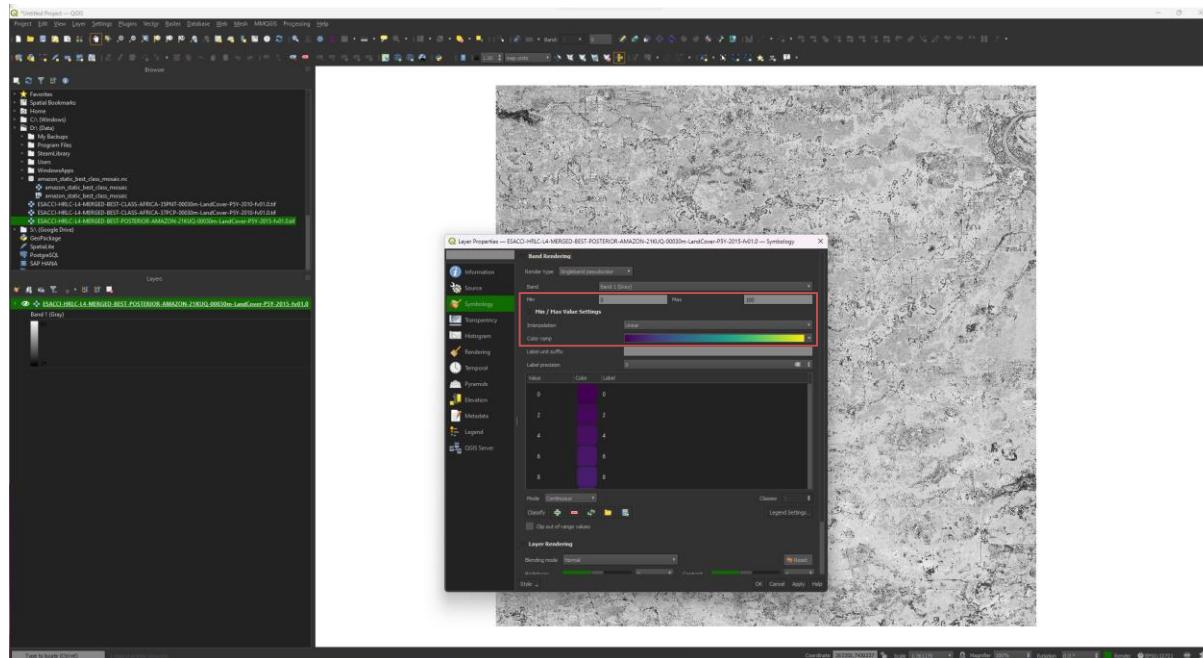
	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	12	



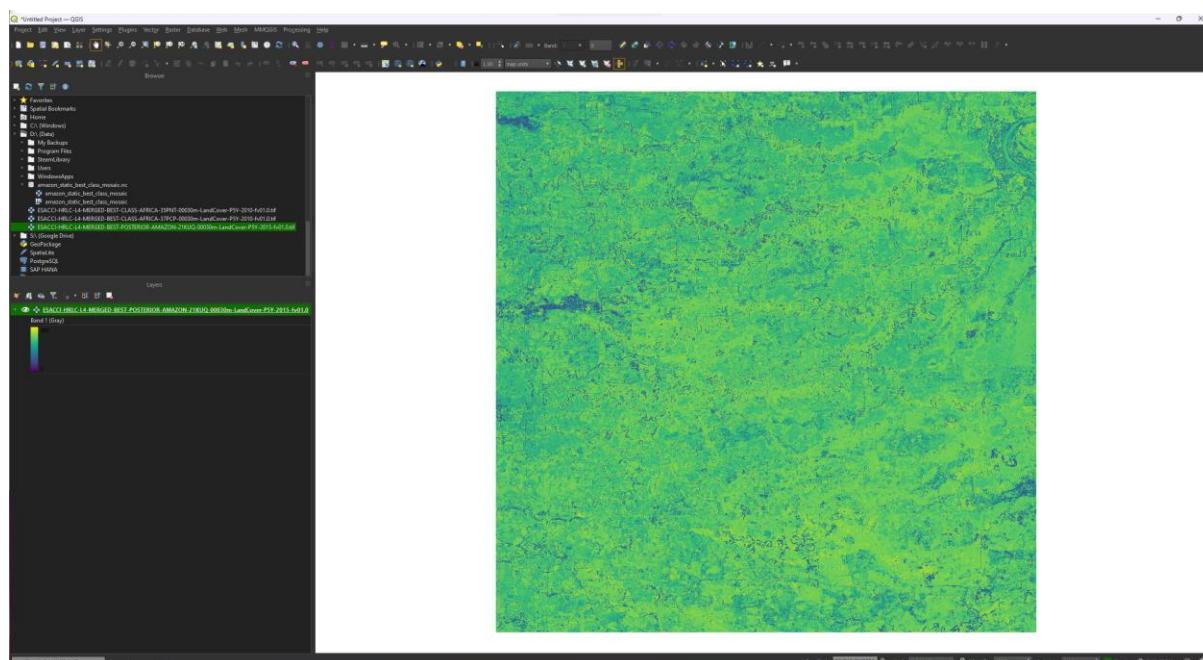
To properly visualize the probabilities, let's set a color ramp. Right click on the layer > *Properties* > *Symbology* > *Render type*: select *Singleband pseudocolor*.



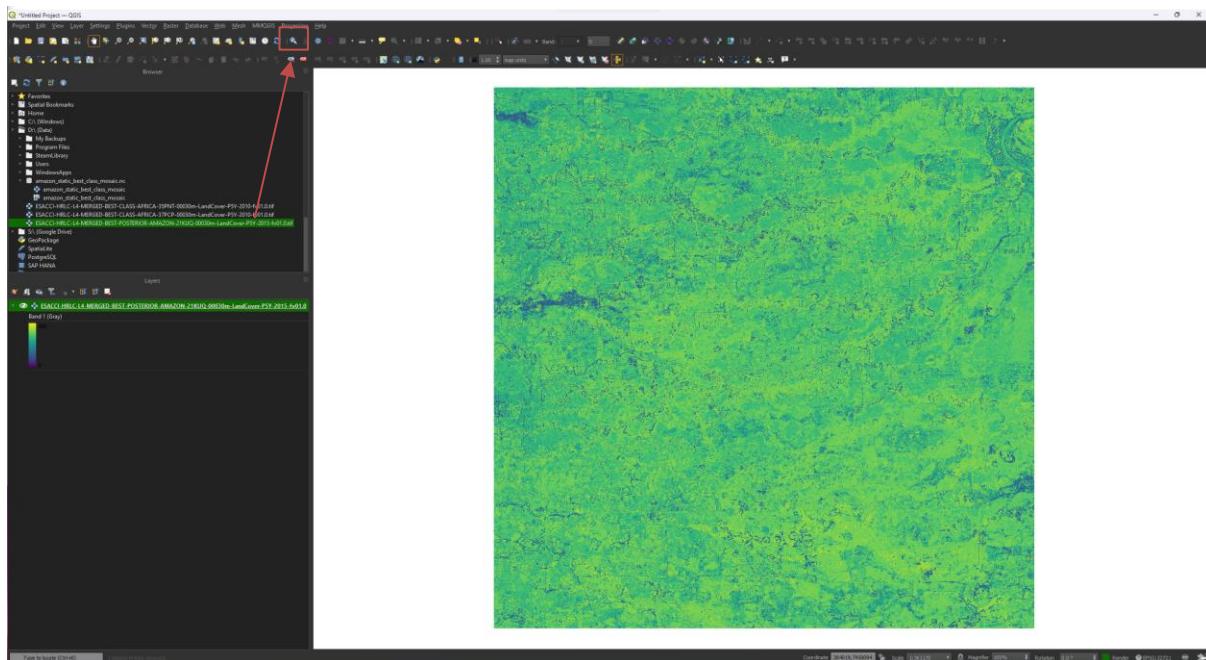
Set the minimum value to 0 and the maximum to 100. Then select the desired color ramp.



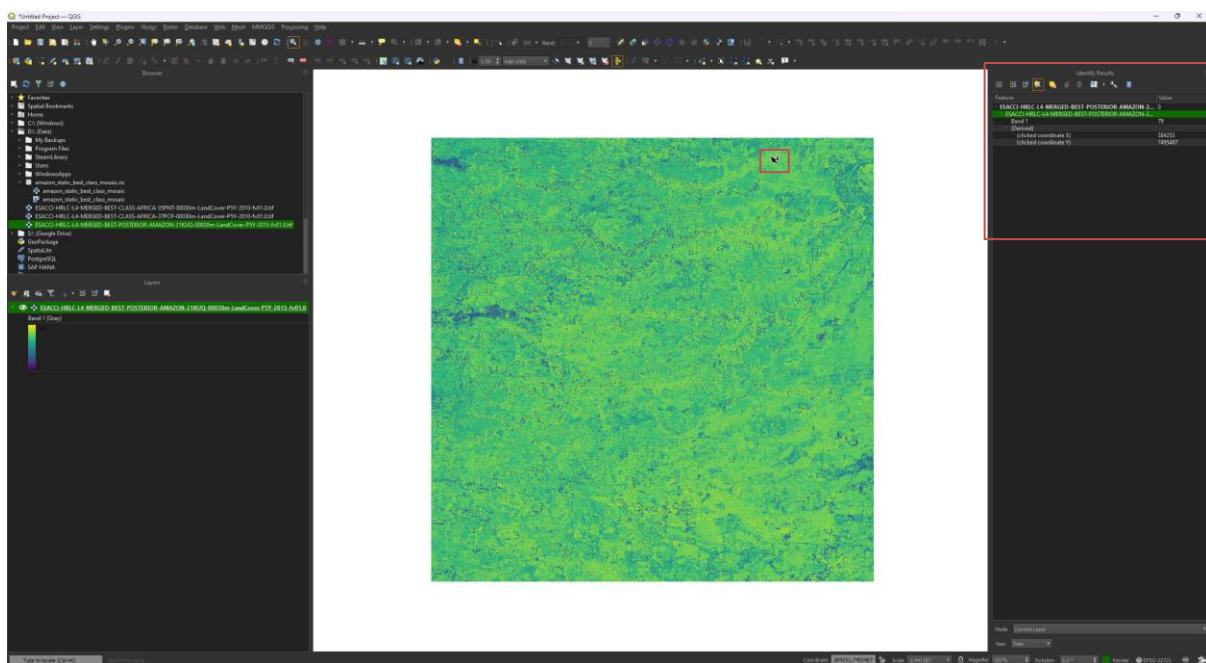
Click OK to confirm.



To check the value for specific pixels, use the *Identify Feature* tool from the toolbar.



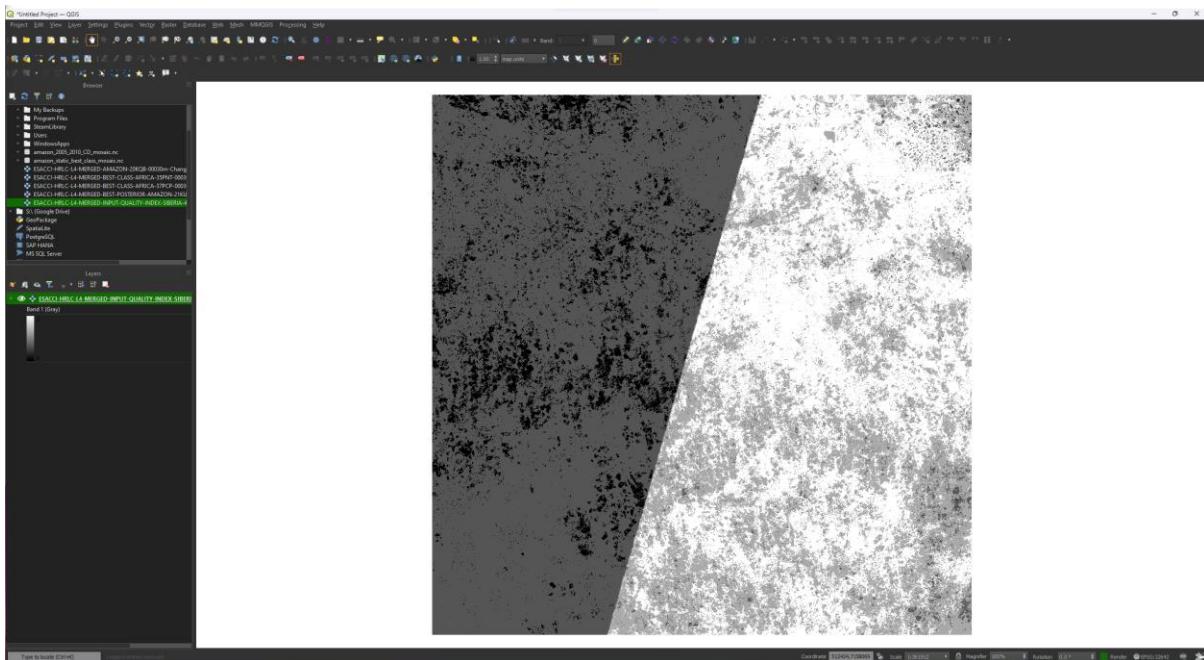
Then, click on the pixel for which we want to extract the exact value. The result will appear on the right together with the location coordinates, expressed in the current CRS.



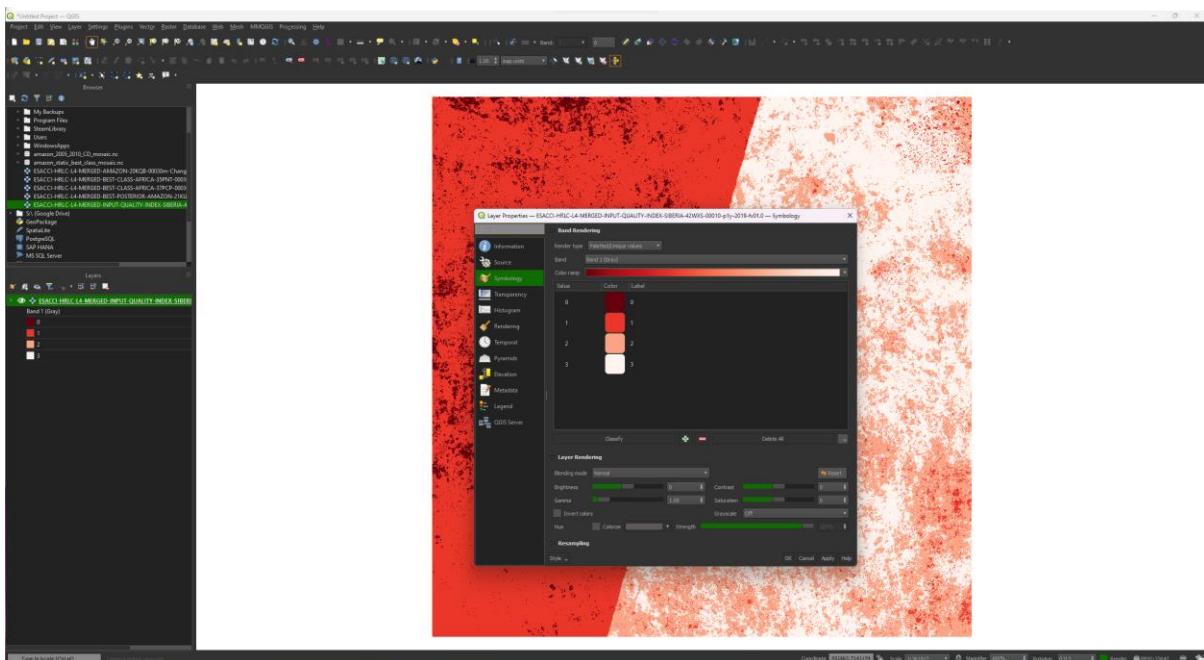
	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	15	

3.3 Input Quality index

Follow the same procedure used to open the Geo TIFF file of a MGRS tile for a classification product.

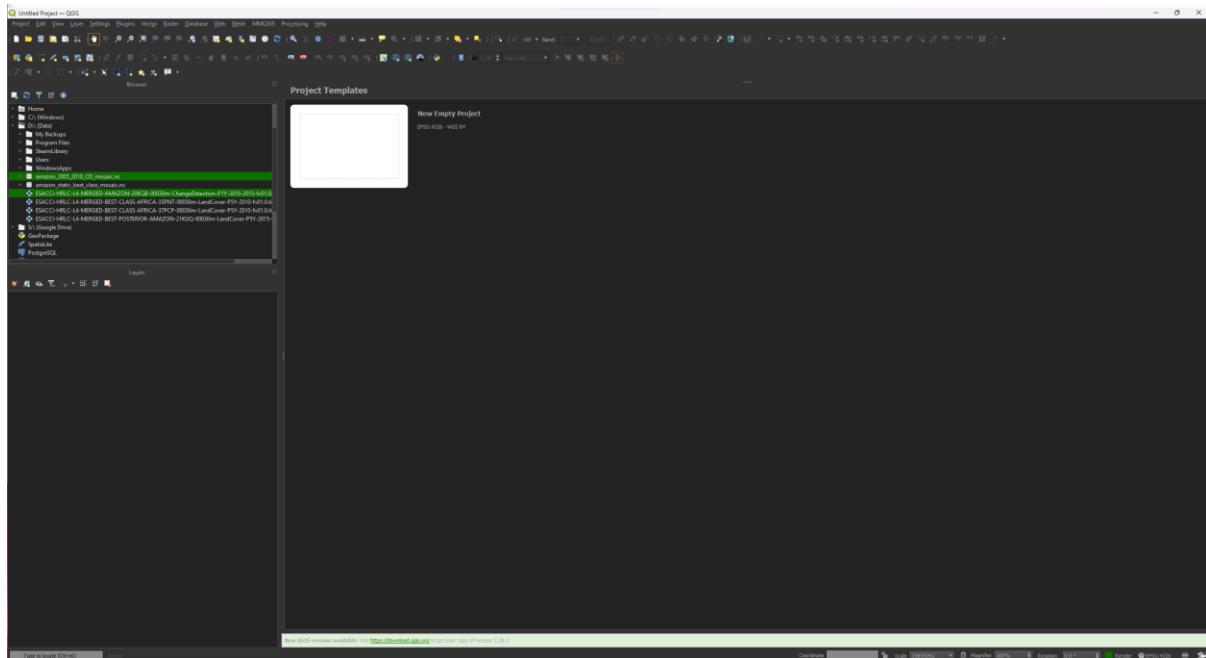


To properly visualize the input quality index, let's set a color map. Right click on the layer > *Properties* > *Symbology* > *Render type*: select *Palette/Unique values*. Click 4 times on the “+” button to add items to the legend so that the values range from 0 to 3. Then, select the color ramp of preference. A value of 0 means bad quality (note that it doesn't mean nodata), while a values of 3 means high quality.

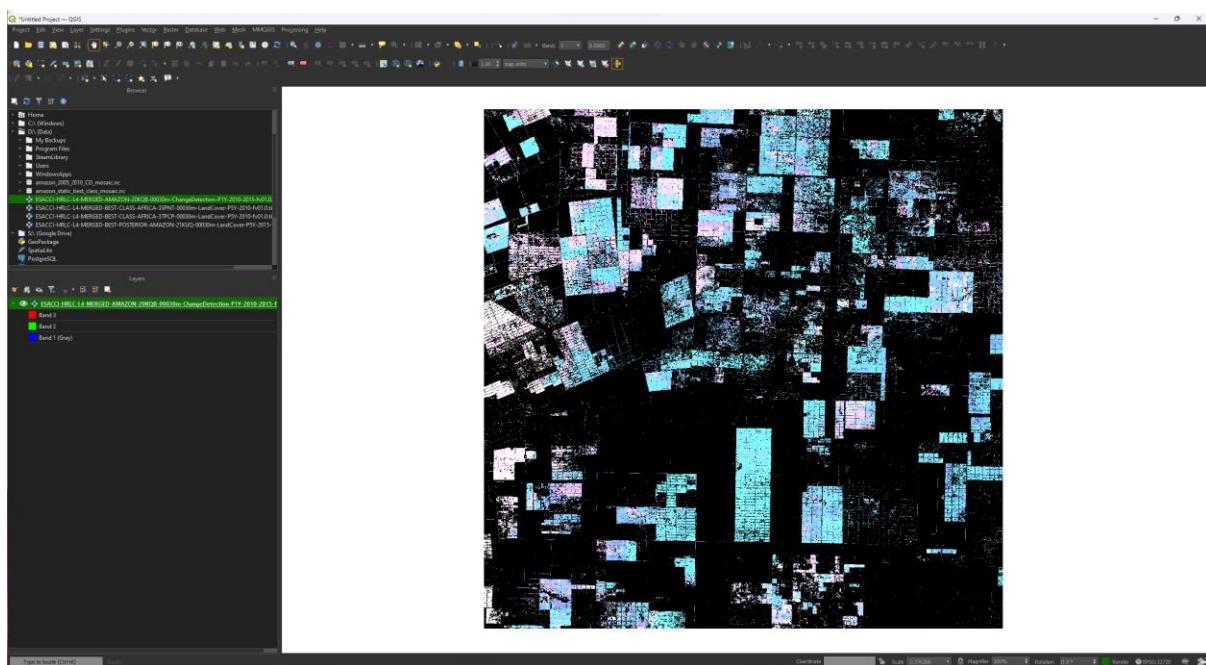


3.4 Change detection products

Open QGis and locate in the Browser panel the folder with the change detection products.



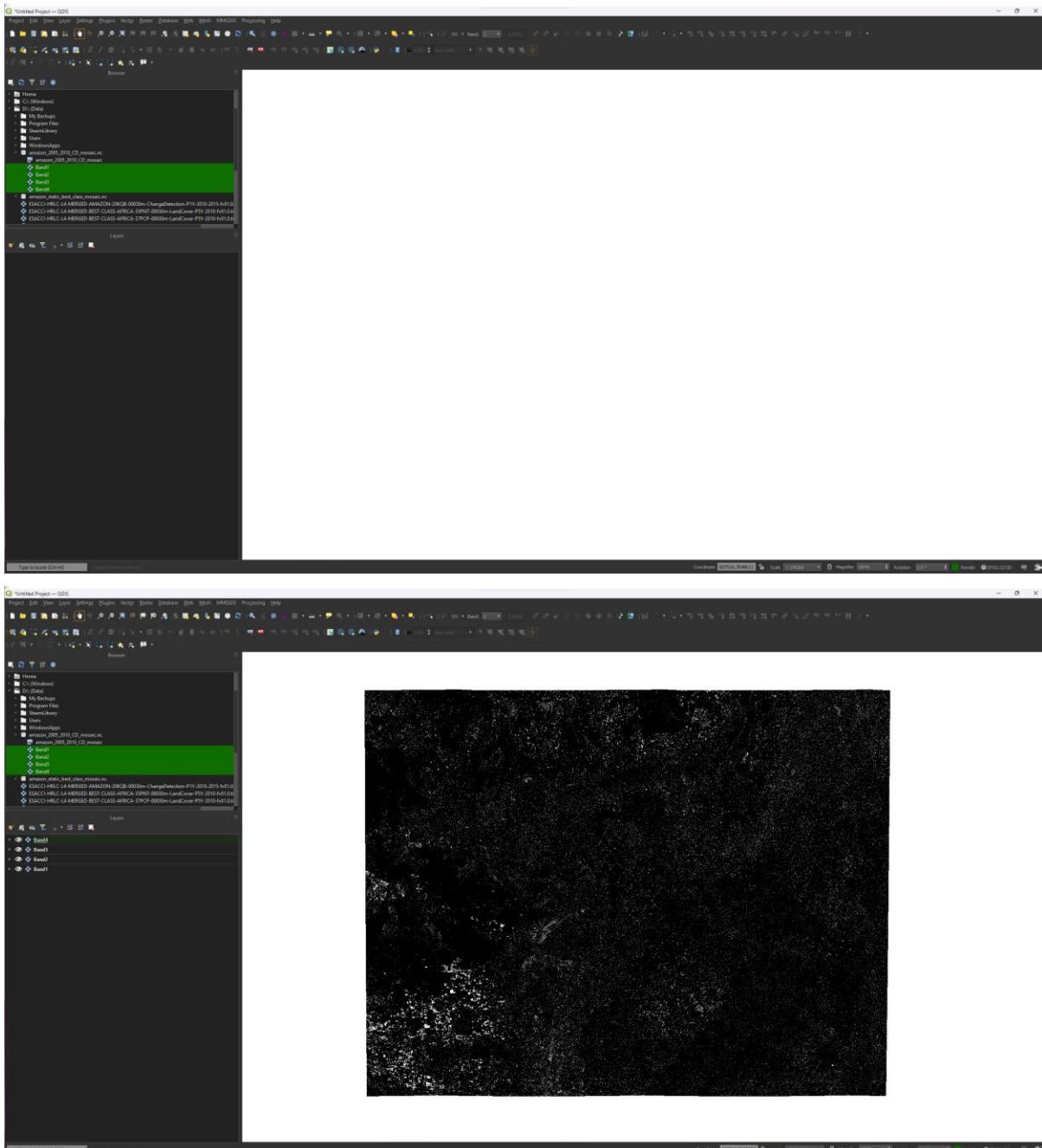
In the case of Geo TIFF files for single MGRS tiles, double click on the file to load the layer into QGis.



	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	17	 high resolution land cover cci

In the case of a NetCDF mosaic, double click on the file. The Browser panel will show five layers under the filename (ignore the one with the same name as the file). Double click on the desired band to load the layer. The bands represents the following layers:

- Band 1: year of change
- Band 2: probability of change
- Band 3: reliability (distance between the couple of years for which the change has been calculated)
- Band 4: PCC

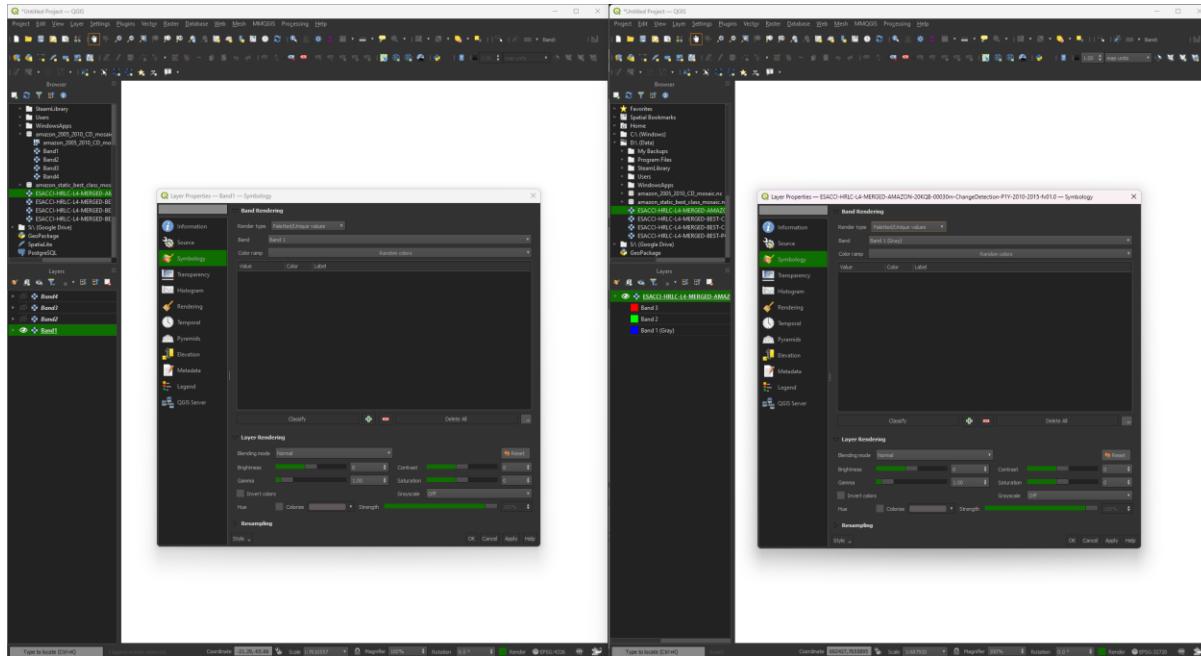


Note that the mosaic loads each band in a separated layer, while all the bands are loaded inside the same layer in the single tile case.

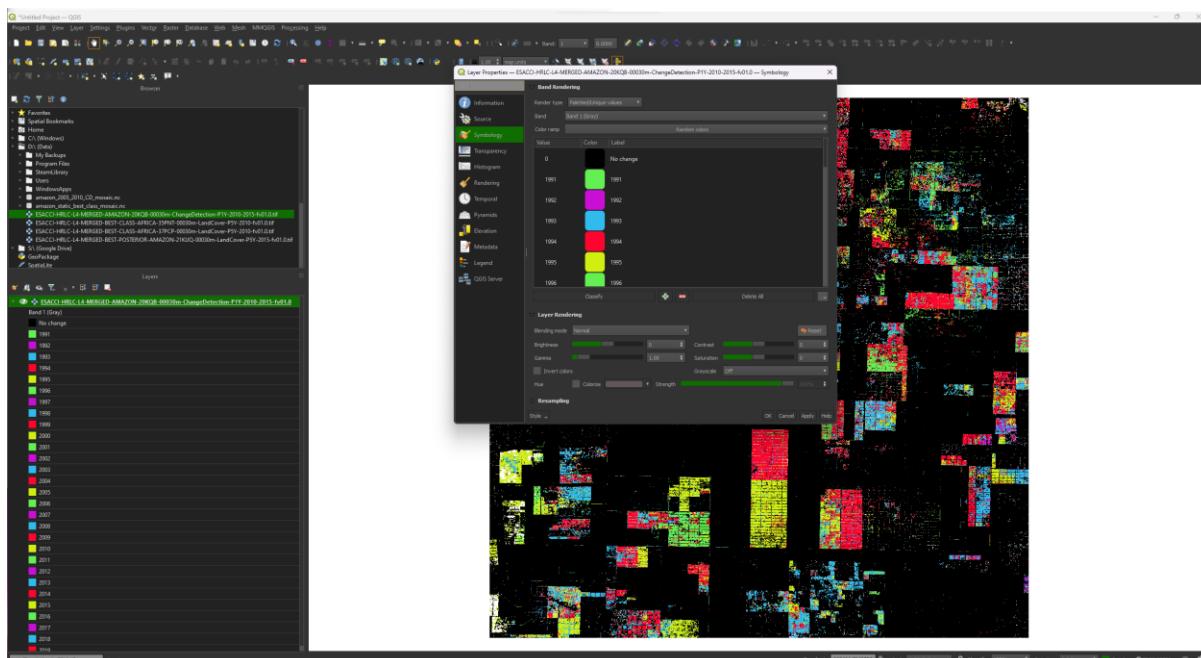
	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	18	

3.4.1 Year of change

In order to see the year of change, right click on Band 1 (for mosaic) or on the multiband layer (single tile) and go to *Properties > Symbology > Render type*: select *Palette/Unique values*. In the case of single tile, check that the selected band is 1.



Now, click on the small arrow near the *Delete All* button > *Select Load Color Map from File* and select the file [CCI_HRLC_color_map_LCC_year.txt](#).



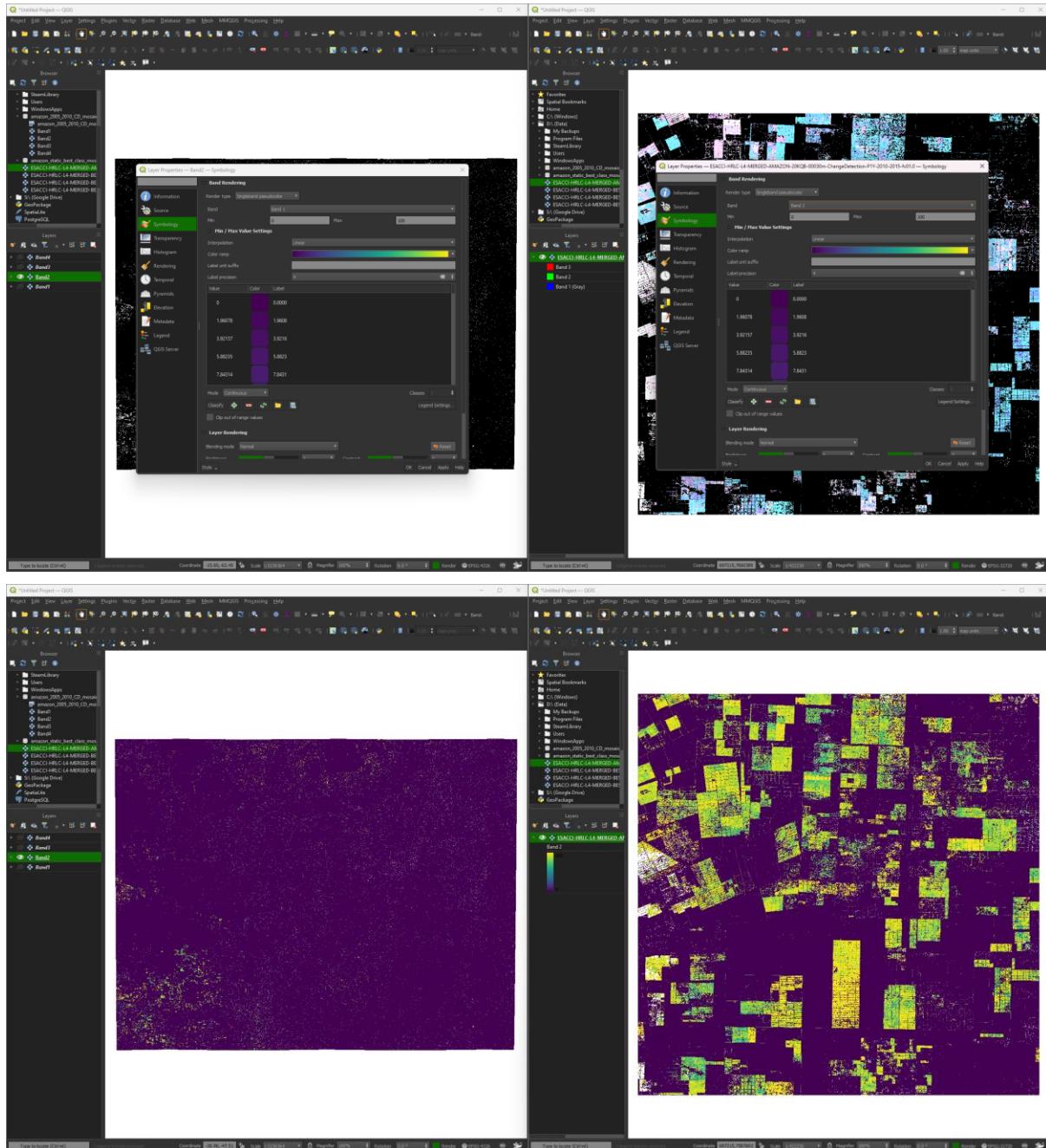
Note that the same colors are used every 5 years. Since a single CD product can represent only a 5 year span, years are correctly represented with different colors. The color legend is defined such that it can work with every change detection product.

3.4.2 Probability of change

In order to see the probability of change, right click on Band 2 (for mosaic) or on the multiband layer (single tile) and go to *Properties > Symbology > Render type*: select *Singleband pseudocolor*. In the case of single tile, check

	Ref	CCI_HRLC_Ph1-CRDP	
Issue	Date	Page	
3.rev.0	02/11/2020	19	

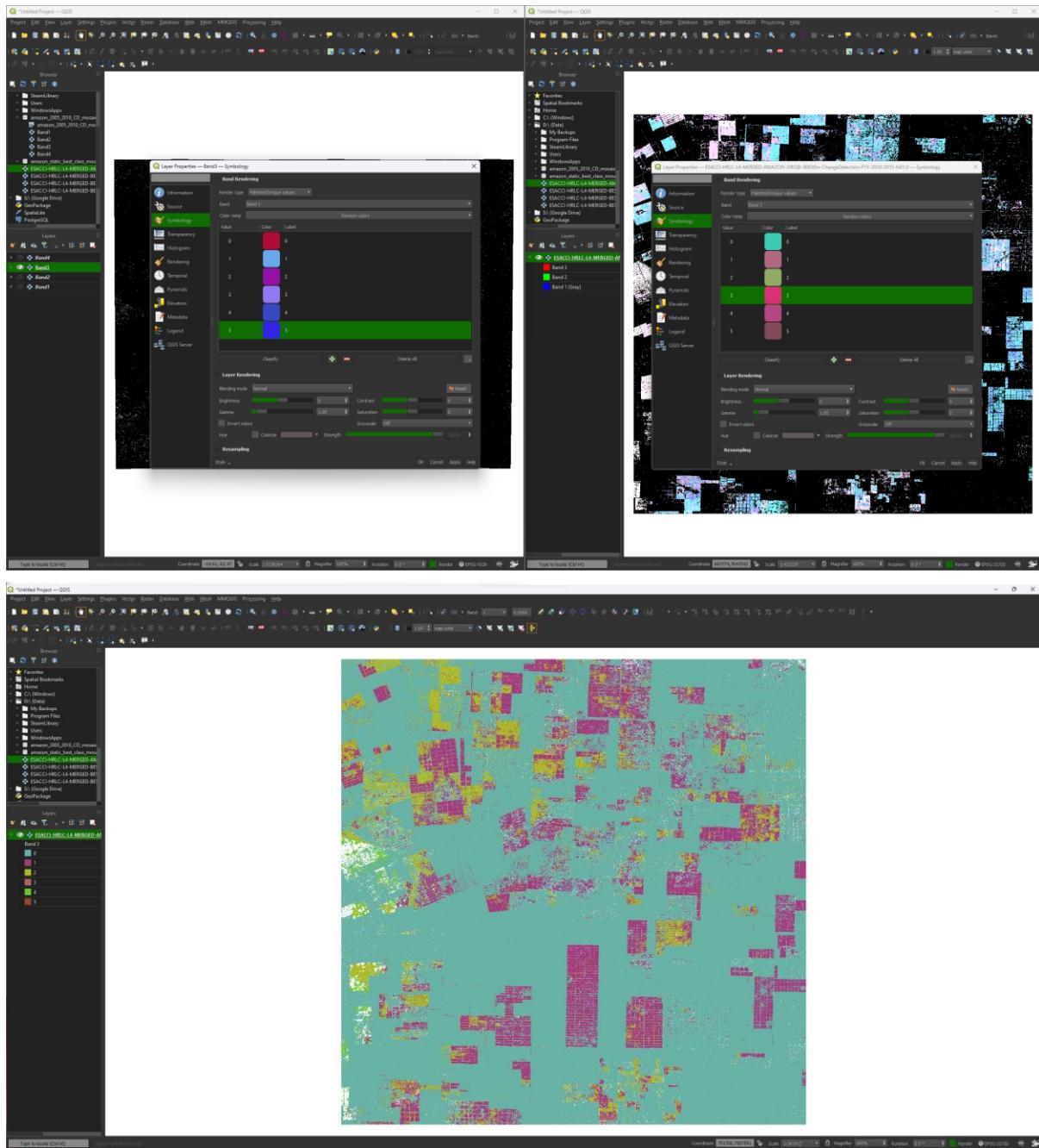
that the selected band is 2. Set the minimum and maximum values to 0 and 100, respectively. Choose the color ramp of preference.



Note that nodata is automatically set transparent, hence in this case white pixels are pixels for which not enough data was available to assert the change.

3.4.3 Reliability

In order to see the reliability of change, right click on Band 3 (for mosaic) or on the multiband layer (single tile) and go to *Properties > Symbology > Render type*: select *Palette/Unique values*. In the case of single tile, check that the selected band is 3. Here, no color legend is available. Click 6 times on the "+" button to add items to the legend so that the values range from 0 to 5 (avoid using the *Classify* button with the mosaic as it will take a while to compute the legend). If a specific color ramp is desired, it can be selected from the color ramp drop-down menu.



3.4.4 PCC

In order to see the PCC, right click on Band 4 (for mosaic) or on the multiband layer (single tile) and go to *Properties > Symbology > Render type:* select *Palette/Unique values*. In the case of single tile, check that the selected band is 4. Now, click on the small arrow near the *Delete All button* > Select *Load Color Map from File* and select the file [CCI_HRLC_color_map_PCC.txt](#).

