Climate Change Initiative Extension (CCI+) Phase-1
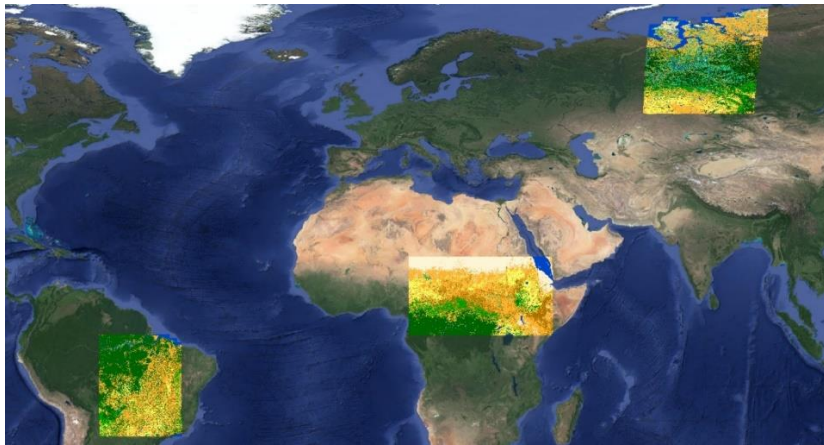
New Essential Climate Variables (NEW ECVS)

High-Resolution Land Cover ECV (HR_LandCover_cci)

Quick User Guide

14/02/2024 - v1.0

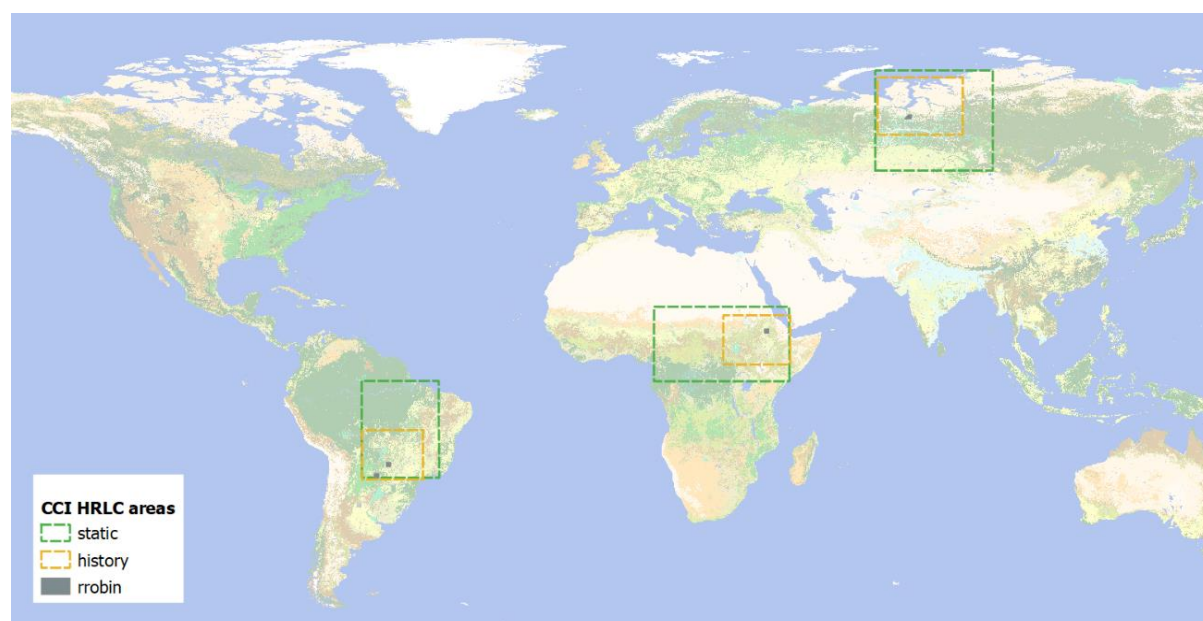| HRLC CLASSES	
CODE	DESCRIPTION
0	No data
10	Tree cover evergreen broadleaf
20	Tree cover evergreen needleleaf
30	Tree cover deciduous broadleaf
40	Tree cover deciduous needleleaf
50	Shrub cover evergreen
60	Shrub cover deciduous
70	Grasslands
80	Croplands
90	Woody vegetation aquatic or regularly flooded
100	Grassland vegetation aquatic or regularly flooded
110	Lichens and mosses
120	Bare areas
130	Built-up
140	Open water
141	Open water seasonal
142	Open water permanent
150	Permanent snow and/or ice

1   Products overview

This document provides quick access to relevant information for the access and use of HRLC products. We provide a brief summary of products properties, legend, covered areas, database access, directory structure and file naming convention. More detailed information about each product is provided in Sections 2,3,4. This document is an excerpt of the CCI_HRLC_Ph1-D4.3_PUG_v2.1 (downloadable from CCI HRLC website, Key Documents) , which is the most comprehensive user guide.

1.1   Summary

	HRLC10 (static land cover maps)	HRLC30 (historical land cover maps)	HRLCC30 (land cover change detection maps)
Products	Classification Map	Classification Map	Change Detection Map
Resolution (meters)	10	30	30
Source Data	Sentinel-2 Sentinel-1	Landsat 5-7-8 ASAR, ERS 1-2	Landsat 5-7-8
Years	2019	1990, 1995, 2000, 2005, 2010, 2015, 2019	1990-2019
Projection	UTM (MRGS products) WGS84 (Mosaics)	UTM (MRGS products) WGS84 (Mosaics)	UTM (MRGS products) WGS84 (Mosaics)
Grid	MGRS	MGRS	MGRS
Uncertainty products available	Yes	Yes	Yes
Encoding	GeoTIFF tiles following the Sentinel-2 MGRS tiling scheme and a GeoTiff format mosaic.	GeoTIFF tiles following the Sentinel-2 MGRS tiling scheme and a GeoTiff format mosaic.	GeoTIFF tiles following the Sentinel-2 MGRS tiling scheme and a GeoTiff format mosaic.

1.2   Areas

1.3   Download directory structure

Project page in the CEDA Archive: https://catalogue.ceda.ac.uk/uuid/b057708eec1042238fb333ab02ec772e

```
Root:

https://data.ceda.ac.uk/neodc/esacci/high_resolution_land_cover/data/land_cover_maps
```

```
/A01_Africa
/A02_Amazonia
/A03_Siberia
```

```
    /historical
            /v1.2
                    /geotiff
                            /HRLC30
                                    /mosaic
                                    /tiles
                                            /1990
                                            /1995
                                            /2000
                                            /2005
                                            /2010
                                            /2015
                                            /2019
                            /HRLCC30
                                    /mosaic
                                    /tiles
                                            /1990_1995
                                            /1995_2000
                                            /2000_2005
                                            /2005_2010
                                            /2010_2015
                                            /2015_2019
        /static
                /v1.2
                        /geotiff
                                /HRLC10
                                        /mosaic
                                        /tiles
                                                /2019
```

```
/01_Africa/static/v1.2/geotiff/HRLC10
```
https://catalogue.ceda.ac.uk/uuid/f107a4ce186844bb8adf8cd1f2f6d552
```
/02_Amazonia/static/v1.2/geotiff/HRLC10
```
https://catalogue.ceda.ac.uk/uuid/0bc7042123984c69aa45cb6788bfdaa0
```
/03_Siberia/static/v1.2/geotiff/HRLC10/
```
https://catalogue.ceda.ac.uk/uuid/e7864129084c4baaa34be3a1cfaaa13d
```
/01_Africa/historical/v1.2/geotiff
```
https://catalogue.ceda.ac.uk/uuid/a3fb75aa46db4711ab587f3fa3ca01fe
```
/02_Amazon/historical/v1.2/geotiff
```
https://catalogue.ceda.ac.uk/uuid/b053b51e854d484a9657f6bfb5ebd516
```
/03_Siberia/historical/v1.2/geotiff
```
https://catalogue.ceda.ac.uk/uuid/854cc98dbc634cdb8afa8835994428f5

1.4 File naming convention

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

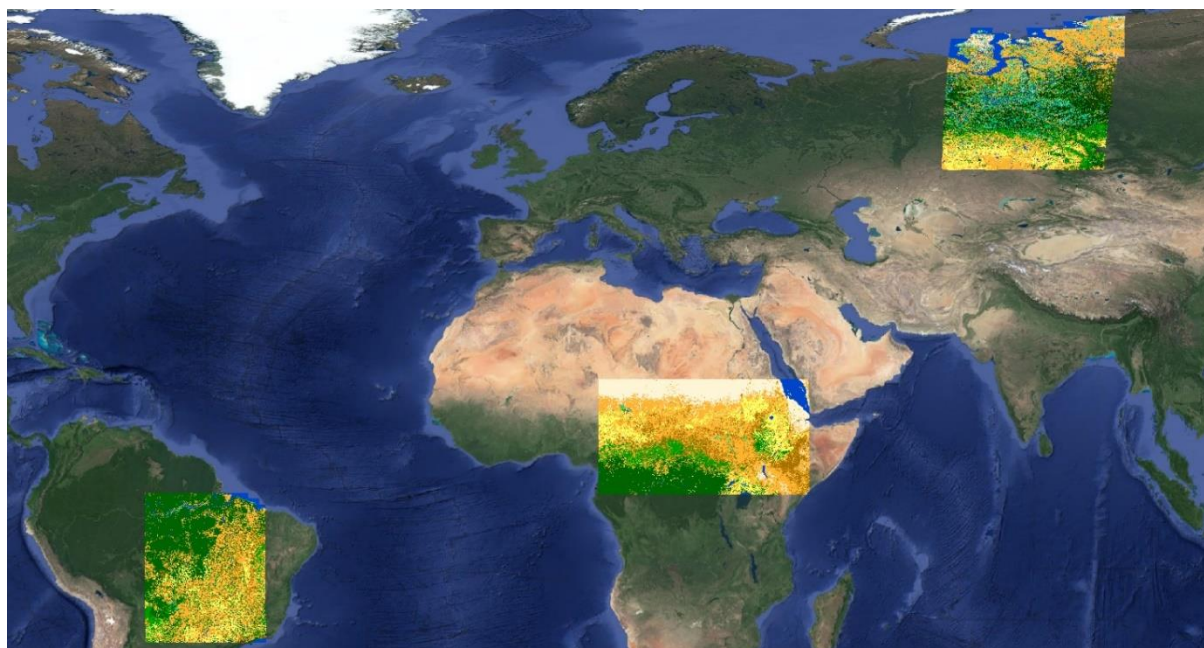| field	values	explanation	notes
product_type	MAP	Classification product (CL01)	
	UNCERT	Uncertainty product (CL02,PS01,PS02,IQIX)	
	CHANGE	Change detection product (CDET)	
product_id	CL01	First class (accord. to classifier ranking)	Further subdivision of product types. A distinct code for each product available.
	CL02	Second class (accord. to classifier ranking)	
	PS01	Posterior probability associated to CL01	
	PS02	Posterior probability associated to CL02	
	IQIX	Input quality index	
	CDET	Change detection	
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 (1 or 5 years)	
epoch	YYYY	Epoch of the product (e.g., 1990,2000,2019)	
file_extension	.tif	File format (.tif for tile products and mosaic products)	

With:

NN: 01=Africa, 02=Amazon, 03=Siberia

MMXXX: tiling nomenclature a 100x100 km2 tile in the MGRS format: e.g., 45XVC.

1.5   Legend of the land cover map products

CODE	DESCRIPTION		
HRLC CLASSES			
0	No data		
10	Tree cover evergreen broadleaf		
20	Tree cover evergreen needleleaf		
30	Tree cover deciduous broadleaf		
40	Tree cover deciduous needleleaf		
50	Shrub cover evergreen		
60	Shrub cover deciduous		
70	Grasslands		
80	Croplands		
90	Woody vegetation aquatic or regularly flooded		
100	Grassland vegetation aquatic or regularly flooded		
110	Lichens and mosses		
120	Bare areas		
130	Built-up		
140	**Open water**	141	Open water seasonal
		142	Open water permanent
150	Permanent snow and/or ice		

2 HRLC10: High Resolution Land Cover Map at 10m products

2.1 Format, metadata and projection

product type	product id	Description	NetCDF DataType	GeoTIFF DataType	Values Range
MAP	CL01	First class as returned by the land cover mapping algorithm according to posterior probability ranking. Class values are those described in **Error! Reference source not found.**.	NC_BYTE	Byte	0 - 150
UNCERT	CL02	Second class as returned by the land cover mapping algorithm according to posterior probability ranking. Class values are those described in **Error! Reference source not found.**.	-	Byte	0 - 150
UNCERT	PS01	Posterior probability associated to the first ranked class. Original probability values in the range [0,1] are mapped to 0-100 integer values.	-	Byte	0 - 100
UNCERT	PS02	Posterior probability associated to the second ranked class. Original probability values in the range [0,1] are mapped to 0-100 integer values.	-	Byte	0 - 100
UNCERT	IQIX	Optical imagery input quality evaluated before land cover mapping by considering the number of valid images at pixel level used for land cover mapping. Ranges from 0–low quality to 3–high quality.	-	Byte	0 - 3

2.1.1 Naming detailed structure

ESACCI-<CCI Project>-<Processing Level>-<Data Type>-<Product String>[-<Additional Segregator>] <IndicativeDate>[<Indicative Time>]-fv<File version>.tif

<CCI Project>

ESACCI- HRLC

<Processing Level>

L4

<Data Type>

MAP - UNCERT

<Product String>

CL01 – CL02 – PS01 – PS02 - IQIX

<Additional Segregator Tile>

Area code A01=Africa, A02=Amazon, A03=Siberia (3 chars) concatenated with the tile code following Sentinel-2 tiling system based on MGRS (6 chars).

<Additional Segregator Resolution>

10m

<Indicative Date>

The identifying date for this data set is YYYY, where YYYY is the four digit year. As prefix, the indication of the period is given as specified in Data Standard document with ISO notation.
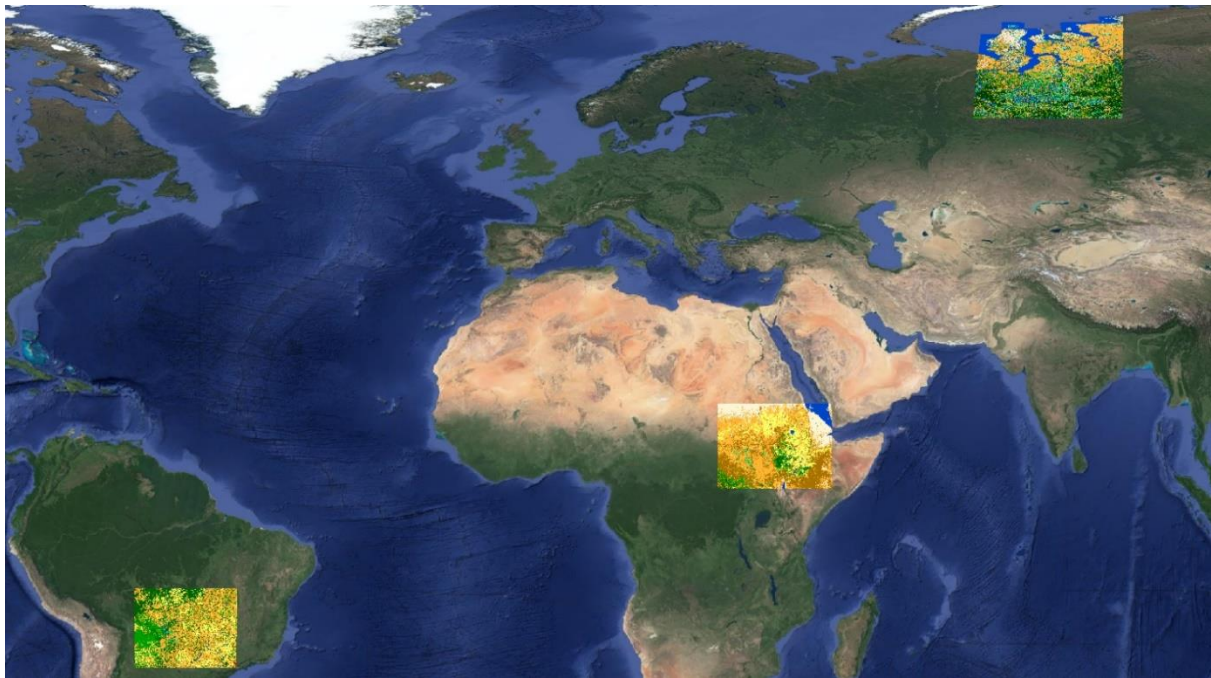
<File Version>

File version number in the form n{1,}[.n{1,}]. This is 1 or more digits followed by optional . and another 1 or more digits.

Examples:

- ESACCI-HRLC-L4-MAP-CL01-A01MOSAIC-10m-P1Y-2019-fv01.2.tif
- ESACCI-HRLC-L4-MAP-CL01-A01T32NPF-10m-P1Y-2019-fv01.0.tif

3   HRLC30: High Resolution Land Cover Map at 30m products

3.1   Format, metadata and projection

product type	product id	Description	NetCDF DataType	GeoTIFF DataType	Values Range
MAP	CL01	First class as returned by the land cover mapping algorithm according to posterior probability ranking. Class values are those described in **Error! Reference source not found.**.	NC_BYTE	Byte	0 - 150
UNCERT	CL02	Second class as returned by the land cover mapping algorithm according to posterior probability ranking. Class values are those described in **Error! Reference source not found.**.	-	Byte	0 - 150
UNCERT	PS01	Posterior probability associated to the first ranked class. Original probability values in the range [0,1] are mapped to 0-100 integer values.	-	Byte	0 - 100
UNCERT	PS02	Posterior probability associated to the second ranked class. Original probability values in the range [0,1] are mapped to 0-100 integer values.	-	Byte	0 - 100
UNCERT	IQIX	Optical imagery input quality evaluated before land cover mapping by considering the number of valid images at pixel level used for land cover mapping. Ranges from 0–low quality to 3–high quality.	-	Byte	0 - 3

3.1.1   Naming detailed structure

ESACCI-<CCI   Project>-<Processing   Level>-<Data   Type>-<Product   String>[-<Additional   Segregator>]
<IndicativeDate>[<Indicative Time>]-fv<File version>.tif

<CCI Project>

ESACCI- HRLC

<Processing Level>

L4

<Data Type>

MAP - UNCERT

<Product String>

CL01 – CL02 – PS01 – PS02 - IQIX

<Additional Segregator Tile>

Area code A01=Africa, A02=Amazon, A03=Siberia (3 chars) concatenated with the tile code following Sentinel-2 tiling system based on MGRS (6 chars).

<Additional Segregator Resolution>

30m

<Indicative Date>

The identifying date for this data set is YYYY, where YYYY is the four digit year. As prefix, the indication of the period is given as specified in Data Standard document with ISO notation.
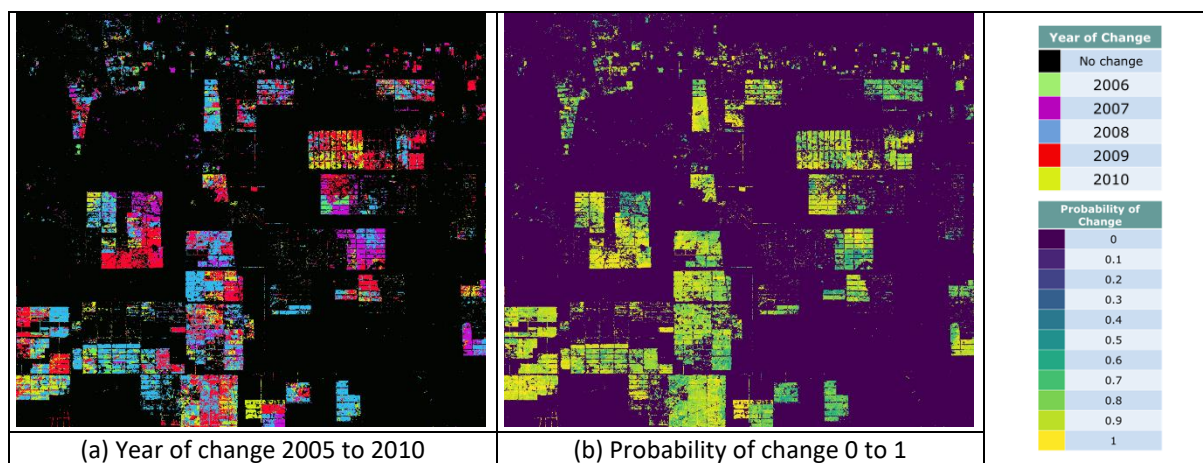
<File Version>

File version number in the form n{1,}[.n{1,}]. This is 1 or more digits followed by optional . and another 1 or more digits.

Examples:

- ESACCI-HRLC-L4-MAP-CL01-A03MOSAIC-30m-P5Y-2010-fv01.2.tif
- ESACCI-HRLC-L4-MAP-CL01-A02T20LPJ-30m-P5Y-1995-fv01.2.tif

4 HRLC30: High Resolution Land Cover Change Map at 30m products

(a) Year of change 2005 to 2010	(b) Probability of change 0 to 1

4.1 Format, metadata and projection

product type	product id	*band*	Description	NetCDF DataType	GeoTIFF DataType	Values Range
CHANGE	CDET	1	YEAR OF CHANGE: the year of change in the 5-year span of the two years from which the LCC product is calculated.	NC_FLOAT	Float32	1990 - 2019 (NaN)
		2	PROBABILITY OF CHANGE: probability of the change as returned by the land cover change detection algorithm. Original probability values in the range [0,1] are mapped to 0-100 integer values.	-	Float32	0 - 100 (NaN)
		3	RELIABILITY: distance between the couple of years for which the change has been calculated	-	Float32	0 - 5 (NaN)
		4	PCC PRIORITY CHANGES: from Post Classification Comparison of HRLC30 maps, the class cover transition of the change in its degree of priority. 0=no change, 1=low priority change, 2=high priority change.	-	Float32	0 - 2

The YEAR OF CHANGE is calculated when enough data is available (at least three acquisitions in consecutive months in a year) for each pixel in consecutive years. If enough data are not available for consecutive years, the algorithm keeps the first year (with enough data) and checks the number of acquisitions in the other years. This procedure (checking the availability of data for the next years) is continued to find a year with enough acquisitions in the whole six years of data. If the data availability is verified, the year of the change and the PROBABILITY OF CHANGE are reported on a multiannual span (instead of yearly). Thus, the value of RELIABILITY shows the distance between the couple of years that the change information is provided and it is a number between 1 – 5 for the changed pixels and 0 for no-change. If every year has not enough data the change

information is missing, reliability and probability are not calculated and NaN is assigned as a value to those parameters.

4.1.1 Naming detailed structure

ESACCI-<CCI Project>-<Processing Level>-<Data Type>-<Product String>[-<Additional Segregator>] <IndicativeDate>[<Indicative Time>]-fv<File version>.tif

<CCI Project>

ESACCI- HRLC

<Processing Level>

L4

<Data Type>

CHANGE

<Product String>

CDET

<Additional Segregator Tile>

Area code A01=Africa, A02=Amazon, A03=Siberia (3 chars) concatenated with the tile code following Sentinel-2 tiling system based on MGRS (6 chars).

<Additional Segregator Resolution>

30m

<Indicative Date>

The identifying date for this data set is YYYY, where YYYY is the four digit year. As prefix, the indication of the period is given as specified in Data Standard document with ISO notation.

<File Version>

File version number in the form n{1,}[.n{1,}]. This is 1 or more digits followed by optional . and another 1 or more digits.

Examples:

- ESACCI-HRLC-L4-CHANGE-CDET-A01MOSAIC-30m-P1Y-2000-2005-fv01.2.tif
- ESACCI-HRLC-L4-CHANGE-CDET-A03T42VXM-30m-P1Y-2010-2015-fv01.2.tif