CLC2018 methodology

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European Commission

Copernicus
Europe's eyes on Earth

European Environment Agency

Contents

Business as usual - almost…

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Evolution of CORINE Land Cover

	CLC1990	CLC2000	CLC2006	CLC2012	CLC2018
Satellite data	Landsat TM (Landsat MSS) Single date	Landsat ETM Single date	SPOT-4 XI, IRS LISS III Dual date	IRS LISS III RapidEye Dual date	Sentinel-2 MSI Landsat-8 OLI Minimum dual date
Mapping methodology	Visual photo-interpretation on plastic	CAPI	CAPI (+ semi-automatic)	CAPI (+ semi-automatic)	CAPI (+ semi-automatic)
Change mapping	None	Not standardized	Change mapping first	Change mapping first	Change mapping first
Nomenclature MMU/MMW	44 classes 25 ha/100m	44 classes 25 ha/100m	44 classes 25 ha/100m	44 classes 25 ha/100m	44 classes 25 ha/100m
Access to the data	Unclear dis-semination policy	Dissemination policy agreed from the start	Free access for all kind of users	Free access for all kind of users	Free access for all kind of users

Methodology

Tasks

- **Revision of CLC2012**
- **Mapping 2012-2018 changes → MAIN PRODUCT**

Production method

In most countries: photointerpretation– uniform methodology (Guidelines)
In some countries: "semi-automatic" bottom-up methodology – highly country- / data-dependent

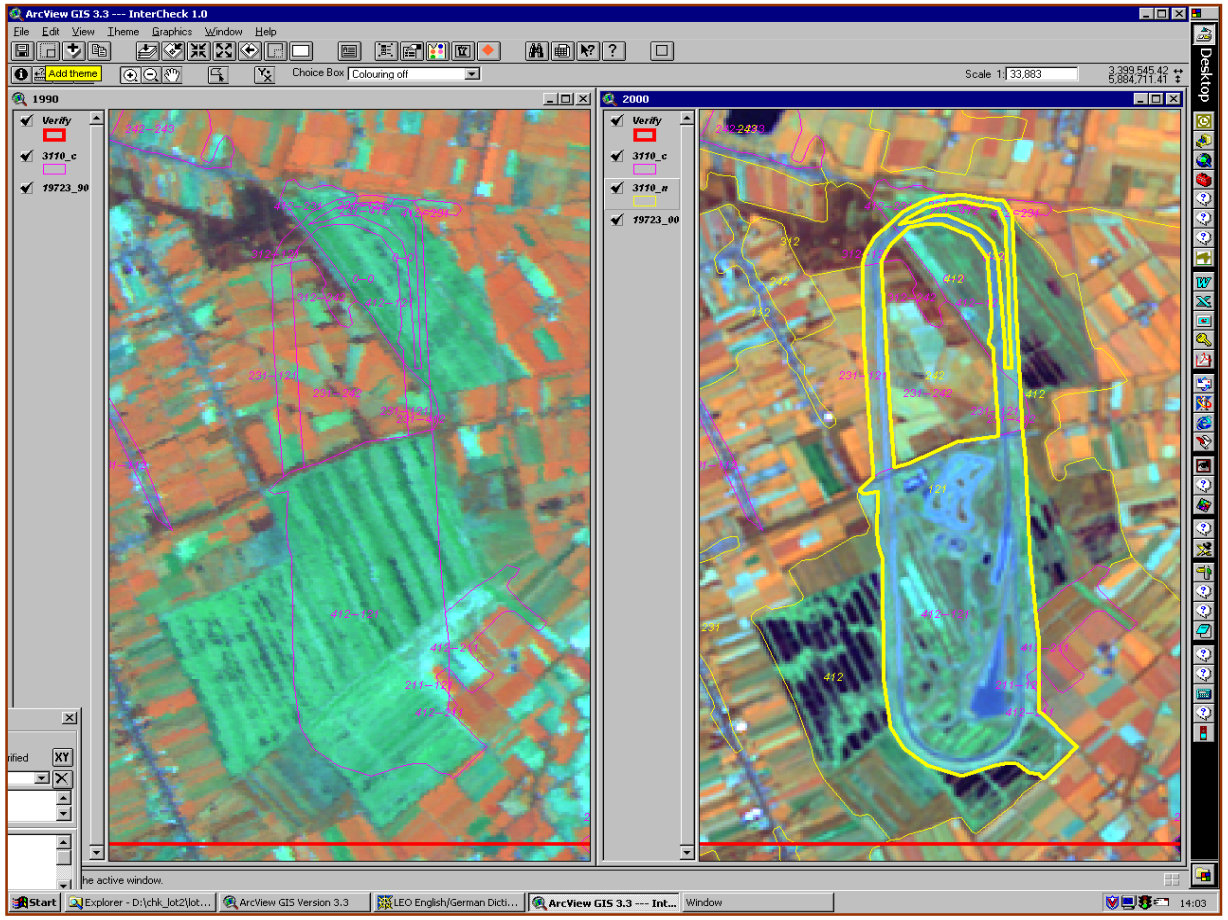
- **Combination of image processing, in-situ data merging and cartographic generalisation (FI, IE, IS, NO, SE)**
- **Full bottom-up solution: generalisation of higher resolution national land monitoring data (DE, ES)**

Basic parameters have not changed (MMU = 25 ha / 5 ha, MMW = 100 m, standard nomenclature)

Some amendments and clarification in the nomenclature (see previous presentation)

Mapping CORINE Land Cover changes

- **Minimum contiguous area of change: 5 ha**
- **Minimum width: 100 m**
- **Satellite images from two different years**
- **Change should describe a real evolution process**
- **„Change mapping first“ is preferred over „CLC2018 mapped first“**



Year-1 **Year-2**

European Commission | Copernicus Europe's eyes on Earth | European Environment Agency | European Topic Centre on Urban, Land and Soil Systems

Producing CLC2018

$CLC2018 = CLC2012_{rev}$ (+) $CLC\text{-}Change_{2012\text{-}2018}$

ArcGIS Toolbox is provided to perform the operation (like in CLC2012)

- **Small (<25 ha) polygons are automatically generalized**
- **Polygons slightly below 25 ha can be enlarged**

Two prerequisites of successful operation

- **$CLC\text{-}Change_{2012\text{-}2018}$ outlines are geometrically based on $CLC2012_{rev}$ outlines.**
- **Both $CLC2012_{rev}$ and $CLC\text{-}Change_{2012\text{-}2018}$ are topologically correct databases (no holes, no overlaps, no multi-part polygons, no dissolve errors).**

Input vector data

CLC2012 database

- **All countries are expected to use the national CLC2012 coverage (and CLC-Change$_{2006-2012}$) clipped from the border matched, integrated European version.**

- **Border-matched CLC2012 (vector format, national projection) for participating countries are available for download at:**

http://forum.eionet.europa.eu/nrc_land_covers/library/gio-land/corine-land-cover-clc/support-files-clc-production

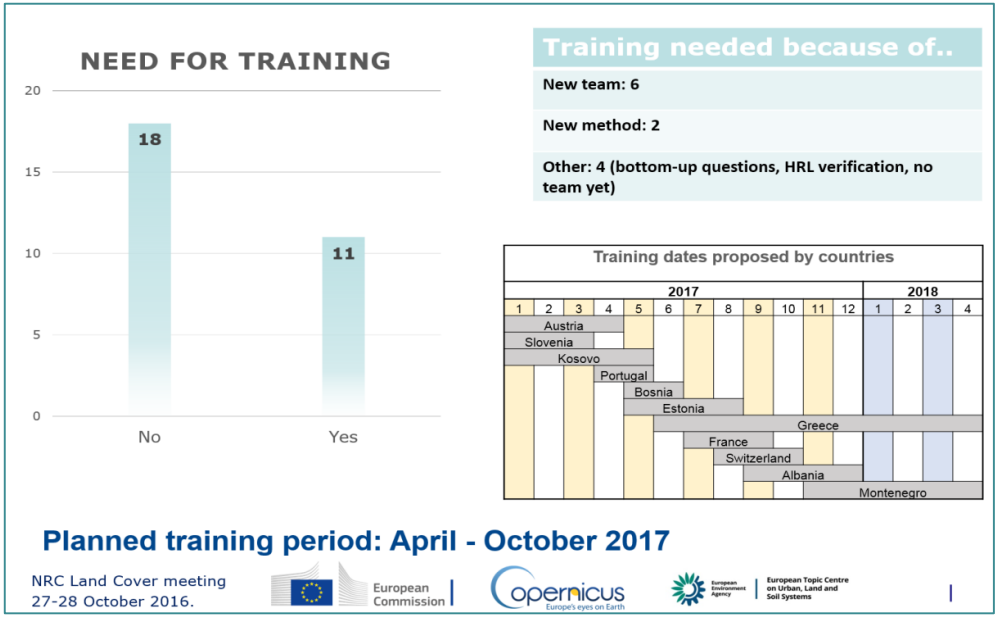
Ancillary / in-situ data

Data to be used to complement IMAGE2018

- **Topographic maps**
- **Aerial photographs or VHR satellite imagery**
- **LPIS data**
- **Copernicus High Resolution Layers**
- **CLC-Change$_{2000\text{-}2006}$ database may be used as support layer to keep consistency between the "old" and "new" change layers**

CLC training needs

CLC Technical Team provides training on CLC change mapping and software (CLC2018 Support Package):
- 2 (3) days
- on-site
- aimed at photointerpreters



Countries requesting training (in CLC2018 survey):

- **Albania – new team**
- **Austria - not needed**
- **Bosnia – not confirmed**
- **Cyprus – not confirmed**
- **Estonia – not confirmed**
- **France – new team (10-11/2017)**
- **Greece – new team (12/2017-01/2018)**
- **Kosovo – new team (11/2017)**
- **Montenegro – not needed**
- **Slovenia – new team**
- **Switzerland – new team**
- **Portugal – new team**

Quality assurance and quality control

- ★ **Internal verification (by National Team)**
- ★ **Verification by the CLC Technical Team to ensure that**
  - **Basic rules of database construction are followed**
  - **Databases produced by different national teams are compatible**
- ★ **Final technical control of national products (before integration to European database)**

- ★ **European validation (target accuracy = 85%)**

Thematic QC – verification

Principally similar, but less resources, less time than before → simplified process

- **Usually remote verification**
- **Mission to new national teams / countries applying new methodology**
- **Countries with more than one team are checked by regions (e.g. ES, IT..)**
- **1st verification: after a few working units are completed (10% area)**
  - **Verification of one working unit having many changes**
- **2nd verification: when around the 75% of the country is completed**
  - **Verification of some working units**

Evaluation only qualitative: Accepted, Conditionally Accepted, Rejected

Novelty:

- **50x50 km verification area covered by a single S2 image to be prepared by NT**

Thematic QC – verification

NT is requested to send to CLC Technical Team:

- **Vector data: revised CLC2012 (or CLC2018) and CLC-Changes 2012-2018**
- **Image data:**
  - **Image2012**
  - **Image2018 only if not the standard Image 2018 provided by EEA is used**

Overview of verification scheme

	1st verification	2nd verification	Data to be provided; data format	Remark
Sample selection by	national team	CLC2018 Technical Team		
Sample size	a single area, about 50 km x 50 km in size within a Sentinel-2 tile (or Landsat 8 image)	about 50 km x 50 km areas within Sentinel-2 tiles (or Landsat 8 image). Number of areas depends on size of the country / region (see Table 17).	revised CLC2012 (or CLC2018) and CLC-Change2012-2018 in shapefile format	samples should be completed, i.e. full area interpreted
IMAGE2012	area(s) covering the sample interpretation(s)			**all** used IMAGE2012 data have to be sent
IMAGE2018	ID (file name) of S2 (or Landsat-8) images used in deriving CLC data should be provided for each sample			images to be sent by NT only if not the centrally provided IMAGE2018 is used
Ancillary data			WMS access welcome	recommended if available

[1] If in non-standard methodology CLC2018 is produced first

Technical QC and delivery

National data can be considered as 'ready for delivery' after the following steps are completed:

1. Last verification has taken place (Verification Report);

2. Recommendations in the Verification Report have been integrated;

3. Technical quality of deliverables has been checked by NT and screened using the online tool: **http://clcqc.gisat.cz/help/AboutCLCQCTool.html**

Online checked deliveries uploaded into the CDR

DBTA report released with summary of data and metadata conformity checks

A – delivery has been accepted
B – request for improvement

Deliverables and Metadata

Deliverables

- CLC-Change$_{2012\text{-}2018}$
- CLC2018
- Revised CLC2012 (if produced)
- Metadata

Working-unit-level metadata: to document all steps of production of CLC-Change2012-2018 database (per working unit)

Country-level metadata: mostly serve the users by informing them about the main parameters of the product.

Metadata structure with instructions about its use will be published on Eionet forum.

Thank you for your attention !