

Quick start guide

for the

LACO-WIKI ONLINE TOOL

An Open Access Online Portal for Land Cover Validation

<http://laco-wiki.net>

Date of release: 30.04.2020



Table of Contents

1	INTRODUCTION	3
2	STEPS IN THE VALIDATION PROCESS	4
2.1	LOGIN	4
2.2	UPLOAD	5
2.3	LEGEND	7
2.4	GENERATING A SAMPLE COLLECTION	9
2.5	VALIDATING A SAMPLE COLLECTION	10
2.6	GENERATING AN ACCURACY REPORT	14
3	NEW FEATURES ADDED TO LACO-WIKI.....	17
3.1	ADDITION OF NDVI PROFILES	17
3.2	ADDITION OF FLICKR PHOTOGRAPHS.....	19
3.3	MULTIPLE VALIDATIONS AT THE SAME LOCATION	20
3.4	DELETION OF DATA SETS IN LACO-WIKI.....	21
3.5	ADDITION OF WMS LAYERS SECURED VIA BASIC AUTHENTICATION	23
3.6	COMPILE A SINGLE ACCURACY REPORT FROM MULTIPLE SESSIONS	23
3.7	ABILITY TO BOOKMARK VALIDATIONS	24
3.8	PRODUCTION OF A REPORT FOR COPERNICUS LOCAL COMPONENT PRODUCTS.....	26
3.9	IMPROVEMENTS TO SUPPORT LARGE SHAPEFILES	27

1 Introduction

LACO-Wiki is an open access online tool for land cover validation. This document provides an overview of the basic functionality of LACO-Wiki and guides you through uploading and validating a data set.

LACO-Wiki enables you to set-up statistically robust **sampling designs** and then visually interpret the samples in a **user-friendly environment**. You can then generate **state-of-the-art accuracy reports** for communication to map users.

The tool also includes data management and **sharing functionality** so that every data set uploaded or generated in LACO-Wiki can be managed by you and shared with other users.

Key Features

LACO-Wiki offers:

- A single online access point for the complete map validation process.
- A user-friendly environment to upload new maps and create sampling designs.
- State-of-the-art accuracy reports generated with just a few clicks.
- Easy access to shared data sets and validation sessions, allowing users to share the workload with other people in their team so that multiple people can validate a set of samples at the same time.

2 Steps in the Validation Process

The following section guides you through an example of a complete validation session from login to generating the final accuracy report.

2.1 Login

LACO-Wiki currently supports three different login options:

- An existing Geo-Wiki account, created at <https://www.geo-wiki.org>
- Facebook
- Google.

To get started, go to <https://laco-wiki.net> and use one of the three options to log into LACO-Wiki (Figure 1). Note that LACO-Wiki will ask you for permission to access your email address and public profile.

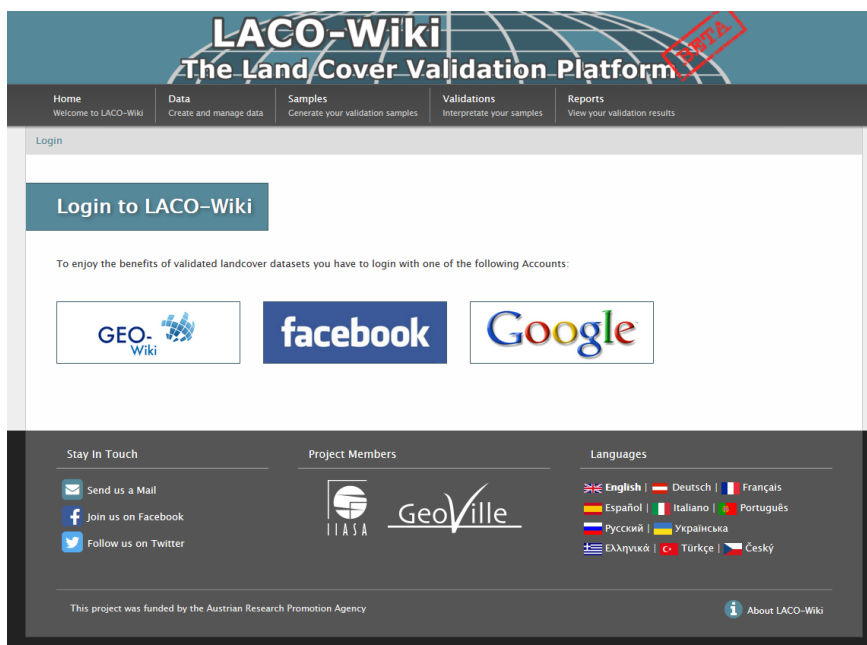


Figure 1: Login with your Geo-Wiki, Facebook or Google account

The first time you log into LACO-Wiki, you will be asked to review some **Terms of Use** and to accept these before you continue (Figure 2). The **Terms of Use** of LACO-Wiki were originally listed on the **About** page and did not require agreement by users. To be compliant with the European Union's General Data Protection Regulation, you are now required to read and agree to the Terms of Use before using the software. At the bottom of the Terms of Use is a link to the **Privacy Policy**; hence, users agree to both when they log in the first time. The user can view the Terms of Use and Privacy Policy at any time from the **About** page of LACO-Wiki:

<https://laco-wiki.net/en/About>

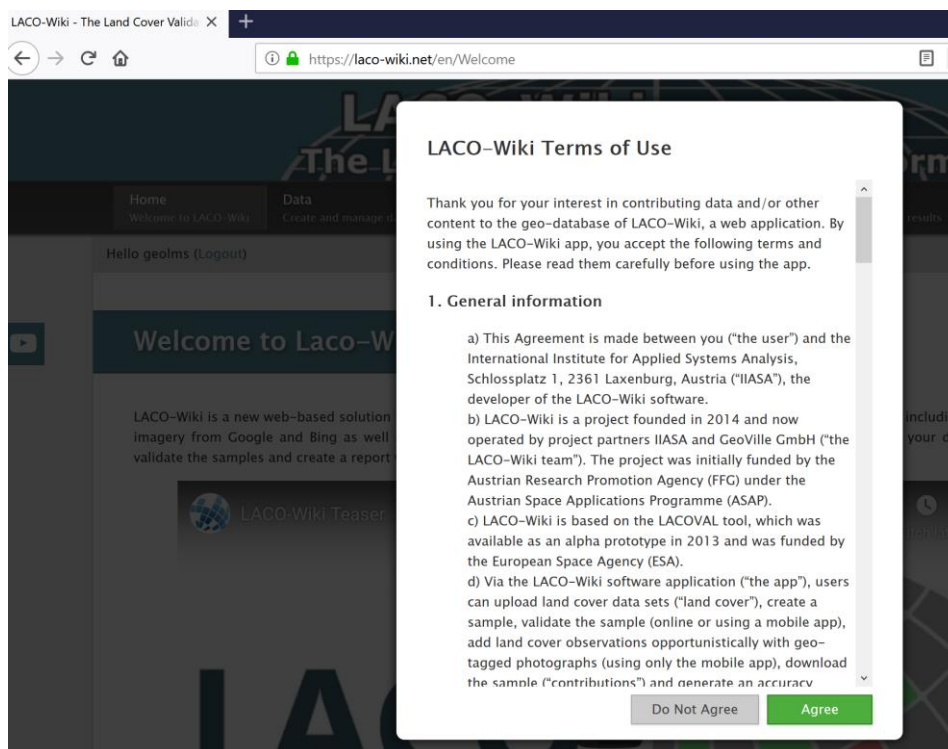


Figure 2: LACO-Wiki Terms of Use, which are displayed the first time that you log into LACO-Wiki

2.2 Upload

After logging in, you are ready to upload and create your first data set.

Select **Data** from the menu at the top of the application and then press the **Upload** button at the bottom of the page to begin creating a new data set in the system (Figure 3).

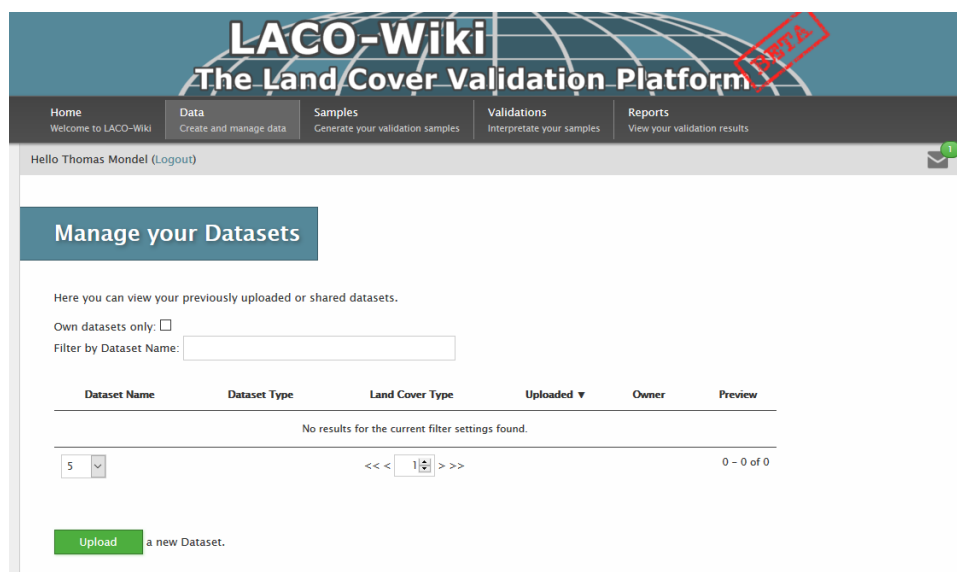


Figure 3: Click Upload to create your first data set

You will be forwarded to the **Create a new Dataset** screen (Figure 4). Here you can enter the details about your data set such as the name, land cover type and the description.

LACO-Wiki currently supports three different land cover types for your data set:

- **Categorical:** Also called thematic, discrete or classified data, categorical data can be in vector or raster format to represent discrete information. Examples of categorical data are land cover or land use maps such as the pan-European CORINE land cover data set, the Urban Atlas as well as global land cover maps such as ESA's CCI, GlobCover, etc.
- **Continuous:** Continuous data represent phenomena such as percentages, elevations or densities such as the Copernicus high resolution impervious layer, forest density or maps of population density.
- **Background:** In addition to base maps from Google Maps and Bing Maps, you can add your own background layers to aid in the validation process. Examples of such a data set would be an orthophoto of your study area.

Create a new Dataset

Here you can create a new dataset. Define a name, the land cover type and choose the corresponding files.

Dataset Information

Dataset Name: ✓

Land Cover Type: ✓

Categorical:
Categorical data, also called thematic, discrete, or classified data, are used both for vector and raster data to represent discrete information. Examples of categorical data are land cover or land use maps like pan-European CORINE land cover, Urban Atlas or regional LISA Land Cover as well as global CCI Land Cover, GlobCover etc.

Continuous:
Continuous data, representing phenomena such as percentage, elevation data or density such as the Copernicus high resolution layers of imperviousness degree and forest density or population (density) maps.

Background:
Some nice text about background layers.

Dataset Description: ✓

Figure 4: Enter your data set information

The final step is to add shape files or GeoTiffs to your new data set. Currently the following file types are supported:

- **Support file types:** Shape (.shp, .shx, .dbf, .prj) and GeoTiff (.tif, .tiff)
- **Supported spatial reference systems/projections:** WGS84 or ETRS89 LAEA

Add your files to the data set by clicking the **Select Files** button and manually select them using the file browser or simply drag-and-drop them into the area bounded by a dotted line (Figure 5).

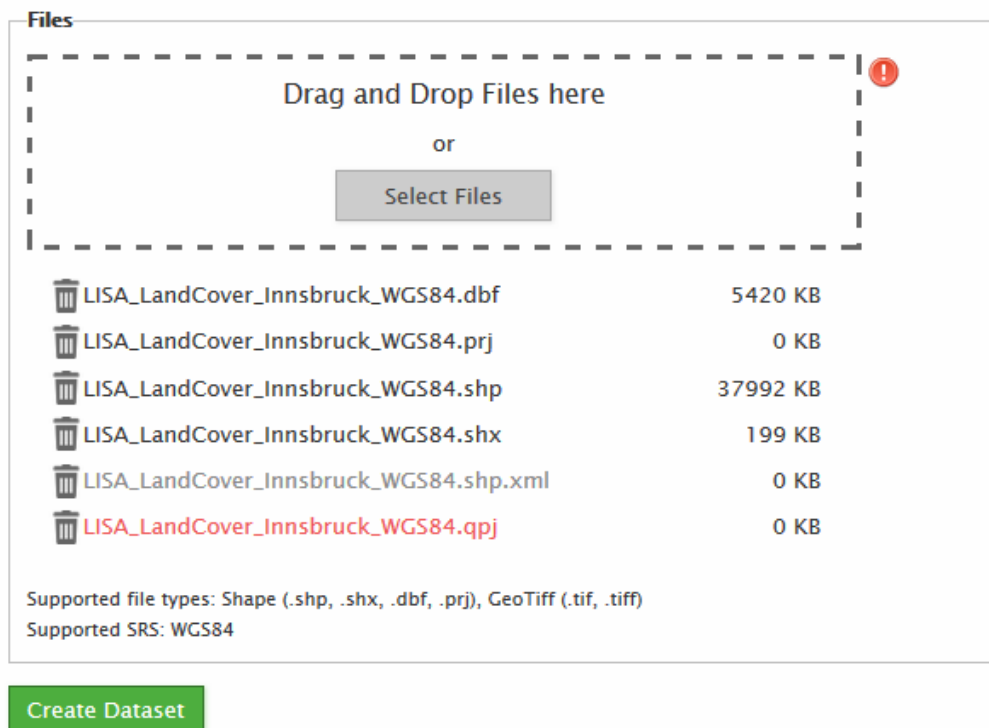


Figure 5: Adding files to the new data set

Unsupported file types are shown in red. Unknown file types are shown in grey. You can remove these files from the list by clicking the trash bin icon on the left.

Once you are happy with your selection, press the **Create Dataset** button to start the upload process and create your first data set in LACO-Wiki.

2.3 Legend

After the upload is finished, LACO-Wiki will automatically direct you to the **Dataset Details** page (Figure 6) while processing the data set in the system.

In the **Dataset Details** screen, you can see basic information about the new data set, share it with other users and define a legend.

Dataset Details

Go to Dataset Overview

Basic Information

Owner: Thomas Mondel (you)
 Dataset Name: LISA_LandCover_Innsbruck_WGS84
 Dataset Type: Vector
 Land Cover Type: Categorical
 Uploaded: Friday, October 21, 2016 2:18 PM

Dataset Description

Detailed description of the LISA_LandCover_Innsbruck_WGS84 dataset

Vector Details

Shape Type Polygon
 Extent [11.4228 47.2479, 11.5063 47.2937]
 Projection Name WGS84
 Extent WGS84 [11.4228 47.2479, 11.5063 47.2937]
 Feature Count 25460

Sharing

Shared data sets can be used by other users to create a validation sample.

Share with users or groups...

Preview Image



Legend

You haven't defined any legend yet. You can define a new legend [here](#).

Figure 6: Data set details page. Click on [here](#) to define a legend.

In the **Legend** box, click on **here** to define the legend for your data set as shown in Figure 6.

You can define legend entries for all data values in the data set, add new values, remove existing ones or select the legend from a pre-defined set of legend templates (Figure 7). The preview screen shows you what your data set will look like when using the defined legend.

Legend Designer

Back to Details

Modify Current Legend Values

Edit your current values. Add or remove values. Change value ranges and pick colors for each set. The preview image on the right shows you how the final result may look like.

Value	Name	Color
1	Buildings	#DB0000
2	Other constructed area	#FEF8A4
3	Bare soil	#D7C29E
4	Scree	#D2D2D2
5	Bare rock	#A5A5A5
6	Surface water	#0000FF
7	Snow	#FFFFFF
8	Ice	#00FFFF
9	Trees	#018100
10	Bushes	#92AE2F
11	Dwarf shrubs	#A5FEA4
12	Herbaceous vegetation	#00FF00
13	Reed	#FFFF00
14	Shadow	#000000
15	Clouds	#73004C

Add New Value

Save

Select Column/Template

Select Column: lbtyp

Select Template: LISA

Load

Preview Image



Figure 7: Define your data set classes (categorical) or range of values (continuous) and the associated colors in the legend designer

Once you are satisfied with your selection, click on the **Save** button and return to the **Dataset Details** page.

2.4 Generating a Sample Collection

The next step in the process is to create a **Sample Collection** based on your data set. A **Sample Collection** is a set of samples that will either be generated by LACO-Wiki using one of several possible sampling schemes or you can upload your own sample that you have generated outside of LACO-Wiki, e.g., using GIS software.

To start the process in which you generate the sample using LACO-Wiki:

1. Click the button in the **Validation Samples** section on the **Dataset Details** screen. This will direct you to the **Create a new Sample Collection** page (Figure 8).
2. Add the name and a description to your sample collection.
3. Add different sampling methods to your collection. Depending on type of data that you uploaded (vector or raster), different sampling methods will be available.

Currently the following sampling methods are supported:

- **Random Point:** This approach creates a sample with a number of points defined by the user that will be randomly distributed over a reference data set, e.g., the data set that you uploaded or a data set that has been shared.
- **Random Pixel:** This approach creates a sample with a number of pixels defined by the user that will be randomly selected from a reference data set. Duplicates are not possible.
- **Random Polygon:** This approach creates a sample with a number of polygons defined by the user that will be randomly selected from a reference data set. Duplicates are not possible.
- **Polygon at Random Point:** This approach creates a sample with a number of polygons defined by the user, which will be randomly selected from a reference data set, where the probability for selection is influenced by the size of the polygons (i.e., large polygons have a higher probability of being selected). Duplicates are not possible.
- **Stratified Random Point:** This approach creates a sample with a number of points per class defined by the user, which will be randomly distributed over the specified classes of a reference data set.
- **Stratified Random Pixel:** This approach creates a sample with a number of pixels per class defined by the user, which will be randomly selected from the specified classes of a reference data set.
- **Stratified Random Polygon:** This approach creates a sample with a number of polygons per class defined by the user, which will be randomly selected from the specified classes of a reference data set.

Create new Sample Collection

Sample Name: ✓

Description: ✓

The given dataset contains a vector file and supports the following sample types:

Random Point
"This approach creates a sample dataset with a definable number of points, which will be randomly distributed over the reference dataset."

Random Polygon
"This approach creates a sample dataset with a definable number of polygons which will be randomly selected from the reference dataset. Duplicates are not possible."

Polygon at Random Point
"This approach creates a sample dataset with a definable number of polygons, which will be randomly selected from the reference dataset, whereby the probability for

Your Samples

Add new samples by clicking the buttons on the left.

11x Random Point (vector)	<input type="button" value="Edit"/>	<input type="button" value="Trash"/>
23x Random Polygon	<input type="button" value="Edit"/>	<input type="button" value="Trash"/>
3x Polygon at Random Location	<input type="button" value="Edit"/>	<input type="button" value="Trash"/>

Figure 8: Create a new sample collection by adding different sampling methods to the collection. Different sampling methods are available depending on whether the data set is point, polygon or raster

2.5 Validating a Sample Collection


Your sample collection will now appear on the **Dataset Details** page. You can then add a new validation session based on the sample collection you created.


Click on **Add a validation session** to get started.

This will take you to the **Create your validation exercise** screen (Figure 9).

Here you can define a validation exercise for your previously created samples.

Basic Settings

Name: 

Description: 

Validation Method: ▼

Blind:
The user has no information about the classification of the sample and therefore needs to provide a new interpretation based on a pre-defined list of classes.

Plausibility:
The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no.

Enhanced Plausibility:
The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no. In case the classification is incorrect, the user provides a new interpretation based on a pre-defined list of classes.

Validation Platform: ▼

Web:
Web platform validation sessions can be validated by the LACO-Wiki web application. This is the default use case.

Mobile:
Mobile platform validation sessions can be validated by the LACO-Wiki Mobile app. The LACO-Wiki Mobile app will be made public in the near future.

Figure 9: Create your Validation exercise

Enter a name for the validation session along with a description, and then choose a validation method. The following validation methods are currently supported:

- **Blind:** The user has no information about the classification of the sample and therefore needs to provide a new interpretation based on a pre-defined list of classes.
- **Plausibility:** The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no.

- **Enhanced Plausibility:** The user has information about the classification of the sample, can answer yes and no, and if no (i.e., incorrect), they can correct the classification based on a pre-defined list of classes.

You can also choose your validation platform. There are two supported validation platforms available:

- **Web:** The validation process will be carried out inside a web browser using a number of base imagery data sets.
- **Mobile:** The validation process will be carried out using the LACO-Wiki mobile smartphone app on the ground. The mobile app can be downloaded from the Google Playstore and the Apple AppStore.

After choosing web or mobile, you can select some additional validation settings shown in Figure 10 such as the option to add a comment field, geo-tagged photographs from Flickr and NDVI (normalized difference vegetation indices) profiles to the validation session.

Figure 10: Additional validation settings

Finally, you can set the minimum and maximum zoom level, the sample navigation (feature extent or fixed zoom level) and define the base layers and overlays (Figure 11).

Figure 11: Configure your validation settings and layer configuration

When you have selected all the features, click on the **Create Validation Session** button to start validating your sample collection (Figure 12).

The process of validating your samples can be paused at any time and then continued when required. See the example in Figure 12 where the session was paused.

LACO-Wiki also allows you to split the validation workload by sharing the current validation session with other users. These users can then contribute to validating your data set.

Figure 12: Details page of the validation session that has been created

The actual validation is done by classifying the object (point, polygon or raster grid cell) using one of the legend items. Figure 13 shows an example of blind validation of a point object. In this case you would classify the object by choosing one of the legend items on the right.

Figure 13: Details page of the validation session that has been created

2.6 Generating an Accuracy Report

After validating all the samples in the sample collection, you can go back to the **Validation Session Details** page to generate a report.

To do this, click on **Create a new report** in the section called **Reports based on this validation session**.

This will take you to the **Create your Report** screen (Figure 14).

Create your Report

Here you can create a new report for your validation.

Report Settings

Report name: ✓

Description: ✓

Raw Data: ✓

Style: ✓

Statistical values:

User Accuracy
The user accuracy presents the reliability of classes in the classified image: it is the fraction of correctly classified pixels with regard to all pixels selected as a given class.

Producer Accuracy
The producer accuracy presents the accuracy of your classification: it is the fraction of correctly classified pixels with regard to all pixels of a given ground truth class.

Overall Accuracy
The overall accuracy is calculated as the total number of correctly classified pixels (diagonal elements) divided by the total number of test pixels.

Average Mutual Information
The average mutual information is measuring the dependence between two variables. AMI provides a means of assessing the similarity of maps with different themes, i.e. the amount of information that one map predicts of the other (Finn, 1993, Foody, 2006)

Figure 14: Create your Report screen

Start by giving the report a name and a description. You can then select from different pre-defined styles for the color scheme of the report.

Next, select the statistical values or accuracy measures that you want to add to the report. Currently the following values are supported:

- **User Accuracy:** The user accuracy is the reliability of classes in the classified image: it is the fraction of correctly classified samples compared to all samples selected for a given class.
- **Producer Accuracy:** The producer accuracy is the accuracy of your classification: it is the fraction of correctly classified samples compared to all samples of a given ground truth class.
- **Overall Accuracy:** The overall accuracy is as the total number of correctly classified samples (diagonal elements of a confusion matrix) divided by the total number of samples.
- **Average Mutual Information (AMI):** The average mutual information measures the dependence between two variables. AMI provides a means of assessing the similarity of maps with different themes, i.e., the amount of information that one map can predict from the other (Finn, 1993, Foody, 2006).
- **Quantity Disagreement:** The amount of difference between a reference map and a comparison map that is due to the less than perfect match in the proportions of the categories (Pontius and Millones, 2011).
- **Allocation Disagreement:** The amount of difference between a reference map and a comparison map that is due to the less than optimal match in the spatial allocation of the categories, given the proportions of the categories in the reference and comparison maps (Pontius and Millones, 2011).
- **Kappa:** Cohen's kappa coefficient is a statistic that measures inter-rater agreement for qualitative (categorical) items. It is generally thought to be a more robust measure than a simple percent agreement calculation, since kappa takes the agreement occurring by chance into account.
- **Portmanteau Accuracy:** The portmanteau accuracy describes the overall accuracy when the data are collapsed into two classes: the land cover type of interest, and all other land cover types combined into a single class.
- **Portmanteau Accuracy Partial:** Partial portmanteau accuracy eliminates true negatives from the calculation, so this measure is the number of correctly mapped samples in a class, divided by the total number of samples mapped or validated in a class.

Finally, generate your report by clicking the **Create Report** button. The report can then be downloaded in Excel format. An example is shown in Figure 15.

LACO-Wiki – An open access online portal for land cover validation
QUICK START GUIDE

LACO-Wiki Validation Report, generated on 10/21/2016 3:02:56 PM																	
	Reference Data																
	Buildings (1)	Other constructed area (2)	Bare soil (3)	Scree (4)	Bare rock (5)	Surface water (6)	Snow (7)	Ice (8)	Trees (9)	Bushes (10)	Dwarf shrubs (11)	Herbaceous vegetation (12)	Reed (13)	Shadow (14)	Clouds (15)	Row Total	User Accuracy
Buildings (1)	3	0	0	0	0	0	0	0	1	1	0	1	0	0	0	6	50.00%
Other constructed area (2)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.00%
Bare soil (3)	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0.00%
Scree (4)	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	3	0.00%
Bare rock (5)	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	3	0.00%
Surface water (6)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.00%
Snow (7)	0	1	0	0	0	0	0	0	1	0	0	3	0	0	0	5	0.00%
Ice (8)	1	0	0	0	0	0	0	0	1	1	0	1	0	0	0	4	0.00%
Trees (9)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.00%
Bushes (10)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.00%
Dwarf shrubs (11)	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0.00%
Herbaceous vegetation (12)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0.00%
Reed (13)	0	0	0	0	0	0	0	0	1	2	0	1	0	0	0	4	0.00%
Shadow (14)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Clouds (15)	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	0.00%
Column Total	6	1	1	0	0	0	0	0	10	8	0	11	0	0	0	37	
Producer Accuracy	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Portmanteau Accuracy	83.78%	94.59%	89.19%	91.89%	91.89%	97.30%	86.49%	89.19%	70.27%	75.68%	94.59%	67.57%	89.19%	100.00%	94.59%		
Allocation Disagreement	0.216216																
Average Mutual Information	0.975478																
Kappa	0.032308																
Overall Accuracy	0.081081																
Quantity Disagreement	0.702703																

Figure 15: An example validation report in Excel

You have now successfully uploaded, created, sampled and validated your first data set using the LACO-Wiki online tool and downloaded your first accuracy report.

3 NEW FEATURES ADDED TO LACO-WIKI

Below is a description of the new features that have been added to LACO-Wiki during 2019 and the first two months of 2020 (as part of the CrowdVal project funded by the European Space Agency (ESA) and in support of the implementation of the Copernicus Land monitoring service, funded by the European Environment Agency (EEA).

3.1 Addition of NDVI profiles

The option to display NDVI profiles has been added to LACO-Wiki, which can help in visual interpretation, particularly for those land cover classes that are difficult to differentiate from the satellite imagery alone or that have a seasonal component.

To add NDVI profiles to a validation session, this feature must first be enabled when creating the session. An example is shown in Figure 16 in which the **Vegetation indices** check box is turned on if NDVI profiles are to be displayed.

Here you can define a validation exercise for your previously created samples.

Basic Settings

Name: ✓

Description: ✓

Validation Method:

Blind:
The user has no information about the classification of the sample and therefore needs to provide a new interpretation based on a pre-defined list of classes.

Plausibility:
The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no.

Enhanced Plausibility:
The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no. In case the classification is incorrect, the user provides a new interpretation based on a pre-defined list of classes.

Validation Platform:

Web:
Web platform validation sessions can be validated by the LACO-Wiki web application. This is the default use case.

Mobile:
Mobile platform validation sessions can be validated by the LACO-Wiki Mobile app. The LACO-Wiki Mobile app will be made public in the near future.

Validation Settings

Comment field:

Geo-tagged photos:

Vegetation indices: ✓

Figure 16: Enabling the NDVI profiles in a validation session

Once you enter the validation session, two sets of NDVI profiles will appear below the main validation area, as shown in Figure 17. The chart on the left shows a time series of 32-day composites from Landsat 7 and 8, a 16-day composite from MODIS and daily time series from the PROBA-V satellite. On the right is the average NDVI from each of these sources.

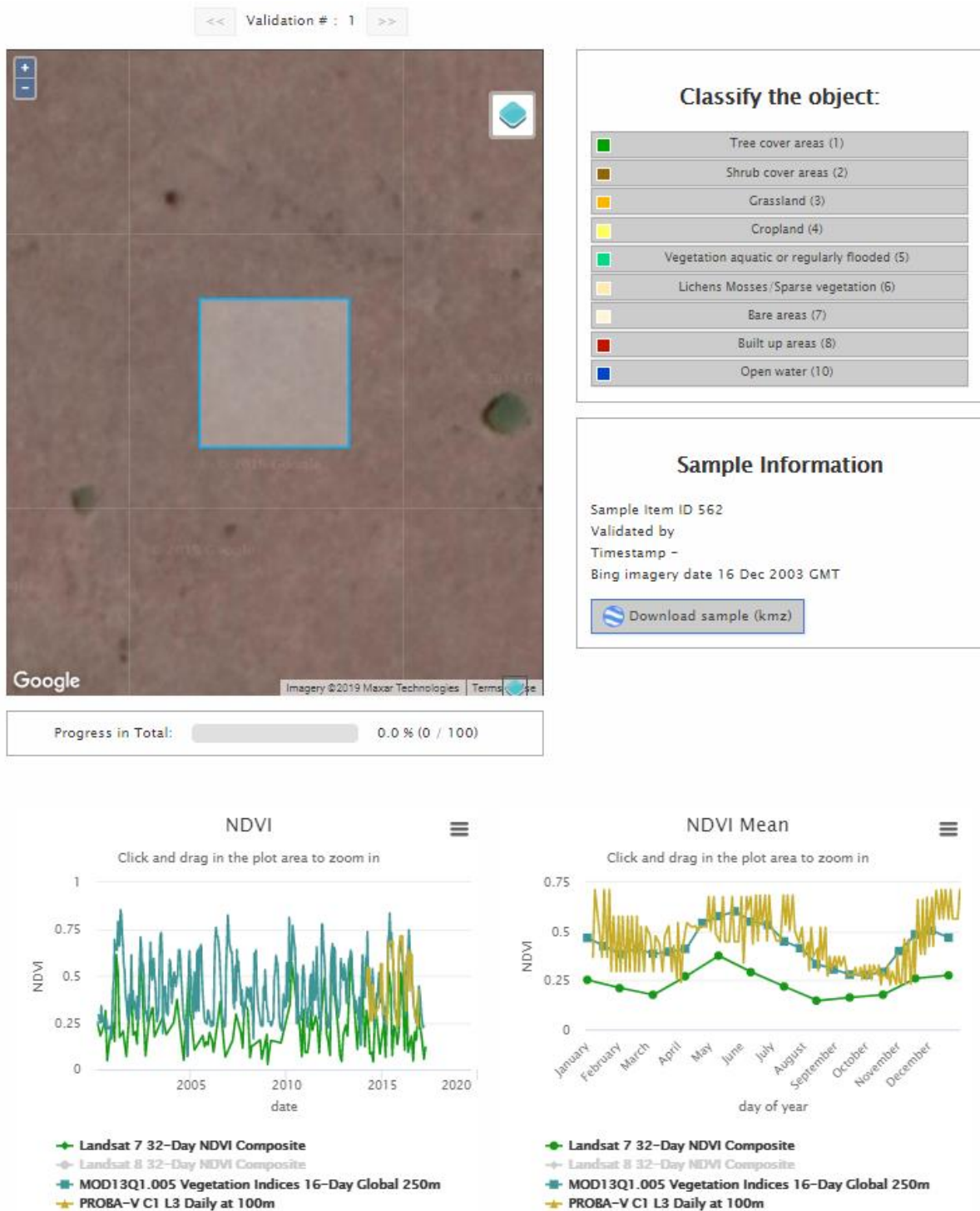


Figure 17: NDVI profiles that are displayed during a validation session

3.2 Addition of Flickr photographs

To aid in visual interpretation, geo-tagged photographs from Flickr have been added to LACO-Wiki. Similar to the NDVI profiles, this feature must be turned on during the creation of a validation session as shown in Figure 18.

Here you can define a validation exercise for your previously created samples.

Basic Settings

Name: ✓

Description: ✓

Validation Method:

Blind:
The user has no information about the classification of the sample and therefore needs to provide a new interpretation based on a pre-defined list of classes.

Plausibility:
The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no.

Enhanced Plausibility:
The user has information about the classification of the sample and evaluates the plausibility of the thematic classification with yes or no. In case the classification is incorrect, the user provides a new interpretation based on a pre-defined list of classes.

Validation Platform:

Web:
Web platform validation sessions can be validated by the LACO-Wiki web application. This is the default use case.

Mobile:
Mobile platform validation sessions can be validated by the LACO-Wiki Mobile app. The LACO-Wiki Mobile app will be made public in the near future.

Validation Settings

Comment field:

Geo-tagged photos: ✓

Figure 18: Enabling geo-tagged photos in a validation session

If a geo-tagged photograph is present, it will appear as a yellow dot on the satellite imagery. In most cases, users will need to zoom out to see whether photographs are present. Figure 19 shows an example of zooming out, where the pixel to be validated appears on the left near the top of the screen (small blue box) and a yellow dot indicates the presence of a geo-tagged photograph. Clicking on one of the dots displays the photograph, which in Figure 19 shows a Grassland type of land cover.

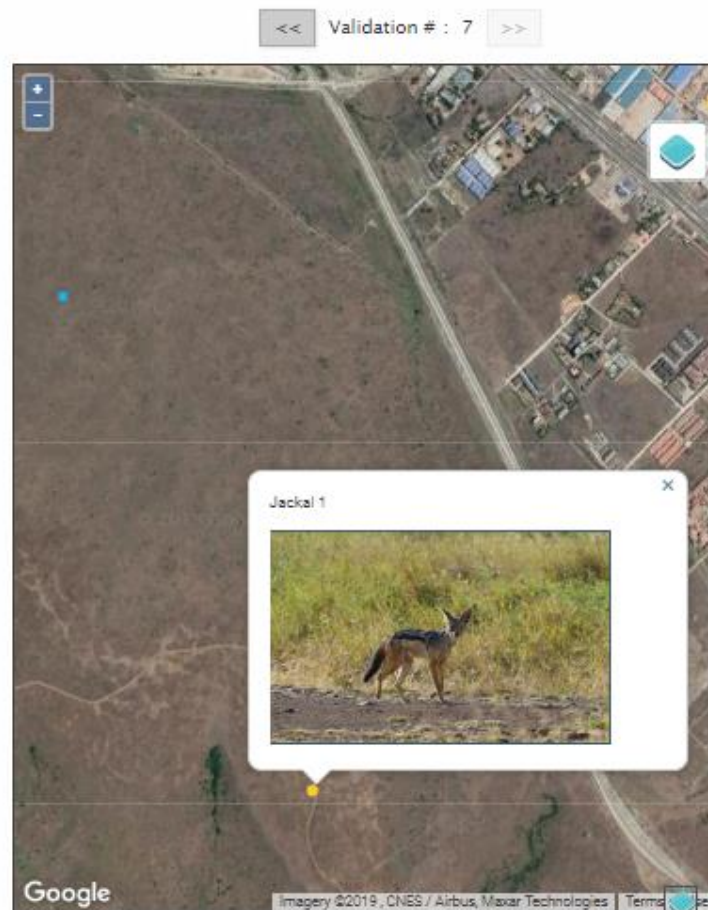


Figure 19: A geo-tagged photograph in the vicinity of the pixel being validated (shown as a small box in blue on the upper left-hand side)

3.3 Multiple validations at the same location

For reasons of quality assurance and the application of approaches such as majority voting to the validation data set, having multiple validations at the same location is possible in LACO-Wiki. This can be implemented as follows:

1. Create an initial sample of any type, i.e., random, stratified, etc.
2. Download the created sample as a shapefile from LACO-Wiki.
3. Create a second sample using the augmentation option that has been added to LACO-Wiki (see Figure 20a). Load the shapefile (see Figure 20b) downloaded in step 2.
4. Repeat step 3 to create the number of sample sets that correspond to the number of times you want a location to be validated.

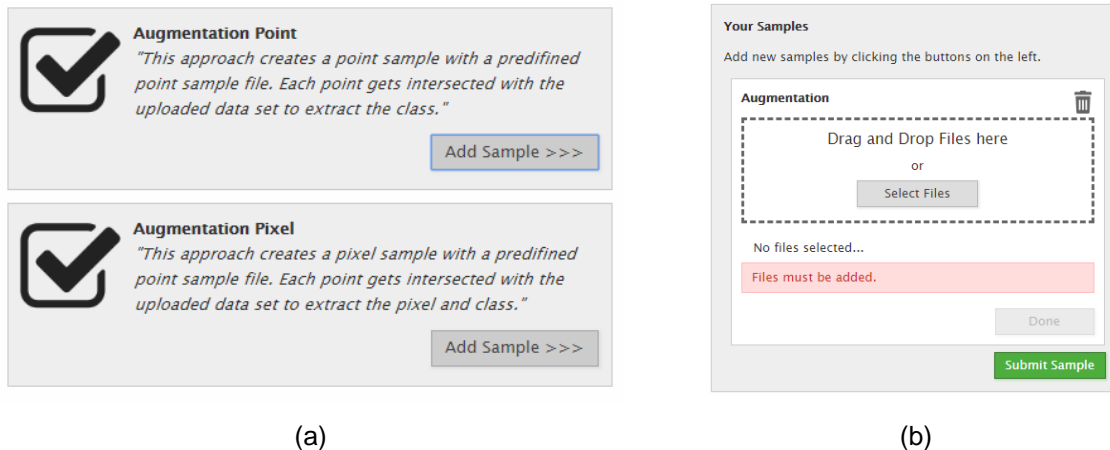


Figure 20: Implementing multiple validations in LACO-Wiki using (a) the augmentation feature to (b) upload a sample that was created initially and downloaded using LACO-Wiki

The process outlined above produces multiple samples of the same data set. These are then turned into multiple validation sessions that are assigned to (or shared with) different individuals, who then carry out the validation. Accuracy reports can be created for each validation session so that the results can be compared across individuals or the raw data can be downloaded to produce a combined validation data set (using external software such as a GIS package, Excel, R, etc.).

3.4 Deletion of data sets in LACO-Wiki

It is now possible to delete a data set uploaded to LACO-Wiki along with all the associated files, i.e., sample collections, validation exercises and accuracy reports. Figure 21 shows an example of a data set that was uploaded and the **Delete data set** button at the bottom of the page.

Deleting a data set before any sample collections, validation exercises or accuracy reports have been created is straight forward and the data set will be removed from the list of data sets.

Once any sample collections, validation exercises or accuracy reports have been created, you need to decide whether you want to delete all the files (in which case you should check the box entitled **Delete all associated files**), or whether you only want to delete the data set and keep the associated files accessible, e.g., you may not want the data set to remain in LACO-Wiki but you would like to keep the accuracy report.

You should also note that if you have shared the data set with other users (or everyone), then you need to be aware that checking the **Delete all associated files** check box will also deleted any associated files that other users have created.

LACO-Wiki – An open access online portal for land cover validation

QUICK START GUIDE

Basic Information

Owner: geolms (you)
Data Set Name: Amsterdam
Data Set Type: Vector
Land Cover Type: Categorical
Uploaded: Thursday, February 27, 2020 4:10 PM

Dataset Description

Urban Atlas for Amsterdam

Vector Details

Shape Type: Polygon
Extent: [4.5506 52.2144, 5.3792 52.6126]
Projection Name: WGS84
Extent WGS84: [4.5506 52.2144, 5.3792 52.6126]
Feature Count: 23779

Delete data set

If you press the Delete Data Set button, your uploaded data set will be deleted. However, any associated files generated from this data set (i.e., samples, validation sessions and reports) will remain visible in the system. If you want to delete all the associated files, then check the box: Delete all associated files. Note that if you have shared your data set, deleting all associated files will also delete any associated files created by other users.

Delete data set

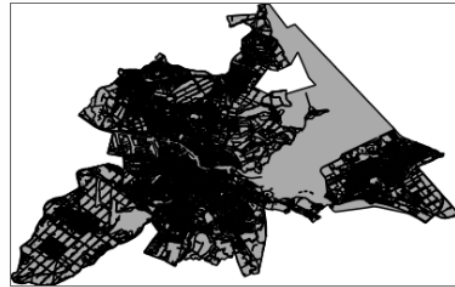
Delete all associated files

Sharing

Shared data sets can be used by other users to create a validation sample.

Share with users or groups...

Preview Image



Legend

You haven't defined any legend yet. You can define a new legend [here](#).

Figure 21: The Delete data set option is now available and visible once you have uploaded a new data set to LACO-Wiki

Deletion options are also available for individual associated files, e.g., if you create a sample collection from a data set, you can delete that sample collection while retaining the data set. Deletion options for different file types in LACO-Wiki are shown in Figure 22.

Sample Details

Go to Sample Overview

Basic Information

Owner: geolms (you)
Sample Name: Sample from Urban Atlas
Associated Data Set: DS-Urban Atlas 2012
Created: Thursday, February 27, 2020 5:01 PM

Sample Description

A random sample from Urban Atlas

Composition Details

100x Random Polygon

Validation Sessions based on this sample

You have not yet created any validation sessions based on this sample. You can define a new validation session here.

Deleting the Sample

If you press the Delete Sample button, then this sample will be deleted. However, any validation sessions and reports created from this sample will not be deleted. To delete an associated validation session or report, navigate to the validation session or reports page and delete these individually.

Delete Sample

Validation Session Details

Go to Validation Session Overview

Basic Information

Owner: geolms (you)
Validation Session Name: Urban Atlas Validation Exercise
Associated Data Set: DS-Urban Atlas 2012
Associated Sample: Sample from Urban Atlas
Created: Thursday, February 27, 2020 5:45 PM
Validation Method: Blind

Validation Session Description

Validation of Urban Atlas

View Bookmarked Validation Items

Bookmark created during validation can be viewed.

View Bookmarks

Reports based on this validation session

You have not created any reports based on this validation session yet. You can create a new report here.

Deleting the Validation Session

If you press the Delete Validation Session button, then this validation session and the validation samples will be deleted. However, any reports created from this validation session will not be deleted. To delete an associated report, navigate to the reports page and delete these individually.

Delete Validation Session

Report Details

Go to Report Overview

Basic Information

Owner: geolms (you)
Report Name: Urban Atlas Validation

Associated Dataset: DS-Urban Atlas 2012

Associated Sample: Sample from Urban Atlas
Associated Validation Session: Urban Atlas Validation Exercise
Created: Thursday, February 27, 2020 6:18 PM
Includes Raw Data: True
Style: Deep Blue
Statistical values: Allocation Disagreement, Average Mutual Information, Kappa, Overall Accuracy, Portmanteau Accuracy, Portmanteau Accuracy Partial, Producer Accuracy, Quantity Disagreement, User Accuracy

Report Description

Validation of Urban Atlas

Deleting the Report

If you press the Delete Report button, then this report will be deleted. Users will no longer be able to download the generated report files, in particular if you have shared this report with others.

Delete Report

(a) (b) (c)

Figure 22: Deletion options for (a) a sample (b) a validation session and (c) an accuracy report

3.5 Addition of WMS layers secured via basic authentication

In addition to adding WMS layers that are openly available with no authentication, you can now load a WMS layer with basic authentication, e.g., a set of your own orthophotos sitting on a secure server.

In the **Create your Validation Exercise** in the **Layer Configuration** box, you can now add an **External Web Map Service** that is secured via basic authentication (i.e., accessible with a username and password) as either a base layer or an overlay as shown in Figure 23.

The screenshot shows the 'Layer Configuration' interface. It is divided into two sections: 'Base layers' and 'Overlays'.
Base layers: A dropdown menu shows 'External Web Map Service' with a checkmark. Below it are input fields for the URL 'http://your-web-map-service.net', layer names 'layer1,layer2,layer3', an optional 'username', and a 'password' field with the note '(If username is input)'. A '+ Add base layer' button is below.
Overlays: A dropdown menu shows 'External Web Map Service' with an eye icon. It has the same input fields for URL, layers, username, and password. A '+ Add overlay' button is below.

Figure 23: Adding a WMS to a validation session that has a username and password

3.6 Compile a single accuracy report from multiple sessions

There are situations in which you may wish to validate a single layer in multiple sessions. The reason for this is either because your map is greater than 2GB, which is the limit for shapefiles, or you want to assign certain classes to different validators, e.g., those with specific expertise in interpreting certain classes. These multiple sessions then need to be combined into a single accuracy report. This feature has now been added to LACO-Wiki. From the **Manage your Reports** screen (Figure 24), you can select multiple validation sessions in the drop-down box next to the **Create** button. This will combine the validations into a single confusion matrix and calculate one set of accuracy measures.

The screenshot shows the 'Manage your Reports' interface. It includes a header, a description, a filter box, a table of reports, and a 'Create' button with a dropdown menu.
Table of Reports:

Report Name	Associated Validation Session	Created	Owner
URBAN ATLAS VALIDATION	Urban Atlas Validation Exercise	02/27/2020	geolms

Below the table is a pagination control showing '1' of '1' items.
Create Button: A green 'Create' button is followed by a dropdown menu. The dropdown shows 'Urban Atlas Validation Exercise #3, Urban Atlas Validatio...' and three checked items: 'Urban Atlas Validation Exercise #3', 'Urban Atlas Validation Exercise #2', and 'Urban Atlas Validation Exercise validation1'.

Figure 24: Creating a single report from multiple validation sessions

Note that the user must choose the correct validation sessions. This means they must have been interpreted using the same validation method (i.e., blind, plausibility or enhanced plausibility) and the same type of data set (i.e., raster or vector).

3.7 Ability to bookmark validations

During a validation exercise, you might encounter an example that you want to bookmark for future use, e.g., as a screen shot to be added to the Local Components Validation Report (see 3.8). While in any validation session, you will see the option to add a bookmark at the bottom of the page. For example, Figure 25 shows a ploughed field; if you want to bookmark this, you give the bookmark a name (e.g., PloughedField) and press the **Add Bookmark** button.

The screenshot displays the 'Validate the Campaign Samples' interface. At the top, there is a navigation link 'Go to Campaign Overview' and a 'Validation # : 1' indicator. The main area features a satellite map of a ploughed field with a blue outline and a central target icon. To the right of the map is a 'Classify the object:' panel with a list of land cover categories, each with a color-coded square and a count in parentheses. Below the map, a progress bar shows 'Progress in Total: 0.0% (0 / 100)'. At the bottom left, the 'Bookmark Validation Item' section includes a text input field containing 'PloughedField', an 'Add Bookmark' button, and a 'View Bookmarks' button. At the bottom right, the 'Sample Information' section displays 'Sample Item Id 209', 'Validated by', 'Timestamp -', and 'Bing imagery date 31 Dec 2009 GMT', along with a 'Download sample (kmz)' button.

Figure 25: Adding a bookmark to an individual validation sample

Once the bookmark is created, it can also be deleted, as shown in Figure 26.



Figure 26: The Delete button can be used to delete the bookmark that was created.

From the **Validation Session Details** page, you can view your bookmarks by clicking on the **View Bookmarks** button (Figure 27), which then displays them in a list (Figure 28).

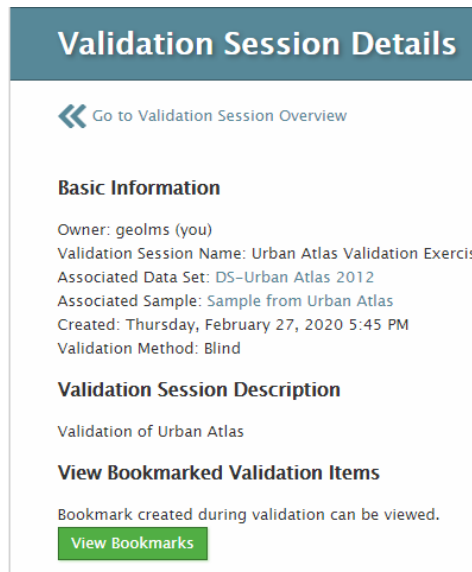


Figure 27: The **View Bookmarks** button can be used to view all bookmarks associated with that validation session in a list

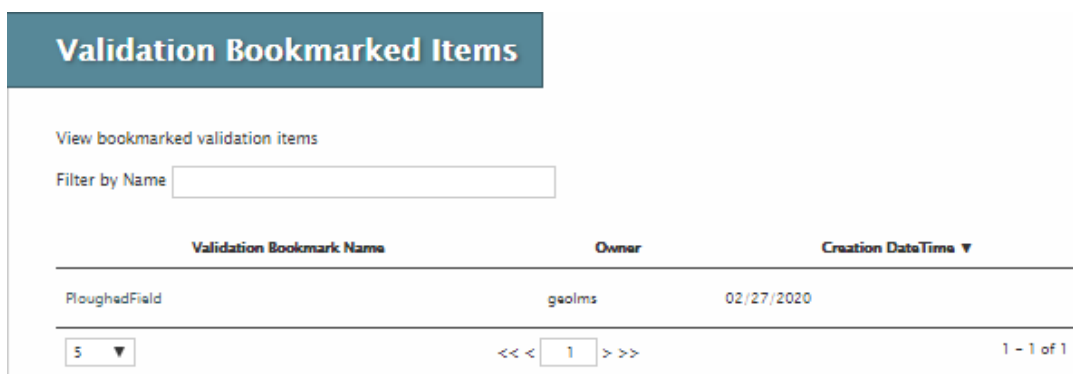
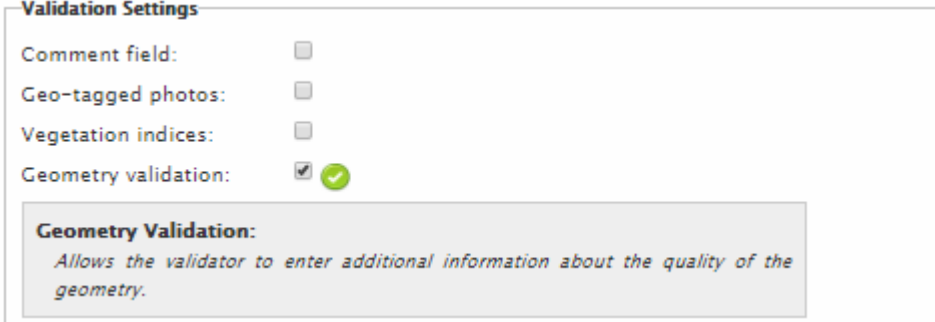


Figure 28: The list of bookmarked validation items

3.8 Production of a verification report for Copernicus Local Component Products

This feature was implemented to allow users involved in the verification of local component products from Copernicus (e.g., Urban Atlas, Natura 2000 sites, etc.) to produce a verification report that matches the one specified in the **Guidelines for Verification of Local Component Products**. This includes all the information required plus placeholders for missing pieces (e.g., screenshots that were bookmarked using the feature outline in 3.7).

The option to create these reports will only be enabled when you have uploaded a vector polygon data set (or used the augmentation feature outlined in section 3.3 to upload a polygon sample) and enabled the **Geometry validation** option in the creation of a validation session (Figure 29).




Validation Settings

Comment field:

Geo-tagged photos:

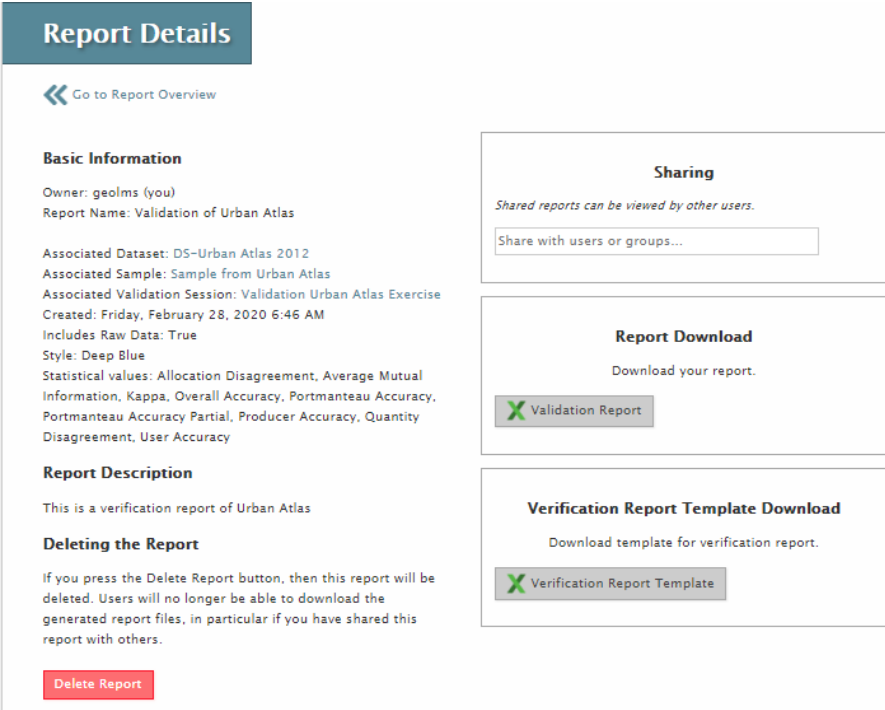
Vegetation indices:

Geometry validation: 

Geometry Validation:
Allows the validator to enter additional information about the quality of the geometry.

Figure 29: The **Geometric validation** option must be enabled in the validation session to generate the verification report

When a report is then generated, the option to download the **Verification Report Template** will appear as shown in Figure 30.



Report Details

[Go to Report Overview](#)

Basic Information

Owner: geolms (you)
Report Name: Validation of Urban Atlas

Associated Dataset: DS-Urban Atlas 2012
Associated Sample: Sample from Urban Atlas
Associated Validation Session: Validation Urban Atlas Exercise
Created: Friday, February 28, 2020 6:46 AM
Includes Raw Data: True
Style: Deep Blue
Statistical values: Allocation Disagreement, Average Mutual Information, Kappa, Overall Accuracy, Portmanteau Accuracy, Portmanteau Accuracy Partial, Producer Accuracy, Quantity Disagreement, User Accuracy

Report Description

This is a verification report of Urban Atlas

Deleting the Report

If you press the Delete Report button, then this report will be deleted. Users will no longer be able to download the generated report files, in particular if you have shared this report with others.

[Delete Report](#)

Sharing

Shared reports can be viewed by other users.

Share with users or groups...

Report Download

Download your report.

[Validation Report](#)

Verification Report Template Download

Download template for verification report.

[Verification Report Template](#)

Figure 30: The **Verification Report Template** can be downloaded from the **Report Details** page

The report consists of three main components:

1. A sheet containing the **Metadata**. Most of the information on this sheet must be filled in by you.
2. A sheet containing the **Overall characterization of the dataset**. Most of the information is populated by LACO-Wiki including the summary statistics, but you will need to add a map of the data set.
3. Multiple sheets containing the **Characterization of the dataset by LU/LC class**, where there is one sheet per class. Most of the information is populated automatically by LACO-Wiki but you will need to add screenshots from the bookmarked validations.

The Excel report can also be converted to a Word document if you prefer this format.

3.9 Improvements to support large shapefiles

To accommodate large shapefiles (i.e., the .shp or .dbf component approaches 2 GB in size or there are many millions of features in the shapefile), the processing of shapefiles has been improved in LACO-Wiki. After uploading a shapefile, the processing of the data set takes place in the background so you can continue to use LACO-Wiki (see **Vector Details** in Figure 31). An email is sent to your registered email address telling you that the process has started. When the process is completed, you will be sent another email to your registered email account.

The screenshot shows the 'Dataset Details' page for a dataset named 'Budapest UA'. The page is divided into several sections: 'Basic Information', 'Dataset Description', and 'Vector Details'. Under 'Basic Information', it lists the owner as 'geolms (you)', the dataset name as 'Budapest UA', the type as 'Vector', and the upload date as 'Thursday, April 30, 2020 5:09 PM'. The 'Dataset Description' section contains the text 'Budapest UA'. The 'Vector Details' section features a 'Processing' status icon (a circle of dots) and a message: 'The uploaded data set is being processed and stored in the server. The time needed to complete this process will depend on the size of the data set. Check the notification area for progress.' Below this, it states: 'When completed, an e-mail will be sent to: geolms@leeds.ac.uk.' To the right of the text is a 'Preview Image' placeholder, which is a large empty box with a small loading spinner icon in the center.

Figure 31: Under **Vector Details**, you are provided with information about the progress in analyzing this data set, and that you will be sent an email when the processing is completed.

Similarly, when you select a legend template or define a legend, the processing will take place in the background and you will receive an email telling you that the process has started and another email

when the process is completed. Figure 32 shows the processing happening in the background, telling you that an email will be sent to your registered email address when complete.

Legend Designer

← Back to Details

Modify Current Legend Values

Edit your current values. Add or remove values. Change value ranges and pick colors for each set. The preview image on the right shows you how the final result may look like.

Once the legend is updated, the distribution of values by legend classes for the data set is calculated in the background. Once this calculation is completed, the data set will be available for sampling.

When completed, an e-mail will be sent to: geolms@leeds.ac.uk.

Value	Name	Color
	Continuous Urban Fabric (S.L)	#7C3235
	Discontinuous Dense Urban I	#C0252D
	Discontinuous Medium Dens	#F26548
	Discontinuous Low Density U	#F79779
	Water bodies	#B9E6FB
	Forests	#006F45
	Agricultural, se	#FFFA89
	Sports and leisure facilities	#D9E592

Figure 32: Under **Vector Details**, you are provided with information about the progress in analyzing this data set, and that you will be sent an email when the processing is completed.

In the future, we plan to support File Geodatabases, which will mean that larger files can be uploaded to LACO-Wiki. For the moment, if you have problems with your shapefile, contact us at info@laco-wiki.net or create your sample outside of LACO-Wiki. Then upload it using the Augmentation feature (see section 3.3).