

Sen4CAP Hands-on training – Louvain-la-Neuve, Belgium –
22-23 January 2020



Session 3: Products download and exploration (visualization tool)



sen4cap
common agricultural policy

UCL
Université
catholique
de Louvain



e-geos
AN ASI / TELESPIAZIO COMPANY



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European Space Agency

Sessions overview



• Thursday – 23 January (full day):	
9h00-10h30	<ul style="list-style-type: none">○ Hands-on training using Unix Virtual Machines on CREODIAS<ul style="list-style-type: none">▪ First steps with the Sen4CAP system for an automated usage▪ LPIS / GSAA data preparation and upload
10h30-11h00	<ul style="list-style-type: none">○ Break
11h00-12h30	<ul style="list-style-type: none">○ Hands-on training using Unix Virtual Machines on CREODIAS (continued)<ul style="list-style-type: none">▪ Manual usage of the Sen4CAP processors▪ System installation and ICT requirements
12h30-14h00	<ul style="list-style-type: none">○ Lunch
14h00-15h30	<ul style="list-style-type: none">○ Hands-on training using the Sen4CAP products<ul style="list-style-type: none">▪ Products download from the system▪ Sen4CAP visualization tool▪ Products exploration in Snap or QGIS
15h30-16h00	<ul style="list-style-type: none">○ Break
16h00-17h00	<ul style="list-style-type: none">○ Hands-on training using the Sen4CAP products<ul style="list-style-type: none">▪ Products exploration in Snap or QGIS
17h00-17h30	<ul style="list-style-type: none">○ Questions and discussions

Session 1: First steps with the Sen4CAP system for an automated usage

Session 2: Manual usage of the Sen4CAP processors + system installation

Session 3: Products download and exploration + visualization tool

Questions and answers



Session 3: Products download and exploration + visualization tool



- 1) Products download from the system
- 2) Visualization tool
- 3) Products exploration
 - L3B vegetation status products (NDVI, LAI, fAPAR, fCover)
 - L4A crop type mapping
 - L4B grassland mowing detection
 - L4C agricultural practices (EFA) monitoring

Session 3: Products download and exploration + visualization tool



- 1) Products download from the system
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Products download from the system



2 ways to do it

Using the web interface

Directly from the machine

For the small downloads

The screenshot shows the 'sen4cap' web interface for 'sentinel for common agricultural policy'. The navigation bar includes 'sites', 'products' (highlighted with a red box), 'system overview', 'dashboard', 'custom jobs', 'monitoring', 'users', 'data sources', and 'logout'. A 'Filter' dropdown is set to 'NLD_2019'. The product list on the left includes categories like 'L2A Atmospheric correction', 'L3A LAI mono-date product', 'L4A Crop type product', and 'L4B Grassland Mowing product'. A specific product 'S2AGRI_S4C_L4B_PRD_S18_20190815T123515_V20190401T000000_20190731T000000' is selected and highlighted with a red arrow. A map of the Netherlands is displayed on the right, with a red dashed box indicating the geographic area of the selected product. The bottom status bar shows 'Logged in as sen4cap | DB version 1.0.1'.



Products download from the system



2 ways
to do it

Using the
web interface

Directly from
the machine

```
[s4cuser@mars2019 s4c_l4b]$ pwd
/mnt/archive/nld_2019/s4c_l4b
[s4cuser@mars2019 s4c_l4b]$ ll
total 0
drwxr-xr-x 5 s4cuser s4cuser 143 Jan 17 12:36 S2AGRI_S4C_L4B_PRD_S18_20190615T181320_V20190401T000000_20190531T000000
drwxr-xr-x 5 s4cuser s4cuser 143 Jan 17 12:36 S2AGRI_S4C_L4B_PRD_S18_20190715T125313_V20190401T000000_20190630T000000
drwxr-xr-x 5 s4cuser s4cuser 143 Jan 17 12:36 S2AGRI_S4C_L4B_PRD_S18_20190815T123515_V20190401T000000_20190731T000000
drwxr-xr-x 5 s4cuser s4cuser 143 Jan 17 12:36 S2AGRI_S4C_L4B_PRD_S18_20190915T010517_V20190401T000000_20190831T000000
drwxr-xr-x 5 s4cuser s4cuser 143 Jan 17 12:36 S2AGRI_S4C_L4B_PRD_S18_20191015T172541_V20190401T000000_20190930T000000
drwxr-xr-x 5 s4cuser s4cuser 143 Jan 17 12:36 S2AGRI_S4C_L4B_PRD_S18_20191115T060814_V20190401T000000_20191031T000000
[s4cuser@mars2019 s4c_l4b]$
```

For the big downloads

For example through an **ssh connection**, in the case of Sen4CAP running on a cloud

Session 3: Products download and exploration + visualization tool



- 1) Products download from the system
- 2) Visualization tool
- 3) Products exploration
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L3B vegetation status products (NDVI, LAI, fAPAR, fCover)



- From the visualization tool
- Outputs from the system

L3B vegetation status products (NDVI, LAI, fAPAR, fCover)



- ⇒ Select the NDVI layer.
- ⇒ Zoom on a few crops that are of different kinds and adjacent (ex: potatoes (left) vs winter wheat (right)).
- ⇒ Define a monitoring period (ex: from 2019-05-01 to 2019-10-01).
- ⇒ Create an animation and compare the vegetation development cycles of the 2 crops.
- ⇒ Compare with LAI and FAPAR.



L3B vegetation status products (NDVI, LAI, fAPAR, fCover)



- From the visualization tool
- Outputs from the system

Output from the system: naming and content

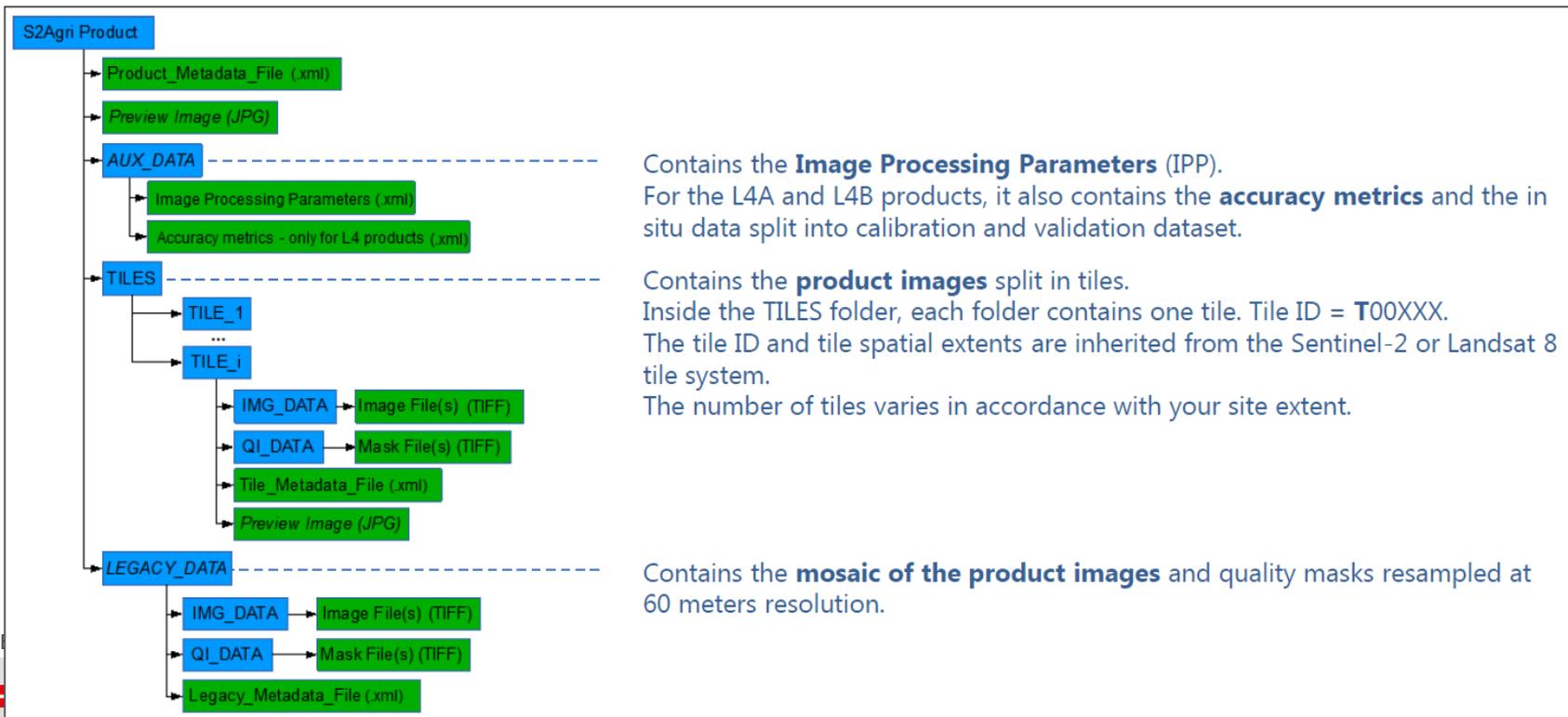


/mnt/archive/nld_2019/I3b_lai/S2AGRI_L3B_PRD_S1_20190914T001743_A20190907T103639

Product

Processing date

Acquisition date



Output from the system: naming and content

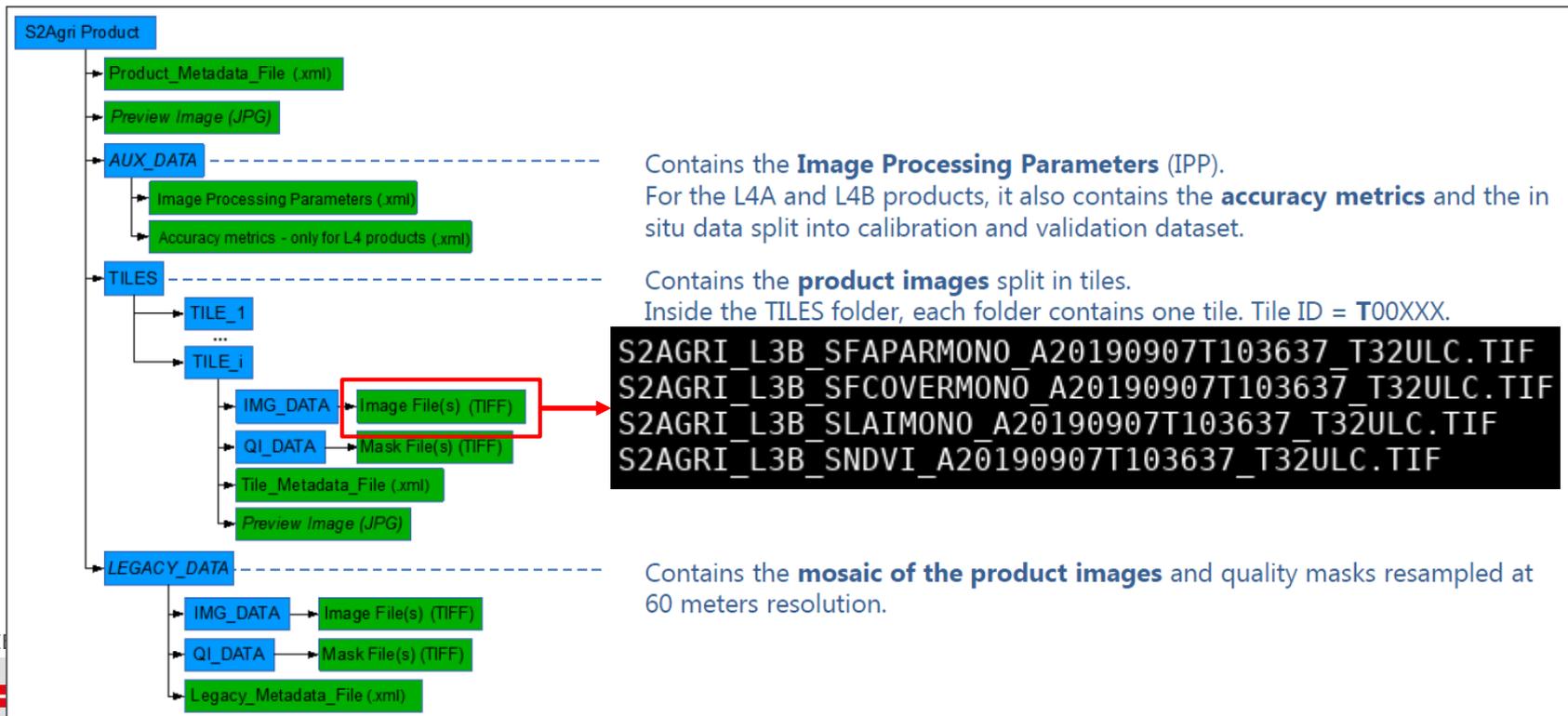


/mnt/archive/nld_2019/I3b_lai/S2AGRI_L3B_PRD_S1_20190914T001743_A20190907T103639

Product

Processing date

Acquisition date



Session 3: Products download and exploration + visualization tool



- 1) Products download from the system
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L4A crop type mapping



- From the visualization tool
- Outputs from the system



Conformity assessment at the parcel-level



The screenshot displays the Geopedia web application interface. On the left, a sidebar contains a list of layers under the heading "Sen4CAP_Netherlands". The layer "NL_CropType_2019_results_latest (Classif_r)" is selected and highlighted with a red box. The main map area shows a grid of agricultural parcels, with some parcels colored red to indicate non-conformity. A detailed information panel is open over the map, containing the following text:

INTERPRETATION OF REGULATION: The Sen4CAP "L4A Crop type product" aims at providing information about the crop type observed by remote sensing over each parcel of the Land Parcel Identification System (LPIS) or Geo-Spatial Aid Application (GSAA) dataset. The remote sensing information at the parcel-level is then combined at the holding-level to answer the question of whether the crop diversification regulation has been correctly applied by the farmer.

The results of the crop type mapping and the crop diversification use case are provided continuously during the season. All results within the season can be observed and compared in the `LT_CropType_2019_results_all` layer. Layers `LT_CropType_2019_results_latest` are filtered by the `Valid_to` date, so only the latest results are shown.

1. NewID: Sen4CAP internal parcel id
2. Original attribute fields: attribute fields from the original LPIS / GSAA dataset, including the original crop type code as provided by the PA (click on the NewID to view them)
3. CT_common: link to the CropType_Common table
4. Onl_id: original parcel id
5. Onl_holder: original holding id
6. CT_predr1: Sen4CAP L4A-code of the crop type predicted by the model with the highest degree of confidence
7. CT_conf_1: degree of confidence of CT_predr1 (ranging from 0 to 1)
8. CT_predr2: Sen4CAP L4A-code of the crop type predicted by the model with the second highest degree of confidence
9. CT_conf_2: degree of confidence of CT_predr2 (ranging from 0 to 1)
10. CTnumDIV_p: The crop diversification class code, corresponding to CT_predr1
11. Classif_r: results of the conformity assessment at the parcel level (conform, not conform, not classified)
12. CD_cat: results of the category assessment at the holding level
13. CD_diagn: results of the holding-level assessment about crop diversification rules (compliant or missing info for the specific crop diversification category)
14. Valid_from: starting date of the data used for acquisition of the results
15. Valid_to: end date of the data used for acquisition of the results
16. Date_imported: Date of the import of the record to the Visualisation tool

VISUALISATION (1) by Classif_r

- Classified_conform
- Classified_not_conform
- Classified_not_conform_prediction_used
- Not_classified_land_cover
- Not_classified_mms2pvc
- Not_classified_mstpp
- Not_classified_undefined
- Not_classified_geometry
- Not_classified_mixed_class

VISUALISATION (2) by CD_cat

- Exemption1
- Exemption2
- Exemption3

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Conformity assessment at the parcel-level



The screenshot displays the Geopedia web interface. On the left, a sidebar shows the layer selection menu for 'Sen4CAP_Netherlands', with 'NL_CropType_2019_results_latest (Classif_r)' selected. The main map area shows a grid of agricultural parcels, with several parcels highlighted in red. A table of records is overlaid on the bottom right of the map, showing data for the selected layer.

NewID	CropType	Ort_id	Ort_hold	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2	CNumDIV_p	Classif_r	CD_cat	CD_diag	Valid_from
508059	508059	31.000000347	203811691	3000(Grass)	0.988	140(Tribolium)	0.005	50(Grass_pem)	Classified_conform	Exemption1	Not_required	2019-03-01
99448	99448	31.000000413	202357844	13(Beets)	0.956	135(Sprouts)	0.016	12(Beta)	Classified_conform	Category2	Compliant	2019-03-01
387287	387287	31.000000395	202395149						Not_classified_noS1	Exemption2	Not_required	2019-03-01
717778	717778	31.000000354	203721860	3000(Grass)	1	2(Agrarian nature ms)	0	50(Grass_pem)	Classified_conform	Exemption3	Not_required	2019-03-01
337688	337688	31.000000366	203767630						Not_classified_noS1	Category1	Compliant	2019-03-01
643626	643626	31.000000372	110396456	3000(Grass)	0.974	140(Tribolium)	0.014	50(Grass_pem)	Classified_conform	Category1	Compliant	2019-03-01

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Conformity assessment at the parcel-level

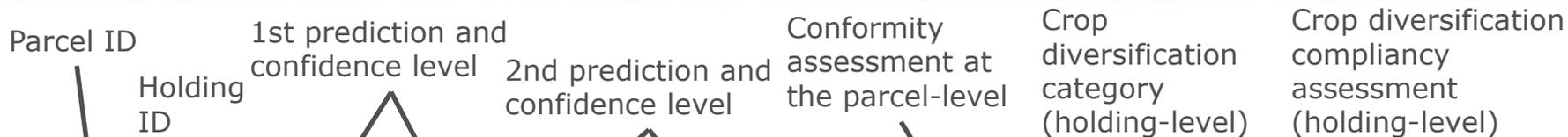


Table of records for layer: NL_CropType_2019_results_latest (Classif_r) (Filtered)

Ori_id	Ori_hold	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2	CNumDIV_p	Classif_r	CD_cat	CD_diagn	Valid_from	Valid_to	Date_imported
31.000000374:	201140496	3000(Grass)	0.925	2000(Permanent fruit)	0.018	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000374:	120073585	3000(Grass)	0.105	126(Secale)	0.09	50(Grass_perm)	Classified_not_confc	Category1	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000390:	204520636						Not_classified_noS1	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000380:	204663138	153(Zea)	0.911	38(Chicory)	0.008	117(Zea)	Classified_conform	Category1	Missing_info	2019-03-01	2019-09-30	2019-10-25
31.000000357:	120151505						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000376:	120030301	153(Zea)	0.161	3000(Grass)	0.058	117(Zea)	Classified_not_confc	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000408:	90094000						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000348:	200293406	3000(Grass)	0.977	140(Trifolium)	0.007	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000389:	202340720						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000360:	204515855	3000(Grass)	0.988	2000(Permanent fruit)	0.006	50(Grass_perm)	Classified_conform	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000405:	90171531						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000347:	203311691	3000(Grass)	0.988	140(Trifolium)	0.005	50(Grass_perm)	Classified_conform	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25

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Conformity assessment at the parcel-level

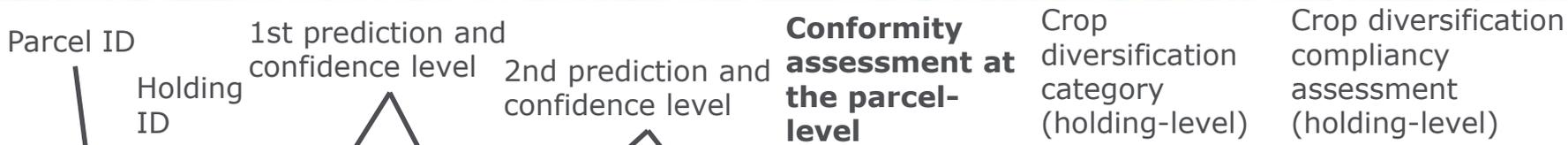


Table of records for layer: NL_CropType_2019_results_latest (Classif_r) (Filtered)

ori_id	ori_hold	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2	CTNumDIV_p	Classif_r	CD_cat	CD_diagn	Valid_from	Valid_to	Date_imported
31.000000374:	201140496	3000(Grass)	0.925	2000(Permanent fruit)	0.018	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000374:	120073585	3000(Grass)	0.105	126(Secale)	0.09	50(Grass_perm)	Classified_not_confc	Category1	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000390:	204520636						Not_classified_noS1	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000380:	204663138	153(Zea)	0.911	38(Chicory)	0.008	117(Zea)	Classified_conform	Category1	Missing_info	2019-03-01	2019-09-30	2019-10-25
31.000000357:	120151505						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000376:	120030301	153(Zea)	0.161	3000(Grass)	0.058	117(Zea)	Classified_not_confc	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000408:	90094000						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000348:	200293406	3000(Grass)	0.977	140(Trifolium)	0.007	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000389:	202340720						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000360:	204515855	3000(Grass)	0.988	2000(Permanent fruit)	0.006	50(Grass_perm)	Classified_conform	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000405:	90171531						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000347:	203811691	3000(Grass)	0.988	140(Trifolium)	0.005	50(Grass_perm)	Classified_conform	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25

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Conformity assessment at the parcel-level



- Assess if the **crop type declared** by the farmer is **confirmed by the satellite signal**

IF prediction 1 OR prediction 2 = declaration > **CONFORM**

IF prediction 1 AND prediction 2 \neq declaration > **NOT CONFORM**

- If the parcel is **not classified**, the reason **why** is given

-> Problem in the **geometry**: no geometry, duplicate or overlapping parcel

-> Not monitored **land cover**

-> Covered by less than 3 **S2 pixels**

-> Covered by less than 1 **S1 pixel**

Classif_r	Description
Classified_conform	Classified and conform
Classified_not_conform	Classified and not conform
Not_classified_geometry	Not classified, problem in the geometry (no valid geometry, duplicate or overlapping with other parcels)
Not_classified_land_cover	Not classified, not monitored land cover class
Not_classified_minS2pix	Not classified, not covered at least by 3 S2 pixels
Not_classified_noS1pix	Not classified, not covered at least by 1 S1 pixel
Not_classified_undefined	Not classified, undefined reason (to investigate)

Conformity assessment at the parcel-level



⇒ Look at a few parcels which are **not classified because of their size / shape** and try to find the # of S1 and S2 pixels that cover it.

Hint: click on the CropType common number.

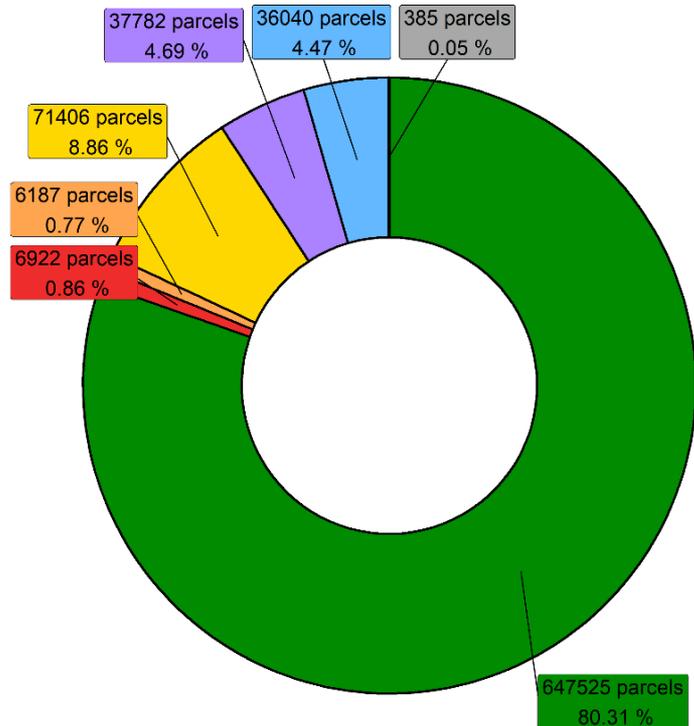
⇒ Look at a few parcels which are detected as **not conform** and compare the 2 predictions with the declared crop type. Which are the confidence levels in these 2 predictions?

⇒ Look at a few parcels that are not classified because they are **not monitored by remote sensing**. Which are these not monitored crop types?

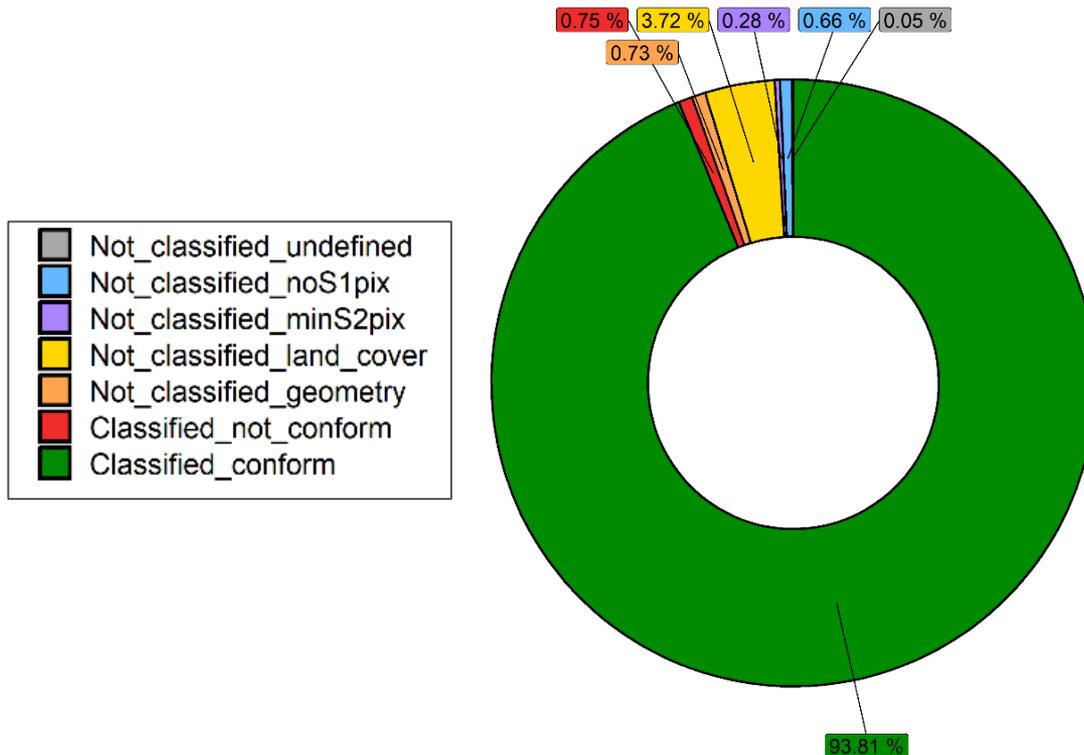
⇒ Look at a few parcels that are not classified because of a « **geometry** » **problem**. What's the problem?

Conformity assessment at the parcel-level

Conformity assessment - Number of parcels
NLD : 20190301 - 20190831



Conformity assessment - Parcel area
NLD : 20190301 - 20190831



- Not_classified_undefined
- Not_classified_noS1pix
- Not_classified_minS2pix
- Not_classified_land_cover
- Not_classified_geometry
- Classified_not_conform
- Classified_conform

Crop diversification category (holding-level)

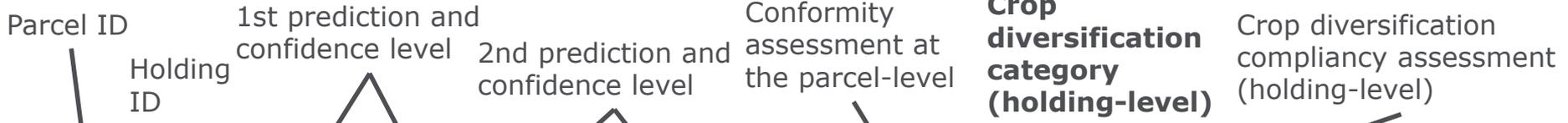


Table of records for layer: NL_CropType_2019_results_latest (Classif_r) (Filtered)

Refresh	Filter	X										
Ori_id	Ori_hold	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2	CTNumDIV_p	Classif_r	CD_cat	CD_diagn	Valid_from	Valid_to	Date_imported
31.000000374:	201140496	3000(Grass)	0.925	2000(Permanent fruit)	0.018	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000374:	120073585	3000(Grass)	0.105	126(Secale)	0.09	50(Grass_perm)	Classified_not_confc	Category1	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000390:	204520636						Not_classified_noS1	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000380:	204663138	153(Zea)	0.911	38(Chicory)	0.008	117(Zea)	Classified_conform	Category1	Missing_info	2019-03-01	2019-09-30	2019-10-25
31.000000357:	120151505						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000376:	120030301	153(Zea)	0.161	3000(Grass)	0.058	117(Zea)	Classified_not_confc	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000408:	90094000						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000348:	200293406	3000(Grass)	0.977	140(Trifolium)	0.007	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000389:	202340720						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000360:	204515855	3000(Grass)	0.988	2000(Permanent fruit)	0.006	50(Grass_perm)	Classified_conform	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000405:	90171531						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000347:	203811691	3000(Grass)	0.988	140(Trifolium)	0.005	50(Grass_perm)	Classified_conform	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25

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Crop diversification category (holding-level)



The screenshot displays the Geopedia web application interface. On the left, a layer list under 'Sen4CAP_Netherlands' includes 'NL_CropType_2019_results_latest (CD_cat)', which is highlighted with a red box. The main map area shows a detailed view of agricultural parcels, color-coded by crop diversification category (e.g., Category 1, Category 2, Exemption 1, Exemption 2). A data table at the bottom provides details for the selected layer.

NewID	CropType	Cropland	Ort_id	Ort_hold	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2	CNumDIV_p	Classif_r	CD_cat	CD_diagn	Valid_from
508059	508059	31.000000347	203811691	3000(Grass)	0.988	140(TriFolium)	0.005	50(Grass_perm)	Classified_conform	Exemption1	Not_required	2019-03-01	
99446	99446	31.000000413	202357844	13(Beets)	0.956	135(Sprouts)	0.016	12(Beta)	Classified_conform	Category2	Compliant	2019-03-01	
387207	387207	31.000000395	202395149						Not_classified_noS1	Exemption2	Not_required	2019-03-01	
717778	717778	31.000000354	203721800	3000(Grass)	1	2(Agrarian nature ms)	0	50(Grass_perm)	Classified_conform	Exemption3	Not_required	2019-03-01	
337698	337698	31.000000365	203767630						Not_classified_noS1	Category1	Compliant	2019-03-01	
643626	643626	31.000000372	110396456	3000(Grass)	0.974	140(TriFolium)	0.014	50(Grass_perm)	Classified_conform	Category1	Compliant	2019-03-01	

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Crop diversification (holding-level)



- Assess the **compliance of the holding** with regard to the **crop diversification rules**

⇒ By applying **worst case scenarios** if the parcel conformity is not assessed

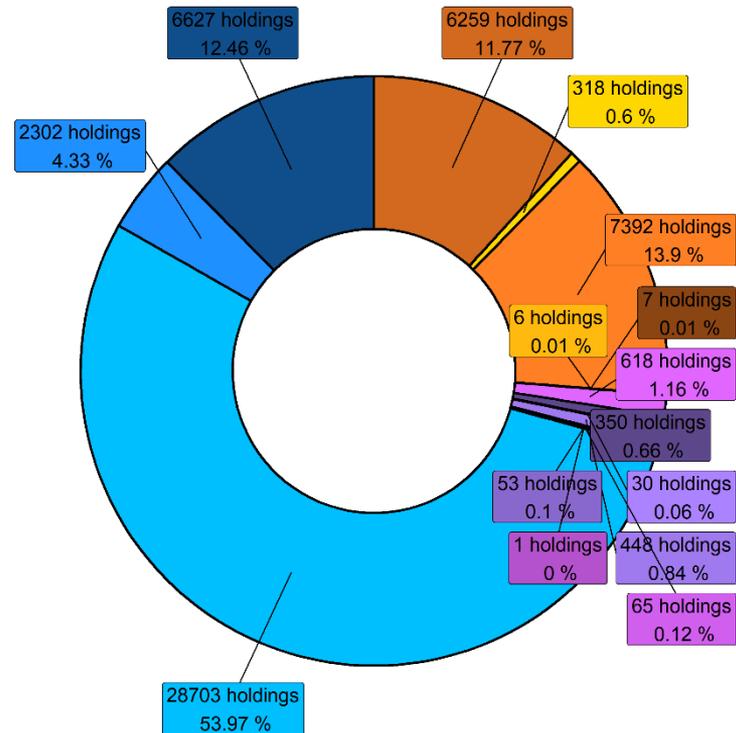
⇒ **7 crop diversification categories**

CD_cat	Description
Exemption1	TAL less than 10 ha
Exemption2	TGrass and Fallow greater than 75% of TAL and remaining AL less than 30 ha
Exemption3	PGrass, TGrass and Cwater greater than 75% of EAA and remaining AL less than 30 ha
Exemption4	Cwater = TAL
Category1	TAL between 10 and 30 ha
Category2	TAL greater than 30 ha
Category3	TGrass and Fallow greater than 75% of TAL
Category1_or_2	Holding belongs to Category1 or Category2
Category1_or_3	Holding belongs to Category1 or Category3
Category2_or_3	Holding belongs to Category2 or Category3
Category1_2_or_3	Holding belongs to Category1, Category2 or Category3
Exemption_or_Category1	Holding belongs to at least one of the Exemption or Category1
Exemption_or_Category2	Holding belongs to at least one of the Exemption or Category2
Exemption_or_Category3	Holding belongs to at least one of the Exemption or Category3
Exemption_or_Category1_or_2	Holding belongs to at least one of the Exemption or Category1 or Category2
Exemption_or_Category1_or_3	Holding belongs to at least one of the Exemption or Category1 or Category3
Exemption_or_Category2_or_3	Holding belongs to at least one of the Exemption or Category2 or Category3
Exemption_or_Category1_2_or_3	Holding belongs to at least one of the Exemption or Category1 or Category2 or Category3

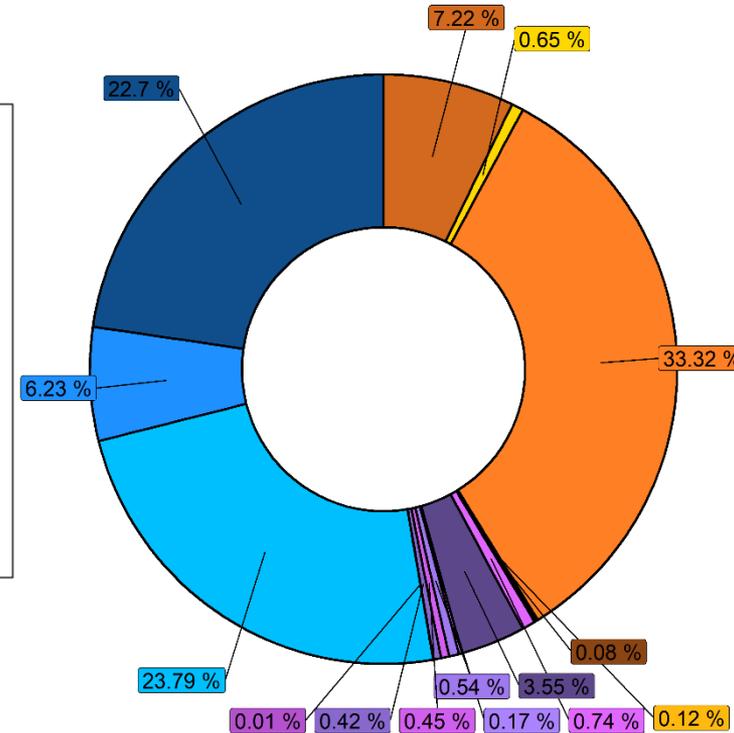


Crop diversification category (holding-level)

Crop diversification category - Number of holdings
NLD : 20190301 - 20190831



Crop diversification category - Holding area
NLD : 20190301 - 20190831



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Crop diversification compliancy assessment (holding-level)

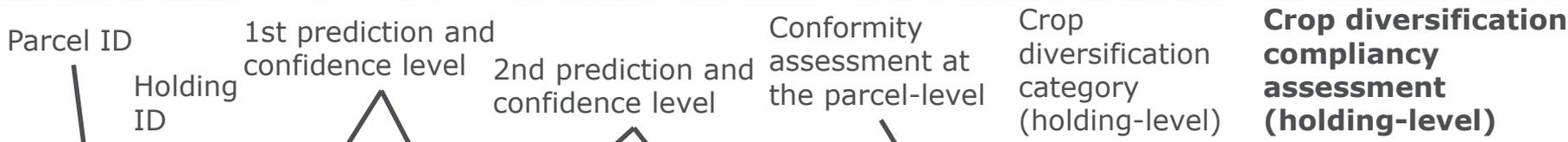


Table of records for layer: NL_CropType_2019_results_latest (Classif_r) (Filtered)

ori_id	ori_hold	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2	CTNumDIV_p	Classif_r	CD_cat	CD_diagn	Valid_from	Valid_to	Date_imported
31.000000374:	201140496	3000(Grass)	0.925	2000(Permanent fruit)	0.018	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000374:	120073585	3000(Grass)	0.105	126(Secale)	0.09	50(Grass_perm)	Classified_not_conf	Category1	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000390:	204520636						Not_classified_noS1	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000380:	204663138	153(Zea)	0.911	38(Chicory)	0.008	117(Zea)	Classified_conform	Category1	Missing_info	2019-03-01	2019-09-30	2019-10-25
31.000000357:	120151505						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000376:	120030301	153(Zea)	0.161	3000(Grass)	0.058	117(Zea)	Classified_not_conf	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000408:	90094000						Not_classified_land_	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000348:	200293406	3000(Grass)	0.977	140(Trifolium)	0.007	50(Grass_perm)	Classified_conform	Category2	Compliant	2019-03-01	2019-09-30	2019-10-25
31.000000389:	202340720						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000360:	204515855	3000(Grass)	0.988	2000(Permanent fruit)	0.006	50(Grass_perm)	Classified_conform	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000405:	90171531						Not_classified_land_	Exemption3	Not_required	2019-03-01	2019-09-30	2019-10-25
31.000000347:	203811691	3000(Grass)	0.988	140(Trifolium)	0.005	50(Grass_perm)	Classified_conform	Exemption1	Not_required	2019-03-01	2019-09-30	2019-10-25

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Crop diversification compliancy assessment (holding-level)



The screenshot displays the Geopedia web application interface. On the left, a sidebar shows a list of layers for 'Sen4CAP_Netherlands', with 'NL_CropType_2019_results_latest (CD_diagn)' selected and highlighted by a red box. The main map area shows a grid of agricultural parcels, each labeled with its compliance status: 'Compliant' (green), 'Not required' (blue), 'Missing info' (orange), and 'Not required' (red). A data table at the bottom provides details for the selected layer.

NewID	CropType	Ort_id	Ort_hold	CT_pred_1	CT_conf_1	CT_pred_2	CT_conf_2	CNumDIV_p	Classif_r	CD_cat	CD_diagn	Valid_from
508059	508059	31.000000347;	203811991	3000;(Grass)	0.988	1403;(Tribolium)	0.005	50;(Grass_perm)	Classified_conform	Exemption1	Not_required	2019-03-01
99446	99446	31.000000413;	202357844	13;(Beets)	0.958	135;(Sprouts)	0.016	12;(Beta)	Classified_conform	Category2	Compliant	2019-03-01
387207	387207	31.000000395;	202395149						Not_classified_nos1	Exemption2	Not_required	2019-03-01
717778	717778	31.000000354;	203721860	3000;(Grass)	1	2;(Agrarian nature msc)	0	50;(Grass_perm)	Classified_conform	Exemption3	Not_required	2019-03-01
337698	337698	31.000000366;	203767830						Not_classified_nos1	Category1	Compliant	2019-03-01
643626	643626	31.000000372;	110396456	3000;(Grass)	0.974	1403;(Tribolium)	0.014	50;(Grass_perm)	Classified_conform	Category1	Compliant	2019-03-01

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Crop diversification (holding-level)

- Assess the **compliance of the holding** with regard to the **crop diversification rules**

⇒ By applying **worst case scenarios** if the parcel conformity is not assessed

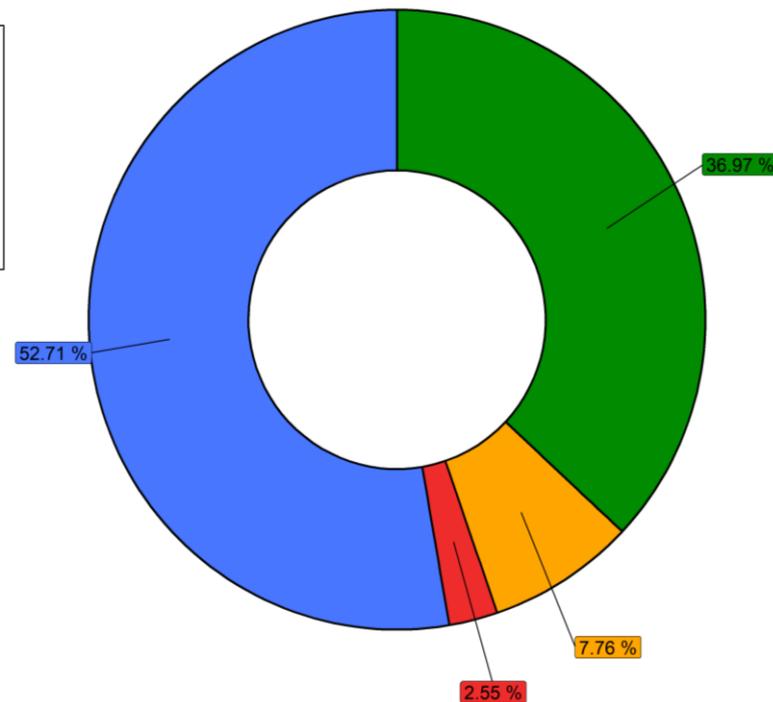
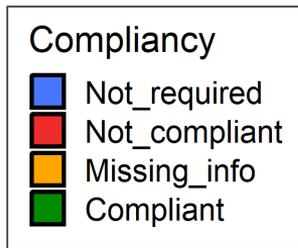
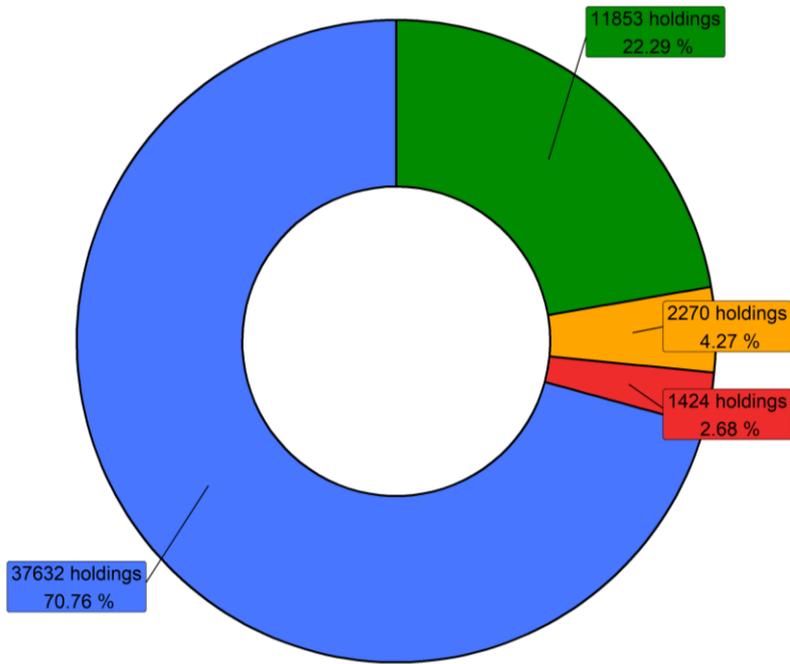
⇒ **7 crop diversification categories**

CD_diagn	Description
Compliant	Holding compliant regarding crop diversification
Not_compliant	Holding not compliant regarding crop diversification
Not_required	Holding with no crop diversification required
Missing_info	Not enough information to assess the holding compliance regarding crop diversification

Crop diversification compliancy assessment (holding-level)

Crop diversification compliancy - Number of holdings
NLD : 20190301 - 20190831

Crop diversification compliancy - Holding area
NLD : 20190301 - 20190831



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L4A crop type mapping



- From the visualization tool
- Outputs from the system



Output from the system: naming and content



/d4/ucl_upload/to_import/01_L4A/S2AGRI_S4C_L4A_PRD_S1_20190915T021528_V20190301T000000_20190831T000000

Product

Processing date

Monitoring period

- **S2AGRI_S4C_L4A_MTD_V20190301T000000_20190831T000000.xml**: metadata file (still basic)
- **AUX_DATA**: should contain Image Processing Parameters (IPP) + validation results (currently empty)
- **LEGACY_DATA**: should contain overview data (currently empty)
- **VECTOR_DATA**:

- CropType.gpkg } Crop type map results

- CropType.csv

- CropType_LUT.csv

- Plot_Results_Ranger_Smote_300_1008-0533.png

- Metrics_Smote_300_1008-0533.csv

- Results_Ranger_Smote_300_1008_0533.rds

- Calib_NewIDs_1007-1739.csv

- Parcels_predict_1007-1739.rds

- Predict_Ranger_1008-0533.rds

- Predict_classif_Ranger_1008-0501.csv

when running crop-diversification.py

+

- crop_div.csv

- crop_div_holding.csv

Crop diversification results

Validation results

Intermediate results

- **SHP**: CropType.shp Crop type map results

Delivery preparation (Sen4CAP project)



/d4/ucl_upload/NLD_2019/L4A_CropType/20190301_20190831

Product

Monitoring period

- Sen4CAP_L4A_CropType_NLD_20190301_20190831.shp = CropType.shp + crop_div.csv
- Sen4CAP_L4A_CropType_NLD_20190301_20190831_AccuracyMetrics.png = from the validation results
- Sen4CAP_L4A_Holding_NLD_20190301_20190831.csv = crop_div_holding.csv
- Sen4CAP_L4A_NLD_2019_CropCode_LUT.csv = input

Validation_tables:

- Sen4CAP_L4A_CropType_NLD_20190101_20190831_confusion_matrix.csv = from the validation results
- Sen4CAP_L4A_CropType_NLD_20190101_20190831_confusion_tables.xlsx = from the validation results

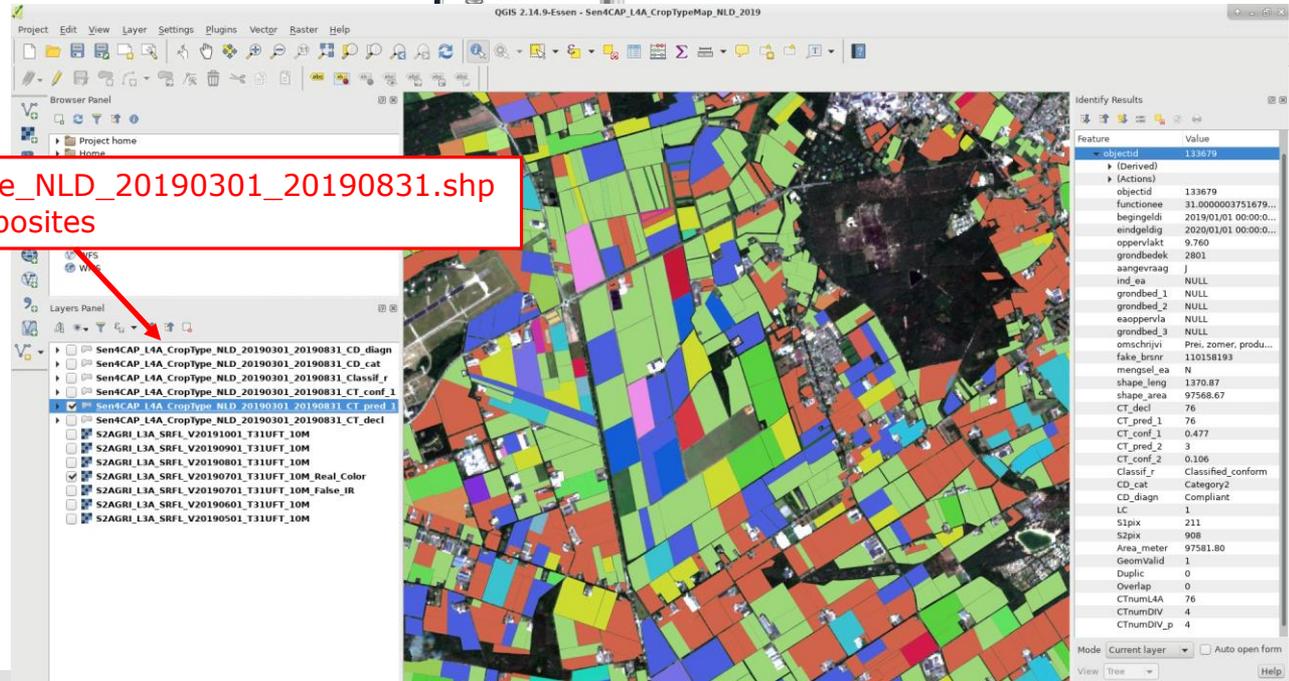
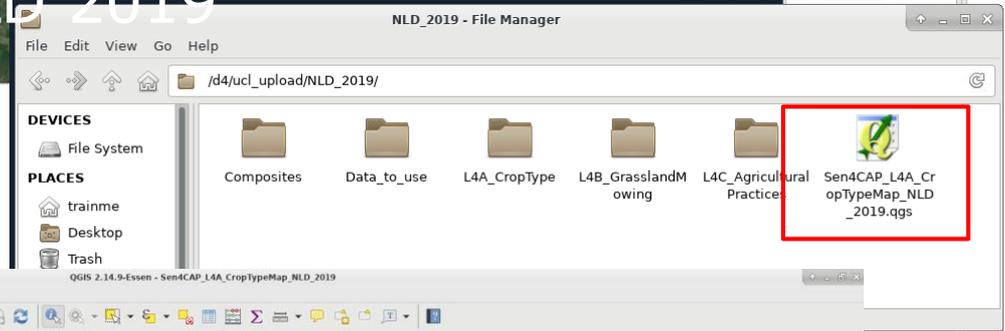
Figures:

- Sen4CAP_L4A_CropType_NLD_20190301_20190831_conformity = statistics (# of parcels and area)
- Sen4CAP_L4A_CropType_NLD_20190301_20190831_CD_category = statistics (# of parcels and area)
- Sen4CAP_L4A_CropType_NLD_20190301_20190831_CD_compliance = statistics (# of parcels and area)

Crop type map results – NLD 2019



⇒ Open the QGIS project:
[/d4/ucl_upload/NLD_2019/Sen4CAP_L4A_CropTypeMap_NLD_2019.qgs](#)



Sen4CAP_L4A_CropType_NLD_20190301_20190831.shp
+ background: S2 composites

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Validation – NLD 2019



⇒ Open the validation tables:

[/d4/ucl_upload/NLD_2019/L4A_CropType/20190301_20190831/validation_tables/Sen4CAP_L4A_CropType_NLD_20190101_20190831_confusion_tables.xlsx](#)

	13	68	...	3000	4000	sum_class	well_class	user_accuracy
13	12074	0	...	15	1	12228	12074	0.987
68	0	1449	...	15	0	1523	1449	0.951
...
3000	33	226	...	330473	112	336026	330473	0.983
4000	0	0	...	4	2	10	2	0.200
sum_dec	12466	1790	...	331927	180	476521	463966	NA
well_class	12074	1449	...	330473	2	463966	NA	NA
producer_accuracy	0.969	0.809	...	0.996	0.011	NA	NA	0.974

Overall accuracy

Confusion_matrix tab

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⇒ Open the validation tables:

/d4/ucl_upload/NLD_2019/L4A_CropType/20190301_20190831/validation_tables/Sen4CAP_L4A_CropType_NLD_20190101_20190831_confusion_tables.xlsx

CTnumL4A	CTL4A	Declared parcels	Well classified	Producer accuracy	Confusion class 1	%	Confusion class 2	%	Confusion class 3	%	Rest %
3000	Grass	331927	330473	0.996	Zea	0.2	Solanum_tuberosum	0.0	Allium_winter	0.0	0.2
153	Zea	58572	57547	0.983	Grass	1.2	Solanum_tuberosum	0.1	Celeriac	0.1	0.3
131	Solanum_tuberosum	25780	25171	0.976	Zea	0.7	Grass	0.6	Beets	0.1	1.0
151	Winter wheat	15515	14881	0.959	Grass	2.3	Triticum_summer	0.8	Triticale	0.2	0.8
13	Beets	12466	12074	0.969	Solanum_tuberosum	1.2	Zea	0.8	Grass	0.3	0.8
90	Onions	4954	4716	0.952	Peas	0.7	Grass	0.5	Zea	0.4	3.2
2000	Permanent fruit	9018	6475	0.718	Grass	18.9	Zea	5.0	Solanum_tuberosum	0.6	3.7
69	Hordeum_summer	4653	3905	0.839	Grass	8.5	Triticum_summer	1.8	Zea	0.9	4.9
143	Tulipa	2188	2039	0.932	Grass	1.9	Hyacinthus	1.6	Ornamental onion	0.6	2.7
68	Hordeum_winter	1790	1449	0.809	Grass	12.6	Winter wheat	1.9	Hordeum_summer	1.6	3.0
142	Triticum_summer	1791	1011	0.564	Grass	13.8	Hordeum_summer	11.6	Winter wheat	4.6	13.6
83	Medicago	840	304	0.362	Grass	55.2	Zea	3.0	Solanum_tuberosum	0.8	4.8
150	Winter carrot	368	266	0.723	Carrot	5.7	Zea	4.1	Celeriac	2.2	15.7
79	Lilium	425	361	0.849	Grass	3.8	Allium_winter	2.4	Zea	2.1	6.8
108	Peas	208	181	0.870	Grass	3.8	Solanum_tuberosum	3.4	Chick peas	1.0	4.8

Accuracy_producer tab

⇒ **3 main confusion crops** for the 15 main crops (in terms of area)

Holding crop diversification table – NLD 2019



⇒ Open the holding crop diversification table:

/d4/ucl_upload/NLD_2019/L4A_CropType/20190301_20190831/Sen4CAP_L4A_Holding_NLD_20190301_20190831.csv

HoldID	CD_cat	CD_diagn	nb_types_c	area_eaa_c	area_tal_c	area_tempGrass_c	area_permGrass_c	area_lif_c	...
50088	Exemption2	Not_required	1	154324.19	154324.19	154324.19	0	0	...
30922	Exemption1	Not_required	0	0	0	0	0	0	...
11542	Category2	Compliant	10	827475.38	827475.38	0	0	0	...
13359	Exemption1	Not_required	1	187429.8	37454.3	37454.3	149975.5	0	...
11540	Exemption1	Not_required	1	55875	29701	29701	26174	0	...
35543	Exemption1	Not_required	1	102894.69	97967.1	0	4927.59	0	...
11546	Exemption1	Not_required	0	0	0	0	0	0	...
11547	Category2	Compliant	6	580335.1	456101	102889.5	124234.1	0	...
11544	Exemption_or_Category1	Missing_info	1	54078.1	54078.1	0	0	0	...

↑
Holding id

↑
Crop diversification category

↑
Crop diversification compliancy

All the values calculated by holding, used for the crop diversification assessment (explained in the ATBD)

Holding crop diversification table – NLD 2019



⇒ List of values calculated by holding

Output variable	Role	Default value [format]
Ori_hold	The initial holding id from the subsidy applications	[integer or string]
CD_cat	Results of the category assessment at the holding level	[character]

To compare with the rules

Output variable	Role	Default value [format]	Category	Description	Crop diversification rules
CD_diagn	Results of the crop diversification rules assessment at the holding level				
nb_types_c	Number of different crop types of AL confirmed by holding		Category1	TAL between 10 and 30 ha	<ul style="list-style-type: none"> At least 2 different crop types Main crop ≤ 75% of TAL
area_eaa_c	Area of the EAA confirmed by the classification, by holding		Category2	TAL greater than 30 ha	<ul style="list-style-type: none"> At least 3 different crop types Main crop ≤ 75% of TAL 2 main crops ≤ 95% of TAL
area_tal_c	Area of the TAL confirmed by the classification, by holding				
area_tempGrass_c	Area of the temporary grassland confirmed by the classification, by holding		Category3	TGrass and Fallow greater than 75% of TAL	Main crop ≤ 75% of remaining AL
area_permGrass_c	Area of the permanent grassland confirmed by the classification, by holding				
area_llf_c	Area of the land lying fallow confirmed by the classification, by holding		Exemption1	TAL less than 10 ha	No crop diversification required
area_cwater_c	Area of the crops under water confirmed by the classification, by holding		Exemption2	TGrass and Fallow greater than 75% of TAL and remaining AL less than 30 ha	No crop diversification required
area_remAL_ex2_c	Area of the remaining AL in the case of exemption 2, by holding		Exemption3	PGrass, TGrass and Cwater greater than 75% of EAA and remaining AL less than 30 ha	No crop diversification required
area_remAL_ex3_c	Area of the remaining AL in the case of exemption 3, by holding				
area_mainCrop_c	Area of the main crop confirmed by the classification, by holding		Exemption4	Cwater = TAL	No crop diversification required
area_2mainCrop_c	Area of the second main crop confirmed by the classification, by holding				
nb_parcelc_nc	Number of remaining parcels not confirmed by the classification (declared as EAA)	[integer]			
area_nc	Area of the remaining area not confirmed by the classification (declared as EAA)	[float]			

TAL = Total Arable Land; AL = Arable Land; EAA = Eligible Agriculture Area; TGrass = Temporary Grassland; PGrass = Permanent Grassland; Fallow = Land Lying Fallow; Cwater = Crop Under Water

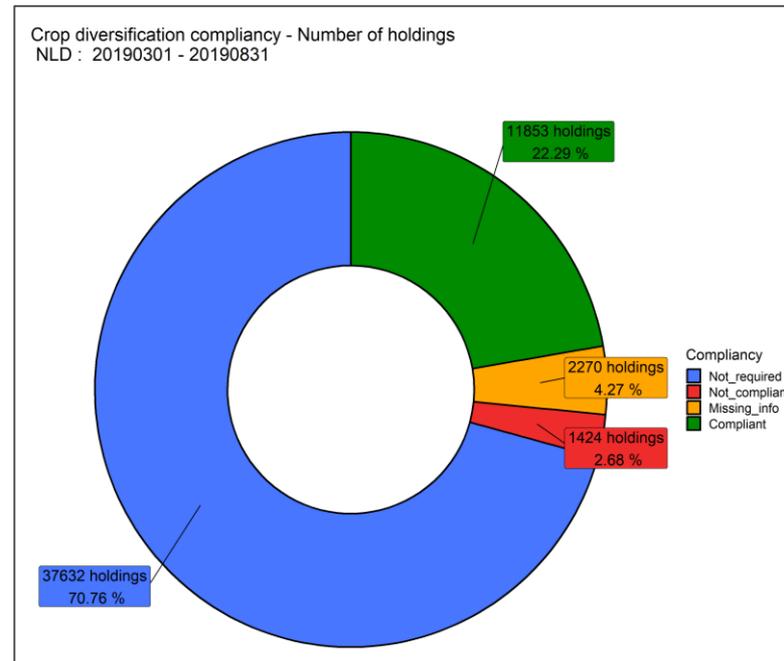
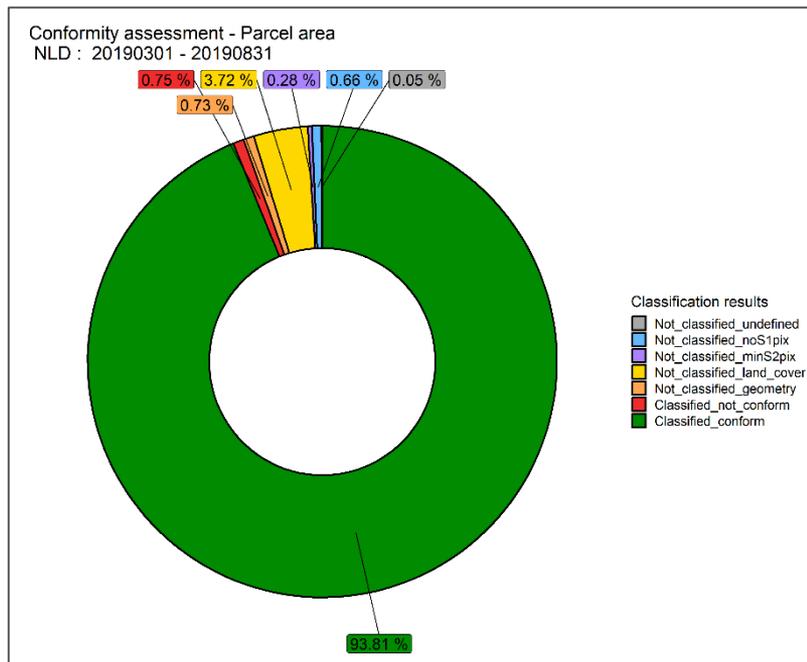


Summary statistics figures – NLD 2019



⇒ Open the one of the summary statistics figures:

/d4/ucl_upload/NLD_2019/L4A_CropType/20190301_20190831/figures/*



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European Space Agency

Crop type map results – NLD 2019



- ⇒ Find a few examples of **not conform** parcels on QGIS. Check the declared and predicted crop types (use for that the crop code LUT) and the confidence levels.
 - ⇒ What's the **F-Score** of the declared crop type?
 - ⇒ Do these not conform parcels affect the **crop diversification assessment** at the holding level?
- ⇒ Find a few parcels that are **not classified** because of their size.
 - ⇒ Do these not classified parcels affect the **crop diversification assessment** at the holding level?
 - ⇒ Try to find back in the holding crop diversification table the values calculated by holding. Why the holding is **not compliant / compliant**?

Session 3: Products download and exploration + visualization tool



- 1) Products download from the system
- 2) Visualization tool
- 3) Products exploration
 - L3B vegetation status products (NDVI, LAI, fAPAR, fCover)
 - L4A crop type mapping
 - L4B grassland mowing detection
 - L4C agricultural practices (EFA) monitoring

L4B grassland mowing detection



- From the visualization tool
- Outputs from the system



Compliance assessment at the parcel-level



Geopedia

INFO CONTENT LAYER PERSONAL

Sen4CAP_Netherlands

- NL_CropCode_Drv_2019
- Classif_r 2019
- CD_cat 2019
- CD_diagn 2019
- Agricultural practices monitoring (UR4) 2019
- NL_AgriPractices_2019_common
- NL_AgriPractices_2019_results_latest
- NL_AgriPractices_2019_results_all
- NL_Agri_Practice
- NL_AgriPractice_subType
- AgPr_Ind_Cond_Indicator
- AgPr_Comp_Indicator
- Grassland moving product (UR2) 2019
- NL_mowingDates_2019_latest**
- NL_mowingDates_2019_all
- Satellite_Mission
- GrMow_Compliance_2019
- Sentinel-2
- Sentinel-2 L2A - True Color
- Sentinel-2 L2A - False Color
- Vegetation status indicator (UR3)
- Sentinel-2 L3A - NDVI
- Sentinel-2 L3A - LAI
- Sentinel-2 L3A - FAPAR

INFO CONTENT LAYER PERSONAL

NL_mowingDates_2019

COUNTRY: Netherlands

YEAR: 2019

AGRICULTURE PRACTICE: GRASSLAND MOVING

INTERPRETATION OF REGULATION: The product has been generated on the basis of ESA data. To have the compliancy, at least 1 mowing between April and October. The temporal range of the product is from 1st April to 31st October. The crops assumed as grassland are the following:

CROP_CODE/CROP TYPE

- 265 - Grassland, permanent
- 331 - Grassland, natural. Main function of agriculture.
- 336 - Grassland, natural. Area with a nature management type that is predominantly used for agricultural activities CAP.

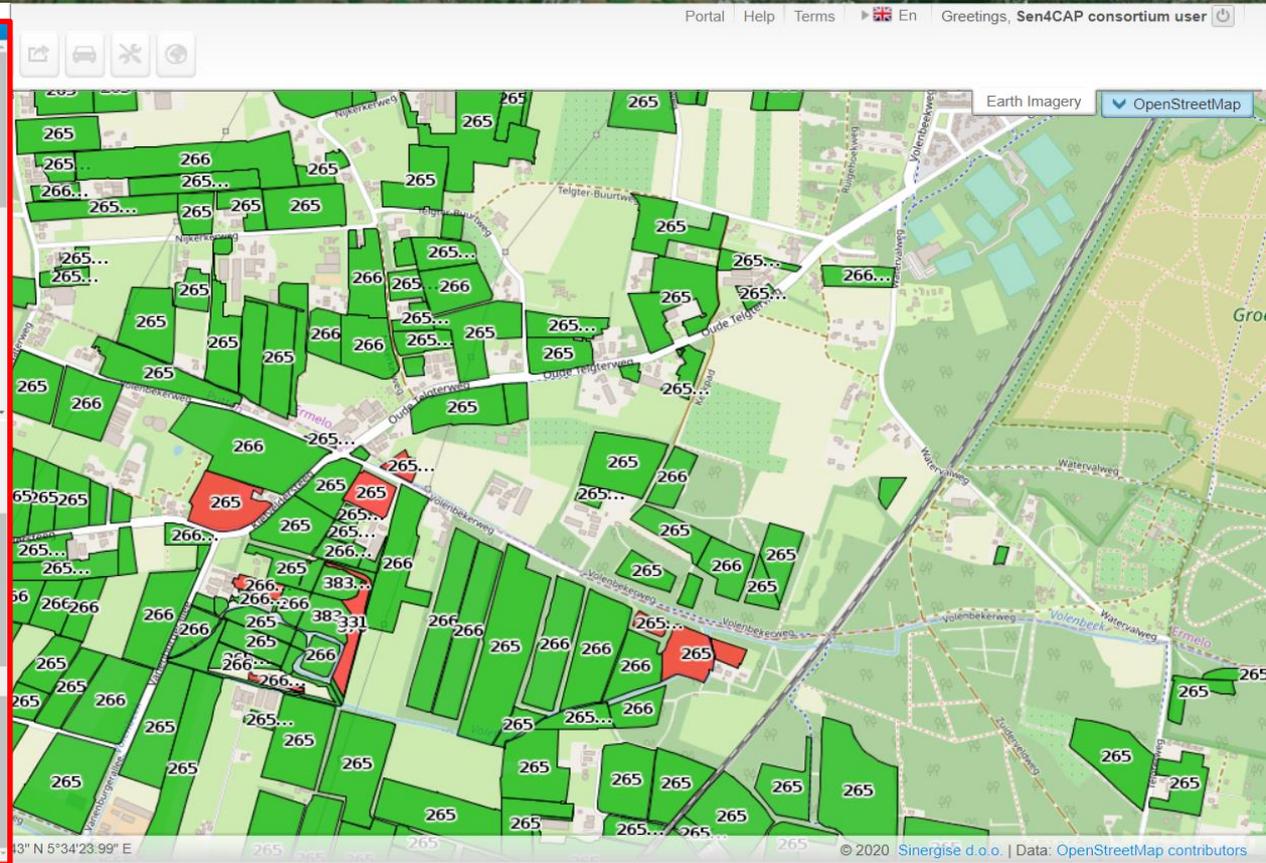
DESCRIPTION OF COLUMNS:

- NewID: Internal parcel ID
- Orl_id: Original parcel id
- Orl_name: Original farm id
- Orl_crop: Code of crop type selected as grassland.
- mow_n: Number of mowing. Values domain: 0, 1, 2, 3, 4.
- m1_start: Date representing the start date of the time interval in which the mowing n° 1 is occurred (if any).
- m1_end: Date representing the end date of the time interval in which the mowing n° 1 is occurred (if any).
- m1_conf: Reliability flag given in terms of probability of right mowing n° 1 detection (if any).
- m1_mis: Satellite mission data used for detection of mowing n° 1 (if any).
- m2_start: Date representing the start date of the time interval in which the mowing n° 2 is occurred (if any).
- m2_end: Date representing the end date of the time interval in which the mowing n° 2 is occurred (if any).
- m2_conf: Reliability flag given in terms of probability of right mowing n° 2 detection (if any).
- m2_mis: Satellite mission data used for detection of mowing n° 2 (if any). Values domain: S1, S2, S1/S2.
- m3_start: Date representing the start date of the time interval in which the mowing n° 3 is occurred (if any).
- m3_end: Date representing the end date of the time interval in which the mowing n° 3 is occurred (if any).
- m3_conf: Reliability flag given in terms of probability of right mowing n° 3 detection (if any).
- m3_mis: Satellite mission data used for detection of mowing n° 3 (if any). Values domain: S1, S2, S1/S2.
- m4_start: Date representing the start date of the time interval in which the mowing n° 4 is occurred (if any).
- m4_end: Date representing the end date of the time interval in which the mowing n° 4 is occurred (if any).
- m4_conf: Reliability flag given in terms of probability of right mowing n° 4 detection (if any).
- m4_mis: Satellite mission data used for detection of mowing n° 4 (if any). Values domain: S1, S2, S1/S2.
- comp: Compliance flag. Values domain: 0, 1, 2, according to the following rules: - "0": Not assessed - "Valid_from": starting date of the data used for acquisition of the results.
- Valid_to: end date of the data used for acquisition of the results.
- Date_imported: Date of the import of the record to the Visualisation tool.

The results of the mowing dates monitoring are provided continuously during the season. All results within the season can be observed and compared in the NL_mowingDates_2019_results_all layer. Layer NL_mowingDates_2019_results_latest is filtered by the valid_to date, so only the latest results are shown.

Legend:

- Not assessed
- Compliant
- Not compliant



Compliance assessment at the parcel-level



Geopedia

INFO CONTENT LAYER PERSONAL

Sen4CAP_Netherlands

- NL_CropCode_Drv_2019
- Classif_r 2019
- CD_cat 2019
- CD_diagn 2019
- Agricultural practices monitoring (UR4) 2019
- NL_AgriPractices_2019_common
- NL_AgriPractices_2019_results_latest
- NL_AgriPractices_2019_results_all
- NL_Agri_Practice
- NL_AgriPractice_subType
- AgPr_Ind_Cond_Indicator
- AgPr_Comp_Indicator
- Grassland mowing product (UR2) 2019
- NL_mowingDates_2019_latest**
- NL_mowingDates_2019_all
- Satellite_Mission
- GrMow_Compliance_2019
- Sentinel-2
- Sentinel-2 L2A - True Color
- Sentinel-2 L2A - False Color
- Vegetation status indicator (UR3)
- Sentinel-2 L3A - NDVI
- Sentinel-2 L3A - LAI
- Sentinel-2 L3A - FAPAR

INFO CONTENT LAYER PERSONAL

NL_mowingDates_2019

COUNTRY: Netherlands

YEAR: 2019

AGRICULTURE PRACTICE: GRASSLAND MOWING

INTERPRETATION OF REGULATION: The product has been generated on the basis of ESA data. To have the compliancy, at least 1 mowing between April and October. The temporal range of the product is from 1st April to 31st October. The crops assumed as grassland are the following:

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CROP_CODE/CROP TYPE

- 265 - Grassland, permanent
- 331 - Grassland, natural. Main function of agriculture.
- 336 - Grassland, natural. Area with a nature management type that is predominantly used for agricultural activities CAP.

DESCRIPTION OF COLUMNS:

- NewID: Internal parcel ID
- Orl_id: Original parcel id
- Orl_name: Original farm id
- Orl_crop: Code of crop type selected as grassland.
- mow_n: Number of mowing. Values domain: 0, 1, 2, 3, 4.
- m1_start: Date representing the start date of the time interval in which the mowing n° 1 is occurred (if any).
- m1_end: Date representing the end date of the time interval in which the mowing n° 1 is occurred (if any).
- m1_conf: Reliability flag given in terms of probability of right mowing n° 1 detection (if any).
- m1_mis: Satellite mission data used for detection of mowing n° 1 (if any).
- m2_start: Date representing the start date of the time interval in which the mowing n° 2 is occurred (if any).
- m2_end: Date representing the end date of the time interval in which the mowing n° 2 is occurred (if any).
- m2_conf: Reliability flag given in terms of probability of right mowing n° 2 detection (if any).
- m2_mis: Satellite mission data used for detection of mowing n° 2 (if any). Values domain: S1, S2, S1/S2
- m3_start: Date representing the start date of the time interval in which the mowing n° 3 is occurred (if any).
- m3_end: Date representing the end date of the time interval in which the mowing n° 3 is occurred (if any).
- m3_conf: Reliability flag given in terms of probability of right mowing n° 3 detection (if any).
- m3_mis: Satellite mission data used for detection of mowing n° 3 (if any). Values domain: S1, S2, S1/S2
- m4_start: Date representing the start date of the time interval in which the mowing n° 4 is occurred (if any).
- m4_end: Date representing the end date of the time interval in which the mowing n° 4 is occurred (if any).
- m4_conf: Reliability flag given in terms of probability of right mowing n° 4 detection (if any).
- m4_mis: Satellite mission data used for detection of mowing n° 4 (if any). Values domain: S1, S2, S1/S2
- comp: Compliance flag. Values domain: 0, 1, 2, according to the following rules: - "0" Not assessed - "Valid_from": starting date of the data used for acquisition of the results. - "Valid_to": end date of the data used for acquisition of the results. - "Date_imported": Date of the import of the record to the Visualisation tool.

The results of the mowing dates monitoring are provided continuously during the season. All results within the season can be observed and compared in the NL_mowingDates_2019_results_all_layer. Layer NL_mowingDates_2019_results_latest as filtered by the Valid_to date, so only the latest results are shown.

Legend:

- Not assessed
- Compliant
- Not compliant

Portal Help Terms En Greetings, Sen4CAP consortium user

Earth Imagery OpenStreetMap

NewID	Orl_id	Orl_name	Orl_crop	mow_n	m1_start	m1_end	m1_conf	m1_mis	m2_start	m2_end	m2_conf	m2_mis	m3_start	m3_end	m3_conf	m3_mis	m4_start	m4_end	m4_conf	m4_mis	Comp	Valid_from	Valid_to	Date_imported
1	010000000002	02047794	265	1	2019-05-13	2019-08-07	0.90	S1													Compliant	2019-08-01	2019-10-31	2019-11-14
2	010000000002	02047795	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
3	010000000002	02047796	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
4	010000000002	02047797	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
5	010000000002	02047798	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
6	010000000002	02047799	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
7	010000000002	02047800	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
8	010000000002	02047801	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
9	010000000002	02047802	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14
10	010000000002	02047803	265	1																	Not compliant	2019-08-01	2019-10-31	2019-11-14



Product overview - Specifications



Parcel Holding ID ID Crop code

Table of records for layer: NL_..._ingDates_2019_latest (File)

NewID	Ort_id	Ort_hold	Ort_crop	Mow_n	M1_dstart	M1_dend	M1_conf	M1_mis	M2_dstart	M2_dend	M2_conf	M2_mis	M3_dstart	M3_dend	M3_conf	M3_mis	M4_dstart	M4_dend	M4_conf	M4_mis	Compl	valid_from	valid_to	Date_Imported
321261	31.00000036400	211139911	265 (Grassland permanent)	3	2019-05-15	2019-05-21	0.434	S1	2019-06-26	2019-07-02	0.493	S1	2019-08-14	2019-08-24	0.787	S2/S1					Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
175161	31.00000041433	211305048	331 (Grassland natural, Main forest of agriculture)	2	2019-06-27	2019-06-30	0.85	S2/S1	2019-09-15	2019-09-21	0.066	S1			0						Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
371526	31.00000040468	70077668	265 (Grassland permanent)	0			0				0				0						Not compliant - no mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
492489	31.00000040557	204100773	265 (Grassland temporary)	2	2019-06-05	2019-06-11	0.413	S1	2019-08-26	2019-08-31	0.537	S2			0						Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
779665	31.00000041928	203626978	265 (Grassland permanent)	2	2019-04-21	2019-06-07	0.536	S2	2019-07-25	2019-07-27	0.543	S2			0						Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
684493	31.00000041684	200303446	265 (Grassland permanent)	1	2019-05-18	2019-08-27	0.783	S2			0				0						Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
481717	31.00000041623	203897985	266 (Grassland temporary)	2	2019-06-10	2019-06-27	0.819	S2/S1	2019-08-21	2019-08-24	0.541	S2			0						Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
493160	31.00000040276	213196780	331 (Grassland natural, Main forest of agriculture)	0			0				0				0						Not compliant - no mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
428679	31.00000038426	110419297	266 (Grassland temporary)	3	2019-05-27	2019-06-02	0.121	S1	2019-07-05	2019-07-17	0.636	S2	2019-08-24	2019-08-26	0.733	S2/S1					Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
492489	31.00000039935	200355195	266 (Grassland temporary)	1	2019-06-10	2019-06-30	0.756	S2/S1			0				0						Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
309536	31.00000034753	110206474	266 (Grassland temporary)	0			0				0				0						Not compliant - no mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
316064	31.00000035243	200414303	265 (Grassland permanent)	3	2019-04-21	2019-05-13	0.877	S2/S1	2019-05-13	2019-06-27	0.899	S2/S1	2019-08-21	2019-08-24	0.783	S2/S1					Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
492360	31.00000039979	201439520	265 (Grassland permanent)	3	2019-04-23	2019-05-13	0.833	S2	2019-06-17	2019-06-25	0.836	S2/S1	2019-07-27	2019-07-30	0.832	S2/S1					Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14
125333	31.00000039962	204557405	265 (Grassland permanent)	2	2019-06-27	2019-07-05	0.542	S2	2019-08-24	2019-08-26	0.501	S2			0						Compliant - a mowing occurred in the reference period	019-04-01	2019-10-31	2019-11-14



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L4B grassland mowing detection



- From the visualization tool
- Outputs from the system



Output from the system: naming and content



/d4/ucl_upload/to_import/02_L4B/S2AGRI_S4C_L4B_PRD_S18_20191115T060814_V20191031T000000_20190401T000000

Product

Processing date

Monitoring period

- **S2AGRI_S4C_L4B_MTD_V20191031T000000_20190401T000000.xml**: metadata file (still basic)
- **AUX_DATA**: (currently empty)
- **LEGACY_DATA**: should contain overview data (currently empty)
- **VECTOR_DATA**:

SHP: Sen4CAP_L4B_MOWD_NLD_20190401-20191031.shp

csv: Sen4CAP_L4B_MOWD_NLD_20190401-20191031.csv

txt: Sen4CAP_L4B_GrasslandMowing_NLD_README.txt

Grassland mowingmap results



Delivery preparation (Sen4CAP project)



/d4/ucl_upload/NLD_2019/L4B_GrasslandMowing/AllSeason_OneMonthStep/
Sen4CAP_L4B_MOWD_NLD_20190401-20191031



Product

Monitoring period

SHP: Sen4CAP_L4B_MOWD_NLD_20190401-20191031.shp

csv: Sen4CAP_L4B_MOWD_NLD_20190401-20191031.csv

txt: Sen4CAP_L4B_GrasslandMowing_NLD_README.txt



Readme file - Metadata



COUNTRY: Lithuania

YEAR: 2019

AGRICULTURE PRACTICE: GRASSLAND MOWING

REGULATION:

Obligatory mowing/grazing dates 2019

- Crop code: GP2. Pasture or meadow, perennial grass up to 5 years. At least 1 mowing or grazing within 31st July
- Crop code: DGP. Perennial pastures or meadows 5 years and more. At least 1 mowing or grazing within 31st July
- Crop code: GPA. Pasture or meadow, perennial grass up to 5 years, renewed in the current year. At least 1 mowing or grazing within 31st July
- Crop code: EPT. Extensive meadows grazing with livestock. At least 1 grazing between 1st May and 30th October
- Crop code: SPT. Specific meadows. At least 1 mowing between 15th July and 15th October
- Crop code: SPT-2. Extensive management of wetlands (direct payments are paid). At least 1 mowing between 15th July and 1st March (next year)
- Crop code: MNP. Aquatic warbler habitats storage in raw and semi-natural grasslands. At least 1 mowing between 1st July and 1st October
- Crop code: MNS. Aquatic warbler habitats storage in wetlands. At least 1 mowing between 1st August and 1st October

Regulation

The crops assumed as grassland are the following:

CROP_CODE	CROP TYPE	ID
GP2	Pasture or meadow, perennial grass up to 5 years	
DGP	Perennial pastures or meadows 5 years and more	
GPA	Pasture or meadow, perennial grass up to 5 years	
EPT	Extensive meadows grazing with livestock	
SPT	Specific meadows	
SPT-2	Extensive management of wetlands (direct payments are paid)	
MNP	Aquatic warbler habitats storage in raw and semi-natural grasslands	
MNS	Aquatic warbler habitats storage in wetlands	

Grassland crop

DESCRIPTION OF COLUMNS:

1. NewID: Unique Parcel ID
2. ori_hold: Holding ID
3. ori_id: Parcel ID derived by the concatenation of the following attributes: valdos, kzs_nr and lauko_
4. ori_crop: Code of crop type selected as grassland.
5. mow_n: Number of mowing. Values domain: 0, 1, 2, 3, 4.
6. m1_dstart: Date representing the start date of the time interval in which the mowing n° 1 is occurred (if any).
7. m1_dend: Date representing the end date of the time interval in which the mowing n° 1 is occurred (if any).
8. m1_conf: Reliability flag given in terms of probability of right mowing n° 1 detection (if any).
9. m1_mis: Satellite mission data used for detection of mowing n° 1 (if any). Values domain: S1, S2, S1/S2 or S2/S1
10. m2_dstart: Date representing the start date of the time interval in which the mowing n° 2 is occurred (if any).
11. m2_dend: Date representing the end date of the time interval in which the mowing n° 2 is occurred (if any).
12. m2_conf: Reliability flag given in terms of probability of right mowing n° 2 detection (if any).
13. m2_mis: Satellite mission data used for detection of mowing n° 2 (if any). Values domain: S1, S2, S1/S2 or S2/S1
14. m3_dstart: Date representing the start date of the time interval in which the mowing n° 3 is occurred (if any).
15. m3_dend: Date representing the end date of the time interval in which the mowing n° 3 is occurred (if any).
16. m3_conf: Reliability flag given in terms of probability of right mowing n° 3 detection (if any).
17. m3_mis: Satellite mission data used for detection of mowing n° 3 (if any). Values domain: S1, S2, S1/S2 or S2/S1
18. m4_dstart: Date representing the start date of the time interval in which the mowing n° 4 is occurred (if any).
19. m4_dend: Date representing the end date of the time interval in which the mowing n° 4 is occurred (if any).
20. m4_conf: Reliability flag given in terms of probability of right mowing n° 4 detection (if any).
21. m4_mis: Satellite mission data used for detection of mowing n° 4 (if any). Values domain: S1, S2, S1/S2 or S2/S1
22. compl: Compliance flag. Value domain: 0, 1, 2 according to the following rules:
 - "0": Not assessed
 - "1": Assessed and compliant because a mowing occurred in the reference period
 - "2": Assessed and not compliant because no mowing occurred in the reference period

Product attributes

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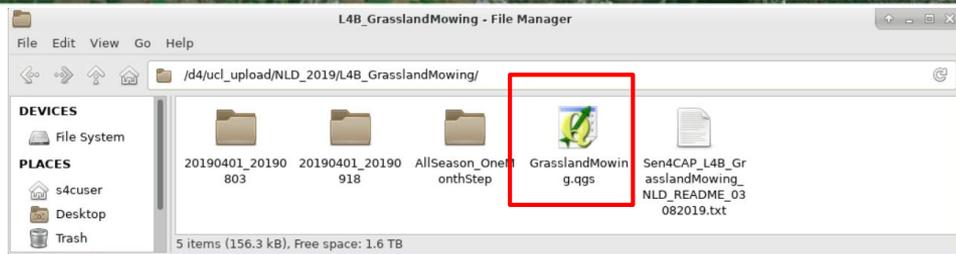


European Space Agency

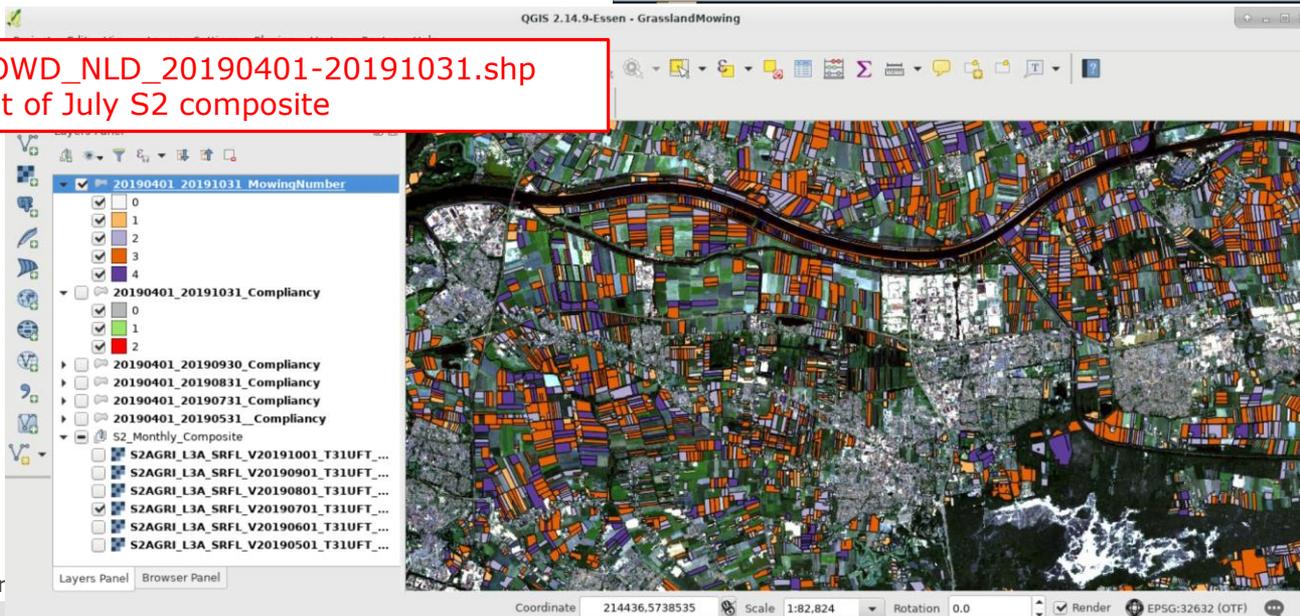
Grassland Mowing map results – NLD 2019



→ Open the QGIS project:
[/d4/ucl_upload/NLD_2019/L4B_GrasslandMowing/GrasslandMowing.qgs](#)



Sen4CAP_L4B_MOWD_NLD_20190401-20191031.shp
+ background: 1st of July S2 composite



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European Space Agency

Grassland Mowing map results – NLD 2019



QGIS 2.14.9-Essen - GrasslandMowing

Project Edit View Layer Settings Plugins Vector Raster Help

Layers Panel

- 20190401_20191031 MowingNumber
 - 0
- 20190401_20191031 Compliancey
 - 0
 - 1
 - 2
- 20190401_20190930 Compliancey
- 20190401_20190831 Compliancey
- 20190401_20190731 Compliancey
- 20190401_20190531 Compliancey
- S2_Monthly_Composite
 - S2AGRI_L3A_SRFL_V20191001_T31UFT_...
 - S2AGRI_L3A_SRFL_V20190901_T31UFT_...
 - S2AGRI_L3A_SRFL_V20190801_T31UFT_...
 - S2AGRI_L3A_SRFL_V20190701_T31UFT_...
 - S2AGRI_L3A_SRFL_V20190601_T31UFT_...
 - S2AGRI_L3A_SRFL_V20190501_T31UFT_...

Open the attribute table

20190401_20191031_MowingNumber :: Features total: 51667, filtered: 51667, selected: 0

	NewID	ori_id	ori_hold	ori_crop	mow_n	m1_dstart	m1_dend	m1_conf	m1_mis	m2_dstart	m2_dend	m2_conf	m2_mis	m3_dstart	m3_der
0	482397	31.0000004...	202369378	266	1	2019-06-17 ...	2019-06-27 ...	0.67600	S2	0	0	0.00000	0	0	0
1	482398	31.0000004...	202369378	265	1	2019-06-22 ...	2019-06-27 ...	0.72300	S2	0	0	0.00000	0	0	0
2	482399	31.0000004...	200252587	265	2	2019-06-30 ...	2019-07-17 ...	0.72400	S2/S1	2019-09-05 ...	2019-09-11 ...	0.43800	S1	0	0
3	482400	31.0000004...	202292211	331	2	2019-06-27 ...	2019-07-27 ...	0.53700	S2	2019-08-28 ...	2019-09-03 ...	0.40000	S1	0	0
4	482401	31.0000004...	200700049	265	3	2019-05-11 ...	2019-05-16 ...	0.81900	S2/S1	2019-06-25 ...	2019-06-30 ...	0.84600	S2/S1	2019-08-21 ...	2019-08-2
5	461362	31.0000003...	204739393	372	0	0	0	0.00000	0	0	0	0.00000	0	0	0
6	482402	31.0000004...	204577369	265	1	2019-07-17 ...	2019-07-27 ...	0.59000	S2	0	0	0.00000	0	0	0
7	541826	31.0000003...	200666987	265	0	0	0	0.00000	0	0	0	0.00000	0	0	0
8	482403	31.0000004...	201263249	331	2	2019-06-07 ...	2019-06-27 ...	0.95200	S2/S1	2019-08-31 ...	2019-09-06 ...	0.40500	S1	0	0
9	482404	31.0000004...	201263249	265	2	2019-05-15 ...	2019-05-21 ...	0.09300	S1	2019-06-07 ...	2019-06-27 ...	0.88800	S2	0	0
10	482405	31.0000004...	210837906	265	2	2019-05-12 ...	2019-05-18 ...	0.50000	S1	2019-06-27 ...	2019-07-25 ...	0.75800	S2	0	0
11	574508	31.0000003...	203591428	265	1	2019-05-14 ...	2019-05-16 ...	0.52500	S2	0	0	0.00000	0	0	0
12	482406	31.0000004...	210837906	266	1	2019-06-27 ...	2019-07-17 ...	0.77500	S2	0	0	0.00000	0	0	0
13	8466	31.0000003...	203021967	265	0	0	0	0.00000	0	0	0	0.00000	0	0	0
14	482407	31.0000004...	210837906	265	2	2019-06-07 ...	2019-06-17 ...	0.82500	S2	2019-07-30 ...	2019-08-21 ...	0.51900	S2	0	0

Coordinate: 214436,5738535 Scale: 1:82,824 Rotation: 0.0 Render EPSG:32632 (OTF)



Session 3: Products download and exploration + visualization tool



- 1) Products download from the system
- 2) Visualization tool
- 3) Products exploration
 - ❑ L3B vegetation status products (NDVI, LAI, fAPAR, fCover)
 - ❑ L4A crop type mapping
 - ❑ L4B grassland mowing detection
 - ❑ L4C agricultural practices (EFA) monitoring



- Analysis is done per practice
 - ✓ products generated per practice
 - ✓ harvest, harvest + catch crops, harvest + nitrogen fixing crops, ...
- Weekly delivery
 - ✓ products provided as SHP + CSV files
 - ✓ per practice and per period
- Products provided via Visualisation tool and ftp

LPIS and GSAA related parameters

- **NewID:** Internal Parcel ID number (link to the GSAA layer)
- **ORIG_ID:** Original parcel ID number
- **ori_hold:** Original farm ID number
- **MAIN_CROP:** Main crop code

Monitoring related parameters

- **VEG_START:** Start date of the estimated period when vegetation is expected on the parcel
- **H_START, H_END:** Start and end date of the estimated period when harvest may occur
- **PRACTICE:** Declared agricultural practice
- **P_TYPE:** Type of the declared agricultural practice
- **P_START, P_END:** Start and end date of the declared agricultural practice

Other parameters

- **S1PIX:** Number of Sentinel-1 pixels within the parcel
- **Date_imported:** date of the import of the record to the Visualisation tool

Harvest monitoring

- **M1 – M5:** Markers 1 - 5
- **H_WEEK:** Week of the year when harvested or cleared conditions are observed
- **H_W_START, H_W_END:** First and last day of the H_WEEK
- **H_W_S1:** First day of the week when harvested or cleared conditions are observed using the Sentinel-1 data (i.e. without the M2 marker)

Agricultural practice monitoring

- **M6 – M10:** Marker 6 - 10
- **C_INDEX:** Indicator of degree of compliancy with agricultural practice obligation

Quality related parameters

- **L_WEEK:** First day of the last week for which the Sentinel-1 data are available
- **S1GAPS:** Number of weeks with Sentinel-1 data missing within the whole monitoring period
- **H_S1GAPS:** Number of weeks with Sentinel-1 data missing in the period from H_START to H_END
- **P_S1GAPS:** Number of weeks with Sentinel-1 data missing in the period from P_START to P_END
- **H_W_S1GAPS:** Number of weeks with Sentinel-1 data missing in the 5 weeks period before the detected harvest/clearance (H_WEEK)
- **H_QUALITY:** Reliability flag of the detected harvest/clearance H_WEEK ("1" - missing data in H_W_S1GAPS period)
- **C_QUALITY:** Reliability flag of the C-INDEX ("1" - missing data in P_S1GAPS period)

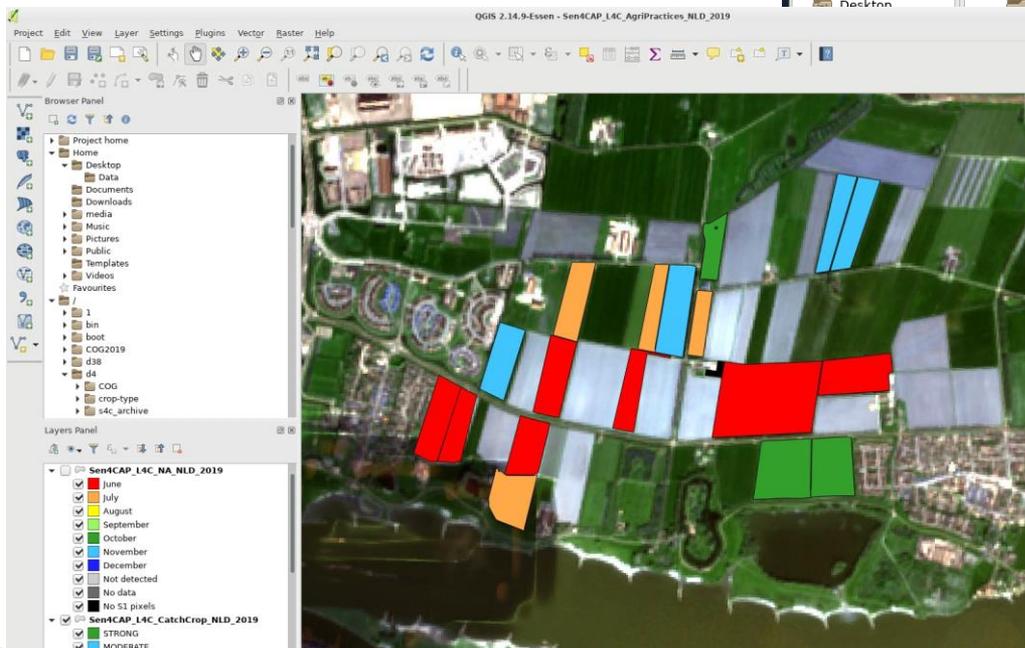
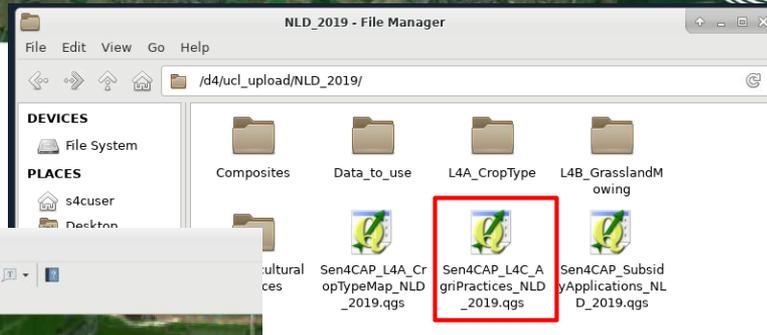
Other parameters

- **L4C_Graph:** Link to the L4C graphics
- **Valid_from, Valid_to:** starting and end date of the reference period used for generating the products
- **Date_imported:** Date of the import of the record to the Visualisation tool

Agricultural practices monitoring – NLD 2019



⇒ Open the QGIS project:
[/d4/ucl_upload/NLD_2019/Sen4CAP_L4C_AgriPractices_NLD_2019.qgs](#)



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**Thank you for your attention
and your contribution**

Any questions?



sen4cap
common agricultural policy