

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



Session 2: Manual usage Sen4CAP system and system installation



sen4cap
common agricultural policy

UCL
Université
catholique
de Louvain



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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 usageLPIS / GSAA data preparation and upload |
|------------|---|

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

- | | |
|-------------|---|
| 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 processorsSystem installation and ICT requirements |
|-------------|--|

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

- | | |
|-------------|---|
| 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 systemSen4CAP visualization toolProducts exploration in Snap or QGIS |
|-------------|---|

Session 3: Products download and exploration + visualization tool

- | | |
|-------------|---|
| 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 |
|-------------|---|

Questions and answers

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 2: Manual usage of the Sen4CAP processors + system installation



- 1) Add a new job to the system scheduler (by-default parameters)
- 2) Launch a custom job (configured parameters)
- 3) Access the system through a linux terminal
- 4) Installation procedure and ICT requirements

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



- 1) Add a new job to the system scheduler (by-default parameters)
- 2) Launch a custom job (configured parameters)
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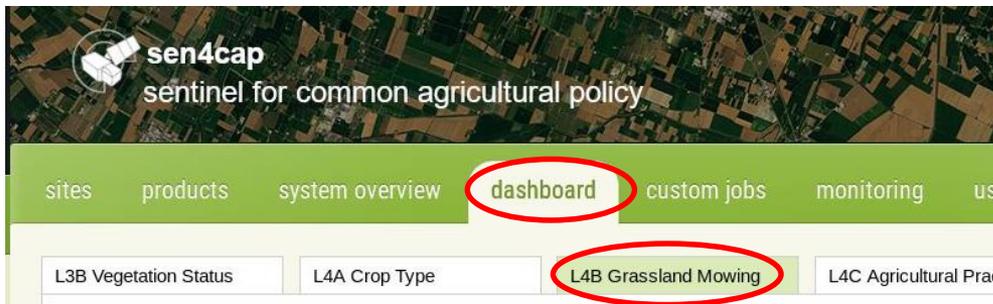
What does a job launched from the dashboard tab do?



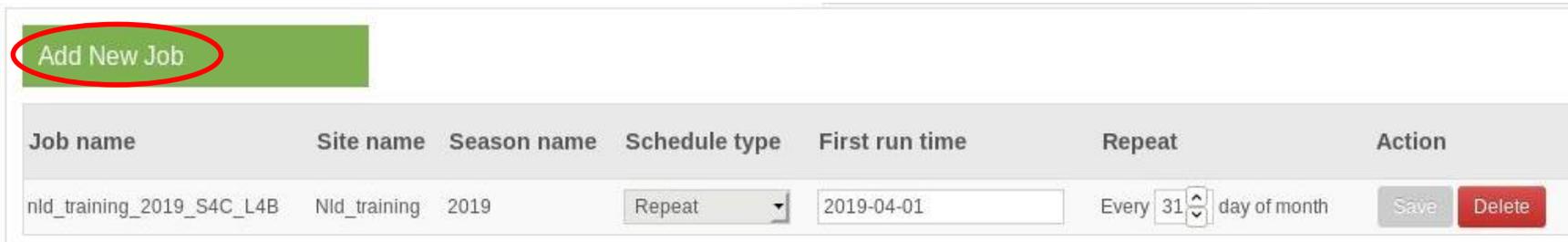
Jobs launched from the dashboard tab enable :

- Manual processing, independently from the pre-defined processors
- Scheduled: once / cycle / repeat
- Not configurable: will use the by-default parameters of the processors

Add a new job to the system scheduler

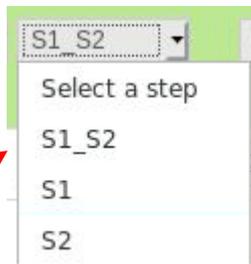


- ⇒ In the « dashboard » tab
- ⇒ Select a processor
- ⇒ Add a new job

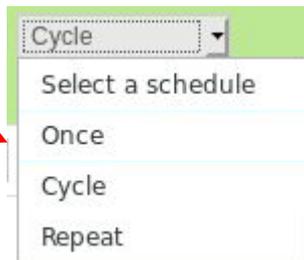


Add a new job to the system scheduler

- ⇒ Define a **job name**
- ⇒ Choose the **site**
- ⇒ Choose the **season**
- ⇒ Choose the used **input data**
- ⇒ Choose the **schedule type**
(and first run time and repeat period if needed)
- ⇒ And save



S1 and S2 combined
S1 only
S2 only
(specific to L4B)



Once -> one time job
Cycle -> first run and then run every x days
Repeat -> repeat every x of the month from the first run

Job name	Site name	Season name	Schedule type	First run time	Repeat	Action
NLD_training_L4B	NLD_2019	2019	S1_S2	Cycle	2019-08-01 After 15 days	Save

Add a new job to the system scheduler



⇒ Look at the by-default parameters

L4B

Default Configuration	
year	
year(nld_training)	2019
start_date(nld_training)	2019-04-01
cfg_upload_dir	/mnt/archive/upload/grassland_mowing_cfg
default_config_path	/usr/share/sen2agri/S4C_L4B_GrasslandM/Bin/src_ini/S4C_L4B_Default_Config.cfg
gen_input_shp_path	/mnt/archive/grassland_mowing_files/{site}/InputShp/SEN4CAP_L4B_GeneratedInputShp.shp
s1_py_script	/usr/share/sen2agri/S4C_L4B_GrasslandMowing/Bin/src_s1/S1_main.py
s2_py_script	/usr/share/sen2agri/S4C_L4B_GrasslandMowing/Bin/src_s2/S2_main.py
sub_steps	S1_S2, S1, S2
input_product_types	S1_S2
cfg_dir	/mnt/archive/grassland_mowing_files/{site}/{year}/config/
working_dir	/mnt/archive/grassland_mowing_files/{site}/{year}/working_dir/

L3B

Default Configuration	
global_bv_samples_file	/usr/share/sen2agri/LaiCommonBVDistributionSamples.txt
laibandscfgfile	/usr/share/sen2agri/Lai_Bands_Cfgs_Belcam.cfg
link_l3c_to_l3b	0
localwnd.bwr	2
localwnd.fwr	0
lut_path	/usr/share/sen2agri/lai.map
modelsfolder	/mnt/archive/L3B_GeneratedModels/
produce_fapar	1
produce_fcover	1
produce_lai	1
produce_ndvi	
produce_ndvi	
rsrctgfile	
tiles_filter	
use_inra_version	
use_lai_bands_cfg	

L4C

Default Configuration	
country(nld_2019)	NLD
practices(nld_2019)	CC, NA
sub_steps	ALL,DataExtraction,CatchCrop,Fallow,
nrt_data_extr_enabled	true
prds_per_group	1
execution_operation	ALL
cfg_upload_dir	/mnt/archive/upload/agric_practices_files/{site}/config
ts_input_tables_upload_dir	/mnt/archive/upload/agric_practices_files/{site}/ts_input_tables
default_config_path	/usr/share/sen2agri/S4C_L4C_Configurations/S4C_L4C_Default_Config.cfg
cfg_dir	/mnt/archive/agric_practices_files/{site}/{year}/config/
data_extr_dir	/mnt/archive/agric_practices_files/{site}/{year}/data_extraction/{p
ts_input_tables_dir	/mnt/archive/agric_practices_files/{site}/{year}/ts_input_tables/{p
filter_ids_path	/mnt/archive/agric_practices_files/{site}/{year}/ts_input_tables/Fi/Sen4CAP_L4C_FilterIds.csv
practices	NA

L4A

Default Configuration	
min-s2-pix	3
min-s1-pix	1
best-s2-pix	10
lc	1234
pa-min	30
pa-train-h	4000
pa-train-l	1100
sample-ratio-h	0.25
sample-ratio-l	0.75
smote-target	1000
smote-k	5
num-trees	300
min-node-size	10

Add a new job to the system scheduler



⇒ These are the by-default parameters of the different processors, **on top of the ones defined in the L4A and L4B config tables**

⇒ To better understand them, you can refer to

- the Algorithm Theoretical Basis Document (**ATBD**) of the different processors
- the « **config_metadata** » table from the system sql database, which shortly defines each parameter

We will see how to connect to the system sql database later

⇒ The by-default parameters can be easily adapted in the « **config** » table of the system sql database

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



- 1) Add a new job to the system scheduler (by-default parameters)
- 2) Launch a custom job (modified parameters)
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What does a custom job do ?



Custom jobs enable :

- Manual processing, independently from the pre-defined processors
- Not scheduled: will be immediately launched
- Configurable: easy to change the by-default parametrization for tests

Launch a custom job



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sites products system overview dashboard **custom jobs** monitoring users data sources logout

L3B Vegetation Status

L4A Crop Type

L4B Grassland Mowing

L4C Agricultural Practices

L3B Vegetation Status

L4A Crop Type

L4B Grassland Mowing

L4C Agricultural Practices

⇒ In the « custom jobs » tab

⇒ Select the processor(s) corresponding to the product(s) you want to generate (e.g. L3B)

Filter and select input data

L3B Vegetation Status Show advanced parameters

Site:*
NLD_2019

Filter Criteria For Input Files

Sensor: S2 Tiles
31UFU,31UFT

S1 Tiles

L8 Tiles

Season:
Select season

From: 2020-01-20 To:

Filter

January 2020

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
S2A_MSI	5	6	7	8	9	10
S2A_MSI						11
S2A_MSI	12	13	14	15	16	17
S2A_MSI						18
S2A_MSI	19	20	21	22	23	24
S2A_MSI						25
S2A_MSI	26	27	28	29	30	31
S2A_MSI						

Available

S2A_MSI_190103T111145_SAF
S2A_MSI_190103T111145_SAF
S2A_MSI_190119T113853_SAF
S2A_MSI_190123T111502_SAF
S2A_MSI_190205T112151_SAF
S2A_MSI_190212T141700_SAF
S2A_MSI_190212T141700_SAF

- ⇒ Select a site already created
- ⇒ Filter the input data by tiles and by dates
- ⇒ Select the data to be used amongst the filter's results

Available input files.*

S2A_MSI_L2A_20190103T104431_N0207_R008_T31UFT_20190103T111145_SAF
S2A_MSI_L2A_20190119T113853_N0207_R008_T31UFT_20190103T111145_SAF
S2A_MSI_L2A_20190119T113853_N0207_R008_T31UFT_20190119T113853_SAF
S2A_MSI_L2A_20190123T104331_N0207_R008_T31UFT_20190123T111502_SAF
S2A_MSI_L2A_20190205T105231_N0207_R051_T31UFT_20190205T112151_SAF
S2A_MSI_L2A_20190212T104141_N0207_R008_T31UFT_20190212T141700_SAF
S2A_MSI_L2A_20190212T104141_N0207_R008_T31UFT_20190212T141700_SAF

The list of products descriptors (xml files).

Note : This process is to be undertaken regardless of the processor used.

Define the extra-parameters and submit the job



Available input files:*

```
S2A_MSIL2A_20190103T104431_N0207_R008_T31UFT_20190103T111145_SAFE
S2A_MSIL2A_20190103T104431_N0207_R008_T31UFU_20190103T111145_SAFE
S2A_MSIL2A_20190119T110401_N0207_R094_T31UFU_20190119T113853_SAFE
S2A_MSIL2A_20190123T104331_N0207_R008_T31UFT_20190123T111502_SAFE
S2A_MSIL2A_20190205T105231_N0207_R051_T31UFU_20190205T112151_SAFE
S2A_MSIL2A_20190212T104141_N0207_R008_T31UFT_20190212T141700_SAFE
S2A_MSIL2A_20190212T104141_N0207_R008_T31UFU_20190212T141700_SAFE
S2A_MSIL2A_20190215T105131_N0207_R051_T31UFT_20190215T112355_SAFE
```

The list of products descriptors (xml files).

Generate LAI mono-dates:

Generate LAI mono-dates

(Generate LAI mono-dates)

Reprocessing with the last N-Days

(Performe reprocessing with the last N-Days)

Backward window:

2

Backward window for LAI N-Day reprocessing

Submit

⇒ Choose the desired parameters, in this case for LAI

⇒ Submit the job

Note : by ticking the « Show advanced parameters » in the upper right corner of the processors' window extra parameters are displayed to be configured by the user.

Show advanced parameters

The same process can be followed to launch jobs from other processors.



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L3B Vegetation Status

L4A Crop Type

L4B Grassland Mowing

L4C Agricultural Practices

Logged in as sen4cap | DB version 1.0.1

1. Processor selection
2. Input data filtering and selection
3. Parameters definition
4. Job submission

Parameters definition for L4A crop type



Show advanced parameters

- Some of these parameters were discussed yesterday
- You can refer to the L4A crop type processor **ATBD**
- AND check the **by-default values** in the « dashboard » tab

L4A Crop Type

Site:*

NLD_2019

Filter Criteria For Input Files

Available input files:*

S2A_MSIL2A_20190103T104431_N0207_R008_T31UFT_20190103T111145.SAFE
S2A_MSIL2A_20190103T104431_N0207_R008_T31UFT_20190103T111145.SAFE
S2A_MSIL2A_20190119T110401_N0207_R094_T31UFT_20190119T113853.SAFE
S2A_MSIL2A_20190123T104331_N0207_R008_T31UFT_20190123T111502.SAFE
S2A_MSIL2A_20190205T105231_N0207_R051_T31UFT_20190205T112151.SAFE
S2A_MSIL2A_20190212T104141_N0207_R008_T31UFT_20190212T141700.SAFE
S2A_MSIL2A_20190212T104141_N0207_R008_T31UFT_20190212T141700.SAFE

The list of products descriptors (xml files).

Minimum node size:

Minimum node size

Number of RF trees:

Number of RF trees

Number of SMOTE neighbours:

Number of SMOTE neighbours

Target sample count for SMOTE:

Target sample count for SMOTE

Training ratio for uncommon crop types:

Training ratio for uncommon crop types

Training ratio for common crop types:

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Parameters definition and input data filtering for L4B grassland mowing detection



Filter Reset Filter

End date for the mowing detection:

End date for the mowing detection

Start date for the mowing detection:

Start date for the mowing detection

Available NDVI input files:

- S2AGRI_L3B_PRD_S1_20190520T103337_A20190101T105624
- S2AGRI_L3B_PRD_S1_20190520T112758_A20190103T104634
- S2AGRI_L3B_PRD_S1_20190520T115723_A20190108T104624
- S2AGRI_L3B_PRD_S1_20190520T121701_A20190109T110647
- S2AGRI_L3B_PRD_S1_20190520T123818_A20190114T110647
- S2AGRI_L3B_PRD_S1_20190520T135431_A20190118T104651
- S2AGRI_L3B_PRD_S1_20190520T143917_A20190119T110648

The list of NDVI products

Available COHE input files:

- SEN4CAP_L2A_S1_V20181226T171600_20190101T171655_VH_015_COHE
- SEN4CAP_L2A_S1_V20181226T171600_20190101T171655_VV_015_COHE
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VH_015_COHE
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VV_015_COHE
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VH_037_COHE
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VV_037_COHE
- SEN4CAP_L2A_S1_V20181228T054919_20190103T054944_VH_037_COHE

The list of COHE products

Available AMP input files:

- SEN4CAP_L2A_S1_V20181226T171600_20190101T171655_VV_015_AMP
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VH_015_AMP
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VV_015_AMP
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VH_037_AMP
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VV_037_AMP
- SEN4CAP_L2A_S1_V20181228T054919_20190103T054944_VH_037_AMP
- SEN4CAP_L2A_S1_V20181228T054919_20190103T054944_VV_037_AMP

The list of AMP products

Submit

- Start and end dates for the mowing detection
- ⇒ other parameters mostly included in the config file
- When S1 and S2 are used, filter and select each input files type

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Parameters definition and input data filtering for L4C Agricultural Practices



Filter Reset Filter

Available NDVI input files:

- S2AGRI_L3B_PRD_S1_20190520T103337_A20190101T105624
- S2AGRI_L3B_PRD_S1_20190520T112758_A20190103T104634
- S2AGRI_L3B_PRD_S1_20190520T115723_A20190108T104624
- S2AGRI_L3B_PRD_S1_20190520T121701_A20190109T110647
- S2AGRI_L3B_PRD_S1_20190520T123818_A20190114T110647
- S2AGRI_L3B_PRD_S1_20190520T135431_A20190118T104651
- S2AGRI_L3B_PRD_S1_20190520T143917_A20190119T110648

The list of NDVI products

Available COHE input files:

- SEN4CAP_L2A_S1_V20181226T171600_20190101T171655_VH_015_COHE
- SEN4CAP_L2A_S1_V20181226T171600_20190101T171655_VV_015_COHE
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VH_015_COHE
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VV_015_COHE
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VH_037_COHE
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VV_037_COHE
- SEN4CAP_L2A_S1_V20181228T054919_20190103T054944_VH_037_COHE

The list of COHE products

Available AMP input files:

- SEN4CAP_L2A_S1_V20181226T171600_20190101T171655_VV_015_AMP
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VH_015_AMP
- SEN4CAP_L2A_S1_V20181226T171625_20190101T171655_VV_015_AMP
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VH_037_AMP
- SEN4CAP_L2A_S1_V20181228T054854_20190103T054944_VV_037_AMP
- SEN4CAP_L2A_S1_V20181228T054919_20190103T054944_VH_037_AMP
- SEN4CAP_L2A_S1_V20181228T054919_20190103T054944_VV_037_AMP

The list of AMP products

Submit

- No advanced parameters at this stage
- ⇒ mostly included in the config file
- When S1 and S2 are used, filter and select each input files type

Submission and progress monitoring



sites products system overview dashboard custom jobs **monitoring** users data sources logout

NLD_2019

Download statistics

0.18 97.09% (4232)

Estimated number of products to download: 3035

Current downloads

Site	Product	Product Type	Progress
No downloads in progress.			

Jobs history

Rows/page: 10

1 2 ... 6370 < Prev Next >

Job ID	End timestamp	Processor	Site	Status	Start type	Output
64971	-	L3B Vegetation Status	NLD_2019	Running	Requested	[output]
64970	-	L3B Vegetation Status	NLD_2019	Finished	Scheduled	[output]
64969	-	L3B Vegetation Status	NLD_2019	Finished	Scheduled	[output]
64968	2020-01-20 15:23:10.177+01	L2-S1 Pre-Processor	NLD_2019	Finished	Triggered	[output]
64967	2020-01-20 14:59:57.019+01	L2-S1 Pre-Processor	NLD_2019	Finished	Triggered	[output]
64966	2020-01-20 14:04:00.323+01	L2-S1 Pre-Processor	NLD_2019	Error	Triggered	[output]
64965	2020-01-20 13:59:56.994+01	L2-S1 Pre-Processor	NLD_2019	Finished	Triggered	[output]
64964	2020-01-20 13:04:15.044+01	L2-S1 Pre-Processor	NLD_2019	Error	Triggered	[output]
64963	2020-01-20 12:59:56.706+01	L2-S1 Pre-Processor	NLD_2019	Finished	Triggered	[output]
64962	2020-01-20 12:04:08.122+01	L2-S1 Pre-Processor	NLD_2019	Error	Triggered	[output]



- ⇒ Click « Submit »
- ⇒ Get the two confirmation messages
- ⇒ Go to « monitoring » tab
- ⇒ Select site
- ⇒ Check the status of the last job in « Jobs history »



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



- 1) Add a new job to the system scheduler (by-default parameters)
- 2) Launch a custom job (modified parameters)
- 3) Access the system through a linux terminal
- 4) Installation procedure and ICT requirements

Access the system through a Linux terminal



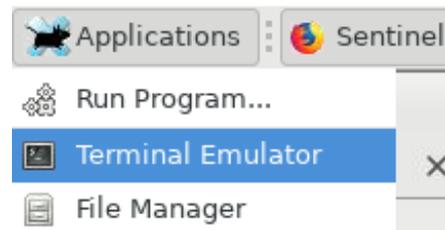
Operations that can be performed from a Linux terminal:

- ⇒ Look at processed data
- ⇒ Database access and change of configuration parameters
- ⇒ Manual invocation of some processors
- ⇒ Viewing the system logs
- ⇒ Starting or stopping system components

Look at processed data



- ⇒ Open a Terminal Emulator
 - ⇒ Go in the system data folder root
- ```
cd /mnt/archive
```
- ⇒ List the folders and files



/mnt/archive/

||

```
[s4cuser@trainme0 archive]$ ll
total 1424
lrwxrwxrwx 1 eouser eouser 24 Aug 1 16:18 agric_practices -> agric_practices_nld_2019
drwxrwxrwx 6 apache apache 97 Jan 21 19:08 agric_practices_files
drwxrwxr-x 5 eouser eouser 65 Jul 25 15:07 agric_practices_nld_2018
drwxr-xr-x 6 eouser eouser 213 Oct 17 10:22 agric_practices_nld_2019
drwxrwxr-x 2 s4cuser s4cuser 6 Jan 22 16:46 crop_type_output
drwxr-xr-x 3 sen2agri-service sen2agri-service 28 Jan 17 13:41 cze_mars
drwxr-xr-x 2 sen2agri-service sen2agri-service 6 Jan 22 20:39 demmaccs_tmp
drwxr-xr-x 4 sen2agri-service sen2agri-service 26 Apr 25 2019 dwn_def
drwxr-xr-x 4 root root 51 Mar 24 2019 gipp_maja
drwxr-xr-x 9 sen2agri-service sen2agri-service 162 Jan 21 18:42 grassland_mowing_files
drwxr-xr-x 2 sen2agri-service sen2agri-service 6 May 6 2019 L3B_GeneratedModels
drwxr-xr-x 4 sen2agri-service sen2agri-service 43 Jan 16 16:13 lpis
drwxrwxrwx 4 sen2agri-service sen2agri-service 4096 Jan 16 14:56 lpis-import
drwxr-xr-x 4 sen2agri-service sen2agri-service 54 Jan 21 16:11 maccs_def
drwxr-xr-x 9 sen2agri-service sen2agri-service 40960 Nov 26 13:43 nld_2019
drwxr-xr-x 3 sen2agri-service sen2agri-service 20 Jan 17 14:26 nld_2019_test
drwxr-xr-x 4 sen2agri-service sen2agri-service 47 Jan 21 21:43 nld_training
drwxr-xr-x 6 sen2agri-service sen2agri-service 82 Nov 27 09:07 orchestrator_temp
drwxr-xr-x 2 root root 60 Mar 24 2019 reference_data
drwxrwxr-x 2 eouser eouser 28672 Mar 24 2019 srtm
drwxrwxr-x 2 eouser eouser 897024 Mar 24 2019 swbd
drwxrwxr-x 6 s4cuser s4cuser 86 Jan 22 17:15 temp
drwxr-xr-x 6 root root 238 Oct 18 14:36 tmp
drwxr-xr-x 6 apache apache 106 Jan 16 16:09 upload
```



# Look at processed data



⇒ Look at the list of processed S2 L2A data

[ll /cd/mnt/archive/maccs\\_def/nld\\_2019/l2a/](#)

⇒ Look at the list of processed S1 data

[ll /cd/mnt/archive/nld\\_2019/](#)

⇒ Look at more advanced products

[ll /cd/mnt/archive/nld\\_2019/s4c\\_l4a](#)

[ll /cd/mnt/archive/nld\\_2019/s4c\\_l4b](#)

[ll /cd/mnt/archive/nld\\_2019/s4c\\_l4c](#)

From the  
NLD\_2019 site

```
drwxr-xr-x 5 sen2agri-service sen2agri-service 143 Jan 21 21:43 S2AGRI_S4C_L4B_PRD_S1_20200121T214355_V20190101T000000_20190801T000000
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
```

# Database access and change of configuration parameters



⇒ Connect to the **sql database**

```
sudo -u postgres psql sen4cap
```

⇒ List the content of the database

```
\d
```

config table

config metadata table

prepared subsidy applications  
for the NLD\_2019 site

list the S2 L1C to download  
and preprocessed by the  
system with status

+ LUT, product, etc.

| Schema | Name                                       | Type     | Owner    |
|--------|--------------------------------------------|----------|----------|
| public | activity_status                            | table    | postgres |
| public | agricultural_practice                      | table    | postgres |
| public | cog_archive                                | table    | postgres |
| public | cog_archive_id_seq                         | sequence | postgres |
| public | config                                     | table    | postgres |
| public | config_category                            | table    | postgres |
| public | config_id_seq                              | sequence | postgres |
| public | config_job                                 | table    | postgres |
| public | config_metadata                            | table    | postgres |
| public | datasource                                 | table    | admin    |
| public | datasource_id_seq                          | sequence | admin    |
| public | decl_nld_2019_2019                         | table    | admin    |
| public | decl_nld_training_2019_staging             | table    | admin    |
| public | decl_nld_training_2019_staging_ogc_fid_seq | sequence | admin    |
| public | downloader_count                           | table    | admin    |
| public | downloader_history                         | table    | postgres |
| public | downloader_history_id_seq                  | sequence | postgres |
| public | downloader_status                          | table    | postgres |
| public | event                                      | table    | postgres |
| public | event_id_seq                               | sequence | postgres |
| public | event_type                                 | table    | postgres |
| public | geography_columns                          | view     | postgres |
| public | geometry_columns                           | view     | postgres |



# Database access and change of configuration parameters



- SQL syntax knowledge is required
- Useful commands:

`\d` -> view the list of tables in the system

`\d <table_name>` -> view the structure of the table with the name <table\_name>

`select * from <table_name>;` -> view the values in the table with name <table\_name>

`Ctrl + d` -> log out of the database



# Database access and change of configuration parameters

⇒ Look for the config\_metadata table

select key, friendly\_name from config\_metadata;

= list of the system parameters with a short explanation

| key                           | friendly_name                                     |
|-------------------------------|---------------------------------------------------|
| archiver.archive_path         | Archive Path                                      |
| archiver.max_age.l2a          | L2A Product Max Age (days)                        |
| archiver.max_age.l3b          | L3B Product Max Age (days)                        |
| archiver.max_age.s4c_l4a      | L4A Product Max Age (days)                        |
| archiver.max_age.s4c_l4b      | L4A Product Max Age (days)                        |
| archiver.max_age.s4c_l4c      | L4A Product Max Age (days)                        |
| demmaccs.cog-tiffs            | Produce L2A tiff files as Cloud Optimized Geotiff |
| demmaccs.compress-tiffs       | Compress the resulted L2A tiff files              |
| demmaccs.gips-path            | path where the gips files are to be found         |
| demmaccs.maccs-launcher       | launcher for maccs within the keeping unit        |
| demmaccs.output-path          | path for l2a products                             |
| demmaccs.remove-fre           | Remove FRE files from resulted L2A product        |
| demmaccs.remove-sre           | Remove SRE files from resulted L2A product        |
| demmaccs.srtm-path            | path where the srtm files are to be found         |
| demmaccs.swbd-path            | path where the swbd files are to be found         |
| demmaccs.working-dir          | working directory for demmaccs                    |
| downloader.enabled            | Downloader is enabled                             |
| downloader.l8.enabled         |                                                   |
| downloader.l8.max-retries     |                                                   |
| downloader.l8.write-dir       |                                                   |
| downloader.max-cloud-coverage |                                                   |
| downloader.s1.enabled         |                                                   |
| downloader.s2.enabled         |                                                   |
| downloader.s2.max-retries     |                                                   |

⇒ Look for the parameters of the L4A crop type processor in the config table

select key, value from config where key like '%l4a%';

| key                                  | value   |
|--------------------------------------|---------|
| archiver.max_age.s4c_l4a             | 1       |
| executor.processor.s4c_l4a.slurm_qos | qoscrop |
| general.scratch-path.s4c_l4a         | /mnt/ar |
| processor.l4a.reference_data_dir     | N/A     |
| processor.s4c_l4a.min-s2-pix         | 3       |
| processor.s4c_l4a.min-s1-pix         | 1       |
| processor.s4c_l4a.best-s2-pix        | 10      |
| processor.s4c_l4a.lc                 | 1234    |
| processor.s4c_l4a.pa-min             | 30      |
| processor.s4c_l4a.pa-train-h         | 4000    |
| processor.s4c_l4a.pa-train-l         | 1100    |
| processor.s4c_l4a.sample-ratio-h     | 0.25    |
| processor.s4c_l4a.sample-ratio-l     | 0.75    |
| processor.s4c_l4a.smote-target       | 1000    |
| processor.s4c_l4a.smote-k            | 5       |
| processor.s4c_l4a.num-trees          | 300     |
| processor.s4c_l4a.min-node-size      | 10      |

17 rows)

- Not all processors can be invoked from the command line
- Some of the steps of the processors can be executed in command lines by taking the commands in the “monitoring” tab of the web interface
- Example of processor invocation (more examples in SUM):

```
crop-type-wrapper.py -s SITE_ID --season-start 2018-01-01 --season-end 2019-01-01 --working-path /mnt/archive/tmp --out-path /mnt/archive/crop-type-output/ --tiles 31UWT 32UQR
```

# Viewing the system logs



- Following the logs on console

```
sudo journalctl -fu <service_name>
```

Ex:

```
sudo journalctl -fu sen2agri-orchestrator
```

```
sudo journalctl -fu sen2agri-services
```

```
sudo journalctl -fu sen2agri-demmaccs
```

```
sudo journalctl -fu sen2agri-executor
```

- Redirecting logs to file:

```
sudo journalctl -fu <service_name> > file_name.log
```

Ex.:

```
sudo journalctl -fu sen2agri-orchestrator > orchest.log
```

```
sudo journalctl -fu sen2agri-services > services.log
```

```
sudo journalctl -fu sen2agri-demmaccs > demmaccs.log
```

```
sudo journalctl -fu sen2agri-executor > executor.log
```

```
eouser@trainme-21 ~$ sudo journalctl -fu sen2agri-services
-- Logs begin at Tue 2020-01-21 07:48:27 CET. --
Jan 21 16:26:36 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:36.537 TRACE [DefaultQuartzScheduler_Worker-6] r.c.t.utils.executors.Executor - 0 running tasks, 0 queued tasks
Jan 21 16:26:36 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:36.871 DEBUG [DefaultQuartzScheduler_Worker-6] o.e.s.p.SentinellLevel2Worker - Step 7 (Coherence Deburst) completed in 02m02s
Jan 21 16:26:36 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:36.885 DEBUG [DefaultQuartzScheduler_Worker-6] o.e.s.p.SentinellLevel2Worker - Executing step 8 (Coherence Merge): [(gpt,-c,256M,-q,8,/
ssd/SEN4CAP_L2A_S1_V20190110T174018_20190116T174113_VV_059/s1_step_8_1.xml)]
Jan 21 16:26:36 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:36.911 DEBUG [DefaultQuartzScheduler_Worker-6] r.c.t.utils.executors.Executor - Job 2064946564 requires 8192MB of RAM, system has 61368
3 available (of which 0MB requested by other jobs)
Jan 21 16:26:36 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:36.912 TRACE [process-exec-2] r.c.t.utils.executors.Executor - [trainme-21.novalocal] gpt -c 256M -q 8 /ssd/SEN4CAP_L2A_S1_V20190110T174
018_20190116T174113_VV_059/s1_step_8_1.xml
Jan 21 16:26:36 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:36.912 TRACE [Thread-90] r.c.t.utils.executors.Executor - 0 running tasks, 1 queued tasks
Jan 21 16:26:38 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:38.941 TRACE [process-exec-2] r.c.t.utils.executors.Executor - INFO: org.esa.snap.core.gpf.operators.tooladapter.ToolAdapterIO: Initiali
zing external tool adapters
Jan 21 16:26:42 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:42.911 TRACE [process-exec-2] r.c.t.utils.executors.Executor - SEVERE: org.esa.s2tbx.dataio.gdal.activator.GDALDistributionInstaller: Th
e environment variable LD_LIBRARY_PATH is not set. It must contain the current folder '.',
Jan 21 16:26:44 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:44.002 TRACE [process-exec-2] r.c.t.utils.executors.Executor - Executing processing graph
Jan 21 16:26:45 trainme-21.novalocal start.sh[2315]: 2020-Jan-21 16:26:45.466 TRACE [process-exec-2] r.c.t.utils.executors.Executor - INFO: org.hsquidb.persist.Logger: dataFileCache open start
```

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European Space Agency

# Starting or stopping system components



- Checking the status of a service

```
sudo systemctl status <service_name>
```

Ex: `sudo systemctl status sen2agri-services`

- Stopping a services

```
sudo systemctl stop <service_name>
```

Ex: `sudo systemctl stop sen2agri-services`

- Starting a service:

```
sudo systemctl start <service_name>
```

Or

```
sudo systemctl restart <service_name>
```

Ex: `sudo systemctl start sen2agri-services`

Or

```
sudo systemctl restart sen2agri-services
```

# Add a new job to the system scheduler

A way to better understand these parameters

⇒ Open a Terminal Emulator

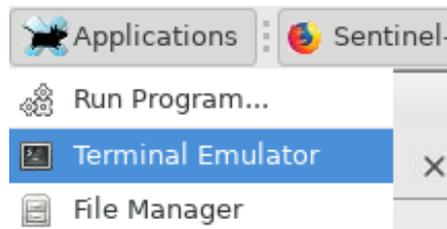
⇒ Connect to the sql database

```
sudo -u postgres psql sen4cap
```

⇒ Look for the config\_metadata table

```
select key, friendly_name from config_metadata;
```

= list of the system parameters with a short explanation

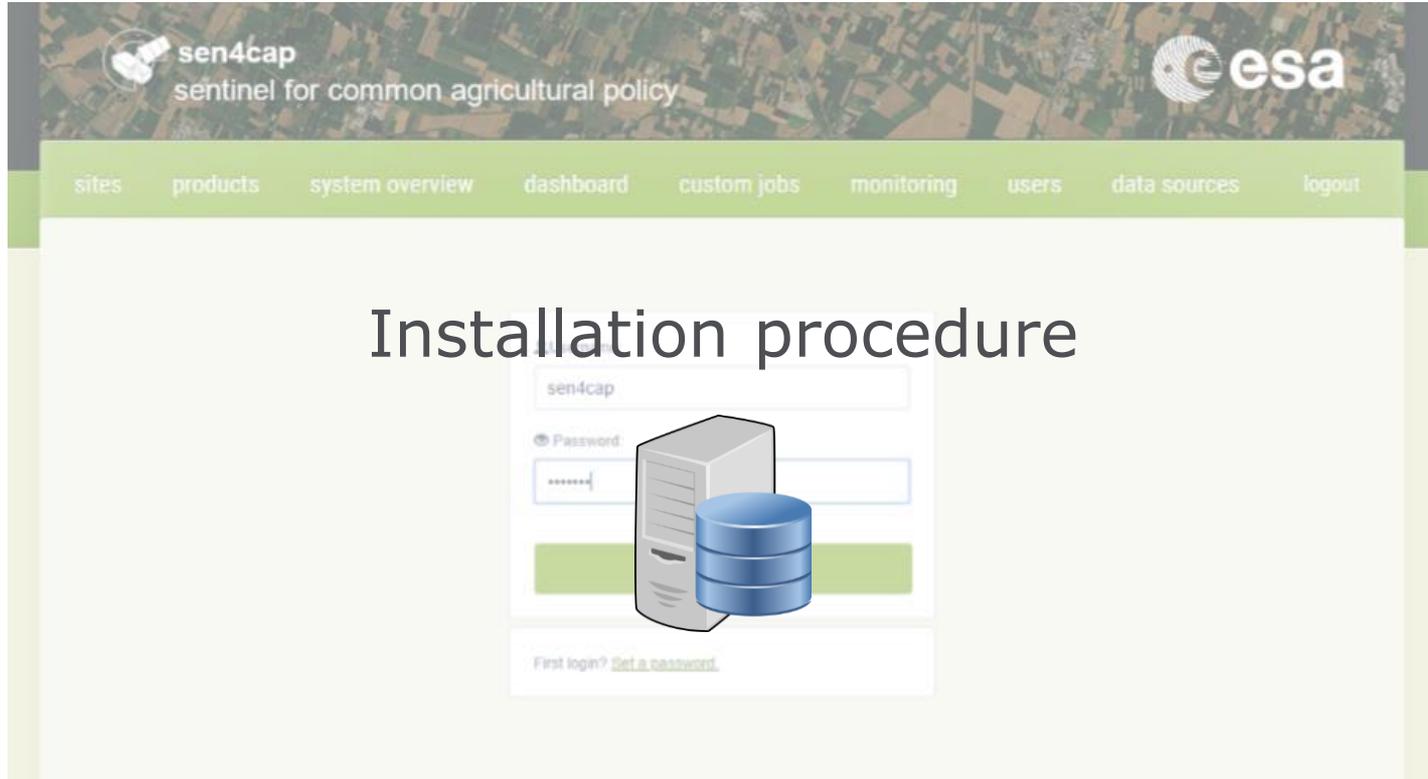


| key                           | friendly_name                                     |
|-------------------------------|---------------------------------------------------|
| archiver.archive_path         | Archive Path                                      |
| archiver.max_age.l2a          | L2A Product Max Age (days)                        |
| archiver.max_age.l3b          | L3B Product Max Age (days)                        |
| archiver.max_age.s4c_l4a      | L4A Product Max Age (days)                        |
| archiver.max_age.s4c_l4b      | L4A Product Max Age (days)                        |
| archiver.max_age.s4c_l4c      | L4A Product Max Age (days)                        |
| demmaccs.cog-tiffs            | Produce L2A tiff files as Cloud Optimized Geotiff |
| demmaccs.compress-tiffs       | Compress the resulted L2A tiff files              |
| demmaccs.gips-path            | path where the gips files are to be found         |
| demmaccs.maccs-launcher       | launcher for maccs within the keeping unit        |
| demmaccs.output-path          | path for l2a products                             |
| demmaccs.remove-fre           | Remove FRE files from resulted L2A product        |
| demmaccs.remove-sre           | Remove SRE files from resulted L2A product        |
| demmaccs.srtm-path            | path where the srtm files are to be found         |
| demmaccs.swbd-path            | path where the swbd files are to be found         |
| demmaccs.working-dir          | working directory for demmaccs                    |
| downloader.enabled            | Downloader is enabled                             |
| downloader.l8.enabled         | L8 downloader is enabled                          |
| downloader.l8.max-retries     | Maximum retries for downloading a product         |
| downloader.l8.write-dir       | Write directory for Landsat8                      |
| downloader.max-cloud-coverage | Maximum Cloud Coverage (%)                        |
| downloader.s1.enabled         | S1 downloader is enabled                          |
| downloader.s2.enabled         | S2 downloader is enabled                          |
| downloader.s2.max-retries     | Maximum retries for downloading a product         |

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



- 1) Add a new job to the system scheduler (by-default parameters)
- 2) Launch a custom job (modified parameters)
- 3) Access the system through a linux terminal
- 4) Installation procedure and ICT requirements



The screenshot shows the 'sen4cap' web application interface. At the top left, there is a logo with a satellite and the text 'sen4cap sentinel for common agricultural policy'. At the top right is the 'esa' logo. Below these is a navigation bar with the following items: 'sites', 'products', 'system overview', 'dashboard', 'custom jobs', 'monitoring', 'users', 'data sources', and 'logout'. The main content area features the title 'Installation procedure' in large black text. Below the title is a login form with a text input field containing 'sen4cap', a password field with a masked password '\*\*\*\*\*', and a green 'Login' button. To the right of the password field is an illustration of a server tower and a blue database cylinder. At the bottom of the form, there is a link: 'First login? [Get a casword.](#)'

## □ System summary

- Open source
- Can be installed on cloud but also on local servers
- Modular and extensible
- Can connect to a variety of data sources for downloading the products (SciHub, DIAS-es, USGS, Alaska Satellite Facility (ASF), etc.)
- Automatic ingestion and pre-processing of the lower level products
- Automatic executions of processors (default mode)
- Manual execution of processors
- Product visualization

# STEP 1

## Create user accounts on data provider platform



- For downloading S2 and L8 acquisitions from the distribution server, the system will need 2 accounts to be provided after the installation (if not plugged on local depository)
  - An account and a password for the ESA Sentinels Scientific Data Hub (SciHub), allowing downloading S2 products. This account can be obtained accessing <https://scihub.copernicus.eu/dhus/#/home>
  - An account and a password for the United States Geological Survey (USGS) portal, allowing downloading L8 products. The account can be created accessing the link <https://ers.cr.usgs.gov/login/> (if L8 desired)



# STEP 2

## Sen4CAP system download



- Go on Sen4CAP website: <http://esa-sen4cap.org/>
- -> Data & Tools -> Download Software



### Software Download

Posted on: 19 November 2019 By: administrator

Name \*

Organization \*

Country \*

E mail \*

Please fill in the form to get access to the installation package.

### Installation package

The installation package of the Sen4CAP system has been split into **4 parts** to ease its download:

- A zip archive containing all the necessary **binaries and setup scripts** (not considering MAJA, see below) [866MB]:
  - **install\_script** – contains the installation scripts that are used to create the distribution and to install the system and the tool needed for the integration of the Sen4CAP processors in SNAP
  - **rpm\_binaries** – the RPM files for all other system components (SLURM, orchestrator, downloader, processors)
- A zip archive containing the **GIPP files** [~1.2GB]: files needed by MAJA 3.2.2
- A zip archive containing the **SRTM dataset** [~16 GB]: files needed by MAJA 3.2.2
- A zip archive containing the **SWBD dataset** [~900 MB]: files needed by MAJA 3.2.2

**IMPORTANT:** **MAJA 3.2.2** that is used by the Sen4CAP system for the atmospheric corrections and non-valid pixels masking – is not included in the installation package of the Sen4CAP system and has to be downloaded separately from the **CNES site**. Nevertheless, MAJA must be installed before running the Sen4CAP installer, as described in the Software User Manual. The Sen4CAP installation script will look for the executable and prompt for its installed path location.

### User manuals

Download the latest **Software User Manual**.

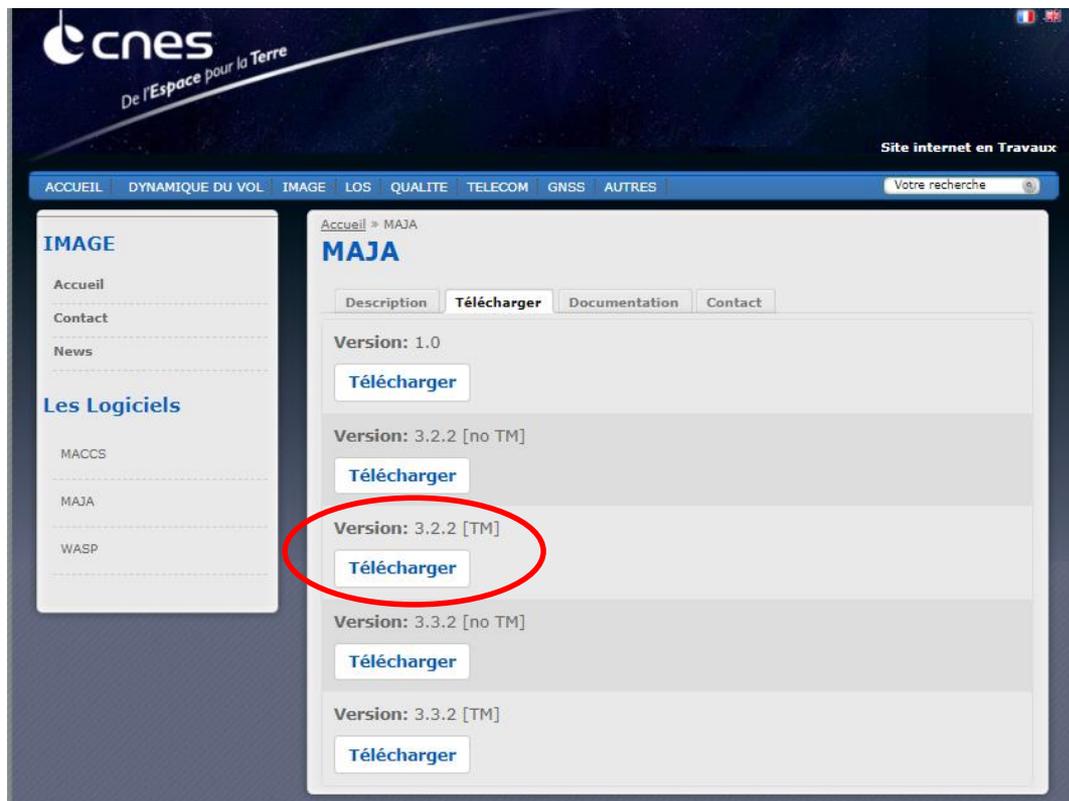
**SUM**

# STEP 3

## CNES MAJA download and installation



- Go on CNES website:  
<https://logiciels.cnes.fr/>
- Download version 3.2.2 TM
- MAJA installation PRIOR to the Sen4CAP system installation
- Instructions for installation are provided by CNES inside of the MAJA installation package



# STEP 4

## Sen4CAP system installation



- Before the installation, some default directories have to be created in the system either physically or mounted. The default directories are:
  - /mnt/archive – this is the default working directory for the system
  - /mnt/upload – the folder where the files from the user are uploaded

Copy the srtm.zip and swbd.zip in the root folder of the installation package

Run the following commands:

```
open a terminal -- go into /install_script folder:
cd /path/to/Sen4CAPDistribution/install_script

Run the install script

sudo ./sen4capPlatformInstallAndConfig.sh
```

This script will automatically install the system (SLURM, orchestrator, processors, downloader, website, the database and all other dependencies) -> the installation is completely automatic, requiring minimum interaction from the user



# STEP 5

## Configure the data provider accounts



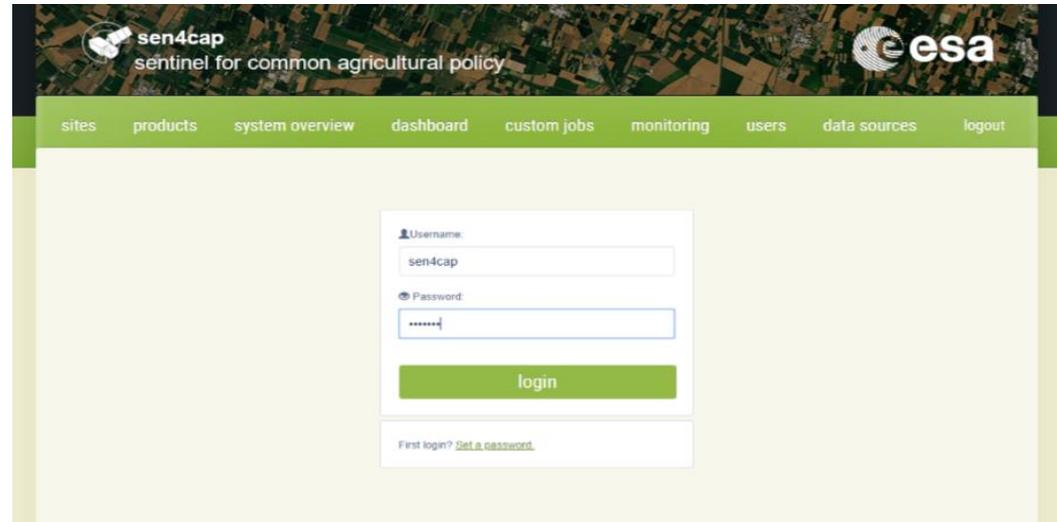
- There are two files which have to be modified after the installation in order to provide the user name and password for both SciHub and USGS servers
  - /usr/share/sen2agri/sen2agri-downloaders/apihub.txt
  - /usr/share/sen2agri/sen2agri-downloaders/usgs.txt

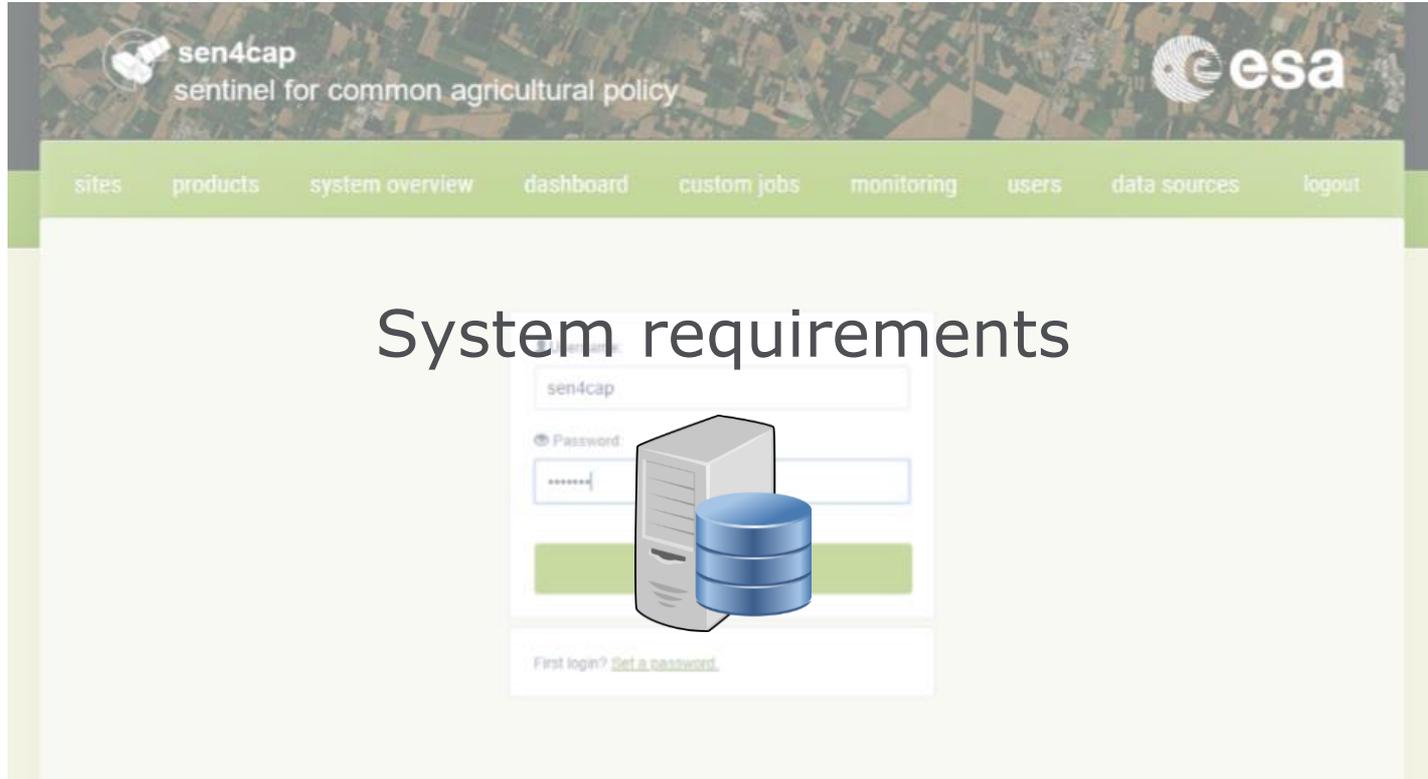
# STEP 6

## Installation is finished



- After the installation is finished, the web Graphical User Interface of the system can be accessed from any web browser.
- The following addresses allow the access:
  - if the user is connected to the same machine as the Sen4CAP system:  
<http://localhost>
  - If not: <http://ipaddress>





The screenshot shows the 'sen4cap' web application interface. At the top left, there is a satellite icon and the text 'sen4cap sentinel for common agricultural policy'. At the top right is the 'esa' logo. Below this is a navigation bar with the following items: 'sites', 'products', 'system overview', 'dashboard', 'custom jobs', 'monitoring', 'users', 'data sources', and 'logout'. The main content area features the heading 'System requirements' in large black text. Below the heading is a login form with a text input field containing 'sen4cap' and a password input field with masked characters. To the right of the password field is an illustration of a server tower and a blue database cylinder. Below the login fields is a green button. At the bottom of the login area, there is a link that says 'First login? [Get a casework](#)'.

## ❑ System requirements

- disk space for system installation -> 80 GB
- disk space for the resulted products (/mnt/archive) -> depends on the number of sites to be defined, the seasons and the number of tiles to be used for each site
- disk space for the internal directory where the shapefiles of the created sites will be uploaded in order to be used by the system (/mnt/upload) -> at least 20 GB is needed
- RAM -> between 64 and 128 GB, depending on the size of the country
- number of CPUs -> between 8 processors and 16 processors (or more), depending on the size of the country
- CentOS 7 (minimum version 7.5) 64-bit

**Small country**  
(Lithuania – 65.300 km<sup>2</sup>)

**Large country**  
(Romania – 238.400 km<sup>2</sup>)

## ICT ressources – Virtual Machine specifications

|                                   | Small country         | Large country         |
|-----------------------------------|-----------------------|-----------------------|
| CPU                               | • 8                   | • 16                  |
| RAM                               | • 64GB                | • 128GB RAM           |
| Storage                           | • 4TB HDD + 150GB SSD | • 4TB HDD + 250GB SSD |
| Object storage (as of 07.11.2019) | • ~ 4 TB              | • ~ 12 TB             |

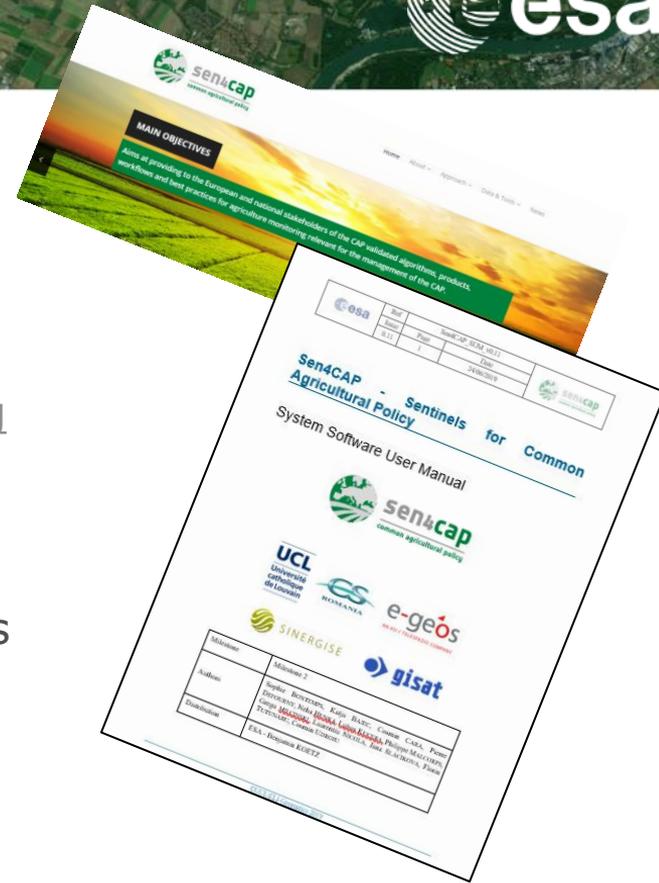
## Products volumetry (including intermediate products)

|                                          | Small country        | Large country              |
|------------------------------------------|----------------------|----------------------------|
| S2 L2A                                   | ~ 3.5 TB             | > 9 TB                     |
| S1 amplitude & coherence                 | ~ 2 TB               | ~ 4 TB                     |
| S2 NDVI, LAI, fCover, FAPAR              | ~ 1 TB               | ~ 2 TB                     |
| Crop type map (every month May-Oct)      | ~ 2 TB               | ~ 4 TB                     |
| Grassland mowing (every 2 weeks Apr-Oct) | ~ 25 GB              | ~ 50 GB                    |
| EFA practices (every week from May)      | ~ 600 GB             | ~ 2.2 TB                   |
|                                          | <b>Total: 9.1 TB</b> | <b>Total: &gt; 21.2 TB</b> |

# Sen4CAP support



- Website: <http://esa-sen4cap.org/>
- A Support User Manual (SUM)
- Product descriptions (data structure, interpretation, etc.) and quick user guide focusing on the use cases
- An address for the questions: [info@esa-sen4cap.org](mailto:info@esa-sen4cap.org)
- In a few months:
  - A section on the website with **FAQ**
  - A **forum** open for the Sen4CAP system users



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

**Any questions?**



**sen4cap**  
common agricultural policy