



sen4cap
common agricultural policy

Welcome to the 10th webinar



The webinar will last around 1h

**The slides will be available on the Sen4CAP website in the coming 48 hrs
(<http://esa-sen4cap.org/>)**

Presenters:

Sophie Bontemps & Diane Heymans from *UCLouvain*

Cosmin Udroi & Laurentiu Nicola from *CS GROUP - ROMANIA*

Members of the consortium available to answer your questions



- Sen4CAP overview
- New use cases for 2022
- System evolution – New version 3.0
 - New web interface
 - Issues and solutions
- Questions & Answers
- Next events

- **Sen4CAP overview**
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Sen4CAP: from an ESA project to a toolbox



Design and
prototyping
2017 – local sites

Demonstration
and validation
*2018 & 2019 – national
NRT*

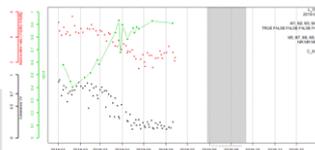
User uptake and
system evolution
2020, 2021, 2022

- Use cases selection
- Products Specifications
- Benchmarked Methods
- Algo & System design
- Prototype products
- Validation



ESA U IED -

- Use cases demonstration
- National scale
- Continuous monitoring
- Validation & Fitness-to-use assessment
- Capacity building and training
- System qualification



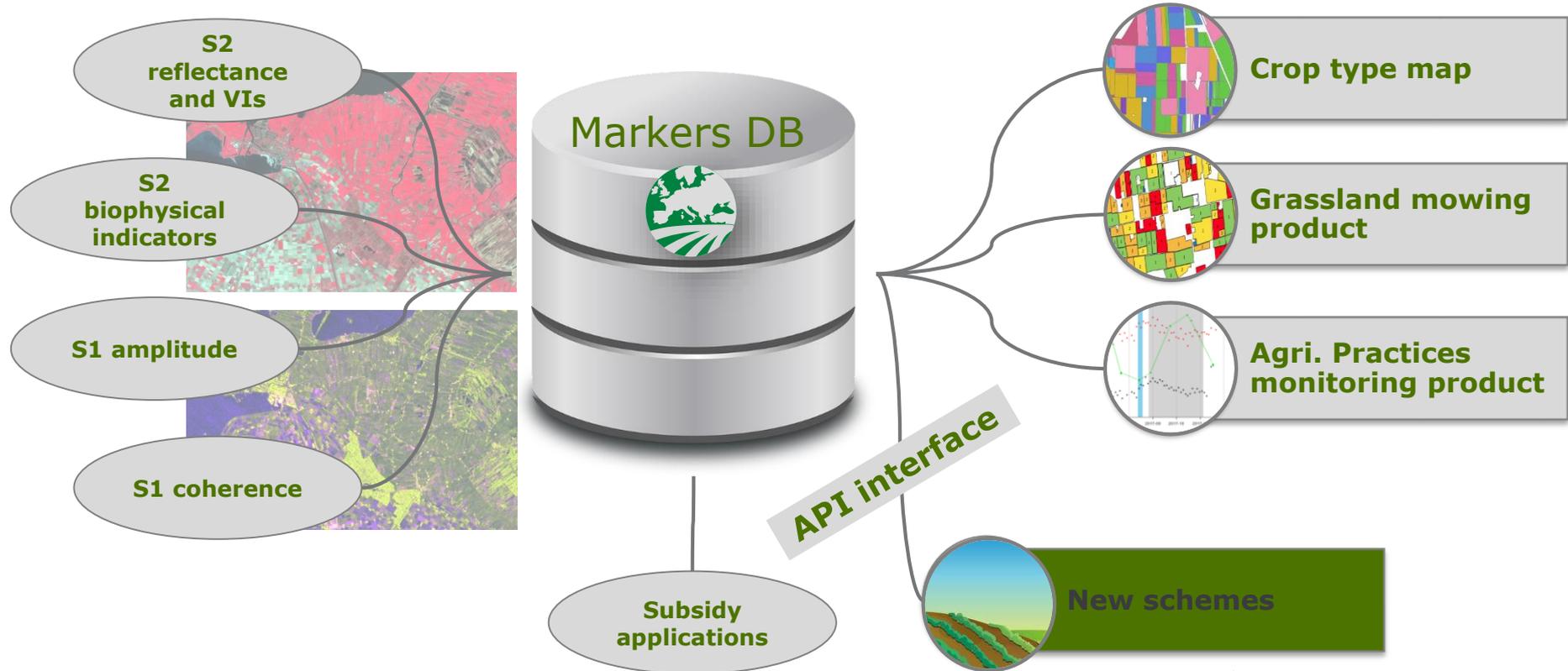
- 330 downloads and 20+ Paying Agencies testing the system on CREODIAS
- System evolution with new use cases to be defined (open call) – moving towards performance
- Training and webinars
- Support to users



10th Sen4CAP Webina

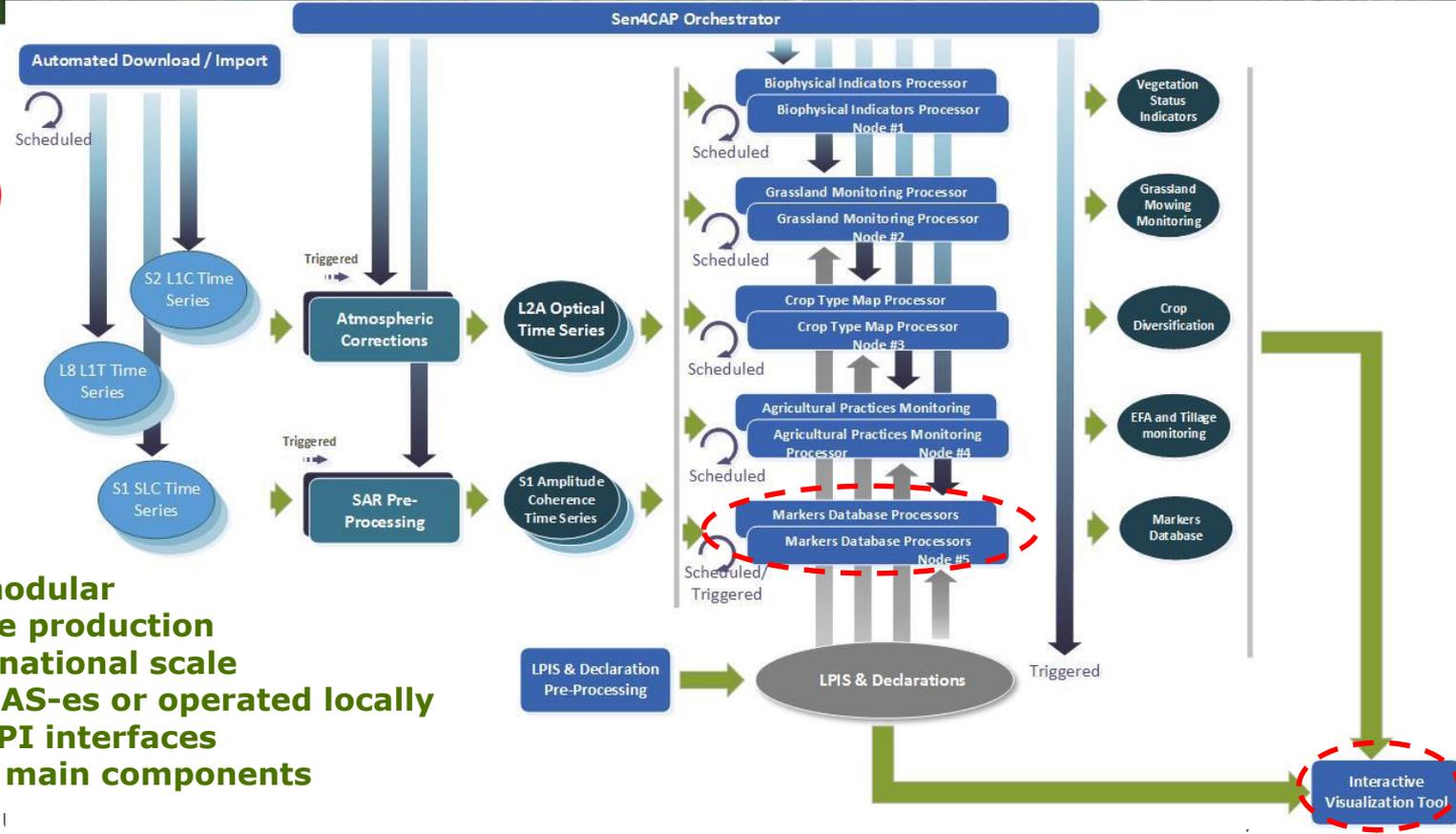


Markers and products assessed through selected use cases but available for many other applications



Sen4CAP – An open-source system

Version 3.0 delivered on 18 Nov 2021



- ❖ Sentinel-1 & -2
- ❖ Automated and modular
- ❖ For NRT or off-line production
- ❖ Demonstrated at national scale
- ❖ Portable on all DIAS-es or operated locally
- ❖ User-friendly & API interfaces
- ❖ Dockerization for main components

ESA UNCLASSIFIED - For Official I

Sen4CAP is free and open source Based on open source existing software



Under GNU-GPL License



Based on **Orfeo ToolBox** framework



Cluster-ready architecture for distributed processing



Integration of **SNAP** tools and processing chains



Operational system required : **CentOS7**
(GNU/LINUX)



PostgreSQL and **PostGIS** implementation



Sen4CAP system : simple parametrization and subsidy application upload



Before the monitoring period

Monitoring period

System initialization



Start of the season

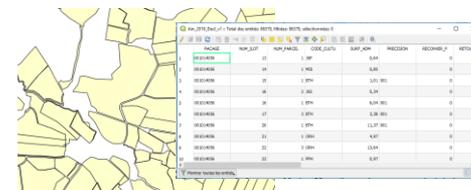
End of the season...



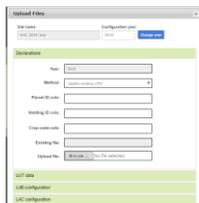
Sen4CAP system : main parameters settings

Area of Interest	Shapefile to be uploaded
Monitoring period	Start and end dates to be defined
S1+S2 / S1+S2+L8	L8 to be selected

Subsidy application



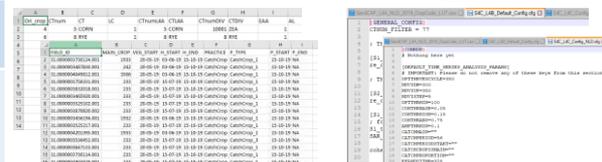
Upload data



Sen4CAP system : data from PA

Subsidy application (shp)	Subsidy application layer (shapefile)
Tables and config files (csv)	L4A crop code LUT L4B config file L4C config file + agri practices tables

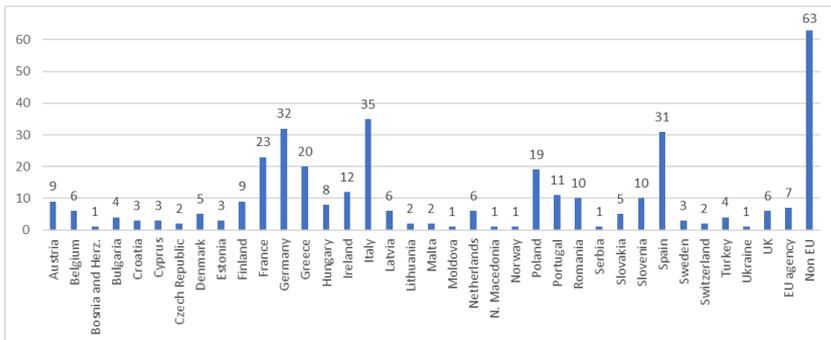
Tables and config files



User community & Support

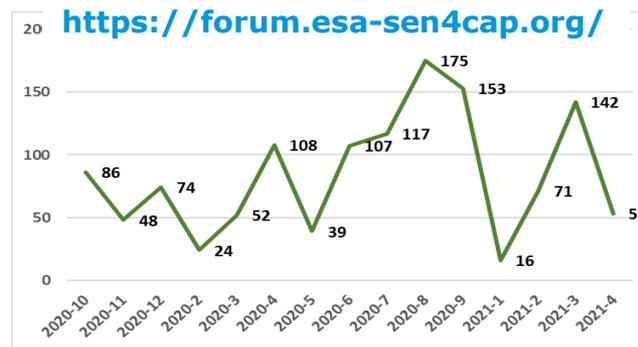


370 downloads since November 2019



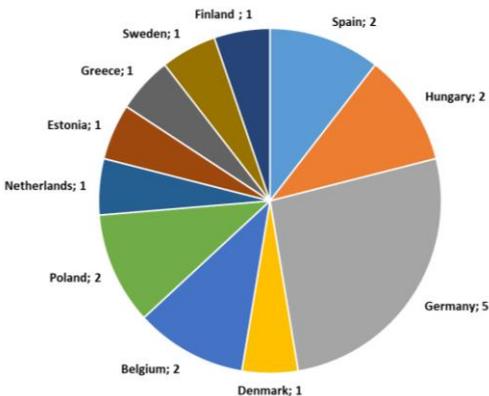
Online forum

492 posts – 100 users



Webinars and Q&A sessions
Hands-on & online trainings
All resources online

20+ Paying Agencies accessing **test Virtual Machines** on CREODIAS



<http://esa-sen4cap.org/content/presentations>

sen4CAP Webinar, 15 February 2022



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Markers DB evolution towards the new CAP regulations – From compliancy to performance



- ❖ **Nov 2021:** Call for new use cases
- ❖ **Jan 2022:** 3 to 5 use cases selected by consortium and ESA
- ❖ **Jan-Jun 2022:** Benchmarking, including assessment (consortium and Paying Agency)
- ❖ **Jul-Oct 2022:** Implementation in Sen4CAP and documentation

New use cases

- Focus:
 - Key use cases missing in the current Sen4CAP
 - Supporting the transition towards performance regulations
- Active participation of Paying Agency:
 - Sharing in situ data to perform R&D and validation
 - Contributing to the validation / fitness-to-use assessment
- R&D and implementation feasible in 6 months
- Of interest for more than one region / country
- No budget for Paying Agency, only manpower from the Sen4CAP consortium

Proposals received 10+ Paying Agencies



Use Case 1. Sub-parcel heterogeneity marker(s)

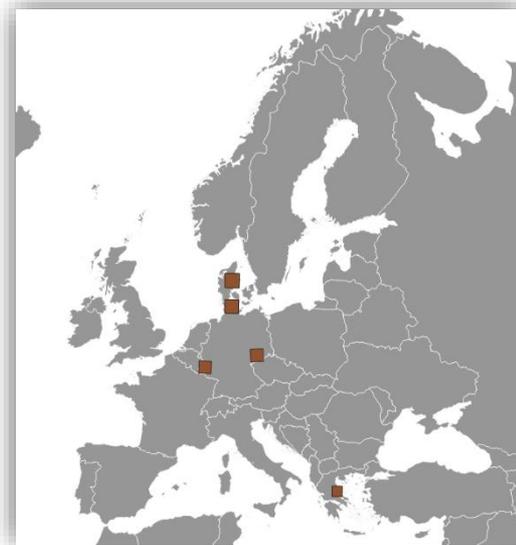
- Spatial non-congruency

Purpose is to determine the presence of a spatially continuous cluster of pixels that exhibits a different signature from the expected scenario within the declared parcel.

Ex. *Disparate crop types or management within the same parcel boundary*

Part of the "Baseline Phenomenon"

New analysis – Per pixel



- Germany - Saxony
- Germany –Schlewig-Holstein
- Danish
- Greece – Opekepe
- Luxembourg
- Latvia (TBC)

Use Case 2. Change in categories between years (AL, PC, PG)

- Part of the “Baseline Phenomenon”
- Change detection based on :
 - Time series changes
 - Degree of similarity
 - Agricultural Activities
 - ...



- *Germany - Saxony*
- *Luxembourg*

New analysis – Multi-annual

Use Case 3. Bare soil markers

- Presence of vegetation during all year, including during winter when less S2 images are available

Ex.

- **Long cover** (or Catch Crop destruction)
- Permanent Grassland Ploughing
- Indicator of erosion



New analysis – SAR Indices



- *Belgium – Walloon Region*
- *Luxembourg*
- *Sweden*

- Possibility for external users to add his own **indices**
 - New “basic” markers will be implemented in the system
 - E.g.: **median** for the S2 bands will be implemented (slower than mean, thus not implemented by default but as an option to activate)
 - Other “basic” markers” to propose? **Inform us before 31st March!**
 - Possibility for users to create now indices (ratio, sum, differences, etc.) based on implemented “basic”
- Information on selected training parcels (L4A)
 - Charts of time-series (mean & stdev)

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May
2019

BETA version

Only available for
the PAs

25th of
Nov
2019

Version 1.0 release candidate

Open-source

Possibility for the
PAs to access a
test machine with
the system

2020

Version 1.1, 1.2, 1.3

1st consolidated
version

Big evolutions:

- Corrections in the advanced processors
- Sen2Cor L2A compatible
- Move of the system database to a docker container
- ...

January
2021

Version 2.0

Big evolutions:

- Markers database
- Tillage processor
- Dockerization
- ...

November
2021

Version 3.0

Big evolutions:

- Web interface (system configuration)
- Products visualization
- Additions in MDB
- Secured services
- Dockerization
- ..

New web interface



The system is accessible now from : <http://localhost:8080/ui/login.html>

The screenshot displays the Sen4CAP web interface with several overlapping panels:

- Site manager:** A table listing sites with columns for Site name, Short name, Season name, and Seasons. It includes a 'Create new site' button.
- SEN4CAP BROWSER:** A tree view showing a hierarchy of products, including L2 Atmospheric correction, L3B product, L1C product, Sentinel 1 L2 Amplitude product, Sentinel 1 L2 Coherence product, Sen4CAP L4A Crop Type product, Sen4CAP L4B Grassland Mowing product, and LPIIS product.
- PROPERTIES:** A panel showing the properties of a selected site, including a list of attributes and a 'Save' button.
- Map View:** A satellite map showing the geographical location of the selected site, with a 'Markers' list and a 'Quick Preview' graph.
- S4C L4A Crop Type:** A configuration panel for the L4A Crop Type product, featuring various settings such as 'LC classes to assess', 'Number of RF trees', 'Target sample count for SMOTE', 'Training ratio for common crop types', 'Minimum parcels to assess a crop type', 'Minimum number of S1 pixels', 'Mode', 'Minimum node size', 'Number of SMOTE neighbours', 'Training ratio for uncommon crop types', 'Upper threshold for parcel counts by crop type', 'Minimum number of S2 pixels for parcels to use in training', 'Minimum number of S2 pixels', and 'Lower threshold for parcel counts by crop type'. Each setting has a numeric input field and a '+' or '-' button to adjust the value.



MDB 1 : Single dates markers (values directly derived from Sentinel-1 and Sentinel-2 time series), also **for each Sentinel-2 band (mean +stdev)**

!! None by default – to be configured
!! Generated by tiles

MDB 3 : PRACTICE markers (from Sentinel-1 and Sentinel-2) corresponding to the “HARVEST” markers of the L4C Agricultural Practices processor

+ *Secured Sen4CAP services via HTTPS and authentication tokens usage*

Known issue 1 : S2 L1C change format



Imminent deployment of Sentinel-2 Processing Baseline 04.00 on 25 January 2022

21 January 2022

Further to our news of [15 December 2021](#), we are pleased to confirm the imminent deployment of Processing Baseline 04.00 on **25 January 2022**.

As anticipated, the transition from the present baseline (currently PB-3.01 for both Level-1C and Level-2A products) to the new baseline PB-04.00 will be applied starting at a given Datatake of transition for each of the Sentinel-2A and Sentinel-2B production flows.

Referring to the applicable Sentinel-2 Acquisition Plans for [Sentinel-2A](#) and for [Sentinel-2B](#), the first Sentinel-2A/B Datatakes that will result featuring the new PB-04.00 are the following:

- Sentinel-2A: the Datatake identified as "34435-1", with sensing start time at 03:20 UTC approximately, along Sentinel-2A orbit 34435- Sentinel-2B: the Datatake identified as "25526-1", with sensing start time at 02:29 UTC approximately, along Sentinel-2B orbit 25526

It is further highlighted that the latest version of SNAP (available [here](#)) is supporting the new products format, and that the Sen2Cor plug-in processor has been updated as described [here](#).

We would like to wish all users a smooth and successful transition.

<https://sentinels.copernicus.eu/web/sentinel/-/copernicus-sentinel-2-processing-baseline-04-00-25-01-2022>

→ Format of Sentinel-2 L1C product changed on the 25th of January 2022

How to deal with this new format in Sen4CAP ?

1. A new version of MAJA is available for update and a docker with this version will be created

<https://labo.obs-mip.fr/multitemp/maja-4-5-is-now-available/>

2. Use the ESA L2A images (processed with Sen2COR)

Known issue 1 : S2 L1C change format



1. Soon, a new version of MAJA will be available for update and process S2 data
 - Only change in the docker within the system (and download the GIPP)

MAJA image name	sen4x/maja:4.3.1-centos-7	+
processor.l2a.maja.gipp-path:	/mnt/archive/gipp_maja_4.3.1	

2. Use the ESA L2A images (processed with Sen2COR)

L2A processor to use for Sentinel-2 products (`maja` or `sen2cor`)	MAJA	+
L2A processor to use for Sentinel-2 products (`maja` or `sen2cor`)	Sen2Cor	+

If download with the system (possibility to be site specific)

downloader.use.esa.l2a:	FALSE	+
downloader.use.esa.l2a:	TRUE	+

When Using local root – change for the full machine

Local root:	/eodata/Sentinel-2/MSI/L1C
Local root:	/eodata/Sentinel-2/MSI/L2A

The full time series must be pre-processed with the same algorithm (MAJA or Sen2COR) – don't change within the season)

News

Copernicus Sentinel-1B anomaly

23 December 2021

Copernicus Sentinel-1B is unavailable since 23 December 2021 at 06:53 UTC, no data are being generated. An anomaly occurred onboard, that will require some time for detailed analyses. The satellite is in a nominal mode, the SAR has been temporarily switched off. Further news will be issued on the recovery operations.

Copernicus Sentinel-1B anomaly (4th update)

28 January 2022

Following the [previous news](#) on the Sentinel-1B anomaly that occurred on 23 December 2021, very detailed investigations related to the satellite power system's affected unit are on-going, and will require some additional weeks.

The objective is to identify the root cause of the anomaly and then possibly perform new attempts for the reactivation of the unit.

The satellite remains under control, the thermal control system works properly and the regular orbit control manoeuvres are routinely performed.

- No certainty that past data will be recovered
- How to deal in Sen4CAP?

1. Work only with S2 data for "Crop Type map" and "Grassland mowing", but not advised for "EFA practices"

2. Possibility to create 12 days coherence using only S1A

- ✓ processing OK
- ✓ likely impact on results

Know issue 2 : absence of Sentinel-1B



1. Work only with S2 data :

➤ “Crop Type map” :

Mode (both, s1-only, s2-only)	Both	+
	↓	
Mode (both, s1-only, s2-only)	S2 only	+

➤ “Grassland mowing” :

Input product types	S1_S2	+
	↓	
Input product types	S2	+

2. Possibility to create 12 days coherence using only S1A

S1 master name	S1B	+
	↓	
S1 master name	S1A	+

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Problem to login to website interface



<https://forum.esa-sen4cap.org/t/problems-with-login-via-website-interface-after-update-to-version-3-0/448>

- The website is accessible through the port 8080. It needs to be opened (ex. <http://localhost:8080/ui/login.html>)
- Other port such as 8082 or 8083 are only used internally by the sen4CAP services and do not need to be open
- It is also possible to create an https (and authentication token usage) by manually change the file :

`/usr/share/sen2agri/sen2agri-services/config/application.properties`

```
# HTTPS Configuration
# The server.port value defined here has precedence over the one set in
services.properties
server.port = 8443
server.ssl.enabled = true
server.ssl.key-store = </your/SSL/certificate/path/here>
server.ssl.key-store-password = <your_SSL_certificate_password_here>
server.ssl.keyStoreType = PKCS12
server.ssl.keyAlias = Sen2Agri-Services
```



<https://forum.esa-sen4cap.org/t/l2-s1-pre-processing-errors/306/10>

→ When running on Creodias:

→ preferred fetch_mode for datasources is "Direct link to products" and not "Symbolic link"

```
psql -U admin sen4cap -c "delete from l1_tile_history where satellite_id = 3"  
psql -U admin sen4cap -c "delete from downloader_history where satellite_id = 3"  
sudo systemctl restart sen2agri-services
```

→ "processor.l2s1.copy.locally" to be set on true

```
psql -U admin sen4cap -c "update config set value = true where key = 'processor.l2s1.copy.locally' "  
sudo systemctl restart sen2agri-services
```

→ How to re-launch the S1 pre-processing (ex. In case of errors like "Not enough disk space")

```
psql -U admin sen4cap  
sen4cap=# delete from l1_tile_history where downloader_history_id in (select id from downloader_history where satellite_id = 3  
and status_id = 6);  
sen4cap=# update downloader_history set status_id = 2 where satellite_id = 3 and status_id = 6;  
sen4cap=# \q  
sudo systemctl restart sen2agri-services
```

L3B vegetation status not working



<https://forum.esa-sen4cap.org/t/l3b-vegetation-status-not-working-v3-0/457>

→ First check that sen2agri-services are running and try to restart them if inactive:

```
sudo systemctl status sen2agri-executor sen2agri-orchestrator sen2agri-scheduler  
sudo systemctl restart sen2agri-executor sen2agri-orchestrator sen2agri-scheduler
```

→ Slurm installed and running correctly ?

→ First check: are SLURM services running

```
sudo su -l sen2agri-service  
srun ls -al
```

→ In case a list of files is not displayed, then try restarting SLURM services:

```
sudo systemctl restart slurmctld slurmdbd slurmd
```

→ In case of "srun command not found" errors, re-installation of slurm should be considered

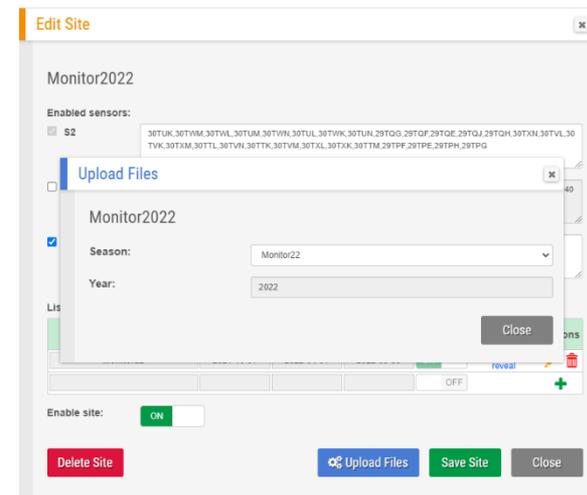
```
sudo yum -y install slurm slurm-slurmctld slurm-slurmd slurm-devel slurm-pam_slurm slurm-perlapi  
slurm-slurmdbd slurm-torque slurm-libs
```

Uploading files not working



<https://forum.esa-sen4cap.org/t/uploading-files-not-working-in-v3-0/459>

- For the moment the upload does not work with a site with two seasons
- And also when one season covers 2 years - start of the season is in one year and the middle of the season in the next year:
 - Change the year it manually in the db :



```
psql -U admin sen4cap -c "update site_auxdata set year = '<year>' where site_id = <site_id> "
```



L4A has NULL values (1%)



<https://forum.esa-sen4cap.org/t/l4a-has-null-values-1/442>

→ There could be various reasons for which the parcel is not classified :

1. too small parcels (less than 1 S1Pix and 3 S2Pix after the buffer)
2. small crop type with less than 30 parcels (importance of good Crop Code LUT)
3. Land cover not in the classified one
4. parcels that has problem in their geometries (those parcels are not presents in the results of the classification) :

① LC classes to assess +

GeomValid = 0 (invalid geometry)

Duplic = 1 (duplicated parcel)

Overlap = 1 (parcel overlapping another parcel)

+ Problem in the pre-processing of S1 (or S2) ?



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- **Forum** for your questions about the system 3.0 (and other)
- Your **propositions for new « basic » markers** to be implemented in the Markers Database by email (info@esa-sen4cap.org) until 31st March 2022
- Next **webinar** planned for early May **2022**
- **ESA Living Planet Symposium (23-27 May 2022, Bonn - Germany)**
<https://lps22.esa.int/frontend/index.php>

Sen4CAP presentation and demo (more information to come)

- Workshop during the next **Panta Rhei conference** (June 22, Germany) – to be confirmed
- **Your questions ???**

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



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common agricultural policy