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SnapEarth Pilot - EarthAgriculture

www.snapearth.eu

Cosmin UDROIU
CS GROUP - ROMANIA

ACTIVITIES AND MAIN CLIENTS

- › During its 30 years of market presence, CS GROUP - ROMANIA has carried on complex IT projects and has significant expertise in software development and maintenance for critical information systems



SPACE

- Earth Observation
- Flight Dynamics
- Scientific Missions
- Navigation
- Onboard Software
- Software for EGSE
- ...



AERONAUTICS

- FADEC
- Multifunctional Display
- Flight Display Systems
- Flight Warning Systems
- Air Traffic Control (ATC) controller-pilot communications
- ...



ENERGY

- Systems Integration at Control Centre levels
- SCADA and Automation Systems
- Information systems for Power Generation Management Systems
- Information Systems for Oil & Gas production



SOFTWARE OUTSOURCING

- Third Party Software Applications Maintenance
- Passenger Information Systems for public transport
- Software development and V&V for Railway Systems
- Automation Systems for Automotive Industry

DEVELOPMENT AND MAINTENANCE SOFTWARE APPLICATIONS

DEVELOPMENT, TEST AND IV&V EMBEDDED SOFTWARE

COMMAND & CONTROL SYSTEMS

MAIN CLIENTS



What Is EarthAgriculture?



- An online service for improvement of agricultural management practices
 - By providing reports and statistical analysis of the green vegetation status (corresponding to the crop vegetative development) @ 10m
 - By providing cropland masks (binary maps separating annual cropland areas from other areas) @ 10m
 - By providing crop type maps: main crop types with a minimum mapping unit of 0.01ha (or 100 Sentinel-2 pixels) @ 10m
 - By providing agricultural and EFA practices and basic markers
 - By performing the grassland growing monitoring
- Over an area of interest and a time period (season)
Either **on demand** or **continuously monitoring**
- Build on the ESA Sen2-Agri (<http://www.esa-sen2agri.org/>) and Sen4CAP (<http://esa-sen4cap.org/>)

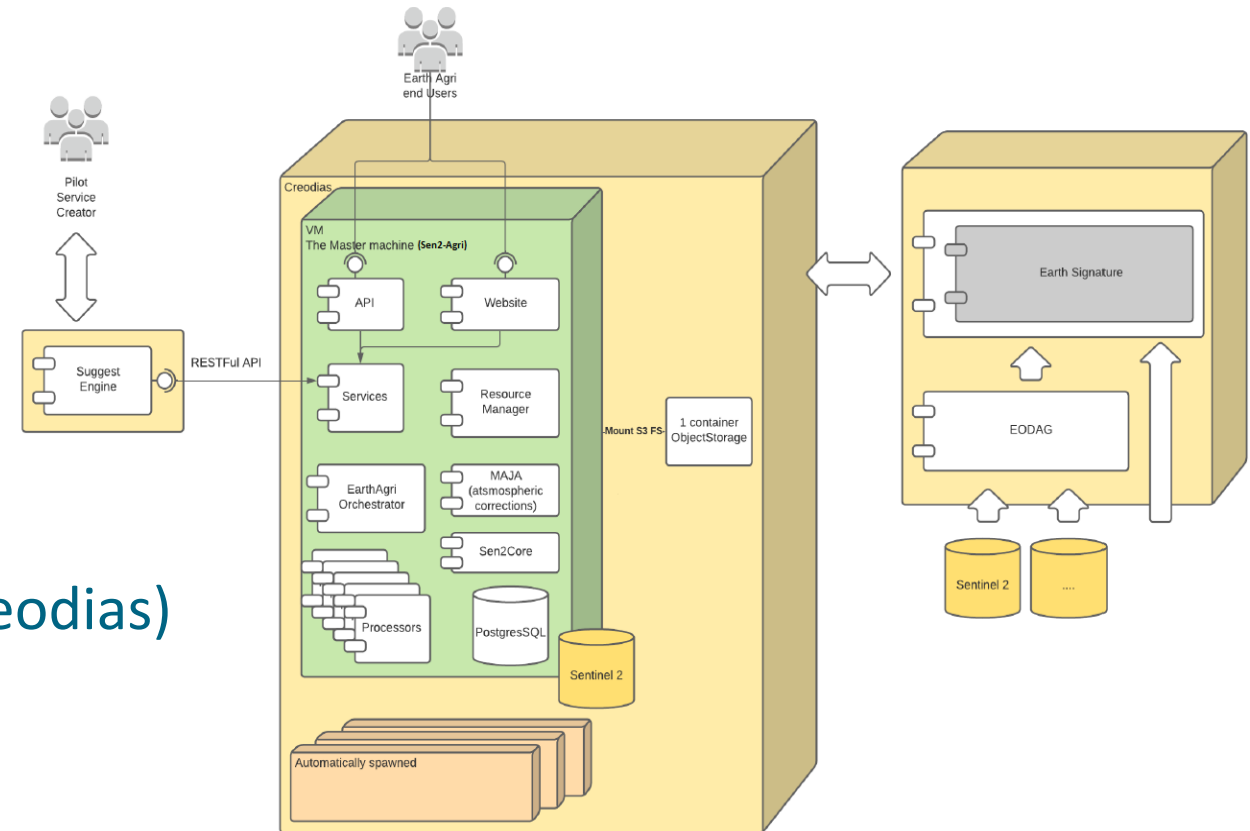
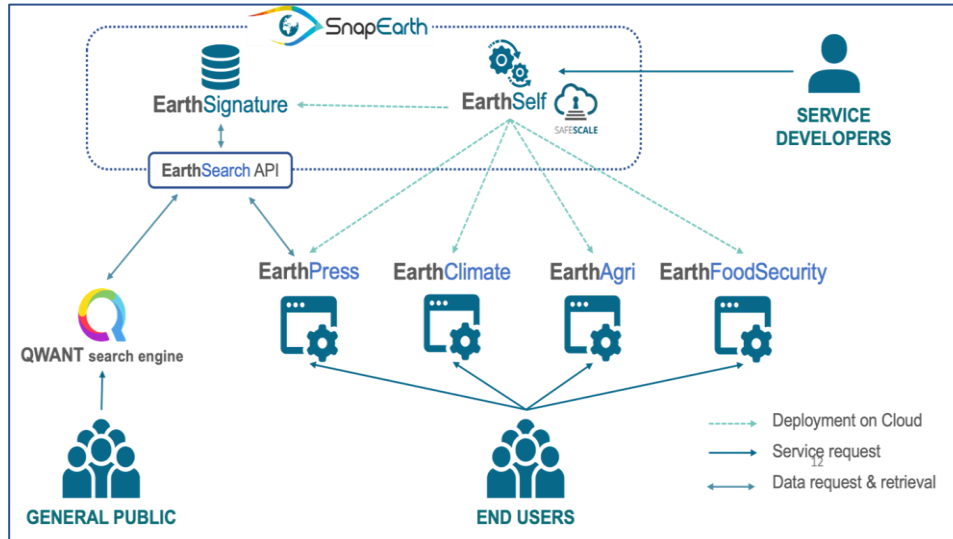
What Is EarthAgriculture?



Advantages using a service rather the standalone implementation

- ☐ **Service-oriented**
- ☐ **No installation** (cloud service)
- ☐ **Dynamic scaling** of resources
- ☐ User-provided in-situ data or **EarthSignature** land cover for Crop Type classification
- ☐ **Enhanced** user interface

EarthAgriculture architecture



➤ Deployed on a machine in cloud (Creodias)

- 16 vCPU
- 128 GB RAM
- 400 GB HDD
- 1 TB Object Storage

User's Dashboard – Define request



- Web based (wizard like) service to create orders for generating EO derived data products
- Create service orders
 - ✓ Vegetation indices
 - ✓ Crop Mask
 - ✓ Crop Type
 - ✓ Parcel level crop type
 - ✓ Agricultural practices
 - ✓ Markers database
- A name is provided to identify easily the request in the dashboard
- User can specify if he needs additional support

The screenshot shows the "User Service Request" form in the EarthAgriculture dashboard. The form is titled "Define your service request" and includes a "Services list" section with a dropdown menu. The dropdown menu is open, showing a list of services: "EarthAgriculture - Vegetation Indices", "EarthAgriculture - Crop Type", "EarthAgriculture - Crop Mask", "EarthAgriculture - Parcel Level Crop Type", "EarthAgriculture - Markers Database", and "EarthAgriculture - Agricultural Practices". Below the dropdown, there are several paragraphs of text describing the services. The form also includes a section for "Please enter a name to your request" with a text input field and a "30 characters max" limit. At the bottom, there is a section for "Your foreseen activities and support needs" with a text input field and a checkbox for "Request additional support". The form has "Cancel" and "Next" buttons at the bottom.

User's Dashboard – AOI and interval selection (1)



- Define new AOI
- Reuse from existing requests
- Select EO to be used

A screenshot of the EarthAgriculture web application interface. The page title is "User Service Request". In the top right corner, there are links for "Dashboard" and "Products", and a "logout" button. The main content area is a form titled "Define your region of interest, region of interest and service availability". The form has two sections. The first section, "Area of interest and sensing period", contains two radio buttons: "Define a new area of interest" (which is selected) and "Reuse the area of interest and data from a previous service request". Below the radio buttons is a paragraph of text: "If you reuse the data from an existing request, you cannot increase the area of interest or sensing period, but you can reuse existing EO and Dynamic Crop Mask products, decreasing the processing time and costs." Below this text is a dropdown menu labeled "-- Select service --". The second section, "Earth Observation Data", contains the text "Select Earth observation data to be used." and two checkboxes: "Sentinel2" (which is checked) and "Landsat8" (which is unchecked).

User's Dashboard – AOI and interval selection (2)




- Choose the area of interest. The user can define AOI by:
 - o Selecting a polygon on map
 - o Providing a shapefile
 - o Selecting from a list of NUTS
- The user can define season, excluding month(s)

Region of interest

Please define your Region(s) of Interest using a GIS layer in ESRI Shapefile (in a zip file including all the components of the layer), GeoJSON or KML format.

No file selected.

Maximum file size: 5 MB



Min Latitude

43.626778

Max Latitude

48.257163999999999

Min Longitude

20.261024

Max Longitude

29.6643310000001

Continent

Europe

Country

Romania

Region

-- Select region --

Sensing period

Select the sensing period of the data that will be used. The period can be maximum one year!

From:

2022-01-01

To:

2022-06-30

Except Month:

Additional data specifications

Detail here any other complementary information about the selection of your datasets.

Free text (300 words max.)

Free text (300 words max.)

Previous

Next

User's Dashboard – Services parametrization



- Parametrize selected services
 - ✓ Configure particular parameters of the service
 - ✓ Choose the execution schedule type :
 - Once, at a given date
 - Cyclic, after X days, starting from a given date
 - Repeat, at a specific day of month, starting from an initial date

EarthAgriculture

Dashboard Products

User Service Request

logout

Parameterize the selected services

Parcel Level Crop Type

⚠ This service needs LPIS and LUT files

Parcel Level Crop Type: a subset of the parcels from the declaration dataset is used to train the Random Forest model which is then applied to the whole declaration dataset

Mode (both, s1-only, s2-only) Both

Scheduled type

Season name	Schedule type	First run time	Repeat
asasa_1_S4C_L4A	Repeat	2022-07-04 00:00:00	Every 31 day of month

[Previous](#) [Next](#)

EarthAgriculture

Dashboard Products

User Service Request

logout

Parameterize the selected services

Vegetation Indices

Vegetation Status Indicators: informs about the evolution of the green vegetation corresponding to the crop vegetative development

☐ Produce NDWI ☒ Produce NDVI

☒ Produce LAI ☐ Produce input domain flags

☒ Produce FCOVER ☒ Produce FAPAR

Scheduled type

Season name	Schedule type	First run time	Repeat
asas_1_L3B	Cycle	2022-01-02 00:00:00	After 1 days

[Previous](#) [Review and submit the request](#)

- If the processor is requiring additional data (LPIS, in-situ data, other configuration files), you will be informed about this

User's Dashboard – Review request before submit



- Review the request before submitting it
- Accept terms and conditions
- Can go back and change some parameters, if needed

EarthAgriculture Dashboard Products logout

User Service Request

Summary information on your service request

This is a collection of information that you have selected.

About your service request

Requested service	EarthAgriculture - Vegetation Indices
Request name	aaa
Additional support	

Parameters

Earth Observation Data

Sentinel2	✓
Landsat8	X

Service Data

Vegetation Indices				
Produce FAPAR	✓			
Produce FCOVER	✓			
Produce input domain flags	X			
Produce LAI	✓			
Produce NDVI	✓			
Produce NDWI	X			
Schedule type	Season name	Repeat Type	First time run	Repeat
	aaa_1_L3B	1	2022-01-02 00:00:00	After 1 days

Region of interest

Continent	Europe
Country	Romania

Sensing period

From	2022-01-01
To	2022-06-30
Except	
Additional data specifications	

☒ I have read and agree to the [Terms and conditions](#).

[Back and edit](#) [Submit the request](#)

User's Dashboard – Upload necessary user files



- Files needed from user can be uploaded:
 - LPIS
 - LUT
 - Processors specific configuration files
 - Insitu data
- Not necessary to be uploaded during request creation
 - Can be uploaded later (when available), in Dashboard, by editing request

The screenshot shows the EarthAgriculture dashboard. At the top, there's a header with the "EarthAgriculture" logo and navigation links for "Dashboard" and "Products". A "logout" link is also present. The main content area is titled "Dashboard" and contains a section for "Upload Files". This section includes a sub-header "Upload Files" and a note: "This is a section of additional information for your request." Below this, there's a form for "Test2" with a tab labeled "Declarations". The form has two main sections: "Upload files:" and "LPIS:". The "LPIS:" section contains two input fields, one for "LPIS:" and one for "LUT:", each with a "Browse..." button and the text "No file selected.". At the bottom right of the form are "Upload" and "Import" buttons. Below the form, there's a list of configuration files: "L4B Configuration", "L4C Configuration", "L4C CC practices infos", "L4C FL practices infos", "L4C NFC practices infos", "L4C NA practices infos", and "Insitu data". A "Done" button is located at the bottom right of the dashboard.

User's Dashboard – View the submitted requests



- View submitted requests in dashboard and their statuses
- View details for each request (similar with summary before submit + storage used and costs, finished or canceled processes, estimated time to finish)
- Cancel one, several or all services in the order
- Get support or report an incident
- Finalize the request (free the resources, delete all products for this request)

The screenshot shows the EarthAgriculture dashboard. At the top, there's a header with the EarthAgriculture logo, a "Dashboard" link, and a "Products" link. Below the header, there's a "Service user request" button. The main content area displays two request cards. The first card, titled "Test2", shows a period from 2020-04-01 to 2020-10-30, services including Crop Mask, Markers Database, Agricultural Practices, Parcel Level Crop Type, Vegetation Indices, and Crop Type, and a status of "Submitted". The second card, titled "Test", shows a period from 2022-01-01 to 2022-12-31, services including Vegetation Indices, Crop Mask, Crop Type, Parcel Level Crop Type, Agricultural Practices, and Markers Database, and a status of "Submitted". Both cards have buttons for "Details", "Edit", "Cancel processors", "Finalize request", "Get support", and "Report incident".

EarthAgriculture

Dashboard

Service user request

Test2

Period	2020-04-01 / 2020-10-30
Services	Crop Mask, Markers Database, Agricultural Practices, Parcel Level Crop Type, Vegetation Indices, Crop Type
Status	Submitted

Details Edit Cancel processors Finalize request Get support Report incident

Test

Period	2022-01-01 / 2022-12-31
Services	Vegetation Indices, Crop Mask, Crop Type, Parcel Level Crop Type, Agricultural Practices, Markers Database
Status	Submitted

Details Edit Cancel processors Finalize request Get support Report incident

User's Dashboard – Product Browser



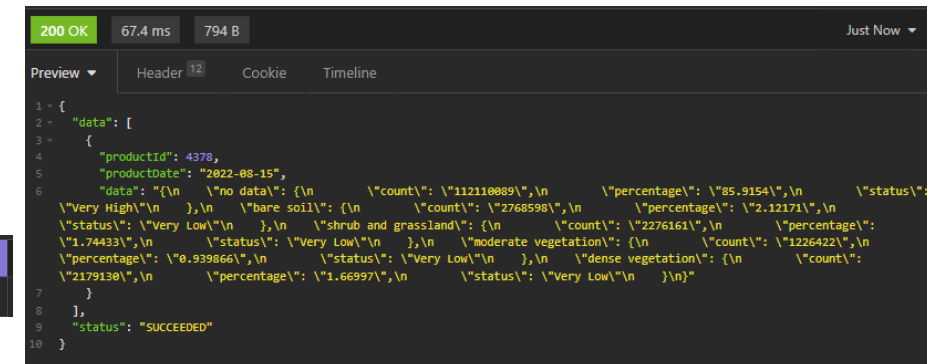
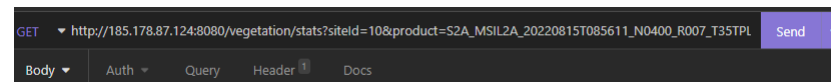
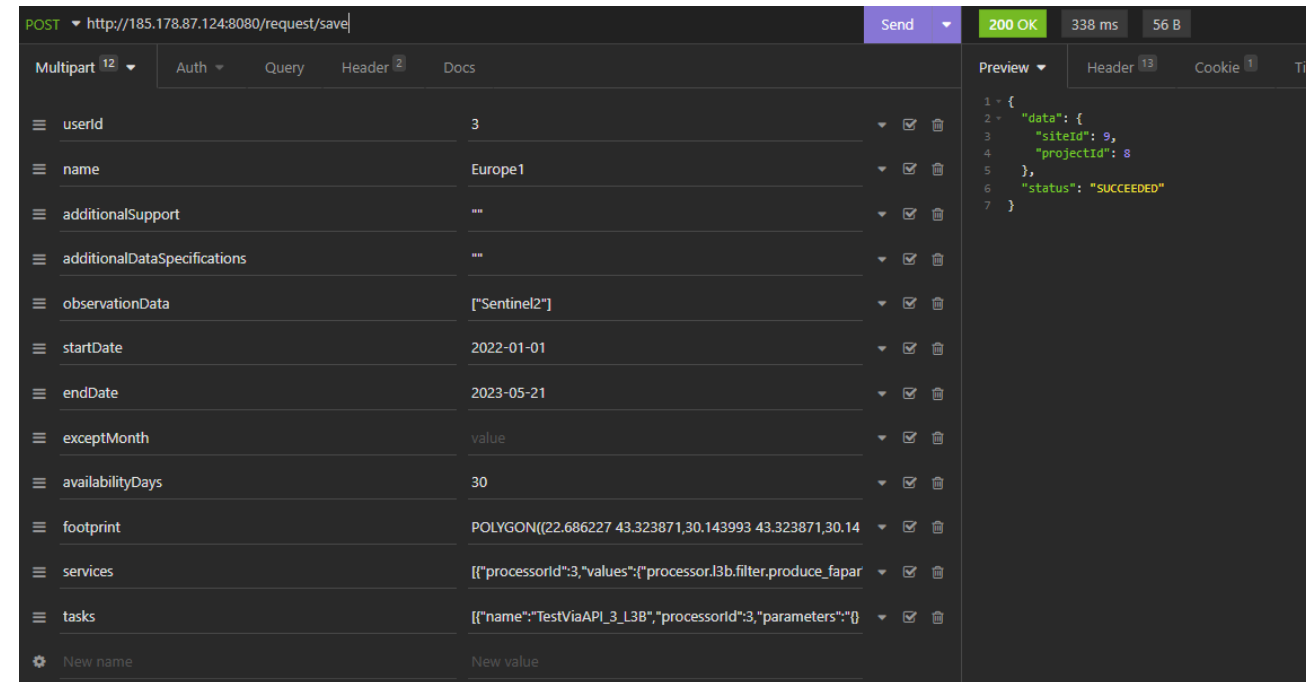
- View product attributes
- Full resolution products visualization on map
- Apply transparency to map or raster layers
- Download products as ZIP files

The screenshot displays the EarthAgriculture Browser interface. On the left, the 'Product browser' panel shows a hierarchical list of products under 'Test_Virgil', including 'L2A Atmospheric correction (98)', 'L3B product (86)', 'Sen2Agri L4A Crop mask product (0)', 'Sen2Agri L4B Crop type product (0)', 'L1C product (0)', 'Sentinel 1 L2 Amplitude product (218)', 'Sentinel 1 L2 Coherence product (216)', 'Sen4CAP L4A Crop type product (11)', 'Sen4CAP L4B Grassland Mowing product (5)', 'LPIS product (1)' (highlighted with 'SEN4CAP_LPIS_S22_2020'), 'Sen4CAP L4C Agricultural Practices product (1)', 'Sen4CAP Marker Database Basic StdDev/Mean (1)', 'Sen4CAP Marker Database AMP VV/VH Ratio (17)', 'Sen4CAP Marker Database L4C M1-M5 (0)', 'Sen4CAP L4A Optical Main Features (4)', 'Sen4CAP L4A Optical Red-Edge Features (4)', 'Sen4CAP L4A SAR Main Features (0)', and 'Sen4CAP L4A SAR Temporal Features (0)'. The central map shows a satellite view with a 'Markers' panel on the left listing various products like 'mean_AMP_VH_022', 'mean_COHE_VH_022', etc. A 'Quick Preview' graph is also visible. On the right, the 'PROPERTIES' panel for 'SEN4CAP_LPIS_S22_2020' shows attributes like 'Ji', 'Nkod_dpb', 'Ctverec', 'Zkod_dpb', 'Kulturakod', 'Plodina_id', 'Vymera', 'Ori_id', 'Ori_hold', 'Ori_crop', 'HoldID', 'GeomValid', 'Duplic', 'Overiap', 'Area_meters', 'ShapeInd', 'S1Pix', 'S2Pix', 'Is_deleted', 'Inserted_tim estamp', and 'Layer'. The 'Actions' panel at the bottom right includes 'Download' (Download size: -1 B) and 'Markers' (Found 64 markers) buttons. A map control panel on the far right shows 'Map: 100', 'Features: 100', and 'VectorTile: 100'.

Accessing EarthAgriculture via REST API



- Many operations available from website are also available via a REST API:
- Login
- Create request
- Retrieve execution information
- Retrieve product information and data



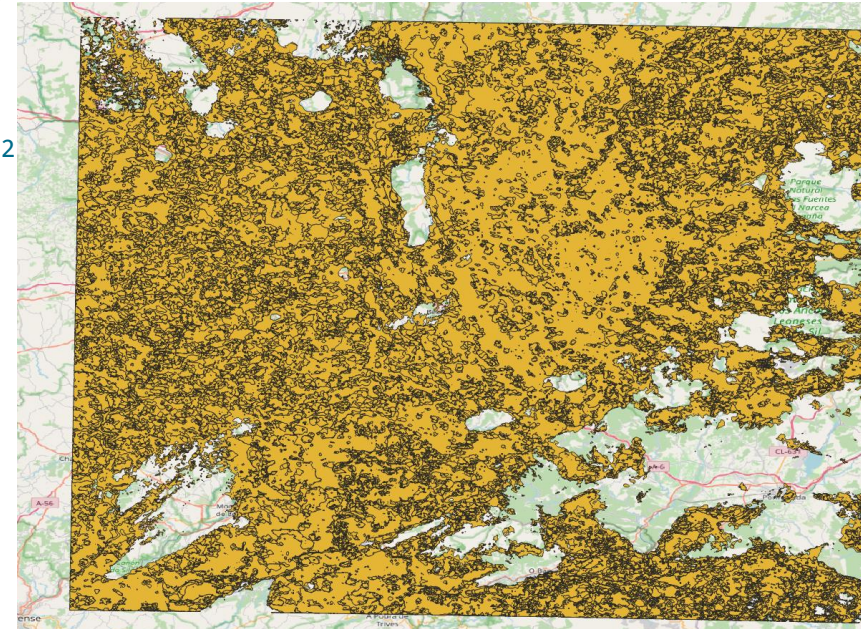
How EarthSignature is used in EarthAgriculture



- Before executing CropMask or CropType, requests are made to EarthSignature:

```
earthsignature.py -s <site_id> -b <start_date> -w <working_dir> -o <out_shp> -a 2
```

- Request is performed for all S2 tiles covering the site
- The results are merged in a final shapefile
- The resulted shapefile is used as in-situ data for the Crop Mask and Crop Type processors



	CODE	CROP
1	412	0
2	313	0
3	223	1
4	331	0
5	322	0
6	312	0
7	411	0
8	222	1
9	213	1
10	211	1
11	421	0
12	321	0
13	142	0
14	244	1
15	311	0
16	221	1
17	335	0
18	332	0
19	334	0
20	122	0
21	323	0
22	133	0
23	324	0
24	422	0
25	523	0
26	132	0
27	131	0
28	512	0
29	511	0
30	521	0
31	522	0

Contact

- Website: <https://snapearth.eu/>
- Newsletter: <https://snapearth.eu/resources/newsletters>
- Social Media:
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 - Twitter: https://twitter.com/Snap_Earth
 - LinkedIn: <https://www.linkedin.com/showcase/snapearth/>
- General questions: contact@snapearth.eu
- Specific solutions:
 - EarthSelf & SafeScale:
 - EarthSignature & EarthSearch:
 - EarthPress:
 - EarthClimate:
 - EarthAgriculture: eosupport@c-s.ro
 - EarthFoodSecurity:



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Thank you

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