

Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East, and Balkans and Developing Links with GEO related initiatives towards GEOSS



D5.6 GEO-CRADLE Portal (III)

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Project Information

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Project GA number: 690133

Project Title: GEO-CRADLE - Coordinating and integrating state-of-the-art Earth Observation Activities in the regions of North Africa, Middle East, and Balkans and Developing Links with GEO related initiatives towards GEOSS.

Project Beneficiaries:

ID	Participant Organisation Name	Country	Logo
1	National Observatory of Athens (NOA) - Coordinator	Greece	
2	Interbalkan Environment Center (IBEC)	Greece	
3	Center for Environment and development for the Arab Region and Europe (CEDARE)	Egypt	
4	Research and Studies Telecommunications Centre (CERT)	Tunisia	
5	Tel Aviv University (TAU)	Israel	
6	Cyprus University of Technology (CUT)	Cyprus	
7	TUBITAK UZAY Space Technologies Research Institute (UZAY)	Turkey	
8	Space research and technology institute (SRTI)	Bulgaria	
9	National Institute of R&D for Optoelectronics (INOE)	Romania	
10	University of Ss Cyril and Methodius (USCM)	FYROM	
11	Institute for Nature Conservation in Albania (INCA)	Albania	
12	Institute of Physics Belgrade (IPB)	Serbia	
13	CIMA Research Foundation (CIMA)	Italy	
14	Academy of Athens (AOA)	Greece	
15	INOSENS (INS)	Serbia	
16	European Association of Remote Sensing Companies (EARSC)	EU	
17	EURISY	EU	
18	EuroGeoSurveys (EGS)	EU	
19	World Radiation Center (PMOD/WRC)*	Switzerland	

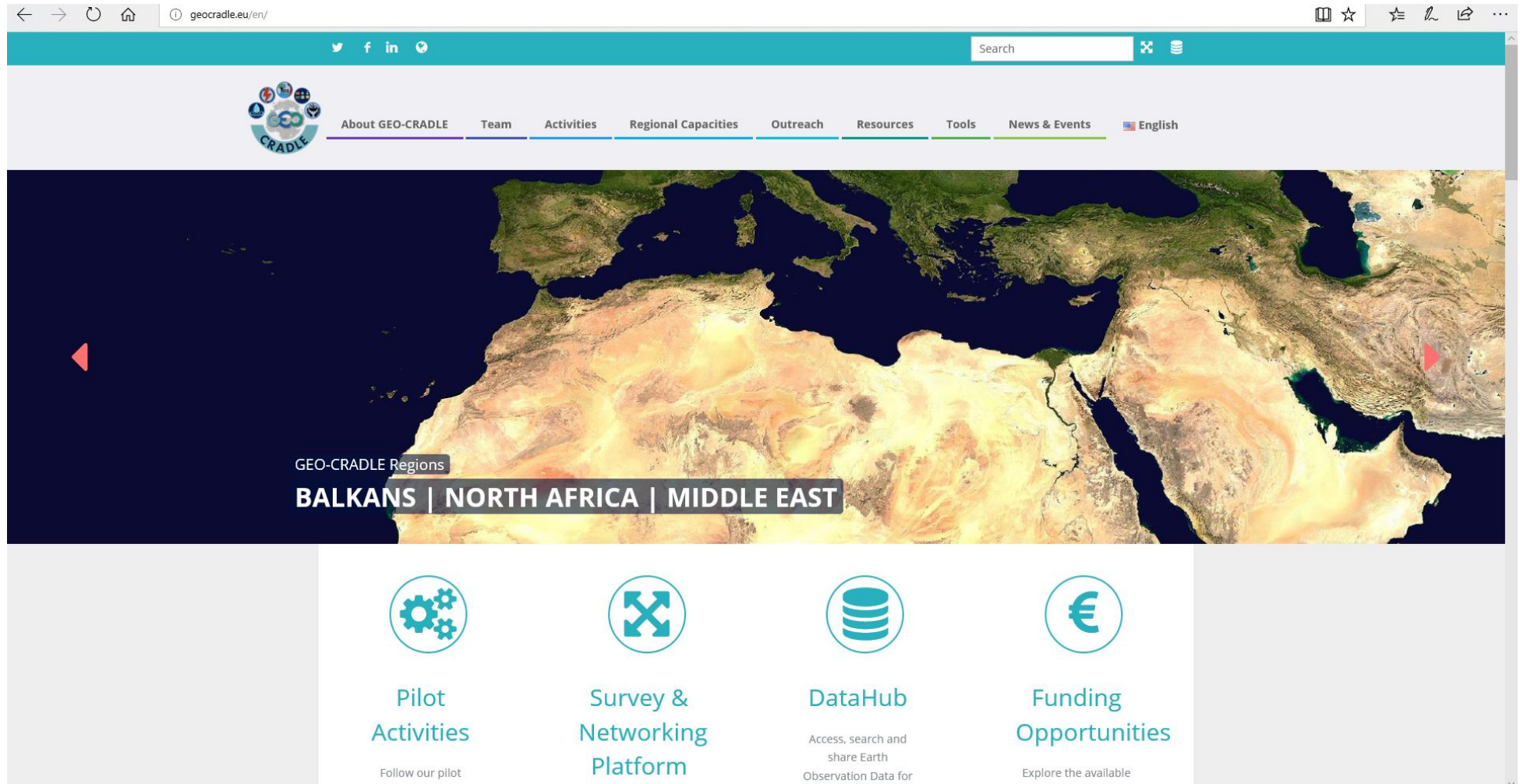
*Note: Switzerland is not requesting financial contribution from the EC

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1) Home page

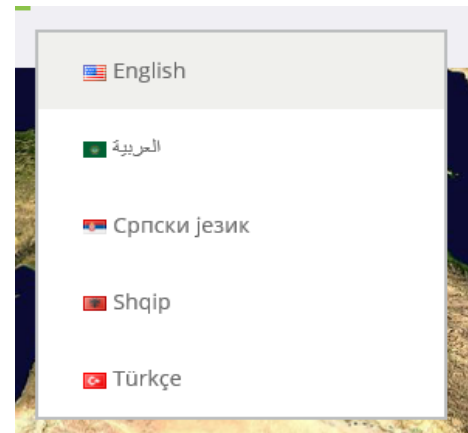
<http://geocradle.eu/>



2) Updates from previous version D5.5 GEO-CRADLE Portal (II)

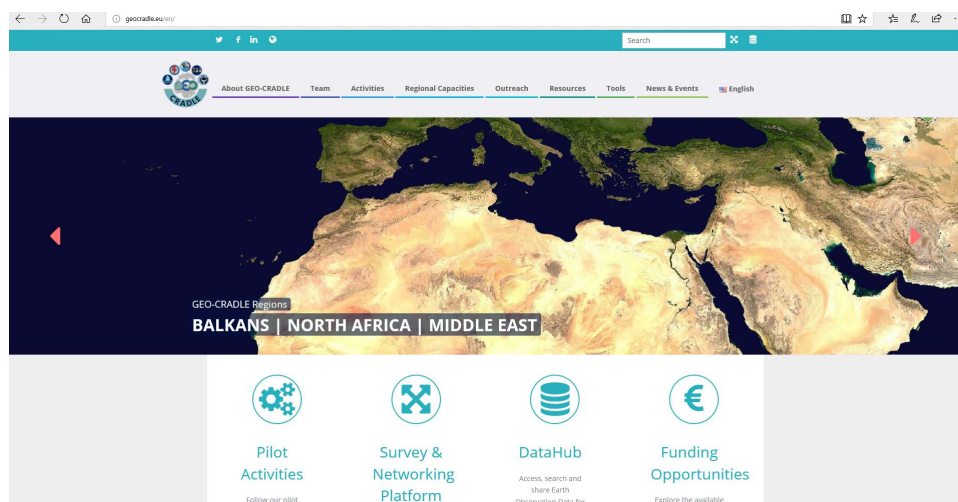
2.1) Website

All the menus and the basic content of the website are now available in 5 languages: English, Arabic, Serbian, Albanian and Turkish. This was implemented inextricably linked to the need of GEO-CRADLE as a coordination project to communicate its actions taking into account the particularities of the three different Rols - Regions of Interest (e.g. language), and optimise its visibility. In the following subsections, screen shots of the different versions are presented.



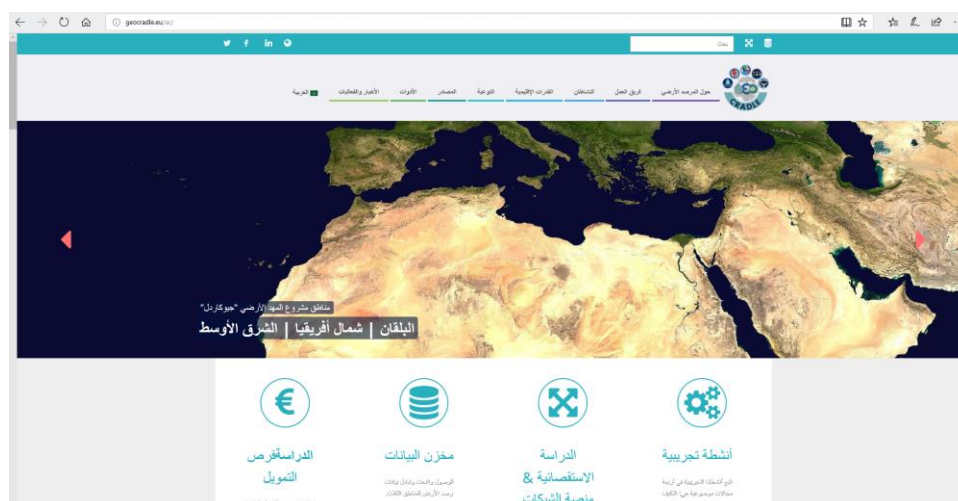
2.1.1) English version

<http://geocradle.eu/en/>



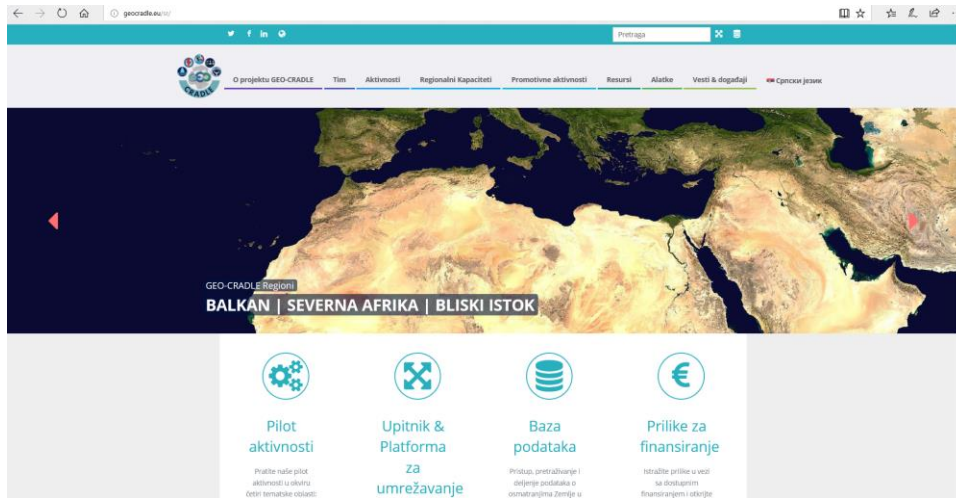
2.1.2) Arabic version

<http://geocradle.eu/ar/>



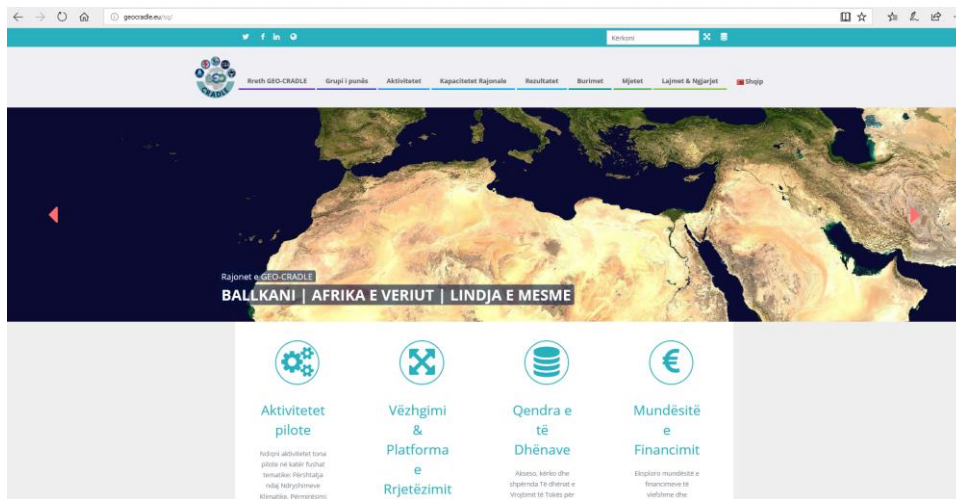
2.1.3) Serbian version

<http://geocradle.eu/sr/>



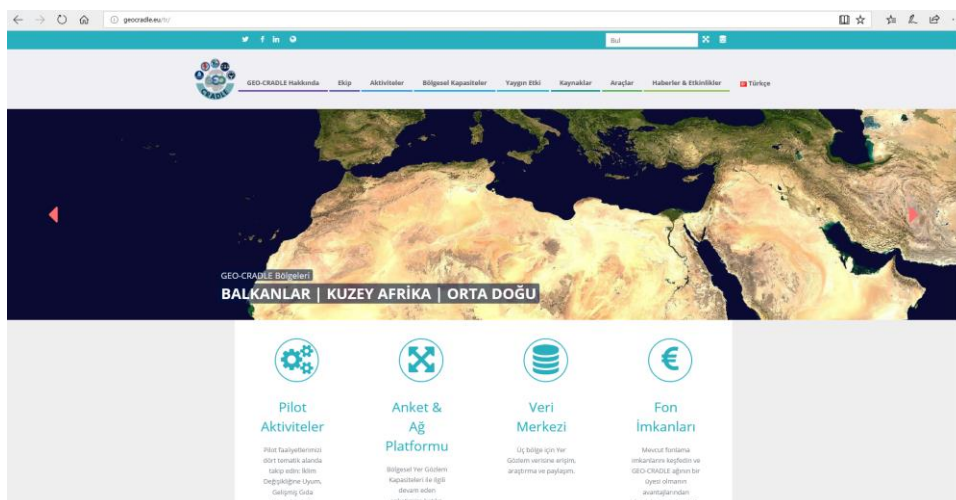
2.1.4) Albanian version

<http://geocradle.eu/sq/>



2.1.5) Turkish version

<http://geocradle.eu/tr/>



2.2) Pilot Activities

The main outcomes deriving from the implementation of the four feasibility studies/ pilots have been uploaded on the website, with links to the relevant products/ services/ applications.

2.2.1) Adaptation to Climate Change

Geo-Cradle Portal > Regional Capacities > Feasibility Studies – Pilots

Feasibility Studies – Pilots

[PILOT 1: ACC](#) [PILOT 2: IFS-WEM](#) [PILOT 3: ARM](#) [PILOT 4: SENSE](#)

1. Adaptation to Climate Change (ACC)

SERVICES:

- If you looking for open access to future Climate Change Data for Europe click here [Climate Change Data - Models](#)
- If you are looking for Climate Change Dust Data click here [Climate Change Data - Dust Data](#)

ABOUT:

The RoI has been recognised by the Intergovernmental Panel on Climate Change as one of the most sensitive and vulnerable to climate change regions on Earth. Climate change is governed to a large extent by atmospheric processes, in particular, the interaction between radiation and atmospheric components (e.g. aerosols, clouds, greenhouse, and trace gases), some of which also contributing significantly to air quality degradation. In summary, the ACC pilot will: (a) support the sustainability of regional EO infrastructures and trigger needed synergies, (b) improve knowledge on current regional climate adaptation policies, and (c) provide reliable assessments on the level of needed coordination and future investment to be carried towards the implementation of GEO, GEOSS and Copernicus in the RoI.

LEADER: National Observatory of Athens (NOA)

The objective of the pilot activities is not to develop new science but to build on the integration of available capacities (infrastructure, datasets, models, etc.) and skills, towards the provision of improved EO Services in the RoI. The pilots will span a period of 15 months (M09-M24), and the final results will be presented to relevant stakeholders (especially decision makers) in a dedicated workshop.

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2.2.2) Improved Food Security - Water Extremes Management

Geo-Cradle Portal > Regional Capacities > Feasibility Studies – Pilots

Feasibility Studies – Pilots

PILOT 1: ACC **PILOT 2: IFS-WEM** PILOT 3: ARM PILOT 4: SENSE

2. Improved Food Security – Water Extremes Management (IFS-WEM)

SERVICES:

- If you looking for a dataset containing a regional vis-NIR (350-2500 nm) soil spectral library of the region BAMENA click here
[Spectral Soil Library](#)
- If you looking for GEO-CRADLE Mydewetra Platform click here [Mydewetra Platform](#)

ABOUT:

Food security depends on many aspects such as water abundance and extremes (flooding and drought), vegetation stresses, yield monitoring, soil quality monitoring and sustainability. Plants need nitrogen, phosphorus and potassium, none so easily available in the RoI. Common standards and protocols following the FAO principles for long-term monitoring of soils and minerals will be defined for the first time in the RoI. Also for the first time the available EO means, service chains, and methods developed in soil science discipline over the past years will be evaluated and tailored to meet the RoI specific mapping needs. A scientific challenge of using multiple satellite missions including the Copernicus missions, together with a large dataset of field spectral measurements will be addressed. New service specifications and roadmaps will arise for deriving food security essential parameters (e.g. soil degradation, soil acidification, soil moisture, and water extremes). Diversified EO datasets and soil spectra libraries together with their metadata will become accessible through the GEO-CRADLE Data Hub for the benefit of all potential users.


LEADER: InterBalkan Environment Center (iBEC)




The objective of the pilot activities is not to develop new science but to build on the integration of available capacities (infrastructure, datasets, models, etc.) and skills, towards the provision of improved EO Services in the RoI. The pilots will span a period of 15 months (M09-M24), and the final results will be presented to relevant stakeholders (especially decision makers) in a dedicated workshop.

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2.2.3) Access to Raw Materials



[About GEO-CRADLE](#) [Team](#) [Activities](#) [Regional Capacities](#) [Outreach](#) [Resources](#) [Tools](#) [News & Events](#) [English](#)

[Geo-Cradle Portal](#) > [Regional Capacities](#) > [Feasibility Studies – Pilots](#)



Feasibility Studies – Pilots

[PILOT 1: ACC](#) [PILOT 2: IFS-WEM](#) [PILOT 3: ARM](#) [PILOT 4: SENSE](#)

3. Access to Raw Materials (ARM)

SERVICES:

- If you looking for EGS data for Greece, Cyprus & Turkey click here [EGS Data](#)

ABOUT:

For the first time, GEO-CRADLE will make available in the RoI the roadmap for long-term monitoring, mapping, and management of mineral deposits, also assessing the ground changes and site degradation relating to mineral exploitation. Diversified data sets together with their metadata will become accessible through the Regional Data Hub. The resulted delineated waste materials areas will advance the knowledge on the critical hazardous areas for remediation purposes. The proposed roadmap for the characterisation of waste materials will promote specifications and methodologies for engaging future operations fitted to raw materials demand, minimising the environmental footprint, and improving the evaluation of the sustainability and management of the post-mining areas.


LEADER: EuroGeoSurveys – The Geological Surveys of Europe (EGS)

The objective of the pilot activities is not to develop new science but to build on the integration of available capacities (infrastructure, datasets, models, etc.) and skills, towards the provision of improved EO Services in the RoI. The pilots will span a period of 15 months (M09-M24), and the final results will be presented to relevant stakeholders (especially decision makers) in a dedicated workshop.




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2.2.4) Access to Energy

The screenshot displays the GEO-CRADLE Portal website. At the top, there is a navigation bar with social media icons (Twitter, Facebook, LinkedIn, YouTube) and a search box. Below this is a menu with options: About GEO-CRADLE, Team, Activities, Regional Capacities (highlighted), Outreach, Resources, Tools, News & Events, and English. A breadcrumb trail reads: Geo-Cradle Portal > Regional Capacities > Feasibility Studies – Pilots. The main header features a satellite image background with the text "Feasibility Studies – Pilots". Below the header are four buttons: PILOT 1: ACC, PILOT 2: IFS-WEM, PILOT 3: ARM, and PILOT 4: SENSE. A horizontal line separates this from the section title "4. Access to Energy (SENSE)". Under "SERVICES:", there is a bullet point: "If you looking for open access data on the solar energy for Egypt and Greece click here" followed by a button labeled "Egypt Solar Energy". Under "ABOUT:", a paragraph describes the SENSE pilot's goal to improve regional EO infrastructures. Below this is the presentation title "Access to Energy (SENSE), The SOLAR ATLAS of Egypt." and the leader information: "LEADER: Physikalisch-Meteorologisches Observatorium Davos/World Radiation Center (PMOD/WRC)". A concluding paragraph states the objective of the pilot activities. The footer contains a "NEWSLETTER" sign-up form with the email "geocradle@noa.gr" and a "SIGN UP" button. It also features the GEO-CRADLE logo, contact information (geocradle@noa.gr, +30 210 3490086), logos for Horizon 2020, the European Union, and GEO, and a funding statement: "The GEO-CRADLE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 690133." The footer also credits "Developed by CrowdPolicy".

Geo-Cradle Portal > Regional Capacities > Feasibility Studies – Pilots

Feasibility Studies – Pilots

PILOT 1: ACC PILOT 2: IFS-WEM PILOT 3: ARM PILOT 4: SENSE

4. Access to Energy (SENSE)

SERVICES:

- If you looking for open access data on the solar energy for Egypt and Greece click here [Egypt Solar Energy](#)

ABOUT:

GEO-CRADLE will lead a coordinated effort to support and improve the regional EO infrastructures through the Solar Energy Nowcasting SystEm (SENSE) pilot. SENSE will demonstrate ways to maximise the value and benefits of EO investments in the RoI and trigger synergies between the private sector with public services and user communities. End-users in both public and private sector (e.g. solar plants, power networks and distributors, state authorities, stand-alone solar panels installations) will benefit from the provision of real-time information on solar energy availability, enabling safer prediction of power distribution from renewables, while preserving natural resources and reducing their reliance on fossil fuels. It is a unique demonstrative example of how EO science and industries (private sector) can come together in contributing to the solution of the “energy” issue in the area, empowering also the decision makers to design energy planning that will stimulate future investments. This is vital for the sustainable development of EO resources and activities that will strengthen the competitiveness and performance of the energy and research sectors.


Presentation: [Access to Energy \(SENSE\), The SOLAR ATLAS of Egypt.](#)




LEADER: Physikalisch-Meteorologisches Observatorium Davos/World Radiation Center (PMOD/WRC)

The objective of the pilot activities is not to develop new science but to build on the integration of available capacities (infrastructure, datasets, models, etc.) and skills, towards the provision of improved EO Services in the RoI. The pilots will span a period of 15 months (M09-M24), and the final results will be presented to relevant stakeholders (especially decision makers) in a dedicated workshop.


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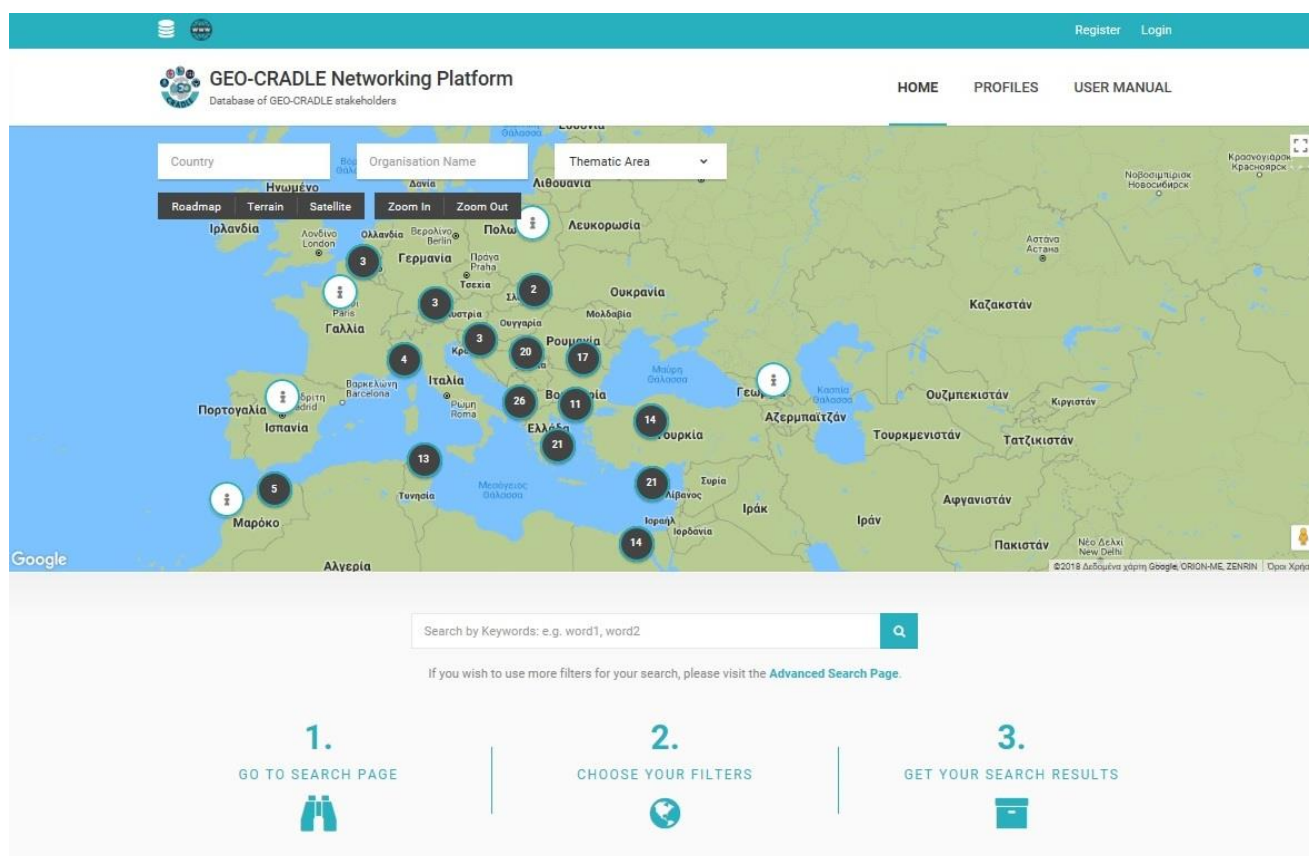
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2.3) Networking Platform

2.3.1) Content

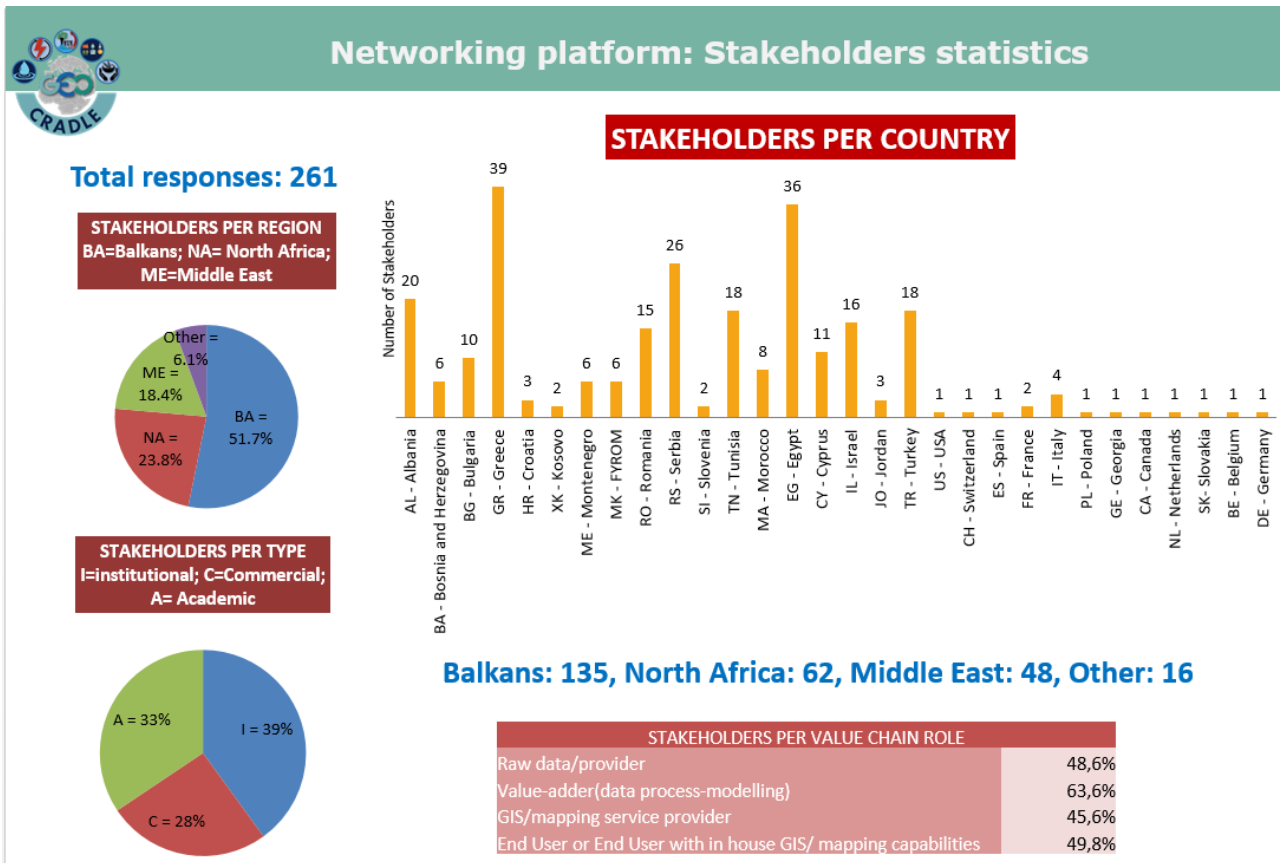
The GEO-CRADLE makes available, for the first time in the RoI (Balkans, Middle East and North Africa), a Networking Platform (<http://geocradle.eu/platform/>) which:

- ✓ incorporates a rich inventory of regional capacities
- ✓ publishes comprehensive profiles of stakeholders
- ✓ provides a first assessment of countries EO maturity
- ✓ facilitates potential partnerships between various stakeholders



The profiles of all stakeholders who have filled in the GEO-CRADLE survey are validated and uploaded on the Networking Platform, in a fully functional mode, following open access principles. The profiles include exclusive and specific information collected via the GEO-CRADLE Survey. After their registration, the stakeholders can login at anytime and edit their profiles.

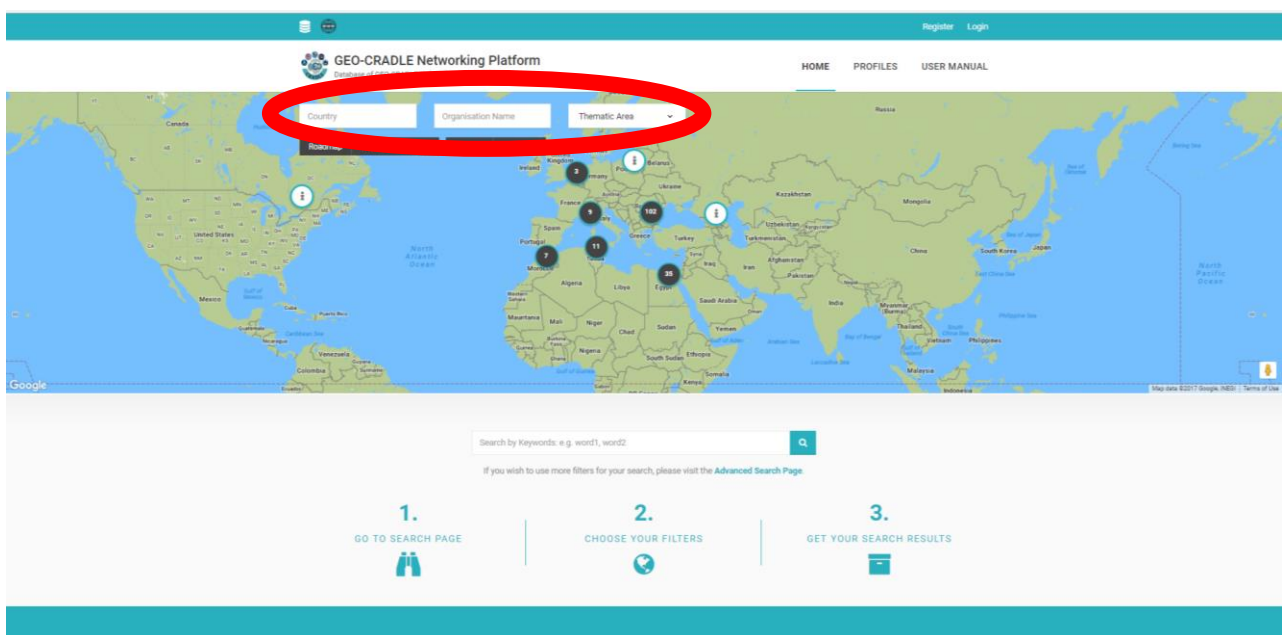
2.3.2) Stakeholders statistics



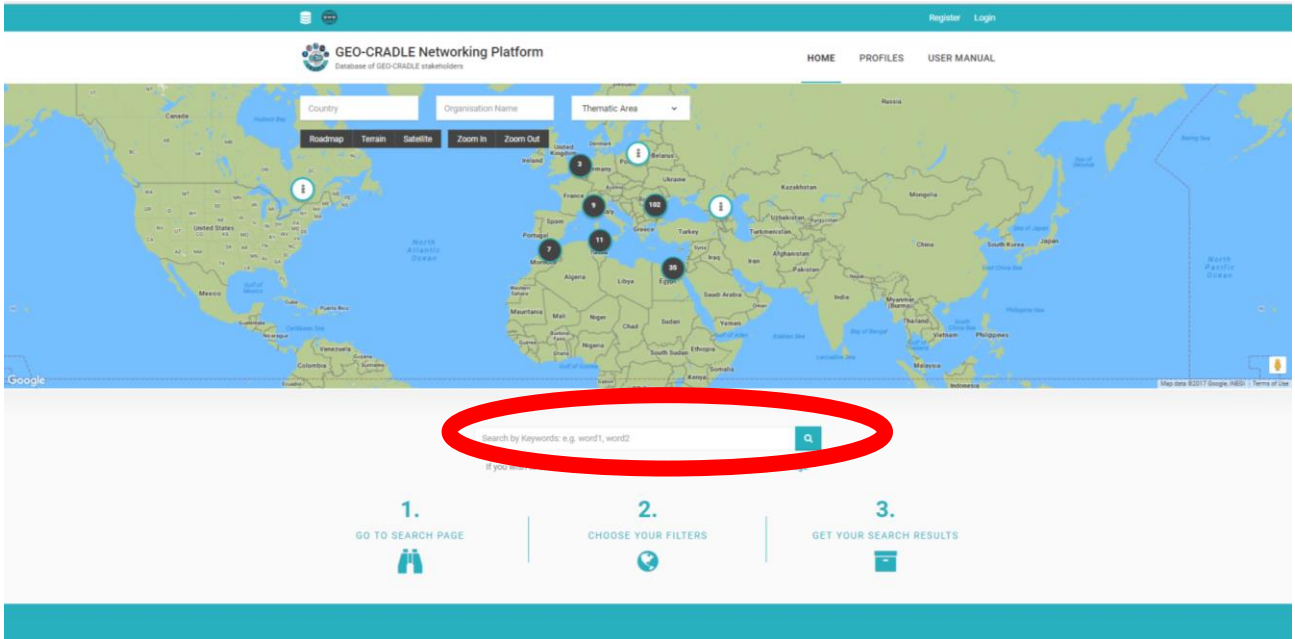
2.3.3) Filtering / searching mechanisms

The Networking Platform provides three different mechanisms for filtering/ search:

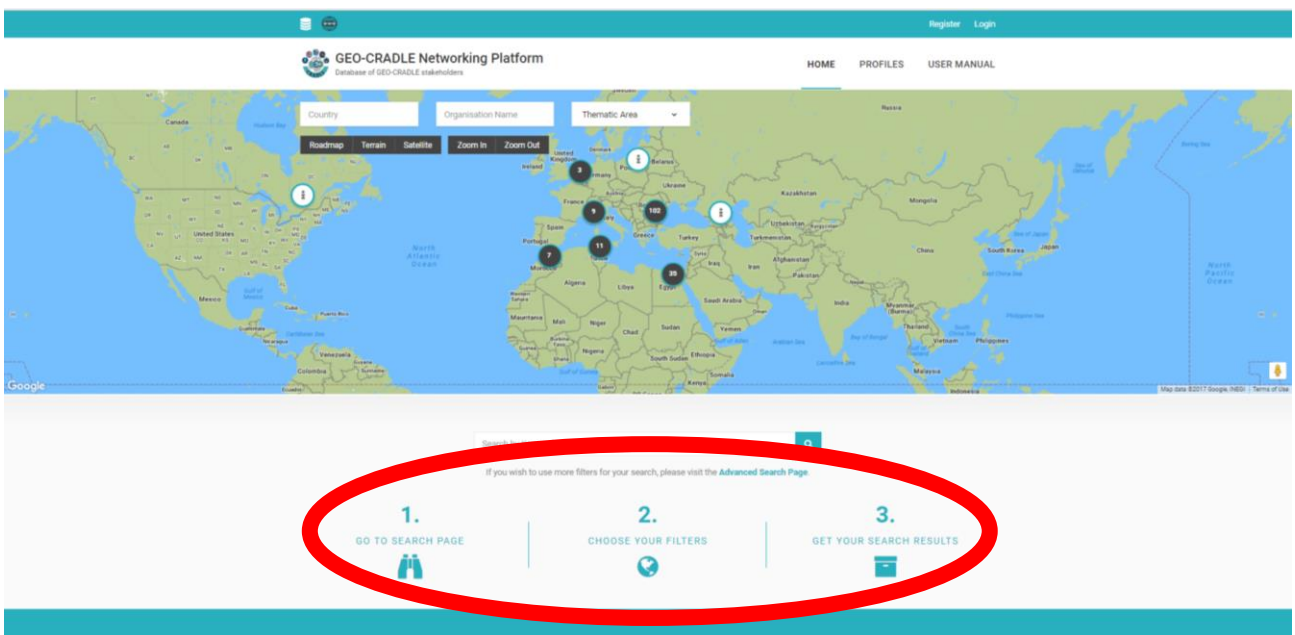
- i. Map search: 3 filters to search the database & displays results on the map



ii. Keywords search: search by one or more keywords (for quick search)



iii. Advanced search page: 10 filters combined with a “search by keywords” option



Search by Keywords: e.g. word1, word2 Search

Thematic Areas

- Access to raw materials
- Climate change
- Energy
- Food security
- Other

Role in the value chain

- Raw data/provider
- Value-adder(data process-modelling)
- GIS/mapping service provider
- End User with in-house GIS/ mapping capabilities
- End User

Region

- Balkans
- North Africa
- Middle East
- Other

Organization type

- Institutional
- Research & Academic
- Commercial

Space-borne capacities

- Do you own/operate EO satellite systems? e.g. Sentinel 1, RASAT
- Do you own/operate EO Ground Segment facilities, for reception storage and redistribution of satellite data? e.g. ESA Mirror Site

Ground-based/In-situ monitoring networks/facilities

- Meteorological/Climatic
- Atmospheric Composition/Profiling
- Hydrometric/Water Quality
- Soil attributes/Spectra
- Energy/Radiation
- Other (e.g. Earthquake/Landslide)

Modelling and computing processing capacities

- Meteorological/Climatic
- Atmospheric Composition/Profiling
- Hydrometric/Water Quality
- Soil attributes/Spectra
- Energy/Radiation
- Other (e.g. Earthquake/Landslide)

The source of EO data used in the model.

- Geospatial data (e.g.DTM)
- Remote sensing data (e.g raw satellite high-level images)
- In situ data (e.g. temperature/pressure/humidity)
- Other

Organisation has sufficient available computing resources for the processing and exploitation of EO data and the models running


- Server Clusters
- HPC Clusters
- Cloud Infrastructure
- Virtualisation Infrastructure
- Processing Power Capacity (CPU/RAM/Storage Capacity)
- Other

EO data exploitation for the provision of value-adding services and products

- Ecosystems(Desertification-environmental impact pollution)
- Land Motion/Ground Movement
- Inland Water (rivers and lakes)
- Land Use/Cover & Change (classified activities and statistics)
- Mesoscale (wind-waves)
- Settings
- Urban Areas
- Infrastructure (building/telecommunications and energy supply)
- Forests
- Snow/Ice
- Air Quality
- Climate
- Marine Ecosystems (including pollution-of algae)
- Weather
- Floods
- Fires
- Agriculture (harvesting-crop/yield/etc)
- Other (e.g. landslides-earthquakes-etc)

2.3.4) Stakeholder Profile

The Stakeholder Profile includes the following sections: Details, Activity Focus, Capacities, National Activities, Engagement in GEO-CRADLE, Location. Information on the views of each specific profile is also provided. An example profile is shown here:



GEO-CRADLE Networking Platform
Database of GEO-CRADLE stakeholders

HOME PROFILES USER MANUAL

Food security, Access to raw materials

TÜBİTAK UZAY Space Technologies Research Institute


☆☆☆☆☆

Share
Add to favorites
Print

Details
Activity Focus
Capacities
National Activities
Engagement in GEO-CRADLE
Location

Details

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☎ 90 312 210 1310

[Message](#)

👁️ **381** views

2.4) Regional Data Hub (RDH)

2.4.1) Introduction

The Regional Data Hub (<http://datahub.geocradle.eu/>) is an Earth Observation (EO) service designed as a de facto “one-stop-shop” for region specific data, information, and knowledge access for EO players, service providers, and end users. A comprehensive description of the RDH is given in the following excerpt, taken from the [vision](#) of the GEO-CRADLE project:

Another key output of GEO-CRADLE that can contribute to the long-term uptake of EO activities in the region is the operation of the Regional Data Hub. By providing access to region-related datasets and services, directly fed from the GEOSS-portal, and at the same time being the centralized gateway for regional data providers to contribute easily and timely their products to GEOSS, the Regional Data Hub is designed to become the focal node in the region in the context of GEOSS and Copernicus implementation.

The RDH, apart from being a service that allows its users to search for (**discovery**), view (**access**) and download (**request**) data related with the region of Balkans, Middle East and North Africa, it is also currently utilized as a gateway/ interface for registering data GEOSS, and has been highly considered by Geo Secretariat as a significant pilot operation of a Regional GEOSS Portal.

The RDH is a stable service with full interoperability with the GEOSS Common Infrastructure (GCI) resources and GEO DAB APIs, and serves as well as a repository of the data becoming available through the project pilots.

2.4.2) The software

For the implementation of the RDH service, an open data management platform was developed using [DKAN](#) and [Drupal CMS](#). The platform is **Web-based** and **online** and runs in the server facilities of the National Observatory of Athens (NOA). Everyone can access the platform through <http://datahub.geocradle.eu/> using a Web browser¹.

DKAN is a complimentary offering to CKAN in the effort to make data more open and accessible². The reasons for choosing DKAN instead of CKAN are the following:

- Integrates open data catalog features into Drupal CMS, which is built upon PHP. PHP powers a significant percentage of the Web, while Drupal powers ~2% of the Internet as a whole with a wide community of active users and developers.
- Offers a powerful ready to use administration panel with several features that allow a site administrator to (a) manage users and user roles, (b) define content types, (c) add content, (d) extend platform’s functionalities installing other modules, etc.
- Offers ready to use and customizable search and view functionalities for the data (e.g. Facet API, Views, Search API, Panels, etc.).

Using DKAN and the [Drupal API](#), which is part of the Drupal content management framework, a Web software application was developed for the implementation of the RDH service. This application, which is called **GCRDH**, is actually a Drupal module bundled with the DKAN platform and extending the platform’s functionalities.

¹ Or any other software package for retrieving files using HTTP, HTTPS, FTP and FTPS the most widely-used Internet protocols (e.g. wget).

² Read <http://dkan.readthedocs.io/en/latest/introduction/dkan-ckan.html> for more information.

The development of the GCRDH module started in December 2016. In April 2017, a pre-alpha version was set up and demonstrated during the [2nd GEO Data Providers workshop](#), (20th-21st April 2017, Florence, Italy). In July and August 2017, two alpha versions were released and were running at NOA Servers. In October 2017, a beta version with massive code refactoring was released, and its features were thoroughly tested and validated in real conditions during the following months of actual operation.

To sum up RDH is implemented via a DKAN platform and the GCRDH module. DKAN provides several ready to use functionalities such as: (a) an administrator panel, (b) a search engine, (c) view, preview and download capabilities for the stored content (i.e. datasets and resources), etc. Once DKAN is installed and properly configured in a Web server, a full-fledged and ready to use open data management platform is made accessible through an IP address³. With the GCRDH module, the DKAN platform is extended with further functionalities that satisfy the service requirements as described in the following section. Since DKAN is built upon Drupal 7.x and Drupal is a content management framework developed with PHP, HTML, CSS and JavaScript, the GCRDH module is also developed with the same technologies and uses the Drupal API.

2.4.3) Service Requirements

During the design analysis of the RDH service, several requirements were taken into account. Those requirements were not abstract; on the contrary they resulted from well recognised and documented needs: (i) the integration of GEOSS, which is a huge system with approximately 100 million registered resources at this very moment and around 25 million resources for the RoI, (ii) the relative underdevelopment of countries in the RoI with regard to EO services and open data policies, (iii) the fact that GEO-CRADLE was not intended to build new infrastructure capacities (e.g. archives, catalogs, etc.) but mainly to utilize the existing ones.

Hence, the following requirements were considered:

1. RDH shall be **online** and **Web-based**.
2. RDH shall be **efficient** and **scalable**.
3. RDH shall support in a **user-friendly** way **two kinds of users**. The types of users are: (a) unauthorized users⁴ and (b) authorized ones (i.e. administrators, content authors, group owners, etc.). The 1st type is more interested in the search, view/preview and download functionalities, whereas the 2nd type is related with an administration panel (i.e. crud functions, content organization, user management, publishing options, etc.).
4. RDH shall **integrate multiple datasources**, also known as **multi-site search**. This is an obvious requirement that stems from the fact that the RDH is going to act as a *“one-stop-shop”* for region specific data, information, and knowledge access for EO players, service providers, and end users.
5. RDH shall **display on-the-fly remote data**, i.e. **no data replication**. The data discovered in remote datasources due to requirement (4) should not be replicated, i.e. copied in a storage owned by RDH.
6. RDH shall **connect with GEOSS**. Current requirement is also covered by requirement (4).
7. RDH shall be **modular** and **extensible**.

³ For the implementation of DKAN the following DKAN version is used: <https://github.com/GetDKAN/dkan-drops-7>

⁴ The unauthorized users are also known as anonymous users.

Some of the above requirements are supported by DKAN itself (e.g. requirements (1) and (2)), but for the rest a new software had to be developed (GCRDH).

2.4.4) Features

For the GCRDH module several sub-modules were developed introducing many interesting features. Actually GCRDH is both a module and a group of modules depending on each other; it is an **ecosystem**, comprised of the following modules:

- a. GCRDH
- b. GCRDH Default Content
- c. HTTP Client
- d. Remote Data
- e. Validate
- f. ATTL
- g. GEOSS

Of course, the GCRDH is also dependent by DKAN modules such as DKAN Datasets and third party modules such as Entity Cache, Redis, etc. A brief description of each module is provided here:

a. GCRDH

The GCRDH module is the main module. It is the module that enables the discovery and access of data located to remote data sources, such as GEOSS, and their eventual display in the search results of the DKAN platform. Since the RDH is built upon DKAN, the search mechanism provided by the RDH is the DKAN's default search mechanism. The default search mechanism looks up for data in a local database, namely: (i) builds the proper SQL query using the user search criteria, (ii) executes the query against a local database, (iii) fetches the records and (iv) in the end renders those records in an HTML page. GCRDH hooks between step (iii) and (iv) and transparently repeats steps (i) to (iii), allowing the RDH to look for data in remote data sources, fetch any data that satisfy the user search criteria and render them along with the local data during step (iv).

For the GCRDH module to be able to search for data in a specific remote datasource and append any discovered data in the results of a user search, a module had to be provided implementing the communication between the RDH and the remote datasource. The communication currently supported is through HTTP; hence the remote datasource should provide a Web service for discovering and accessing its resources implemented through a specific API⁵ (e.g. RESTful API).

Thus GCRDH module supports requirement (4).

b. GCRDH Default Content

This module is inspired by the DKAN Default Content module and is depended by DKAN Fixtures module. It creates the basic groups of datasets that will be available through the RDH. The basic groups correspond to the GEOSS group, which is the one containing the GEOSS datasets, and the pilots groups that contain data generated from the GEO-CRADLE pilots.

c. HTTP Client

This is a rather interesting module since it provides a very important feature which is the caching of the HTTP requests.

⁵ The API schema must also be available in order for the module to implement the discovery and access mechanism.

As mentioned in the GCRDH description section, the access and discovery of data in remote datasources is done through HTTP using the source's Web Service. This is being implemented via external API calls, made through HTTP GET requests and the `drupal_http_request` method is used. However many of these calls are very frequent and tend to return the same HTTP response. Instead of making the same HTTP requests over and over, flooding the network between RDH and the remote datasources, a simple HTTP caching mechanism is implemented and provided by the HTTP Client module.

The way this mechanism works is the following: whenever an HTTP request to a remote datasource is sent, the returned response is saved in an in-memory cache. Subsequent identical requests are served by the cached response. The cached response is used for a Time-to-Live (TTL) equal to an hour and when this TTL expires the response is validated. During validation the request is forwarded to the remote datasource and returns a response that replaces the cached one (**refresh**).

The current module greatly satisfies service requirement (2).

d. Remote Data

This module is maybe the most important because it addresses requirements (2), (4), (5) and (6).

The Remote Data module provides several helper functions as well as the *Remote Data Entity Wrappers*, that allow for the discovery and access of remote data⁶, and the subsequent creation, indexing and caching of the corresponding Drupal/DKAN entities.

Every remote datasource has its own data model. Similarly DKAN has its own data model based on the Drupal Entities⁷. For the remote data to be displayed in the search results of the RDH, which is implemented through DKAN platform, it must be properly "*translated*" into Drupal/DKAN datasets. It's not adequate to have a mechanism that knows how to discover and access data in remote datasources; there must also be a mechanism that knows how to convert remote data in the data model recognized by DKAN. This mechanism is provided by the current module and in particular the Remote Data Entity Wrappers which are classes providing not only the **translation**, but two more **core** mechanisms: the **indexing** and **caching** mechanisms.

The **indexing mechanism** stores a record in the database that contains the ID of the entity corresponding to a remote datum and information about retrieving that. This information is called *remote data index* and helps the system to recognize an entity created from remote data and recreate this entity in case the entity is lost due to a cache flush or a cache replacement policy.

The **caching mechanism** is similar to the one implemented by HTTP Client but with some further elaboration. It is used to cache an entity created from remote data and is dependent by Entity Cache and Redis modules. The combination of Entity Cache and Redis modules create an in-memory cache for Drupal/DKAN entities.

The caching mechanism implemented by Remote Data modules works simply enough. Instead of creating the corresponding entities every time remote data are fetched as part of a user request, those entities are created only the first time (i.e. when they are not found in the cache) and then are cached satisfying subsequent requests for the same data through the cache.

The current cache mechanism, combined with the cache mechanism implemented by the HTTP Client module, support greatly the requirement for efficiency and scalability as they reduce

⁶ Data fetched from remote datasources.

⁷ Read <https://www.drupal.org/docs/7/api/entity-api/an-introduction-to-entities> for more information.

significantly the network traffic and bandwidth consumption between the RDH and the connected remote datasources.

e. Validate

The Validate module is dependent by the Remote Data module. It assures that the Remote Data module will not deliver “stale” data to the RDH users.

Since the Remote Data module caches the entities that were created due to data fetched from remote datasources, there must also be a way to check the consistency of the cached data with the original ones.

If the data in the remote datasource is modified, the corresponding entity that is cached in GCRDH’s cache must be properly updated. The Validate module provides a TTL policy, similar to that of the HTTP Client module. It assigns to every cached entity a TTL (equal to one day) and serves all the requests to an entity until the TTL expires. When the TTL expires, it validates the cached entity checking its validity against the remote datasource; if the corresponding data in the remote datasource have changed, the cached entity is updated.

f. ATTL

When ATTL is enabled, it overrides the default TTL policy of the Validate module. The Validate module by default assigns fixed TTLs of one day; that is not very efficient. The ATTL module provides the ATTL policy which stands for Adaptive TTL, a policy that is currently the state of the art in the Web caching.

In the ATTL policy the last modification time of an object is taken under consideration for assigning a TTL. The most common formula used is the following:

$$TTL = \min(a * (now - last_{modified}), threshold), \text{ where } a \in [0,1]$$

So, the formula assigns (to every object) a TTL that is a fraction of the time past from the last modification time, limited by an upper bound which assures that even those objects that are modified rarely will be validated at some point.

This formula ensures that objects modified a long time ago will take large TTLs, whereas objects modified recently will take small TTLs. It also ensures that if an object that was not modified for long time is eventually modified will take a very small TTL.

With the ATTL policy the validation mechanism is greatly improved. This module provides great benefit to requirement (2) as well.

g. GEOSS

The GEOSS module is the one integrating GEOSS into the RDH. The GEOSS module utilizes the OpenSearch API of the GEO DAB APIs suite in order to discover and access data from GCI and eventually create, index and cache the corresponding Drupal/DKAN entities.

The GEOSS module extends the *Remote Data Entity Wrappers* of the Remote Data module providing the interface for creating, indexing and caching a DKAN dataset from a GEOSS report, a DKAN resource from a GEOSS resource and a Drupal taxonomy term from a GEOSS term Frequency object.

The GEOSS module is also responsible for parsing the search criteria extracted from a user search made through RDH and create the corresponding API call to GCI using these criteria and the OpenSearch API.

Finally, the GEOSS module is the module that allows the GCRDH module to fetch GEOSS data during a user search and append them in data discovered from other sources (either the local database or other remote datasources).

2.4.5) Enhancements

Several enhancements are provided via the GCRDH module:

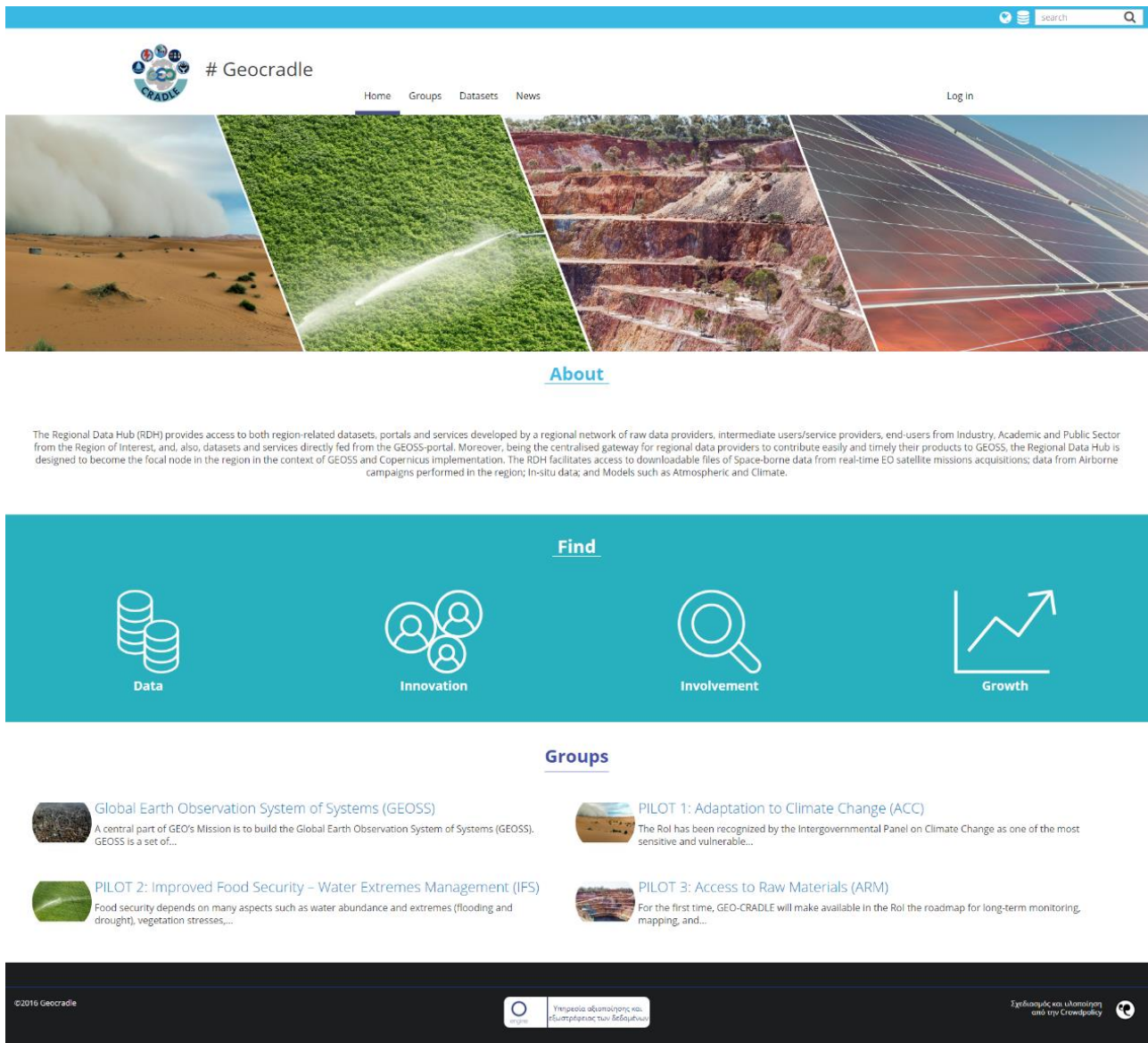
- Improved user interface for the search results.
- Improved WMS and WFS previews. In the case of WFS preview, the GCRDH is able to preview every WFS layer in every EPSG. Also, it supports feature popups for better visualization of the layer information.
- Preview capabilities for GEOSS data (WMS/WFS preview, PDF, CSV preview, etc.).
- Cleaning of GEOSS data; removing/merging duplicate resources for a GEOSS report, assigning titles to resources without titles, detecting formats for resources that have not format information through HTTP HEAD requests.
- URL cleaning; discovery of URLs that have changed or that are not working anymore, discarding data with invalid URL schemes.
- Access of a GEOSS report in RDF and Project Open Data Schema formats.

2.4.6) Regional Data Hub Review

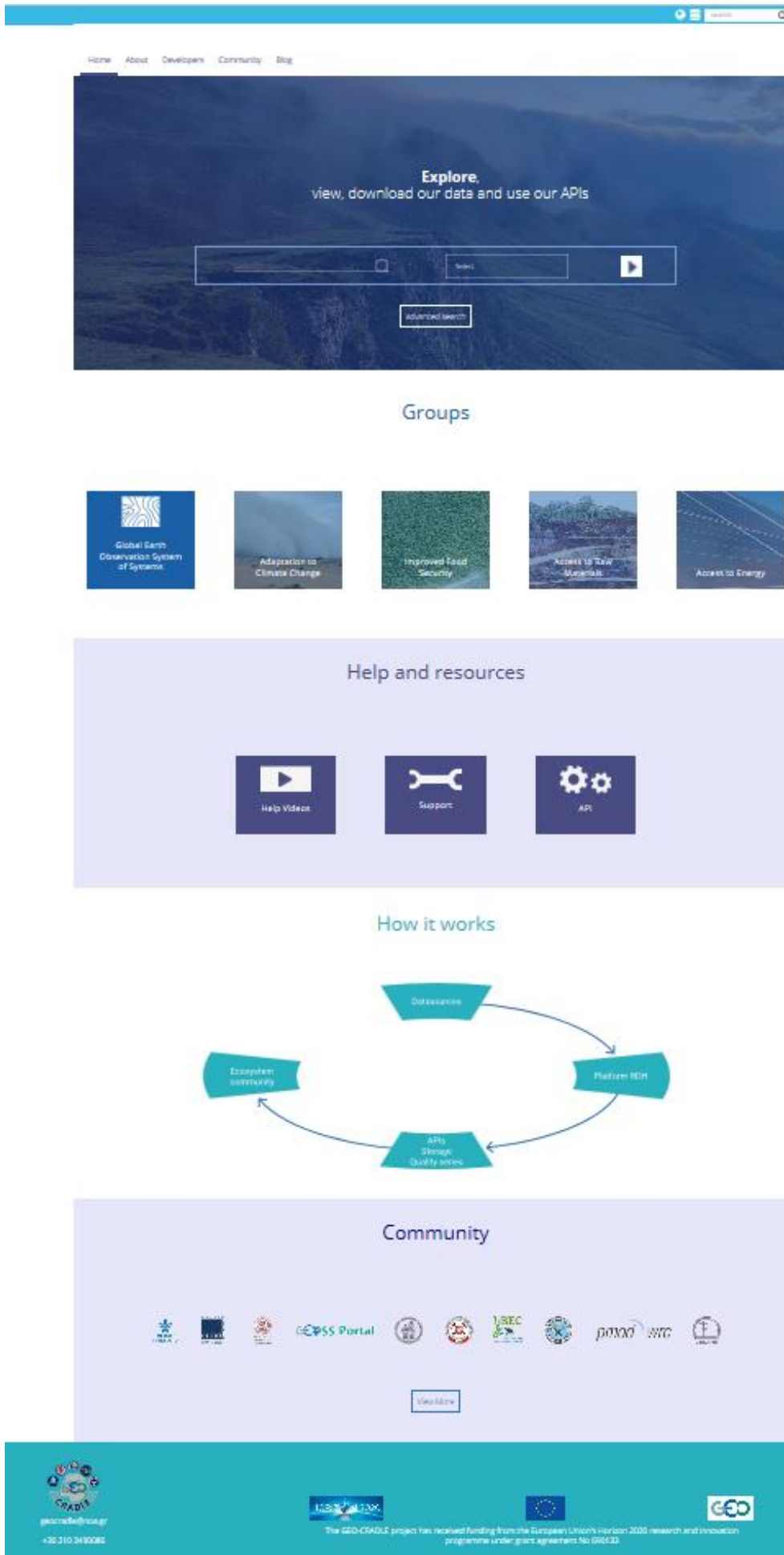
The RDH provides access to both region-related datasets, portals and services developed by a regional network of raw data providers, intermediate users/service providers, end-users from the Industry, Academic and Public Sector within the Region of Interest, and, also, datasets and services directly fed from the GEOSS-portal. Moreover, being the centralised gateway (focal node) for regional data providers to contribute easily and timely their products to GEOSS. The RDH facilitates access to downloadable files of space-borne data from real-time EO satellite missions acquisitions; data from airborne campaigns performed in the region; in-situ data; and model results such as in the domains of Atmosphere and Climate.

- **RDH Landing Page**

Based on the project scope the first version of RDH was developed, available at <http://datahub.geocradle.eu/>. The platform's first page is shown below.



A second platform version was developed, available at <http://noadev.oengine.crowdapps.net/>. The second platform version is actually a template improvement in order to simplify the platform's UI. The updated template is shown below.



From the top header the GEO-CRADLE Site (<http://geocradle.eu/>) and the GEO-CRADLE Networking Platform (<http://geocradle.eu/platform/>) are accessible. Also, more information is available about the platform via the header menu.

The first section of the landing page allows the user to search data based on the available groups provided. The user chooses the group and uses keywords in order to set his/her search prerequisites. Moreover the user can use the advance search mechanism (<http://noadev.oengine.crowdapps.net/search/type/dataset?query=>), which allows him/her to use more filters such as tags, dataset format etc.

The second section of the landing page shows the groups used in the platform in order the datasets to be categorized.

The third section of the landing page provides more information to the users. The user by clicking on each icon can view help videos, support information or information about the API used.

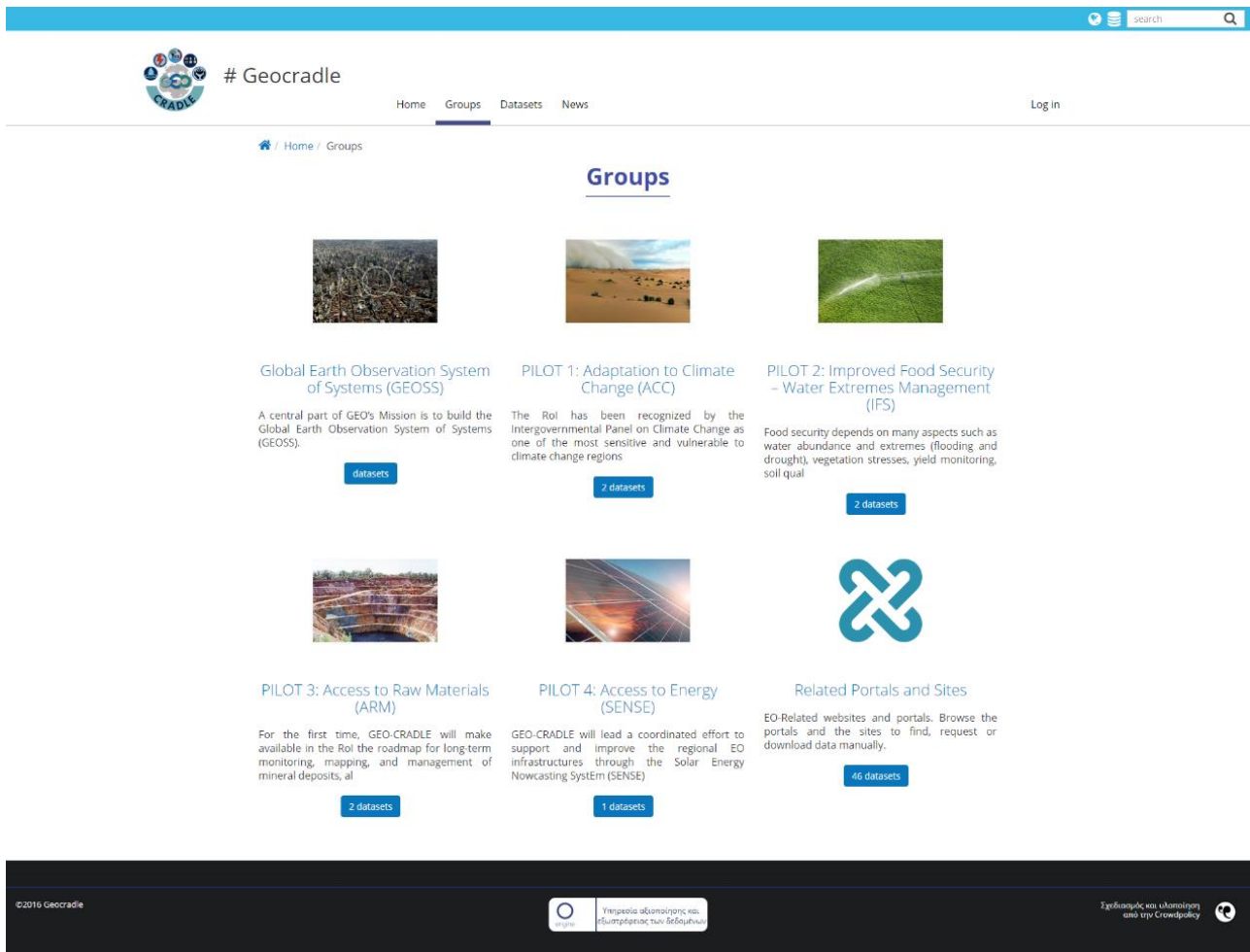
The forth section is actually an infographic which shows the process used in the RDH community.

Moreover, the fifth section shows some of the stakeholders who participate and provide data to the RDH platform.

Finally, the footer shows some useful information, such as the contact details, acknowledgment about the project's funding, and also allows users to subscribe to the project's newsletter.

- **RDH Groups' Preview Page**

From the platform menu the groups preview page is available, where all the available dataset groups used in the platform are gathered. Moreover further information are provided about each group and the datasets provided by them. The groups preview page is available at <http://datahub.geocradle.eu/groups> as shown on the picture bellow.



- **RDH Group’s Single Page**

Each group single page, for example <http://datahub.geocradle.eu/group/pilot-1-adaptation-climate-change-acc> shows more detailed information about the group, the datasets under each group, the tags used, the datasets’ format and the authors. The available groups in the RDH platform are listed below:

- [Global Earth Observation System of Systems \(GEOSS\)](#)
- [Pilot 1: Adaptation to Climate Change \(ACC\)](#)
- [Pilot 2: Improved Food Security – Water Extremes Management \(IFS-WEM\)](#)
- [Pilot 3: Access to Raw Materials \(ARM\)](#)
- [Pilot 4: Access to Energy \(SENSE\)](#)
- [Related Portals and Sites](#)


An example of a single group page, Pilot 1: ACC, is shown in the picture below:

The screenshot shows the Geocradle website interface. At the top, there is a search bar and navigation links for Home, Groups, Datasets, and News. The main content area is titled 'PILOT 1: Adaptation to Climate Change (ACC)'. On the left, there is a sidebar with a 'View' button, a 'Members' button, and a list of filters including Date Changed, Tags, Format, and Author. The main content area displays a list of datasets, including 'ACC-DUST' and 'DEAR-Clima', each with a brief description and a 'Resource(s)' count.

- **RDH Dataset Page**

The dataset page, for example [PSvisibility Sentinel-1 for central Cyprus](#), developed in the framework of Pilot 3: ARM, shows detailed information about the specific dataset. The dataset page is shown below.


search


Geocradle

Home Groups Datasets News
Log in

[Home](#) / [Datasets](#) / [PSvisibility Sentinel-1 for central Cyprus](#)


[View](#) [Revisions](#)



PILOT 3: Access to Raw Materials (ARM)

For the first time, GEO-CRADLE will make available in the RoI the roadmap for long-term monitoring, mapping, and management of mineral deposits, also assessing the ground changes and site...

Data Extent



License

Open Data Commons Open Database License (ODbL)

Other Access

The information on this page (the dataset metadata) is also available in these formats.

[JSON](#) [RDF](#)

via the [DKAN API](#)

Social

[Twitter](#)

[LinkedIn](#)

[Reddit](#)


[Google+](#)


[Facebook](#)

PSvisibility Sentinel-1 for central Cyprus

Visibility index for PS points of INSAR processing of Sentinel-1 satellite images in Descending and Ascending geometry.

Data and Resources

 **PSvisibility Sentinel-1 Descending for central Cyprus**

 **PSvisibility Sentinel-1 Ascending for central Cyprus**

[Go to resource](#)

[Go to resource](#)

mining
Hazards
Environmental

Dataset Info

i These fields are compatible with DCAT, an RDF vocabulary designed to facilitate interoperability between data catalogs published on the Web.

Field	Value
Publisher	PILOT 3: Access to Raw Materials (ARM)
Modified Date	2018-03-19
Release Date	2018-03-19
Identifier	cf534011-03ef-43d0-b2db-49c5e890f465
Spatial / Geographical Coverage Area	POLYGON ((32.354736328125 34.526622529884, 32.354736328125 35.623516772022, 34.112548828125 35.623516772022, 34.112548828125 34.526622529884))
Spatial / Geographical Coverage Location	Central Cyprus
License	Open Data Commons Open Database License (ODbL)
Author	Maria Przyłucka
Contact Name	Maria Przyłucka
Contact Email	maria.przylucka@pgi.gov.pl
Public Access Level	Public

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Υπερβολικά αξιωματικός και εξαιρετικός των δεδομένων

Ευρωπαϊκό και ελληνικό κράτος



- **RDH Solar Atlas Module**

The [Solar Atlas module](#), developed in the framework of Pilot 4: SENSE, is actually an independent advanced search mechanism, developed in the framework of the GEO-CRADLE project. The user can use four different filters (year, month, parameter, color scale) in order to view maps, as shown in the picture below.



The Solar Atlas of Greece

The mean monthly solar energy maps of Greece are based on a 15-year climatology of the Direct Normal and Global Horizontal Irradiances (DNI and GHI respectively), while the spatial resolution is almost 5 km. The climatological radiation data are from the EUMETSAT's Satellite Application Facility on Climate Monitoring (CM SAF). Select the year, month, parameter and scale type for the mean monthly maps of Greece. By selecting the Atlas options you are able to retrieve the 15-year means (1999-2013).

Year	Parameter	▶
Month	Color scale	



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Υλοποίηση και Σχεδιασμός από την Crowdpolicy



The Solar Atlas of Greece

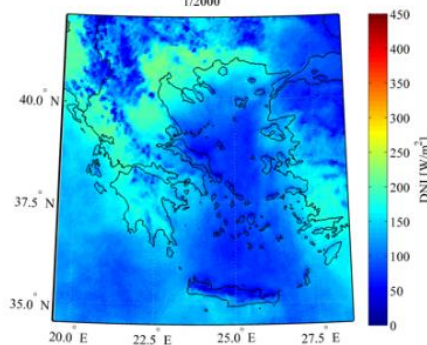
The mean monthly solar energy maps of Greece are based on a 15-year climatology of the Direct Normal and Global Horizontal Irradiances (DNI and GHI respectively), while the spatial resolution is almost 5 km. The climatological radiation data are from the EUMETSAT's Satellite Application Facility on Climate Monitoring (CM SAF). Select the year, month, parameter and scale type for the mean monthly maps of Greece. By selecting the Atlas options you are able to retrieve the 15-year means (1999-2013).

2000	Direct Norm	▶
January	Fixed	

Results



ΕΠΙΦΑΝΕΙΑΚΗ ΑΜΕΣΗ ΗΛΙΑΚΗ ΑΚΤΙΝΟΒΟΛΙΑ
1/2000



ΙΝΣΤΙΤΟΥΤΟ ΕΡΕΥΝΑΣ ΤΕΧΝΟΛΟΓΙΑΣ & ΒΙΩΣΙΜΗΣ ΑΝΑΠΤΥΞΗΣ
ΕΘΝΙΚΟ ΚΕΝΤΡΟ ΕΡΕΥΝΑΣ

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