GEOSS Platform Plus

D2.5

Use Cases Description and User Requirements Document – v3.0

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Task:	T2.1	
Author(s):	GPP Team	
Authorized by	Joost van Bemmelen	
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Abstract:

This document describes high level use cases from the user communities' point of view, and corresponding requirements in response to the objectives of the project, which aims to real-life implementations for user-communities enabling them to discover, access and use actionable information.

The use cases described in this document are driven by the GPP objectives:

- Deliver services and knowledge, including for climate change adaptation and mitigation with a view to science-based decision making;
- Exploit the potential of the GEOSS infrastructure to the maximum extent
- Improve the experience of the users of GEOSS, in particular as regards the accessibility and usage of services and knowledge infrastructure to the maximum extent;
- Increase access to and use of heterogeneous data, including in situ measurements and data from regional and national GEOSS;
- Reinforce European participation in GEOSS.

The requirements connected to the use cases described in this document represent an input to the functional analysis that leads to the system requirements definition.

The approach adopted for eliciting the requirements highly relies on communication with the GEO stakeholders and their direct involvement, to ensure that their actual needs and problems in line with the objectives of this project are well understood, and the best solutions are found and put into practice.

Document Log

Date	Author	Changes	Version	Status
02/08/2024	GPP Team	First version	1.0	Delivered

Executive Summary

This document describes high level use cases from the user communities' point of view, and corresponding requirements in response to the objectives of the project, which aims to real-life implementations for user-communities enabling them to discover, access and use actionable information.

Specifically, the document describes **cross-thematic** use cases such as those relevant to:

- **Community Portal Self-Creation Tool:** Developers in a community can set up their own portals to access Earth observations relevant to their needs. Registered users can create these portals through dedicated templates. Communities can make their portals available on the GEOSS Community portal, pending approval from the governance body.
- **GEOSS Yellow Pages Management:** Data providers can register themselves and their metadata sources/services on the GEOSS Yellow Pages. The Yellow Pages, hosted by UNIGE, manage Data Provider registrations, in compliance with the General Data Protection Regulation (GDPR).
- **Semantically Enabled Free-Text Search:** A cognitive search module, developed in the context of the EIFFEL H2020 project[2], enhances data discovery in GEOSS datasets with semantic-enabled search options.
- **AI-Powered Data Discovery and Access:** A Proof of Concept (PoC) for an Artificial Intelligence (AI)-powered search feature that, using Machine Learning (ML), improves user experience and data accessibility, thus supporting environmental and policy goals.
- **Landing Page:** The GEOSS Portal's landing page aims to increase user engagement by highlighting platform features, applications and benefits.

Moreover, **thematic uses** are described as regards:

- **SDG15.3.1 - Land Degradation** Users can calculate the Sustainable Development Goal (SDG) indicator 15.3.1 for land degradation at the national level using the GEOSS platform.
- **European Marine Observation and Data Network (EMODnet) [4] Data Access:** Users can search and access EMODnet data and related information within GEOSS.
- **Access to regional and local infrastructure and urban development data:** Users can find data relevant to regional and local infrastructure and urban development, including data from Eiffel[2] Pilots 3 and 4 respectively.
- **AfriGEOSS Community Portal**: provides functionalities for discovering and visualizing Earth observation data specific to Africa.
- **Climate Change Impact on Norovirus Pandemic Risk** Users can study the risk of Norovirus outbreaks due to climate change using GEOSS data, although this is still in

early stages due to data access barriers.

- **SDG11.7 - Accessibility to Urban Green Spaces** Users can calculate urban green space accessibility (SDG 11.7) at the city level using GEOSS, addressing issues related to urban sprawl and efficient land use.
- **Nutrient Pollution in European Inland and Coastal Waters** A model developed by CNR-IIA in collaboration with the Joint Research Center (JRC) helps users quantify nutrient pollution in European waters, supporting the EU's Zero Pollution Action Plan.
- **Above Ground Biomass (AGB)** Users can map biomass using remote sensing imagery and machine learning models via GEOSS, relevant for carbon stock quantification and ecosystem services.
- **Gross Primary Production for Monitoring Ecosystem Health within GEOSS (AGAME):** Users can access time series data on gross primary production to study carbon uptake and predict biosphere conditions, integrated into GEOSS for broader accessibility.
- **Harmonized In-Situ Data for crop mapping (MAPS4GPP):** Users can generate crop maps using harmonized in-situ reference data to train classification algorithms, improving the quality of agricultural indicators.
- **Climate Change Data on Urban Heat Fluxes in Milan (HARMONIA [3]):** Researchers can access Harmonia project [3] data on urban heat fluxes via GEOSS to study climate impacts in Milan, informing urban planning and mitigation strategies.

The document also describes the detailed user requirements corresponding to the above-mentioned use cases.

The approach adopted for eliciting the use cases and requirements highly relies on the communication with the end users and the GEO stakeholders through their direct involvement (co-design) by dedicated discussion meetings, involvement and participation to community conferences, and engagement to GEO related conferences and workshops, to ensure that their actual needs and problems in line with the objectives of this project are well understood, and the best solutions are found and put into practice.

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GPP EC Grant Agreement no. 101039118

1. Introduction

1.1.　Document Purpose and Scope

This document describes high level use cases derived from the project objectives and the corresponding requirements.

These are input to the functional analysis which leads to the definition of system requirements for the possible evolution of the GEOSS Platform components and their integration in the user infrastructure.

The approach adopted for eliciting the use cases highly relies on the communication with the GEO stakeholders and their direct involvement, to ensure that their actual needs and problems in line with the objectives of this project are well understood, and the best solutions are found and put into practice.

1.2.　Document Organization

The document is organized as follows:

- **Section 1**: Introduction: describes the purpose and scope of the document and its organization.
- **Section 2**: Rationale and context: it contextualizes the content of this document by providing background information and details on the operational landscape encompassing the system (the GEOSS Platform) that is being enhanced to support the implementation of the scenarios described in this document.
- **Section 3**: Approach and methodology: describes the approach adopted for the elicitation and the definition of the use cases. It also briefly introduces the end-to-end validation and user assessment approach.
- **Section 4**: Use cases: describes high level community-specific use cases, involving the enhanced GEOSS Platform.
- **Section 5**: User requirements: describes the detailed, specific requirements deriving from the above-mentioned use cases.
- **Section 6:** GEOSS platform usability enhancements: shows the requirements to improve GEOSS usability.
- **Section 7**: Contacts with GEO Work Programme activities: describes the results of the contacts with each GEO Work Programme and shows an overview of the elicited needs.
- **Section 8**: Requirements traceability matrix: Traces the requirements to the use cases.
- **Annex A**. References: List the references used in the document.
- **Annex B**. Figures and Tables: Provides links to figures and tables in the document.
- **Annex C**. Terminology: explains the meaning of the acronyms and definitions used in

the document.

- **Annex D**. Helps to clarify a set of use cases, the ones dedicated to the MAP4GPP project, by detailing the data providers.

1.3.   Changes to the previous version

With respect to the previous version, the following use cases have been added:

- UC-ECS-01 - Semantically enabled free-text search
- UC-AIP-01 – AI-Powered Data Discovery and Access
- UC-LPG-01 – Landing Page
- UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces
- UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product
- UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster
- UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment
- UC-MPS-01 - Host WorldCereal repository
- UC-MPS-02 - Register in-situ data providers
- UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository
- UC-MPS-04 – Generate crop maps
- UC-HAR-01 Accessing Climate Change Data on Urban Heat Fluxes in Milan

and the corresponding requirements.

Moreover, the already existing use cases and requirements have been revised in the light of increased information that has become available during the project and some of the connections we had established at the beginning of the project with the GEO Work Programme activities have been refreshed and led to new recommendations for enhancements, such as in the case of GEO Mountains, whose requests are currently being investigated, see details in Section 7.10 GEO Mountains.

2. Rationale and Context

2.1. Background and operational context

Climate change is one of the major environmental issues of our time and Earth Observation (EO) technology provides precious information about its research while promoting its development. The European Space Agency (ESA) and the Group on Earth Observations (GEO) are strongly promoting the use of such EO technology since it captures environmental and socio-economic data over a range of spatial, spectral and temporal resolutions and provides almost endless capabilities to deal with issues related to climate change, sustainable development and disaster risks management.

The GEOSS (Global Earth Observation System of Systems) Platform, through the GEOSS Platform, enables users to access worldwide Earth observation data and information. As one of the official GEOSS Platform components providers, ESA ensures the short and medium-term operational development of the GEOSS Portal, the unique web-based entry-point to EO-data.

Through the GEOSS Platform Plus (GPP) project, ESA, in close collaboration with the GEO partners, contributes to the evolution of the GEOSS Platform and the GEOSS infrastructure from a functional and architectural viewpoint with the aim respectively:

- to make accessible tailor-made information and actionable knowledge by users, focusing, in particular, but not only, to services to non-specialists in the domain of adaptation to extreme climatic events and to changes in climatic conditions, and
- to enable full exploitation of the GEOSS infrastructure and its components, in particular, the GEOSS Infrastructure Development Task Team (GIDTT) accepted evolutions, and by driving the use of current trends in information technology, so that users can experience a user-friendly, up-to-date and therefore familiar environment.

2.2. The GPP Drivers and deriving objectives

GPP considers four drivers for the evolution of the platform, which are the basis to derive project objectives, which drive the definition of use cases. The drivers are shown in the following table, grouped by the above-mentioned viewpoints.

Table 1 Main drivers for the evolution of the GEOSS Platform

<table>
<tr>
<td rowspan="10" style="writing-mode: vertical;">Functional evolution</td>
<td><u>Lessons-learned from the evaluation of the implementation of the EU Strategy on Adaptation to climate change</u></td>
</tr>
<tr>
<td>In 2005, the Commission began to consider the need to adapt to changes in Europe's climate. As a result, a White Paper[1] was adopted in 2009, and an EU adaptation strategy ('the strategy') in 2013[2]. The lessons-learned from the evaluation of its implementation, reported in the corresponding report, show, among other things, that, though knowledge gaps on adaptation may never be entirely closed, it may be time now to switch focus from generating knowledge to applying it for decision-making.

Moreover, the reports high-lights that climate resilience requires, among others specific adaptation standards[3], EO data, other space data and space-based services, citizen science and guidelines that are accessible to both experts and decision-makers.

The strategy is expected to be able to deliver more in the future in certain areas, including Disaster risk reduction, EU maritime and fisheries policy, and coastal areas in general, in the assessment and mapping of social vulnerability to climate-related events, in reinforcing the links between public health and adaptation, notably to improve cross-sectoral cooperation on risk assessment and surveillance and to increase the awareness and capacity of the health sector, including at local level, to address current and emerging climate-related health risks.</td>
</tr>
<tr>
<td><u>The priorities identified under the European Green Deal</u></td>
</tr>
<tr>
<td>Climate change is a global threat and can only be addressed by a global response. The EU actively engages and supports its international partners on climate action, in particular through the UN Framework Convention of Climate Change (UNFCCC) and its Paris Agreement. In parallel to mitigation actions, the EU is taking action on climate adaptation, to face the unavoidable impacts of climate change.

The European Green Deal will transform the EU into a modern, resource-efficient and competitive economy, ensuring (i) no net emissions of greenhouse gases by 2050, (ii) economic growth decoupled from resource use, (ii) no person and no place left behind.

The European Commission adopted a set of proposals to make the EU's climate, energy, transport and taxation policies fit for reducing net greenhouse gas emissions by at least</td>
</tr>
</table>

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[1] Adapting to climate change: Towards a European framework for action. COM (2009) 147 final: https://ec.europa.eu/health/ph_threats/climate/docs/com_2009_147_en.pdf

[2] An EU strategy on adaptation to climate change. COM (2013) 0216 final: https://ec.europa.eu/clima/policies/adaptation/what_en#tab-0-1

[3] The Commission has requested the European Standardisation Organisations to update standards for climate-resilient infrastructure in the transport, energy and building sectors. See Commission Decision (C(2014)3451).

	55% by 2030, compared to 1990 levels.
	Objectives of the Mission on Adaptation to Climate Change including Societal Transformation
	The overall objective of the Mission is to support at least 150 European regions and communities in becoming climate resilient by 2030. In doing so, the Mission will engage local actors, notably in climate-vulnerable regions, as well as citizens by funding projects facilitating and requiring their involvement.
	Considering that the level of preparedness for climate impacts varies substantially between regions in Europe, this R&I support will be provided in different ways.
	The following specific objectives are identified: _(i) Preparing and planning for climate resilience - provide general support to European regions and communities to better understand, prepare for and manage climate risks and opportunities; (ii) Accelerating transformations to climate resilience - work with at least 150 regions and communities to accelerate their transformation to a climate resilient future, supporting them in the co-creation of innovation pathways and the testing of solutions; (iii) Demonstrating systemic transformations to climate resilience - deliver at least 75 large-scale demonstrations of systemic transformations to climate resilience across European regions and communities._
Architecture and Infrastructure evolution	**_Recommendations for GEOSS Platform Evolutions resulting from the Mid Term Evaluation_**
	The Mid Term Evaluation has highlighted that GEO should review the content of the GEOSS Implementation Plan to make sure it: (i) has good links with key global, regional and national data portals (also focussing on carrying out more training activities in developing countries to bridge the digital literacy gap); (ii) addresses the gaps in the integration and availability of in situ data working with in situ terrestrial, freshwater, coastal, ocean and atmospheric observation systems and new in situ initiatives such as GBON and others. In particular, the work of the In Situ Subgroup of the Data Working Group should be strengthened; (iii) plans for appropriate use of the Knowledge Hub within the GEOSS overarching structure to demonstrate the value of Earth observation to decision makers.
	Moreover, the report points out that the Portal, specifically shall: (i) Improve the quality of the metadata (solve missing/non-functioning links); (ii) Improve the filtering options to allow users to select information based on their needs; (iii) Pay more attention to visualization tools; (iv) Provide context and tools to better understand the data (which is the main reason why users sometimes prefer to access data directly from the source rather than through GEOSS); (v) Consider the use of cloud technologies to address existing gaps in the GEOSS system. It was noted that GEO should be aware of the strong evolution of cloud-based data processing environments provided by the commercial sector and how these can interact with government funded cloud offerings especially

203	as it focuses more on engaging the commercial sector.

GPP considers the four drivers identified in Table 1, which have been the basis for deriving the five mentioned above project objectives, and initial high-level scenarios at proposal time. These scenarios, are further refined following communication with the involved stakeholders, are described as use cases in this document.

GPP engages with the GEO stakeholders in the development of the GEOSS infrastructure, working in close collaboration with them and leveraging the results of legacy projects.

In particular, GPP build on the results of the H2020 co-funded project EDGE (2017-2020), a European contribution to GEOSS led by ESA. Moreover, the GPP project considers ongoing initiatives, including All Atlantic, Eiffel and AfriGEOSS, especially as sources of use cases and requirements.

The project objectives can be summarized as follows:

- **OBJ 1**.   Deliver services and knowledge, including for climate change adaptation and mitigation with a view to science-based decision making; GEOSS needs to evolve from a data-oriented system towards a knowledge-oriented one. In the context of climate change adaptation and mitigation, specialised algorithms and dedicated tools are often available for deriving information and knowledge from the data, therefore decision makers and government authorities have the potential to benefit from the knowledge needed to take adapted actions.
- **OBJ 2**.   Exploit the potential of the GEOSS infrastructure to the maximum extent; Starting from the elicitation of the user requirements and taking into account the outcomes of the discussions, the GPP project makes sure that the potential of the GEOSS Infrastructure is exploited to the maximum extent, building on past results, and ensuring that all the infrastructure components functionalities which are relevant for the users are made available to them opportunely evolved where necessary.
- **OBJ 3**.   Improve the experience of the users of GEOSS, in particular as regards the accessibility and usage of services and knowledge; Particular attention is paid to data and metadata quality and, in particular, to the integrity of the information provided, which, as a result of a fruitful cooperation with the other actors (especially the resource providers), shall be correct, verifiable and appropriate for the purpose. Moreover, the user interface offers improved functionalities, especially for filtering and visualising data, with an appealing and familiar look & feel, using modern and well-known graphic elements and media.
- **OBJ 4**.   Increase access to and use of heterogeneous data, including in situ

measurements and data from regional and national GEOSS; Starting from the user needs, the GPP project strengthens the links with the global, regional and national initiatives and enlarges the data providers base of GEOSS, to better respond to user requirements. This includes tackling interoperability with heterogeneous sources of data, including in situ, and considering the work done in the context of the In Situ Subgroup of the Data Working Group.

- **OBJ 5**.   Reinforce European participation in GEOSS; several ongoing and envisaged initiatives aim to contribute to position Europe as a global force in Earth observation. The European Commission (EC) has recognized the need to improve and streamline access to and use of Copernicus data and information, by appointing ESA to design and procure four of the five Data and Information Access Services (DIAS) which ESA did in the meantime.

3. Approach and Methodology: user centrality

The elicitation of the user's needs, specification of user scenarios, end-to-end validation, and assessment of the developed solutions, are achieved through a user-centric approach, focused on an iterative involvement of the users. The purpose is to minimise requirement misunderstandings and to guarantee the ability to quickly adjust to changing requirements, within the time and budget limits.

3.1. Use Case Definition Approach

The use cases described in this document respond to the GPP objectives, whose identification has been guided at proposal time by the above mentioned drivers recommended in the call to which the GPP project responds.

The use cases definition approach is depicted in Figure 1. As a first step, it is necessary to liaise with the identified users to understand their needs, problems, domain and working habits.

An analysis phase follows, focused on brainstorming on the user needs, defining the preliminary scenarios and, if needed, sketching mock-ups of the proposed solution, for easier user evaluation.

In the *Analysis* process, different elements are considered for each user objective, to understand how the Project, by pursuing its objectives, can best serve the user's needs.

Precisely, the following elements, per objective, are considered of critical importance.

- OBJ1 – What is **actionable knowledge**, and how could the GEOSS Platform support in providing Earth Intelligence?
- OBJ2 – Is the full potential of the GEOSS infrastructure exploited, so that any scientist can benefit from it? In particular, can scientists easily take advantage of the work done by other scientists? Is there support for enabling **reproducibility, reusability, replicability**? [4]

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[4] The terms reproducibility, replicability and reusability (or generalizability) are used in the sense defined by the *National Science Foundation's Subcommittee on Replicability and Science (2015):*

- **Reproducibility** refers to the ability of a researcher to duplicate the results of a prior study using the *same materials and procedures* as were used by the original investigator.
- **Replicability** refers to the ability of a researcher to *duplicate* the results of a prior study if the *same procedures* are followed but *new data* are collected.
- **Generalizability** (**reusability or reuse**) refers to whether the results of a study apply in *other contexts or populations* that differ from the original one.

- OBJ3 – What is considered missing in terms of **accessibility** and **usability** of services and knowledge?
- OBJ4 – What are the **data, services, knowledge sources** (including in situ) of interest to the users?
- OBJ5 – What is the (expected) role, in terms of **impact**, of the use case in question and of the involved community in the European landscape?

An answer to the above identified questions is sought through the interaction with the involved stakeholders.

Attention is mainly focussed on the following elements:

- **actionable knowledge** moving towards Earth Intelligence(obj 1)
- **reproducibility, reusability, replicability** (obj 2)
- **data, services, knowledge sources (**obj 4**)**

The aspects relevant to accessibility and user friendliness (**obj 3**) have been analysed (see section 6). The aspects concerning the impact (**obj 5**) can only be analysed later in the project life, and towards the end of the project, and will be discussed in the Final Report.

In short, *reproducibility* involves the original data and code; *replicability* involves new data collection(s) to test for consistency with previous results of a similar study; *reusability* (*reuse* for short) involves the original code (or a slightly modified version) with data for a different region of study, to aim to obtain similar results.
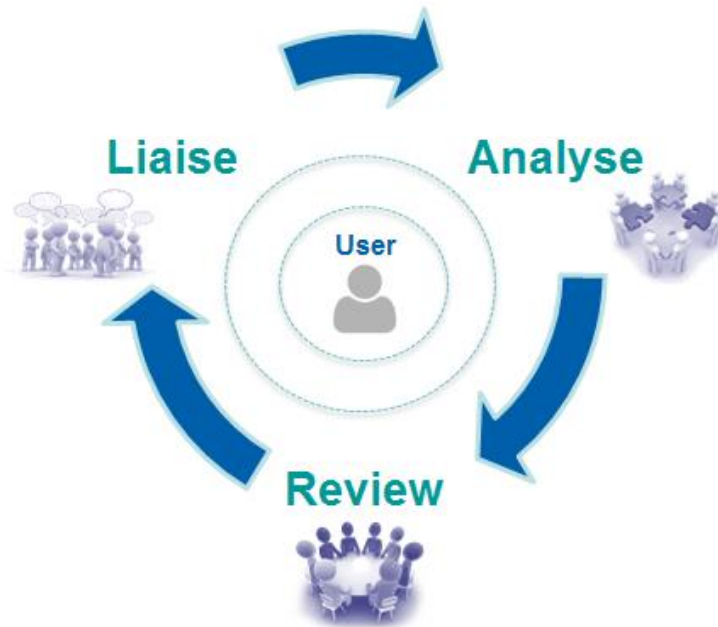
Figure 1 GPP use case definition approach

Use cases and mock-ups are then reviewed with the user and refined, until the needs of the users are correctly and comprehensively captured, and their interest and satisfaction are met, in accordance with the project objectives.

The user community-specific use cases and user requirements are then analysed to derive system requirements, to be implemented to respond to the user needs.

4. Use Cases

The following sections report the use cases descriptions resulting at the end of the use cases definition process presented in 3.1. When necessary for easier communication with the stakeholders, mock-ups have been developed in the process: an excerpt of them is reported.

4.1.   Introduction

This section describes use cases from the user communities' point of view, in response to the objectives of the project. The use cases are grouped by thematic area/context and have the following attributes:

- 'Identifier': a code following the naming convention UC-<Theme>-<Counter>, where:

  o <Theme> is a three-letter identifier of the thematic area/context to which the use case refers, whose explication can be found in the Terminology section.

  o <Counter> is a two-digit counter that uniquely identifies the use case;

- 'Title': a very concise textual description of the use case;

- 'Background and Rationale': a description of the context in which the use case finds its application and of the rationale at its basis.

- 'Use Case': full specification of the use case (actors involved, brief description, data domain, use case flow, etc. - this will be more or less detailed according to the maturity of the use case itself). Excerpts of mock-ups could be used here for better conveying the information.

- 'Related user requirements': the list of the identifiers of the user requirements (fully described in Section 5) that derive from the use case.

4.2.   Community Portal provision

4.2.1.   UC-CSP-01 – Community Portal self-creation

Identifier

UC-CSP-01

Title

Community portal self-creation

Background and Rationale

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A developer of a given community shall be enabled to set-up/implement a community portal him/herself to allow a given community to discover, access and use Earth observations of interest and according to the needs of that specific community.

Use Case

Actors and End Users

- Community's developers
- Any registered and authorized user
- GEOSS Platform Administrator
- GEOSS Governance Body representative

Brief description

Any registered and authorized user is enabled to create a community-specific portal, through a dedicated template, providing capabilities for discovering and accessing data of interest for their community.

Input

User's information required parameters to define a new community portal (see the *Flow*).

Output

A dedicated community portal as requested by the user, corresponding to the specification given.

Data sources

Any data domain selected by the user.

Flow

The flow identifies the steps required for the creation of a Community Portal.

1. The User must log in to the Geoss Portal to have access to the download page where the tool/package link is present. If the User does not have an account on the Portal User will need to create one.
2. The user can download a ready-to-be-installed web page template in order to configure the Community Portal
3. The user is enabled to install the downloaded, above mentioned, tool
4. The user can customize the graphic user interface (GUI) according to the user's preference, specified in the user requirements.

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5. The user can select among a list of predefined views (currently existing in the GEOSS portal) or can select the default one.

Mockups
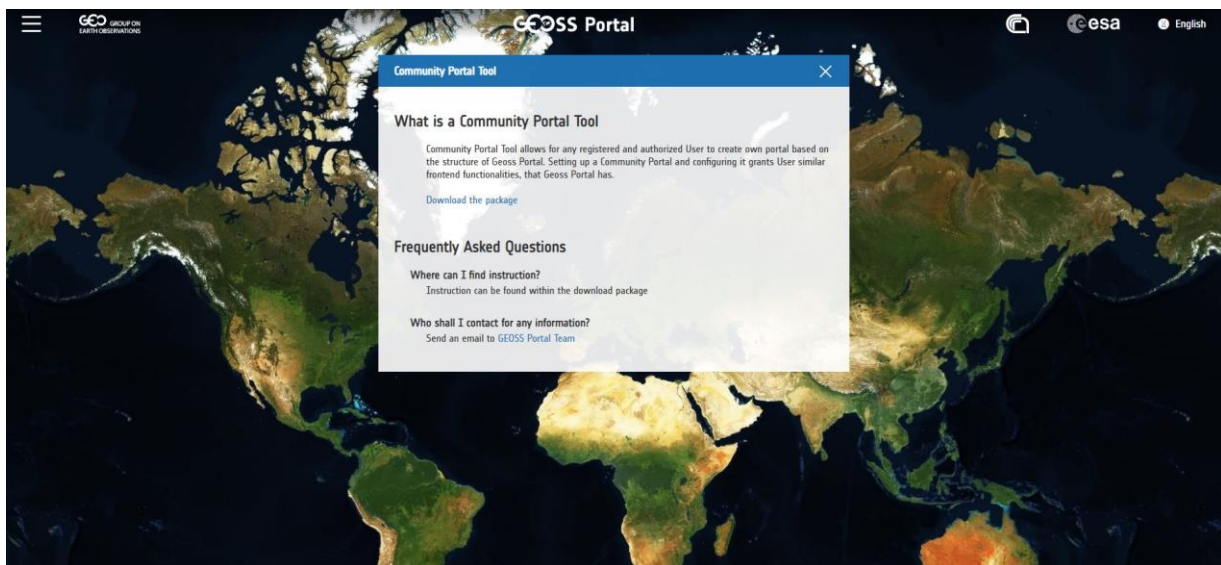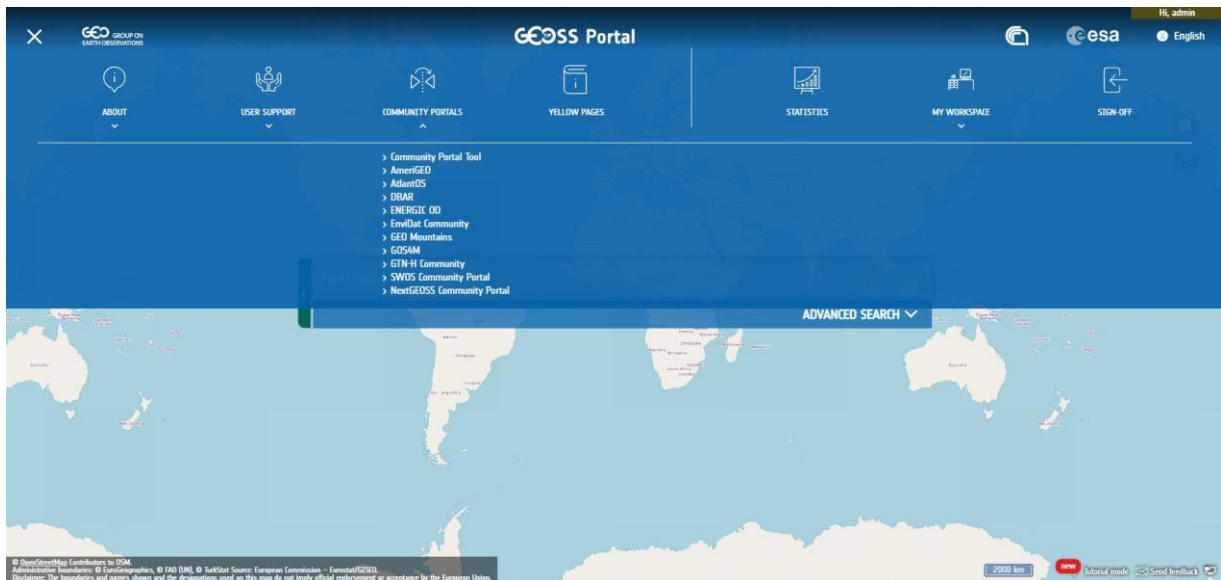
Related User Requirements

- UR-CSP-01 – Community Portal package access
- UR-CSP-02 – Community Portal General Configuration
- UR-CSP-03 – Views Selection
- UR-CSP- 04 - Views Setup

4.2.2.   UC-CSP-02 - Community-specific portal registration on

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GEOSS

Identifier

UC-CSP-02

Title

Community-specific portal registration on GEOSS

Background and Rationale

A community needs to make available their Community Portal on the GEOSS Community portal.

Use Case

Actors and End Users

A representative of a specific community

GEOSS Platform Administrator

GEOSS Governance Body representative

Brief description

Representatives of a specific community are enabled, previa acceptance by the opportune governance body, to make available a community specific portal providing capabilities for discovering and accessing data of interest for their community.

Input

Community information (name, logo, data and search criteria of interest)

Output

The community-specific portal on the GEOSS portal.

Data domain

Any data domain selected by the user.

Flow

The Community Portal registration flow aims at defining the steps needed for the request and approval (by the opportune GEOSS Governance body) of a new Community Portal on the GEOSS platform.

Registered users only can request to be included in the list of official GEOSS Community Portals accessible through the GEOSS portal.

Community Portal registration flow

1. The representative community user sends a request to create a new community portal to the GEO Governance Body representative.
    a. The representative community user provides an explanation of why and for which a community-specific portal should be generated, the community logo and the name.
2. The GEOSS Governance Body representative reviews the request.
    a. If needed, the GEOSS Governance Body representative can request an update of the provided information.
    b. The representative community user provides the requested updates.
3. The GEOSS Governance Body representative accepts the request.
4. The representative community user and the GEOSS Platform Administrator are notified that the request was accepted and the Community Portal will be made available on the GEOSS Community Portals.

Related User Requirements

- UR-CSP-05 – Link to the Community Portal from GEOSS Portal
- UR-CSP-06 – Community Portal information
- UR-CSP-07 – Administration rights
- UR-CSP-08 – Add Community Portal in the Community Portal Section

4.3. Yellow Pages Management

4.3.1. UC-YGP-01 - Registration to the GEOSS Yellow Pages

Identifier

UC-YGP-01

Title

Registration to the GEOSS Yellow Pages

Background and Rationale

A data provider (not registered in the GEOSS platform) should be able to register itself and the different (meta)data sources/services.

Precondition

Data provider is not yet registered in GEOSS Yellow Pages.

Use Case

Actors and End Users

Data provider representative.

Brief description

A data provider is enabled to register to the GEOSS Yellow Pages.

Input

Administrative and Technological description of the provider, link to the website, information about their data as regards discoverability, accessibility, preservation, refreshing, and quality of the metadata.

Output

The Providers is registered in the GEOSS Yellow pages (and is able to administer/modify its profile).

Data domain

Descriptive information about the providers and their data.

Flow

1. The Data provider is given a link to a website where registration can be done.
2. The Data provider provides information into the form presented on the website (e.g. description of the provider, link to the website, information about their data as regards geographical coverage, discoverability, accessibility, preservation, refreshing, quality of the metadata, etc.).
3. The Data provider agrees to the ToS by checking a checkbox.
4. The user (data provider) submitted the registration in the GEOSS Yellow Pages.
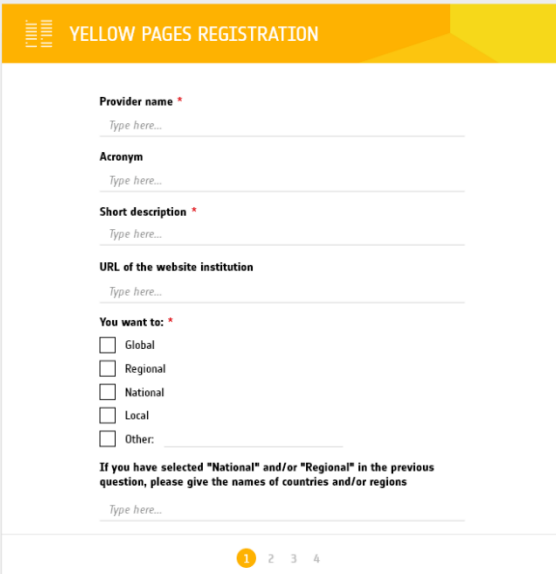
Postcondition:

The User is informed that the submission was successful and, that Use should wait for a decision on consideration.

Open Issues and assumptions

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- It is assumed that the registration request is sent to a dedicated system in which it will be processed;
- Provision of the YP registration capability as a Widget is under discussion.
- What kind of traffic the form should with stand (this decision will have an impact on the API, Database requirements).
- We are assuming that Terms and Conditions of this form will be provided in text form when the implementation will begin.

Mockups

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Related User Requirements

- UR-YPG-01- Graphic Banner
- UR-YPG-02- Wizard Registration
- UR-YPG-03- Terms of Service Acceptance
- UR-YPG-04- User Notifications
- UR-YPG-05- Data Modification\Deletion
- UR-YPG-06 – Data Provider Account Request
- UR-YPG-07- Search and Visualization of Registered Data Providers

4.3.2. UC-YGP-02 – Management of the GEOSS Yellow Pages Widget

Identifier

UC-YGP-02

Title

Management of the GEOSS Yellow Pages

Background and Rationale

The Yellow Pages is the historical GEOSS component that enables and manages the registration of the Data Providers in GEOSS. It is currently hosted at the UNIGE premises and needs to be re-adapted so that it is GDPR-compliant. Considering that such component could also be needed at regional level (I.e. by the various Regional GEOSS to enable registration and management of the Regional GEOSS Data Providers), it has been decided to provide it as a Widget, that could be easily installed where needed.

Use Case

Actors and End Users

The Authorized Yellow Pages owners

Brief description

The authorized Yellow Pages owners should be able to access and download the Yellow pages Widget, and shall make available the registration function to data providers and shall store and process information provided.

Input

Form and related information, protocol to communicate to the Database.

Output

Widget

Data domain

Descriptive information about the providers and their data

Flow

1. The authorized Yellow Pages owner can download the widget.
2. The Yellow Pages owner can install the widget on their premises.
3. The wizard form is made available to the data provider.
4. The information provided by the data provided are stored in the Yellow Pages Database
5. The YP owner will inform the GEO Bodies about the new provider request in order to authorize them.
6. The provider will be informed for the request outcome (Approved/deny).

Open Issues and assumptions

GDPR aspects needs to be further investigated;

The Yellow Pages must be created outside the GOESS Platform and have to be resident in the UNIGE platform. The main point is to avoid to have any personal data on the GEOSS Portal except the one for the registration to the portal and its usage.

Related User Requirements

- UR-YPG-08- Widget download
- UR-YPG-09- Widget Installation
- UR-YPG-10 – Yellow Pages Authorization
- UR-YPG-11 – Yellow Pages Authorization Response
- UR-YPG-12 – Data Modification
- UR-YPG-13 – Data Provider Account Management
- UR-YPG-14 – Data Provider Registration Process Status

4.4. Semantically enabled free-text search[5]

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[5] This derives from the collaboration with the Eiffel project.

4.4.1.   UC-ECS-01 - Semantically enabled free-text search

Identifier

UC-ECS-01

Title

Semantically enabled free-text search

Background and Rationale

Within the EIFFEL H2020 project [2], a Large Language Model-based Cognitive search module has been developed and fine-tuned for the Climate Change domain. The module allows the user to pose free text queries for data discovery in GEOSS core datasets available in the GEOSS Portal. In this case study, the cognitive search functionality was integrated and fused with the filtering capabilities of the GEOSS portal. This enhances the overall user experience, as well as the speed and quality of data discovery. Two approaches were developed and investigated. A) Search and then filter, which first mobilizes the cognitive search to fetch the full set of semantically relevant datasets and then filters them to the user's special needs, and B) Filter then search, which uses exact search for fetching data that contain the query keywords and then use the semantic search for re-ranking the results based on their relevance.

Use Case

Actors and End Users

GEOSS portal users

Brief description

The GEOSS portal user will be able to experience the portal user interface as usual. However, the advanced menu now has three options: conventional text search, semantic search and then filter, or filter and then semantic re-ranking.

Input

Free text query for data sets of interest.

Output

A ranked list of semantically relevant results.

Data domain

The use case is applicable to any data domain.

Flow

1. The user searches for data in a free text form (without the need for the query text to be included in the metadata of the available data).
2. The user selects the *Search then filter* (or *Filter then search*) from the advanced menu.
3. The user receives a a ranked list of data whose metadata are semantically relevant to the query and can filter the results with the GEOSS Portal's filters (e.g., spatial filtering on the map).
4. The semantically relative and filtered ranked list is depicted in the GEOSS Portal user interface.

Open Issues and assumptions

The use case is based on data damp that comprises only GEOSS CORE data in Europe acquired in early 2022.

Related User Requirements

UR-ECS-01 – Communication with the EIFFEL system

4.5. Artificial Intelligence (AI) – Powered Data Discovery and Access (Proof of Concept)

4.5.1. UC-AIP-01 – AI-Powered Data Discovery and Access

Identifier

UC-AIP-01

Title

AI-Powered Data Discovery and Access

Background and Rationale

The increasing volume and complexity of Earth Observation data make it challenging for users to find relevant datasets efficiently. Users face difficulties in browsing, downloading, and understanding data, along with the need for personalized data recommendations. An AI-powered search feature addresses these issues by leveraging natural language processing (NLP) and machine learning to enhance user experience.

The following benefits can be identified:

- User Experience Improvement: Enhancing the overall user experience by making data

discovery and access more intuitive and efficient.

- Technological Advancement: Leveraging cutting-edge AI technologies to improve data processing and retrieval capabilities.

- Data Accessibility: Increasing the accessibility and usability of complex Earth Observation datasets.

- Environmental and Policy Goals: Supporting environmental monitoring and policy-making by providing easy access to relevant data.

- Scalability and Adaptability: Creating a solution that can be scaled and adapted to various contexts and user needs.

For the purpose of the Proof of Concept the dynamic API integration with GEO Discovery and Access Broker (GEO DAB) will be evaluated to retrieve the data queried by a user.

Use Case

Actors and End Users

- General users
- Researchers
- Data analysts

Brief Description

The AI-powered search feature allows users to input natural language queries to discover relevant Earth Observation datasets. The AI processes the queries, understands the intent and context, and provides users with suggested datasets, download instructions, and related datasets. For the proof of concept purpose, the AI Search will only be available for internal users.

Input

- Natural language queries from users (e.g., "data for floods in Spain", "global land cover changes").

Output

- Suggested datasets
- Download instructions
- Related datasets

Data Domain

To be determined as part of the proof of concept. The AI will explore various Earth Observation data sources to identify relevant datasets.

Flow

1. The user accesses the landing page with a search bar.

2. The user inputs a natural language query into the search bar.

3. The AI processes the query to understand the user's intent and context.

4. The AI returns a list of suggested datasets relevant to the query.

5. The AI provides download instructions for the suggested datasets.

6. The AI suggests related datasets based on the user's query.

Related User Requirements

- UR-AIP-01 – Natural Language Query
- UR-AIP-02 – Relevant Dataset Suggestions
- UR-AIP-03 – Download instructions
- UR-AIP-04 – Related Dataset Recommendations
- UR-AIP-05 – User Interface for AI-Powered Search
- UR-AIP-06 – User data security and privacy

Open issues and assumptions

- **Proof of Concept Disclaimer**: This project is a proof of concept, which means its primary aim is to test the feasibility and practicality of AI-powered data discovery and access. The outcomes might vary, and it is possible that we may not achieve the desired goals. The results of this PoC will guide further development and potential implementation.

- Earth Observation data for powering the Prototype will be selected during the solution development process, as will be the sample data with the resulting content structure.

- The Customer allows, if justified for the evaluation of the Concept, the possibility for the Contractor to use manual or automatic web scraping tools on a specified group of data agreed upon with the Customer.

- Infrastructure for the prototype. To develop and build the Prototype (including query processing, data embedding, vector database implementation, language model usage, testing, etc.), on Contractor's hardware resources or cloud services will be used.

- The Prototype will be built based on components with open-source licenses or commercial paid solutions.

- The Prototype is intended for testing and internal work by the Customer's team.

- At the current stage of the order, the Customer does not foresee integrating the Prototype with the production GEOSS Search Engine. If the results obtained at the "Proof of Concept" stage are satisfactory, integration will be considered under a separate contract.

- The Hardware Platform and System Software will be selected by the Contractor.

- Possible expansion of the proof of concept with an administrator panel – a separate website containing at least the functionalities necessary for testing and evaluating the effectiveness of the Prototype, e.g., a search engine for indexed documents, functionalities enabling tuning of the Prototype, adding content for indexing, removing indexed content, etc.

4.6. Landing Page

4.6.1. UC-LPG-01 – Landing Page

Identifier

UC-LPG-01

Title

Landing Page

Background and Rationale

The landing page project for the GEOSS Portal aims to enhance user awareness of platform features and benefits while fostering engagement with GEO communities. By providing a well-structured and informative entry point, the landing page will guide users to relevant pages, ultimately promoting the GEOSS Portal and its ecosystem.

The following benefits are expected:

- User Experience Improvement: Enhancing the overall user experience by providing a clear and structured entry point, but also to call the user to actions in trying the variety of tools and features available in the GEOSS Platform Exosystem.

- Information Organization: Effectively organizing information to guide users.

- Community Support: Increasing user awareness of how GEOSS supports communities.

- User Engagement: Encouraging active participation in GEO activities.

Use Case

Actors and End Users

- General Users
- Researchers
- Data Providers
- GEO Community Members

Brief Description

The landing page serves as a gateway to the GEOSS Portal, offering a clear and structured layout that highlights the platform's features and benefits. It provides educational content to enhance user understanding and directs users to practical use cases, encouraging active participation and engagement with the GEO community.

Input

- User visits to the landing page
- User interaction with educational content and navigation tools

Output

- Increased user awareness of the GEOSS Portal
- Improved user understanding of the GEOSS ecosystem
- Enhanced user engagement and participation in GEO activities

Data Domain

The landing page will encompass various informational and educational content about the GEOSS Portal, including data provider lists, use cases, and articles.

Flow

1. The user accesses the landing page.

2. The user views educational content about the GEOSS platform and its enhancements.

3. The user navigates through a structured layout to find relevant information.

4. The user is directed to the GEOSS Portal for deeper engagement and practical use cases.

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5. The user considers becoming a data provider or engaging in other relevant activities.

Related User Requirements

- UR-LPG-01 – Structured Layout
- UR-LPG-02 – Direct Navigation
- UR-LPG-03 – Search Engine Optimization
- UR-LPG-04 – Analytics Integration
- UR-LPG-05 – Article Management
- UR-LPG-06 – Cookie Notice

Open Issues and Assumptions

- The content and structure of the landing page will be refined based on user feedback and engagement metrics.
- SEO strategies will be employed to ensure the landing page is easily discoverable.
- The landing page will be developed with scalability in mind to accommodate future enhancements.
- Integration with existing GEOSS Portal components will be considered for seamless user experience.

4.7. Land Degradation

4.7.1. UC-LDG-01 - SDG15.3.1 Towards knowledge generation on Land Degradation

Identifier

UC-LDG-01

Title

SDG15.3.1 Towards knowledge generation on Land Degradation

Background and Rationale

Avoiding, reducing and reversing land degradation and restoring degraded land is an urgent priority to protect the biodiversity and ecosystem services that are vital to life on Earth. There is an immediate need to enhance national capacities to undertake quantitative assessments and corresponding mapping of their degraded lands.

Use Case

Actors and End Users

User from a national SDG-related agency

Brief description

The user wants to calculate the related SDG indicator 15.3.1 at the national scale, based on the official GPG 2.0 guidance document from UNCCD, using the GEOSS platform.

Input

Land degradation keywords, user selection on system results

Output (actionable knowledge)

Dashboard providing directly usable information for land degradation

Data sources

(1) Land Cover
(2) Land Productivity
(3) Carbon Stocks (soil organic carbon stocks)

Support for Reproducibility, Reusability, Replicability

This case is particularly fit for Reproducibility

Flow

1. The user connects to the GEOSS platform and does a search for "Land degradation".
2. The user obtains a number of resources that matches his search criteria.
3. The user can discover (or a pre-selection can be made) of the required sub-indicators (see data domain) available in the GEOSS platform and selects the most suitable for his/her needs.
4. The user can discover different data, services and knowledge and their relationship associated to the SDG 15.3.1 indicator. The user can then navigate deeper into the different sources.
5. The user discovers a dedicated model to compute the SDG indicator
6. The user realizes that there is a Service associated to this model. The GEOSS Platform associates the model to the actual processing services that enable its computation, which the user can access and run in a user-friendly way. In particular, the user can inspect the process workflow and search and select data as input to the service. In addition, the user has the capability to choose a Cloud computing platform of preference among the available (these include all the DIAS Platforms and Amazon Web Services).

7. The user can now start the computation on the selected infrastructure and wait for the results
8. The user can visualize the outputs in a dedicated dashboard (that can be further elaborated/modified and shared afterwards).
9. The created dashboard can be added in My Workspace, the user who created the dashboard can chose between sharing his work with other specific users or to render it accessible to all the platform users. In this case the User who created the dashboard should become a data provider or need the Administrator authorization.

   The procedure regarding the acceptance or rejection by the Administrator is the following :

   a. Administrator can reject the dashboard creation and provide information why the rejection happened. User, that created the dashboard can then update it according to the provided information or discard the whole process.
   b. Administrator can accept the dashboard and in this case this dashboard will be accessible for both User, that created it and Users, that are looking for similar data in within the system. The data will be obtainable within the information tab.

Related User Requirements

- UR-LDG-01 – SDG indicator 15.3.1 computation service discovery
- UR-LDG-02 – SDG indicator 15.3.1 computation service execution
- UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations
- UR-LDG-04 – My Workspace Dashboard
- UR-LDG-05- Acceptance of the visualizations

4.8. EMODnet All Atlantic

4.8.1. UC-ATC-01 – EMODnet Physics experiment access

Identifier

UC-ATC-01

Title

EMODnet Physics experiment access

Background and Rationale

The EMODnet Physics portal is an excellent place to find and access ocean observations of known quality all around the world. By searching the portal, CSCS (Cyprus Subsea Consulting

and Services) are able to build and save searches, request and receive data, and verify our calculations for density stratification and current magnitude and direction (and the spatial and seasonal variability of those). Combined with modelling and remote sensing data from Copernicus Marine Service (CMEMS), they become familiar with the oceanographic conditions of the operational area before they even deploy the glider. By using EMODnet, CSCS has a much better track record of glider operations, which will help them gain more customers. Producing and providing a well-supported mission plan also indicates our level of professionalism and attention to detail, which instils confidence in our customers. The commercial sector has been slow to accept gliders for environmental monitoring but with professional and sea-proven missions, this is changing. Our success will mean that more oceanographic data at lower cost can be collected compared to most other means. If gliders become a more commonplace operational tool, then marine safety and security will improve (e.g., better knowledge of currents for pollution fate modelling, better storm forecasts, and better ecosystem management). CSCS plans to continue to use EMODnet, which grows more and more useful as more data are included.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMODnet Physics data.

Brief description

This actor shall be enabled to search for data relevant to EMODnet, among the other available in GEOSS.

Input

Users' search criteria for physics data

Output (actionable knowledge)

EMODnet datasets and related articles

Data sources

(1) Marine physics data
(2) Article: Glider Mission Planning with Historical Data

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the data provided by the EMODnet Physics Catalogue.
4. The user can visualize details (metadata) regarding the data found;
5. The user can access the catalogue through a link and related articles.

Related User Requirements

UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets

4.8.2. UC-ATC-02 – Joint Copernicus Marine – EMODnet experiment: Use of Global Ocean Model, satellite-derived and in situ data by the Brazilian Sea Observatory

Identifier

UC-ATC-02

Title

Joint Copernicus Marine – EMODnet experiment: Use of Global Ocean Model, satellite-derived and in situ data by the Brazilian Sea Observatory

Background and Rationale

BSO (Brazilian Sea Observatory) is a prototype of a coastal monitoring service, including an operational modelling system for the Brazilian coast and a WebGIS platform aiming to integrate: forecast results, in situ measurements, satellite data, vessel positions, on demand tool to predict the drift of oil spills. Multiscale oil spill detection and 39lavate39g system supported by Brazilian Navy: (1) Oil spill drift model coupled with an oil spill detection tool based on satellite observations; (2) Extend the operational modelling system along Brazilian coast; (3) Improve atmospheric forcing resolution with the support of Brazilian meteorological forecasting centres; (4) Forecasts available for downloading (e.g., ERDDAP data server). Multi-user detection, forecasting and Monitoring of Oil Spills at Sea SisMOM.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to Brazilian Observatory service.

Brief description

This actor shall be enabled to search for Brazilian Observatory service.

Input

Users' search criteria for Brazilian observatory service

Output (actionable knowledge)

Brazilian observatory service and related articles

Data sources

(1) Coastal monitoring
(2) EU Marine data services for All Atlantic and Global Oceans data Spaces

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the Brazilian Observatory service and related articles
4. The user can visualize details (metadata), including links to service and articles;
5. The user clicks on the provided link and is redirected to the Brazilian Observatory service.
6. If interested, the user can access the article by clicking on the provided link.

Related User Requirements

UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service

4.9. EMODnet marine ecosystem and biodiversity

4.9.1. UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access

Identifier

UC-MEB-01

GPP EC Grant Agreement no. 101039118

Title

EMODnet Seabed Habitats - Ospar experiment access

Background and Rationale

The main areas where disturbance from bottom-contact fishing was predicted to cause the most significant impact to benthic marine habitats were identified. This work fed directly into the OSPAR Intermediate Assessment (2017) with future implications towards the Marine Strategy Framework Directive assessments. The EMODnet Seabed Habitats helped saving time and resources on data collection, the supply of confidence maps enabled users to provide more detailed and transparent predictions to their deliverables. Th spatial distribution of aggregated disturbance from bottom-contact fishing using the 2010–2015 data series are collected in OSPAR Assessment portal.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMODnet Seabed Habitats, Ospar data.

Brief description

This actor shall be enabled to search for Ospar data.

Input

Users' search criteria for Ospar data

Output (actionable knowledge)

Ospar datasets and related articles

Data sources

(1) OSPAR – Oslo/Paris Convention (for the protection of the Marine Environment of the North-East Atlantic)
(2) Extent of Physical Damage to Predominant and Special Habitats
(3) Article: OSPAR intermediate assessments: evaluation the ecological status of the marine environment in the NE Atlantic

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by

giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the Ospar data.
4. The user can visualize details (metadata) regarding the data found;
5. The user can access the data and article through links.

Related User Requirements

UR-MEB-01 – Discovery and Access to the Ospar Data

4.9.2. UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats

Identifier

UC-MEB-02

Title

EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats

Background and Rationale

Ecological Niche Model was used to identify overlooked areas of the Mediterranean and Eastern Atlantic in this article, as areas containing soft coral habitats. The model could then be used for future surveys to target areas predicting presence of coral habitats and identify new priority conservation areas. Data on the locations of rocky-bottomed habitats across the study area were used in combination with other environmental predictors to undertake Ecological Niche Modelling, in order to investigate the distribution of suitable habitat of Paramuricea clavata.

Use Case

Actors and End Users

Any user willing to search soft corals articles

Brief description

GPP EC Grant Agreement no. 101039118

Any user willing to search for EMODnet soft corals articles.

Input

Users' search criteria for soft corals articles

Output (actionable knowledge)

EMODnet soft coral articles

Data sources

(1) EMODnet seabed Habitats
(2) Soft Corals Habitats
(3) Identifying previously unknown soft coral habitats

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data, products responding to the search criteria, including the Soft Coral Habitats article provided by EMODnet;
4. The user can visualize detailed metadata concerning the article;
5. The user can access the article through the link.

Related User Requirements

UR-MEB-06 – Discovery and Access to the Soft Corals Article

4.9.3. UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean

Identifier

UC-MEB-03

Title

EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by

benthic habitats in the European North Atlantic Ocean

Background and Rationale

The authors of the paper were able to map and assess the ecosystem services provided by habitats in the European North Atlantic Ocean, providing a point for further research and discussion on ecosystem services contribution of benthic habitats in Europe.

Use Case

Actors and End Users

Any user willing to access this article concerning the ecosystem services provided by benthic habitats

Brief description

Any user willing to access to this article.

Input

Users' search criteria for this article

Output (actionable knowledge)

EMODnet ecosystem services articles

Data sources

(1) EMODnet seabed Habitats
(2) Ecosystem services
(3) Mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the ecosystem services article provided by EMODnet;
4. The user can visualize details metadata concerning the article;

5. The user can access the document through the link.

Related User Requirements

UR-MEB-07 – Discovery and Access to the Ecosystem Services Article

4.9.4. UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment

Identifier

UC-MEB-04

Title

EMODnet Seabed Habitats experiment access – Ospar intermediate assessment

Background and Rationale

EMODnet Seabed Habitats data enabled the mapping of potential disturbance to benthic habitats due to fishing in the north-east Atlantic. The assessment was part of the wider OSPAR Intermediate Assessment 2017, which evaluates the status of the marine environment of the North-East Atlantic. The assessment contributes to delivery of both the OSPAR North-East Atlantic Environment Strategy (The OSPAR Strategy) and the European Union Marine Strategy Framework Directive.

The authors assessed physical damage by using habitat distribution maps at EUNIS Level 3, combined with maps of fishing pressures and information on habitat sensitivities to fishing. The majority of the habitat data used in this assessment are derived from the EMODnet Seabed Habitats portal, including EMODnet broad-scale seabed habitat map (EUSeaMap) and more detailed habitat maps from survey.

Furthermore, the confidence maps provided with EMODnet Seabed Habitats maps were used to calculate confidence in the predictions of physical disturbance. The EMODnet Seabed Habitats portal provided a one-stop shop for finding and downloading this data, saving the authors time and effort on data collection.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMODnet Seabed Habitats, Ospar Intermediate Assessment

Brief description

Any user willing to search for Ospar Intermediate Assessment

Input

Users' search criteria for Ospar Intermediate Assessment

Output (actionable knowledge)

Ospar intermediate assessment datasets, articles and reports

Data sources

(1) OSPAR Intermediate Assessment 2017
(2) European Marine Observation and Data Network
(3) EMODnet Seabed Habitats is crucial in assessing the extent of physical damage to benthic habitats in the North-East Atlantic

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the Ospar Intermediate Assessment metadata.
4. The user can visualize details (metadata) regarding the Ospar Intermediate Assessment portal found;
5. The user can access the catalogue and articles through links.

Related User Requirements

UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment

4.9.5. UC-MEB-05 – EMODnet Biology experiment access

Identifier

UC-MEB-05

Title

GPP EC Grant Agreement no. 101039118

EMODnet Biology experiment access

Background and Rationale

Copepods are the most abundant members of the zooplankton family and the major source of food for many fish, whales and seabirds. Their importance to the global marine ecosystem cannot be overstated; both in the ocean food web and in the carbon cycle. Since the 1930s their abundance has been measured by the Continuous Plankton Recorder which is towed behind merchant ships and is one of the longest running biological monitoring programmes in the world.

The analysis method has remained unchanged since the 1950s and the results are unique in providing comparable data on the geographical distribution, seasonal cycles and year-to-year changes in abundance of plankton over a large spatial area.

Geospatial modelling by the EMODnet biology team turned these data into Operational Oceanographic Products and Services (OOPS) which are gridded map layers showing the average abundance of marine species for different time windows.

In turn, these OOPS feed into the "Ecosystem Overviews" of the International Council for the Exploration of the Sea (ICES) which describe the trends in pressures and state of regional ecosystems and underpin ICES's scientific advice on the exploitation and stewardship of the marine ecosystem and marine living resources in the North Atlantic.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMODnet Biology.

Brief description

This actor shall be enabled to search for EMODnet Biology data.

Input

Users' search criteria for EMODnet Biology data

Output (actionable knowledge)

EMODnet Biology datasets and related articles

Data sources

(1) EMODnet Biology

GPP EC Grant Agreement no. 101039118

(2) Zooplankotn

(3) Article: Operational zooplankton data service: a long-term monitoring programme

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the EMODnet Biology data provided by the link;
4. The user can visualize details (metadata) regarding the data found;
5. The user can access the catalogue and articles through links.

Related User Requirements

UR-MEB-03 – Discovery and Access to the EMODnet Biology

4.9.6. UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species

Identifier

UC-MEB-06

Title

EMODnet Biology experiment access: Preventing the introduction of non-indigenous species

Background and Rationale

Non-indigenous species (NIS) introduced by human activities are organisms moved into new areas outside their natural range by, for example, transfer of ships' ballast water, biofouling (accumulation of organisms on ships' hulls) and aquaculture.

The presence of NIS can exert pressures on the marine environment with possible social, economic or environmental impacts. Invasive NIS are one of the most significant threats to global biodiversity. Removing NIS subsequent to introduction is very difficult, which means preventing their introduction is the most cost-effective approach to management, thus avoiding costs and the need for eradication measures.

The EMODnet biology data were used to assess the trends in new records of NIS introductions into the OSPAR Maritime Area, to determine the effectiveness of measures aimed at reducing NIS introductions. The results of the study are published in the OSPAR Intermediate Assessment 2017, which evaluates the status of the marine environment of the North-East Atlantic.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMODnet Biology, non-indigenous species report and articles.

Brief description

This actor shall be enabled to search the EMODnet Biology.

Input

Users' search criteria for non-indigenous species report and articles

Output (actionable knowledge)

Non-indigenous species report and articles

Data sources

(1) EMODnet Biology;
(2) non-indigenous species;
(3) EMODnet Biology helps preventing the introduction of non-indigenous species.

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the EMODnet Biology, non-indigenous species data provided by the link;
4. The user can visualize details (metadata) regarding the data found;
5. the user can access the catalogue and articles through links.

Related User Requirements

4.9.7. UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic

Identifier

UC-MEB-07

Title

Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic

Background and Rationale

Whales move across ocean basins as they travel between critical habitats used for feeding and breeding. Migrations are closely tied to the distribution of their prey, which is highly dynamic in time and space. However, prey is the missing link to understand the distribution and behaviour of whales and other predators. There is limited information on their migratory habitats in the mid-Atlantic region because sampling are logistically complex and expensive. Therefore, it is necessary to develop species distribution models (SDMs) incorporating model-derived prey data. To track whales in the North Atlantic, the mid-Atlantic Ridge was highlighted as a relevant habitat for fin and blue whales during their northward movement. Core habitat for sei whales above 45° N onwards, between Canada and Greenland. Movement patterns were mainly influenced by the interaction of temperature and the zooplankton biomass; however, this relationship differed substantially among species.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMODnet, Copernicus Marine, whales data.

Brief description

This actor shall be enabled to research the data of interest.

Input

Users' search criteria for Copernicus Marine, whales' data

Output (actionable knowledge)

Copernicus Marine, whales' datasets and related articles

Data sources

(1) EMODnet
(2) Copernicus Marine
(3) Joint Copernicus Marine - EMODnet use case: Tracking whales in the North Atlantic

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1) The User accesses the GEOSS Portal;
2) The User sets the search criteria;
3) The System replies with a list of data/products responding to the search criteria, including the Joint Copernicus Marine, whales metadata provided by link;
4) The user can visualize details metadata;
5) The user can access the datasets and articles through the links.

Related User Requirements

UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data

4.10. EMODnet Marine chemistry

4.10.1. UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines

Identifier

UC-MAC-01

Title

EMODnet Chemistry experiment access: Supporting the analysis of EU baselines

Background and Rationale

The first pan-European Marine Litter database, carried out by EMODnet Chemistry, has been used to compute EU Marine Litter quantitative Baseline. The latters are performed by the European Commission Joint Research Centre (EC JRC) and represent a fundamental step of the

MSFD Implementation Strategy to provide comparable assessments and to monitor the effectiveness of litter-reduction measures.

A subset of the pan-European Marine Litter database forms the Baselines dataset: the official monitoring data regarding litter on beaches. EMODnet Chemistry partnership along with Member States' authorities, the Regional Sea Conventions, and some non-governmental organizations provided data and related information.

EMODnet Chemistry has been in charge of collecting and processing data in cooperation with the EC JRC and the MSFD Technical Group on Marine Litter (TG Litter), set up as part of the MSFD Implementation Strategy to support and advise the policy development and implementation process.

The baselines dataset includes a total 3,063 surveys on 389 European beaches over the period 2012 to 2016. It involves data from 22 European countries and all EU regions: Baltic Sea, Greater North Sea, Mediterranean Sea, Black Sea, and NorthEast Atlantic Ocean.

Delivering a single database able to handle marine litter data at pan-European scale required a strict cooperation among involved parties to define the best possible data management strategy and to identify the most valuable methodology, as better explained in Marine litter database: Lessons learned in compiling the first pan-European beach litter database (Addamo et al., 2018).

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMODnet Chemistry, EU baselines, Marine Litter articles.

Brief description

This actor shall be enabled to search for EMODnet Chemistry, EU baselines, Marine Litter articles.

Input

Users' search criteria for EU baselines, Marine Litter articles.

Output (actionable knowledge)

EMODnet Chemistry, EU baselines article, Marine Litter database report.

Data sources

(1) EMODnet Chemistry;

(2) EMODnet Chemistry supports the analysis of EU baselines.

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data, products responding to the search criteria, including the Chemistry marine litter article provided by EMODnet;
4. The user can visualize detailed metadata concerning the article;
5. The user can access the report and related articles through the link.

Related User Requirements

UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline

4.10.2. UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment)

Identifier

UC-MAC-02

Title

EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment)

Background and Rationale

EMODnet Chemistry contributed to the Commission Staff Working Document IMPACT ASSESSMENT (Reducing Marine Litter: action on single use plastics and fishing gear), SWD (2018) 254 final, with an analysis of plastics distribution coming from for 2 "metacategories", namely fishing gear and single use plastics. The study uses the ICES DATRAS available data aggregated per MSFD regions and years.

Data are provided by different sampling devices (gear types) and are not directly comparable between them. For the same gear type, data are normalized in items/km2 in order to improve

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the comparison through years, reducing the effect of differences in sampling efforts along time, as suggested in recent publications (e.g., Schulz, Marcus, et al. "OSPAR standard method and software for statistical analysis of beach litter data." Marine pollution bulletin 122.1-2 (2017): 166-175).

Most importantly, the definition of "fishing gear" and "single use plastic" "metacategories" is approximate, since these "attributes" are not considered during the sampling.

Overall distribution of seafloor litter categories per MSFD regions (for the moment, North East Atlantic Ocean and Baltic Sea data have been analysed) was also provided.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to the EMDOnet Chemistry, Marine Litter reduction

Brief description

This actor shall be enabled to search for EMDOnet Chemistry, Marine Litter reduction

Input

Users' search criteria for marine litter reduction

Output (actionable knowledge)

Marine Litter reduction reports and articles

Data sources

(1) EMODnet Chemistry contributed to EC IMPACT ASSESSMENT (Reducing Marine Litter: action on single use plastics and fishing gear);
(2) Reducing Marine Litter: action on single use plastics and fishing gear.

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria,

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including the EMODnet Chemistry, Marine Litter reduction articles;

4. The user can visualize detailed metadata regarding the articles;
5. The user can access the articles and reports through the link.

Related User Requirements

UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter

4.11. EMODnet Marine Bathymetry

4.11.1. UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic

Identifier

UC-MAB-01

Title

EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic

Background and Rationale

The digital topographic map layers produced by EMODnet do not only show the depth of water, they also indicate where surveys are sparse and confidence in data is low. Extending this analysis for more distant waters requires collaboration with countries outside the EU who have similar programmes.

The Galway Statement signed by the European Union, Canada, and the United States in May 2013 facilitates this. Its Implementation Committee mandated an Atlantic Seabed Mapping International Working Group to take care of the issue. As a result, a prototype map viewer was developed showing EMODnet map layers together with those produced by Norway, Canada and the United States. This provides a basis for setting priorities for further surveys.

Use Case

Actors and End Users

The actor in this use case is any user willing to access to EMODnet Bathymetry services.

Brief description

This actor shall be enabled to search for EMODnet Bathymetry services.

Input

Users' search criteria for EMODnet Bathymetry service

Output (actionable knowledge)

EMODnet Bathymetry service and related articles

Data sources

(1) Bathymetry service
(2) Enhancing marine topographical data discovery and access in the North Atlantic

Support for Reproducibility, Reusability, Replicability

This case (under discussion) fit for Reproducibility, Reusability, Replicability scenarios by giving the possibility to link data with scientific articles.

Flow

1. The User accesses the GEOSS Portal;
2. The User sets the search criteria;
3. The System replies with a list of data/products responding to the search criteria, including the EMODnet Bathymetry service and articles;
4. The user can visualize detailed metadata, including links to service and articles;
5. The user clicks on the provided link and is redirected to the EMODnet Bathymetry services;
6. If interested, the user can access the article by clicking on the provided link.

Related User Requirements

UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services

4.12.   Access to the Eiffel Pilots

4.12.1.   UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data

Identifier

UC-EIF-01

Title

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Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data

Background and Rationale

The European Sea Ports Organisation's (ESPO) 2018 environmental report shows that air quality continues to be the main priority for European ports. The Port Authority of the Balearic Island is aware of this and has been working hard since 2016 to establish the level of air quality in its ports and to find out how port activity may be involved in this rating, in line with the Port Authority of the Balearic Island's Environmental Policy.

A total of 25 stations have been deployed across the public ports on the Balearic Islands. Each of these stations also has sensors for measuring atmospheric pressure, humidity, temperature and noise. All the ports have additionally been equipped with an anemometer which provides constant wind speed and direction readings.

A total of 250 sensors have been installed in the ports of Palma, Alcudia, Mahon, Ibiza and La Savina that record data every ten minutes. The air quality rating has been established based on the same criteria as those set by the Balearic Island Regional Government for its reference stations across the region.

Use Case

Actors and End Users

The actor in this use case is any user willing to access data produced in the context of the Eiffel Pilot 3

Brief description

This actor shall be enabled to search for data relevant to Infrastructure & Transport Management according to defined keywords and find as results, among the other available in GEOSS, also data from Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale, focused in the Balearic Porth Authority and city of Palma de Mallorca responding to the search criteria.

Input

User search criteria, as defined in the user requirements

Output (actionable information)

Infrastructure & Transport Management Regional Scale data produced by the Eiffel Pilot 3

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Data sources

(1) Ports;
(2) Air-quality data;
(3) In-situ sensors.

Preconditions

Data from the Eiffel Pilot 3 Infrastructure & Transport Management Regional scale have been registered in GEOSS

Flow

1. The User accesses the GEOSS Portal;
2. The User selects an area of interest;
3. The User sets the search criteria using the defined keywords;
4. The System replies with a list of data and products responding to the search criteria, including the data produced by the Eiffel Pilot 3;
5. The user can visualize details (metadata) regarding the data found;
6. The user can access and visualize them in the map viewer.

Related User Requirements

- UR-EIF-01 – Discovery of Eiffel Pilot 3 data
- UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data

4.12.2. UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data

Identifier

UC-EIF-02

Title

Access to the Eiffel Pilot 4: Sustainable Urban Development Local | Regional Scale and corresponding data.

Background and Rationale

The National Observatory of Athens (NOA), with support from the Eiffel project introduces the first "solar cadastre" for the city of Athens. The term refers to the geometric description and illustration of the solar energy potential that can be exploited by the respective urban building block with the use of rooftop photovoltaic systems. This service is an operational information

platform aiming to support the penetration of solar systems into the urban fabric, while it will contribute to the decision making regarding the energy transition by offering environmentally friendly solutions.

The technology developed is based on the use of ultra-high-resolution Earth Observation data, advanced graphic creation platforms for three-dimensional ray tracing, radiative transfer models and supercomputer cloud architectures. It operates both climatically and in real-time, with the ultimate goal of facilitating urban planning, supporting the electricity distribution system operators of the produced energy and its efficient integration in the smart grids. Initial results show that the total rooftop usable area is able to massively host dispersed photovoltaics that can produce up to 4.3 terawatt hours (TWh) of energy per year, which in a hypothetical scenario of full rooftop coverage of buildings, can cover up to 49% of the total energy demand of Athens.

Use Case

Actors and End Users

The actor in this use case is any user willing to access data produced in the context of the Eiffel Pilot 4

Brief description

This actor shall be enabled to search for data relevant to Sustainable Urban Development according to defined keywords and find as results, among the other available in GEOSS, also data from Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale, responding to the search criteria, as well as the link(s) to the actual Eiffel Pilot/application (s).

Input

User search criteria, as defined in the user requirements

Output (actionable information)

Sustainable Urban Development Local and Regional Scale data produced by the Eiffel Pilot 4

Data sources

(1) Solar Energy
(2) Climatology

Preconditions

Data from the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale have been

registered in GEOSS

Flow

1. The User accesses the GEOSS Portal;
2. The User selects an area of interest;
3. The User sets the search criteria;
4. The System replies with a list of data, products responding to the search criteria, including the data produced by the Eiffel Pilot 4;
5. The user can visualize details (metadata) regarding the data andproducts found;
6. The user is redirected to the Eiffel Application that allows viewing the data.

Related User Requirements

- UR-EIF-03 – Discovery of Eiffel Pilot 4 data
- UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data

4.13. AfriGEOSS Community Portal

4.13.1. UC-AFG-01 – AfriGEOSS Community Portal

Identifier

UC-AFG-01

Title

AfriGEOSS Community Portal

Background and Rationale

The AfriGEOSS is an initiative to reinforce earth observation in Africa.

Use Case

Actors and End Users

The actor in this use case is any user who wants to explore geospatial data and information regarding Africa.

Brief description

This actor shall be enabled to access a dedicated portal offering ad-hoc functionalities for discovering, accessing and visualizing these data.

Input

User search criteria, to be defined

Output (actionable information)

Data from AfriGEOSS responding to the search criteria

Data sources

The search domain shall include resources and data TBD.

Flow

The user accesses the AfriGEOSS Portal and performs a search, within the above mentioned data domain, by using capabilities that mirror the ones offered by the GEOSS Portal. The user can then filter, browse through, select and access or visualize the search results.

Related User Requirements

- UR-AFG-01 - A dedicated portal for the AfriGEOSS community
- UR-AFG-02 - The AfriGEOSS search keywords
- UR-AFG-03 - The AfriGEOSS Region of Interest
- UR-AFG-04 – The AfriGEOSS search domain
- UR-AFG-05 - The AfriGEOSS filtering capabilities

4.13.2. UC-AFG-02 – Discovery and visualization of resources from AfriGEOSS

Identifier

UC-AFG-02

Title

Discovery and visualization of resources from AfriGEOSS

Background and Rationale

The AfriGEOSS is an initiative to reinforce earth observation in Africa.

Use Case

Actors and End Users

The actor in this use case is any user willing to access data, information or knowledge from

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AfriGEOSS.

Brief description

This actor shall be enabled to discover data in AfriGEOSS.

Input

User search criteria, to be defined

Output (actionable information)

Data from AfriGEOSS responding to the search criteria

Data sources

The search domain shall include data and information made available by AfriGEOSS.

Flow

The user performs a search for resources in AfriGEOSS and finds, browses and visualizes them.

Related User Requirements

- UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS

4.14.   Climate Change impact on Norovirus pandemic risk

4.14.1.   UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk

Identifier

UC-CCP-01

Title

Climate Change impact on Norovirus pandemic risk

Background and Rationale

Norovirus is a rapidly mutating and highly infectious virus, for which there are no pharmacological treatments or vaccines. It is ranked first by the WHO as potential source of infections and pandemics worldwide.

It is expected that climate change may affect the onset of epidemic outbreaks in different

geographical regions due to multiple reasons: a) direct environmental changes due to modification of climate patterns; b) modification of ecological niches of the many species potentially acting as intermediate hosts for animal-to-human transmission.

Use Case

Actors and End Users

User from a national/international Health Organization.

Brief description

The user wants to discover Norovirus epidemic/pandemic risk related to climate/environmental changes.

Input

Norovirus or related keywords**.**

Output (actionable information)

Norovirus epidemic/pandemic risk maps based on environmental changes and ecological niches changes depending on temporal projections of climate change scenarios.

Data sources

Possible data sources include:

- IPCC Climate Change scenarios
- Norovirus epidemiologic database
- Species distribution (GBIF,…)

Flow

1. User searches for Norovirus (or related keywords, e.g., pandemic risk);
2. User discovers the model to produce Norovirus Risk Maps;
3. User selects the discovered model;
4. The GUI displays the model details to User, including input selection (Note: user inputs for the model are still to be finalized);
5. User sets the input values and runs the model (selecting, optionally, the cloud platform where to submit the computation);
6. After the model execution terminates, User is displayed with the result.

Related User Requirements

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- UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches
- UR-CCP-02 - Norovirus epidemiologic data
- UR-CCP-03 – Intergovernmental Panel on Climate Change (IPCC) scenarios data
- UR-CCP-04 – Species Distribution data
- UR-CCP-05 – GEOSS Platform and Vlab Enhancement

4.14.2.   UC-CCP-02 – The effect of Environment on Norovirus infectious events

Identifier

UC-CCP-02

Title

The effect of Environment on NOROVIRUS infectious events.

Background and Rationale

Norovirus is a rapidly mutating and highly infectious virus, for which there are no pharmacological treatments or vaccines. It is ranked first by the WHO as potential source of infections and pandemics worldwide.

It is expected that climate change may affect the onset of epidemic outbreaks in different geographical regions due to multiple reasons: a) direct environmental changes due to modification of climate patterns; b) modification of ecological niches of the many species potentially acting as intermediate hosts for animal-to-human transmission.

Use Case

This second use case aims at implementing a processing tool for calculating the correlation of Norovirus outbreaks with environmental, clinical and, possibly, socio-economic parameters for risk simulation and projection.

It is still in an early phase of definition, mainly due to data policy barriers in accessing hospital data.

Therefore, no further details are yet available.

4.15. Green Spaces Accessibility: from Cities/Country to

EU/global scale

4.15.1. UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces

Identifier

UC-GSA-01

Title

SDG11.7: Accessibility to Urban Green Spaces

Background and Rationale

Over the last three decades, cities worldwide have altogether increased in size by an area equivalent to Ireland. Currently, more than half of the world population live in cities and this number is likely to increase to 66% by 2050. In addition, 59% of cities have also observed a rise in land consumed per new resident. Consequently, urban sprawl and inefficient use of land are important issues with many consequences. Two important ones are the expansion of existing urban settlements and creation of new ones, and the increase of density and use of urban areas. These issues not only put pressure on urban infrastructures (e.g., road and water supply/sewage networks, transport infrastructures) but also have significant impacts on the use of open and green spaces such as threat of their privatisation or loss of their original functions. Therefore, there is a strong need to optimise the use of available space requiring efficient and effective land use management strategies to enhance inclusive and sustainable urbanisation.

In Europe, about 75% of the population already lives in urban areas, and recent projections estimate that the share of urban population in Europe will increase to 80% by 2050. The EU SDG indicator "Share of urban population without green urban areas in their neighbourhood" is one of the proposed indicators currently on-hold due to methodological issues and lack of data. It is supposed to correspond to the SDG11.7.1 of the UN SDG framework. This means that currently, no values are available at the EU level for this indicator. The proposed EU indicator emphasises the importance of the green portion of the public urban space because it is a significant contribution of nature to people (i.e., a nature-based solution) providing valuable ecosystem services. Green spaces contribute in various ways to climate change mitigation, e.g., by cooling through shade provision and moisture and therefore reducing impact of heatwaves, noise reduction and air filtration of pollutants through trees or the promotion of biodiversity (e.g., hosting birds and bees). They are important for social inclusiveness, human health, biodiversity, as well as offering an

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opportunity for social interaction and increasing people's quality of life.

Use Case

Actors and End Users

User from a national SDG-related agency; City planners

Brief description

The user wants to calculate the accessibility to urban green spaces (SDG11.7) at the citiy scale using the GEOSS platform.

Input

NDVI; Delimit built-up area of the city; DEM; population grid; Land Cover; Rivers, Roads, Travel scenario.

Output (actionable information)

Dashboard providing directly usable information for accessibility to urban green space

Data sources

- NDVI
- DEM
- Population
- Land Cover

Support for Reproducibility, Reusability, Replicability

This case is particularly fit for Reproducibility

Flow

1. The user connects to the GEOSS platform and does a search for "Urban green spaces".
2. The user obtains a number of resources that matches his search criteria.
3. The user can discover (or a pre-selection can be made) of the required sub-indicators (see data domain) available in the GEOSS platform and selects the most suitable for his/her needs.
4. The user can discover different data, services and knowledge and their relationship associated to the SDG 11.7.1 indicator. The user can then navigate deeper into the different sources.
5. The user discovers a dedicated model to compute the SDG indicator
6. The user realizes that there is a Service associated to this model. The GEOSS Platform

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associates the model to the actual processing services that enable its computation, which the user can access and run in a user-friendly way. In particular, the user can inspect the process workflow and search and select data as input to the service. In addition, the user has the capability to choose a Cloud computing platform of preference among the available (these include all the DIAS Platforms and Amazon Web Services).

7. The user can now start the computation on the selected infrastructure and wait for the results

8. The user can visualize the outputs in a dedicated dashboard (that can be further elaborated/modified and shared afterwards).

9. The created dashboard can be added in My Workspace, the user who created the dashboard can chose between sharing his work with other specific users or to render it accessible to all

10. the platform users. In this case the User who created the dashboard should become a data provider or need the Administrator authorization.

11. The procedure regarding the acceptance or rejection by the Administrator is the following :

    a. Administrator can reject the dashboard creation and provide information why the rejection happened. User, that created the dashboard can then update it according to the provided information or discard the whole process.

    b. Administrator can accept the dashboard and in this case this dashboard will be accessible for both User, that created it and Users, that are looking for similar data in within the system. The data will be obtainable within the information tab.

Related User Requirements

- UR-GSA-01 – Urban Green Spaces Accessibility Model
- UR-GSA-02 – GSA Data

4.16. Nutrient Pollution and Above Ground Biomass[6]

4.16.1. UC-JRC-01 – Nutrient Pollution in European Inland and Coastal Waters

Identifier

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[6] These use cases derive from a collaboration with the Joint Research Center (JRC)

UC-JRC-01

Title

 Nutrient Pollution in European Inland and Coastal Waters

Background and Rationale

In Europe, intensive agricultural practices together with high population density represent important sources of nutrients for fresh and coastal waters. Nutrient pollution is one of the major pressures on European aquatic ecosystems altering their condition. At present in the EU more than half of water bodies are not in good ecological status, with nutrient being one of the major causes of degradation.

Ambitious water policies are in place in the European Union (EU) for protecting and restoring aquatic ecosystems. Among these, the Urban Wastewater Treatment Directive (UWWTD) has the objective to "protect the environment from adverse effects of wastewater discharges from urban sources and specific industries".

The EU's Urban Wastewater Treatment Directive currently in force is more than 30 years old. Since its adoption in 1991, the quality of European rivers, lakes and seas has dramatically improved. The review of the Directive is one of the actions of the Zero Pollution Action Plan, one of the pillars of the European Green Deal.

In October 2022, the Commission revised the Directive, adapting it to the newest standards, in line with the results of an evaluation and on the basis of an extensive impact assessment. Impact assessments form a key part of the European Commission's "Better regulation" agenda, which seeks to design and evaluate EU policies and laws so that they achieve their objectives in the most efficient and effective way. Impact assessments collect evidence (including evaluation results) to assess whether future legislative or non-legislative EU action is justified and, if so, how it can best be designed to achieve relevant policy objectives.

One of the objectives of the revision was to improve water quality by addressing remaining urban wastewater pollution. To this aim, the GREEN model, developed by the EC Joint Research Centre, was utilized to quantify the current pressures of point and diffuse nitrogen and phosphorus emissions to European fresh and coastal waters and analyze the effects of different policy scenarios of nutrient reduction.

Use Case

Actors and End Users

Policy Maker (water and marine domain), also via their scientific support team acting as a proxy (e.g., EC JRC)

Brief description

Users can select an area of interest and define the settings for the GREEN model executioin, including different policy scenarios. GREEN runs through the Virtual Earth Laboratory (VLab), which utilises the European cloud computing platforms, including the Copernicus DIASes and the European Open Science Cloud, for the execution of scientific models.

Input

Nutrient sources for the region of interest.

Output (actionable information)

Simulation results. By selecting one policy scenario, the user displays the resulting yearly average load of nitrogen/phosphorus in the entire selected area.

It is possible to compare how the different simulated policy scenarios perform. By selecting the nitrogen result, users can display the calculated total yearly average load, both to the river outlet and in the entire region.

When two policy scenarios results are selected, users can visualize the difference of nitrogen and phosphorus loads over the entire area of interest.

Data sources

- Nutrient sources for the region of interest.

Support for Reproducibility, Reusability, Replicability

This case is particularly fit for Reproducibility

Flow

1. The user loads the GREEN Web application (GUI) and selects an area of interest (river basin).
2. The GUI allows user to select if selecting existing simulation results or create a new simulation.
3. User defines the settings for the simulation: temporal period and one or more policy scenarios.
4. User launches the execution of the simulation run.

5. User can visualize the status of the run.
6. User visualizes the simulation results:
    a. By selecting one policy scenario, the user displays the resulting yearly average load of nitrogen/phosphorus in the entire selected area.
    b. User can compare how the different simulated policy scenarios perform. By selecting the nitrogen/phosphorus result, users can display a histogram of the the calculated total yearly average load, both to the river outlet and in the entire region.
    c. When two policy scenarios results are selected, users can visualize a map displaying the difference of nitrogen/phosphorus loads over the entire area of interest

Related User Requirements

- UR-JRC-01 – GREEN Model shared in VLab
- UR-JRC-02 – GREEN Model input data
- UR-JRC-03 – GREEN Model parameters
- UR-JRC-04 – GREEN Web Application

4.16.2.   UC-JRC-02 – Above Ground Biomass

Identifier

UC-JRC-02

Title

Above Ground Biomass

Background and Rationale

The quantification of forest above-ground biomass (AGB) over large areas is used as a proxy for the quantification of carbon stocks, particularly referring to Reduced Emissions from Deforestation and forest Degradation (REDD+) projects, for the quantification of forest resources and ecosystem services, the creation of fuel maps to be used as input to wildfires spread models, and for biodiversity and climate change models. According to the definition of the Intergovernmental Panel on Climate Change (IPCC 2006), Above-Ground Biomass is defined as "All living biomass above the soil including stem, stump, branches, bark, seeds and foliage."

Use Case

Actors and End Users

Policy Maker (forest and land domain), and forestry-related agencies, also via their scientific support team acting as a proxy (e.g., EC JRC).

Brief description

The user wants to calculate the map of biomass based on vegetation indices (VIs) from remote sensing imagery. The user can compare results obtained by different Machine Learning (ML) models.

Input

Remote sensing data.

Output (actionable information)

Above Ground Biomass map.

Data sources

Copernicus Sentinel.

Support for Reproducibility, Reusability, Replicability

 This case is particularly fit for Reproducibility

Flow

Initial high-level user's steps:

1. The user selects an area of interest (AOI) uploading a polygon or selecting an area interactively or by coordinates
2. The user selects a year of interest (YOI) among those available
3. The user can select an existing pre-trained ML model
4. The user assigns a name to the execution and submits the execution request
5. The user retrieves the execution output and saves it to a dashboard

Initial high-level system steps:

1. After user steps 1 and 2, the GUI sends a request to GEO DAB to retrieve the list of Sentinel products covering the selected AOI for the selected YOI
2. GEO DAB returns the list of Sentinel Products
3. The GUI show the bounding boxes of the returned products

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4. The GUI sends a request to VLab to retrieve the list of pre-trained ML models
5. VLab returns the list of pre-trained ML models
6. The GUI sends the execution request to VLab
7. VLab executes the pre-trained ML model
8. The GUI periodically queries VLab for the execution status
9. When the execution is complete, the GUI retrieves the output and saves it to the dashboard

Related User Requirements

- UR-JRC-05 – AGB ML Model shared in VLab
- UR-JRC-06 – Support of multiple AGB ML models in VLab
- UR-JRC-07 GEO DAB Sentinel Products Coverage query
- UR-JRC-08 – GEOSS Portal enhancements for input selection
- UR-JRC-09 GEOSS Portal enhancements for ML models
- UR-JRC-10 GEOSS Portal dashboard for Above Ground Biomass (AGB) maps

4.17. Automated Gross Primary Production for Monitoring Ecosystem Health within GEOSS (AGAME)

Providing quality controlled and up-to-date data is an important prerequisite for informed environmental policies and the implementation of management decisions especially on local and regional scale. In this respect, AGAME aims to:

- provide consistent data products together with detailed metadata. The availability and accessibility of data and derived products will stimulate their exploitation by a wide range of users in the biodiversity sector.
- generate added value products that will facilitate the use of remote sensing data in new applications involving the vision of new operational products in the GEOSS portal that will lead to an increased understanding of Earth processes.

The data requirements as well as functional requirements to access and use these data needs to be developed and aligned already in an early stage of the process. AGAME aims to offer a service co-designed with users that provides information of gross primary production on local scale and can be used to give direct and focused answers to specific questions from the targeted scenarios. The project adopts an end-user centred approach. It will benefit from the cooperation with local stakeholders, their knowledge and expertise. Potential users will be engaged in the service design and validation in an iterative process in the different project phases.

AGAME aims to exploit the benefit of integrating Copernicus Products (remote and local data) and other diverse data sources (local, regional or global) by delivering tailored information and services co-designed with the users. It will incorporate EO data from Sentinel missions, local monitoring data and advanced modelling in the GEOSS platform to improve biodiversity management.

The goal is to contribute to the development of the GEOSS platform by delivering information on gross primary production accessible via the GEOSS Platform.

AGAME adopts an end-user centred approach. It will benefit from the cooperation with local stakeholders, their knowledge and expertise. Potential users will be engaged in the service design and validation in an iterative process in the different project phases.

In total, we organised four virtual co-design workshops to reach out to the different user communities the AGAME project is targeting. We used zoom as conference platform and Mural to collect and structure the inputs from the discussions. The main scope of the workshops was to collect users' needs and requirements together with initial feedback on the desired GEOSS portal functionalities. Figure 1 shows a screenshot of the SPC mural board.

Figure 1 Screenshot of Mural board to collect and structure the user requirements and needs. The board shows the different pre-defined questions as well as the answers from the participants.

The sessions started with by welcoming and introducing the project, followed by a more detailed approach to the objectives and relevant aspects. Next, users from each sector were asked to answer a set of pre-defined questions. Input was collected based on elaborated

questions that we asked to answer on mural boards. The set of questions were divided into three groups: a) (meta)data, b) API (data provider); and c) non-technical questions. In addition, questions, queries, and comments about the products were shared by the users in the space for any open questions.

Contribution to the mural board was anonymous to ensure GDPR compliance. Name and contact emails were kept separately to ensure communication and collect additional inputs.

4.17.1. UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Identifier

UC-AGA-01

Title

Discovery, access, usage and uptake of Gross Primary Production data product (focus on data usage and uptake)

Background and Rationale

Site and Platform Coordinators require spatially explicit time series data on gross primary production (GPP). They need this information to investigate declines in carbon uptake due to global warming and to predict future biosphere conditions influenced by changing climate and land use. Both scenarios are vital for promoting the use and adoption of AGAME products and services. Therefore, it's crucial that these products and services are easily discoverable, accessible, and have a clear and user-friendly design.

Use Case

Actors and End Users

eLTER's Site and Platform Coordinators, Researchers (SPC)

Brief description

The use case focuses on the usage and uptake of AGAME products/services. Derived requirements therefore aim at the usability of products and services to ensure seamless access (requirements regarding the product; accessibility of the product; communication/training for awareness and user friendliness). These requirements were gathered during a co-design workshop. Input was collected based on elaborated questions that we asked to answer on mural boards. The user discovers the data product via key words and selects the required data product based on the system results.

Input

Gross Primary Production keywords, user selection on system results (temporal selection, spatial selection, product selection)

Output (actionable information)

Data products, access to it and training/communication adapted based on user requirements.

Data sources

Land cover maps, Ecosystem type, Sentinel-2 MSI, Flux tower measurements, Training Material.

Flow

1. The user connects to the GEOSS platform and searches for "Primary Productivity".
2. The user obtains results obtained by their search criteria.
3. The user can discover different data sets and select the products suitable for their needs.
4. The user can discover different metrics associated with the selected product.
5. The user can access the workflow used to generate the product and/or training materials.

Open issues and assumptions

The Gross Primary Production data product will be precalculated, stored and shared as static data product for the selected sites using the VLab infrastructure and implementing the models. The data products and the accompanying metadata are shared by dedicated open services and consumed by the GEODAB to be integrated in the GEOSS environment. This includes the visualisation of the spatial data and enabling the download of the linked in-situ data (pointing to the metadata and download capabilities). In the first iteration no integration of the workflow from triggering the VLab model via the GEOSS Portal and visualisation of the model results is planned. Depending on the available resources left, this could be explored in a later phase of the project. This refers especially to the UC-AGA-01 and the related requirement UR-AGA-04.

Related User Requirements

- UR-AGA-01 – Gross Primary Production product discovery
- UR-AGA-02 – Gross Primary Production product visualization
- UR-AGA-03 – Gross Primary Production training materials discovery

- UR-AGA-04 – Gross Primary Production computation service execution
- UR-AGA-05 – Gross Primary Production product specification/definition
- UR-AGA-06 – Gross Primary Production product support/feedback

4.17.2. UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster

Identifier

UC-AGA-02

Title

Integration of Gross Primary Production as element of the eLTER Site Information Cluster (focus on provision of data products and ensuring sustainability of service)

Background and Rationale

The AGAME Gross Primary Production product serves as an additional layer of information within eLTER's site and information cluster. This addition enriches eLTER's research capabilities and aims to sustain AGAME products beyond the project's runtime. By integrating AGAME offerings into eLTER's framework, both scenarios promote the use and adoption of AGAME products and services while providing a long-term perspective for their utilization and impact.

Use Case

Actors and End Users

eLTER RI, eLTER's Site and Platform Coordinators, Researchers

Brief description

The use case focuses on the provision of data products and on the Sustainability of AGAME products and services. Derived requirements therefore aim the automated generation of gross primary production data as an additional layer, an automated process to seamlessly integrated AGAME products/services into the site and information cluster, and communication/training to effectively increase the accessibility and relevance of eLTER applications to a wide range of stakeholders. These requirements were gathered during a co-design workshop. Input was collected based on elaborated questions that we asked to answer on mural boards.

Input

eLTER CIP architecture, eLTER service management planning, eLTERs

training/communication planning

Output (actionable information)

Integration of data products into eLTER CI, access to it and training/communication adapted based on user requirements.

Pre-conditions

- Data, associated metadata and workflow are provisioned according to requirements (and eLTERs cyberinfrastructure).
- Workflow, Meta(Data) is stored, integrated and visualised in eLTERs cyberinfrastructure components.
- Data production/provision is continued for the next years.

Data sources

Data products, access to it and training/communication adapted based on user requirements.

Flow

1. The user can discover different data sets and select the products suitable for their needs using eLTERs eLTERs cyberinfrastructure components.
2. The user can discover different metrics associated with the selected product.
3. The user can access the workflow used to generate the product and/or training materials.
4. The user can ask for support or assistance regarding the product/access to the product.
5. The user can provide feedback to optimise the product, the support system, etc.

Related User Requirements

- UR-AGA-07 – Gross Primary Production product /workflow integration into eLTER cyberinfrastructure
- UR-AGA-08 – Gross Primary Production product documentation
- UR-AGA-09 – Gross Primary Production training materials discovery
- UR-AGA-10 – Gross Primary Production product Metadata
- UR-AGA-11 – Gross Primary Production Product support/feedback
- UR-AGA-12 – Gross Primary Production product specification / definition

4.17.3.   UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment

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Identifier

UC-AGA-03

Title

Integration of Gross Primary Production data product into the GEOSS environment (focus on technical integration of knowledge package)

Background and Rationale

In this scenario, the aim is to provide a comprehensive knowledge package specifically designed for the pan-European context to the GEOSS portal. This involves directly integrating data flows from both project applications into GEOSS-DAB. This integration serves as a pilot link between components of the GEOSS portal and European Research Infrastructures, with a particular focus on eLTER. The goal is to enhance the accessibility of relevant data and information within the GEOSS portal, facilitating broader access and utilization across European research infrastructures.

Use Case

Actors and End Users

GEOSS users, eLTER RI users

Brief description

The use case focuses on providing the GEOSS portal with a comprehensive knowledge package tailored to the pan-European context by directly integrating data flows from both project applications into GEOSS-DAB as a pilot link between GEOSS portal components and European research infrastructures, in particular eLTER. The final implementation scenario would allow the listing of all in-situ data required and retrieved for the project and the products generated, together with all required metadata, to be included in the project application and the GEOSS data portal. The derived requirements therefore aim at technical conformance of AGAME data products/services and GEOSS components, but also at technical conformance with the eLTER Cyberinfrastructure and standards to enable future data delivery to GEOSS. These requirements were gathered during a co-design workshop. Input was collected based on a set of questions, which we asked to be answered on wall charts.

Input

GEOSS architecture, GEOSS standards, eLTER CIP architecture, eLTER standards

Output (actionable information)

Integration of data flows from AGAME into GEOSS-DAB as a pilot link between GEOSS portal components and European Research Infrastructures (eLTER)

Pre-conditions

- Data, associated metadata are provisioned according to GEOSS requirements

Data sources

Data products, access to it and training/communication adapted based on user requirements.

Land cover maps, Ecosystem type, Sentinel-2 MSI, Flux tower measurements, Training Material

Flow

1. The user can discover different data sets and select the products suitable for their needs using GEOSS components.
2. The user can discover different metrics associated with the selected product.
3. The user can access the workflow used to generate the product and/or training materials.

Open issues and assumptions

The Gross Primary Production data product will be precalculated, stored and shared as static data product for the selected sites using the VLab infrastructure and implementing the models. The data products and the accompanying metadata are shared by dedicated open services and consumed by the GEODAB to be integrated in the GEOSS environment. This includes the visualisation of the spatial data and enabling the download of the linked in-situ data (pointing to the metadata and download capabilities). In the first iteration no integration of the workflow from triggering the VLab model via the GEOSS Portal and visualisation of the model results is planned. Depending on the available resources left, this could be explored in a later phase of the project. This also refers to the UC-AGA-01 and the related requirement UR-AGA-04.

Related User Requirements

- UR-AGA-13 – Gross Primary Production Metadata specification and provision
- UR-AGA-14 – Gross Primary Production product API - data provision
- UR-AGA-15 – Gross Primary Production product documentation/knowledge package
- UR-AGA-16 – Gross Primary Production product quality check

- UR-AGA-17 – Gross Primary Production product communication channels
- UR-AGA-18 – Gross Primary Production product data policies

4.18. Harmonized in situ data for crop mapping (MAPS4GPP)

4.18.1. UC-MPS-01 - Host WorldCereal repository

Identifier

UC-MPS-01

Title

Hosting of the WorldCereal harmonized in-situ reference data repository including guidelines on sharing and harmonizing in-situ reference data.

Background and Rationale

During the first phase of the ESA-funded WorldCereal project, its first global community-based, open, harmonised reference data repository (RDM) was produced (Boogaard et al., 2023). The repository (available at https://worldcereal-rdm.geo-wiki.org/) contains data from different sources including the GEOGLAM-JECAM sites, the Radiant MLHub, the Future Harvest (CGIAR) centers, LACO-Wiki, Geo-Wiki and data from individual project contributions. Data were collected, harmonized, and annotated, adding the right context for proper re-use. During the November 2022 GEOGLAM in-situ workshop in Geneva, all participants acknowledged the WorldCereal in-situ data repository initiative as well as the importance to review and harmonize open reference data for specific applications, such as. cropland and crop type mapping.

As the WorldCereal project enters its second phase with a defined end date, there is the clear need to transfer, host and sustain the WorldCereal reference data repository, including the REST API interface, to a new infrastructure. This could be organized as a dedicated place where the GEOGLAM community: 1) has access to harmonized open in-situ reference data; 2) receives guidance on open in-situ reference data sharing including data rights, sharing policies and agreements for best practices; and 3) can contribute by providing additional in-situ data, via standardized interfaces, to form an harmonized repository bigger than the sum of its individual parts.

Use Case

Actors and End Users

Maps4GPP Consortium, GPP partners, GKH, WorldCereal, UNEP, Copernicus Data Space Ecosystem, Open EO platform.

Brief description

Explore, evaluate, and recommend an infrastructure to host the harmonized in-situ reference data repository developed in WorldCereal including the guidelines on sharing and harmonizing in-situ reference data.

Input

- WorldCereal harmonized in-situ reference data repository including an updated REST API (WorldCereal Phase 2)
- WorldCereal guidelines on sharing and harmonizing in-situ reference data

Output (actionable information)

A list of possible solutions (organizations/initiatives) where the harmonized in-situ reference data of WorldCereal, and guidelines on sharing and harmonizing in-situ reference data, can be hosted, and maintained. It will include an overview of different criteria, how the solutions score on the set of criteria and finally recommendations for the most logical solution. For this solution a detailed list of required activities and annual hosting costs will be given.

Data sources

- WorldCereal harmonized in-situ reference data repository including an updated REST API (WorldCereal Phase 2)
- WorldCereal guidelines on sharing and harmonizing in-situ reference data

Flow

The following activities are foreseen:

- Inventory possible solutions (organizations/initiatives) where the harmonized in-situ reference data of WorldCereal, and guidelines on sharing and harmonizing in-situ reference data, can be hosted, and maintained
- Define list of criteria for hosting and maintenance
- Engage with the organization/initiatives to check feasibility and compliance to the criteria
- Summarize results and suggest the best solution including required activities and

annual costs to host the repository

- Register the WorldCereal harmonized in-situ reference data and guidelines in the GKH

Related User Requirements

- UR-MPS-01 – Host WorldCereal repository
- UR-MPS-02 – Register WorldCereal in-situ data and guidelines

4.18.2.   UC-MPS-02 - Register in-situ data providers

Identifier

UC-MPS-02

Title

Register in-situ data providers in the GEOSS platform.

Background and Rationale

There are several institutes, projects and programs providing in-situ data in a standardized way (data providers) that can be used in support of GEOGLAM essential agricultural variables (EAV). Currently, there is no central place where these different data sets can be found and used. One of these data providers is the ESA funded WorldCereal project, that collected and harmonized in-situ reference data for crop mapping. In addition, there are other data providers serving standardized data or even offer data ready for specific use. It would greatly help the GEOGLAM community to open the in-situ reference data via a hub such as the GEOSS platform. Users can explore and download data (human-readable) and integrate in-situ reference data in dedicated applications (machine-readable). While adding data from new providers, part of their data could be converted into "RDM-ready" format and added automatically to the WorldCereal RDM database.

Our on-line survey clearly indicated the need for in-situ data within the GEOSS platform (figure below, question 10). Currently the GEOSS platform and GKH is not frequently used (figure below, question 6).
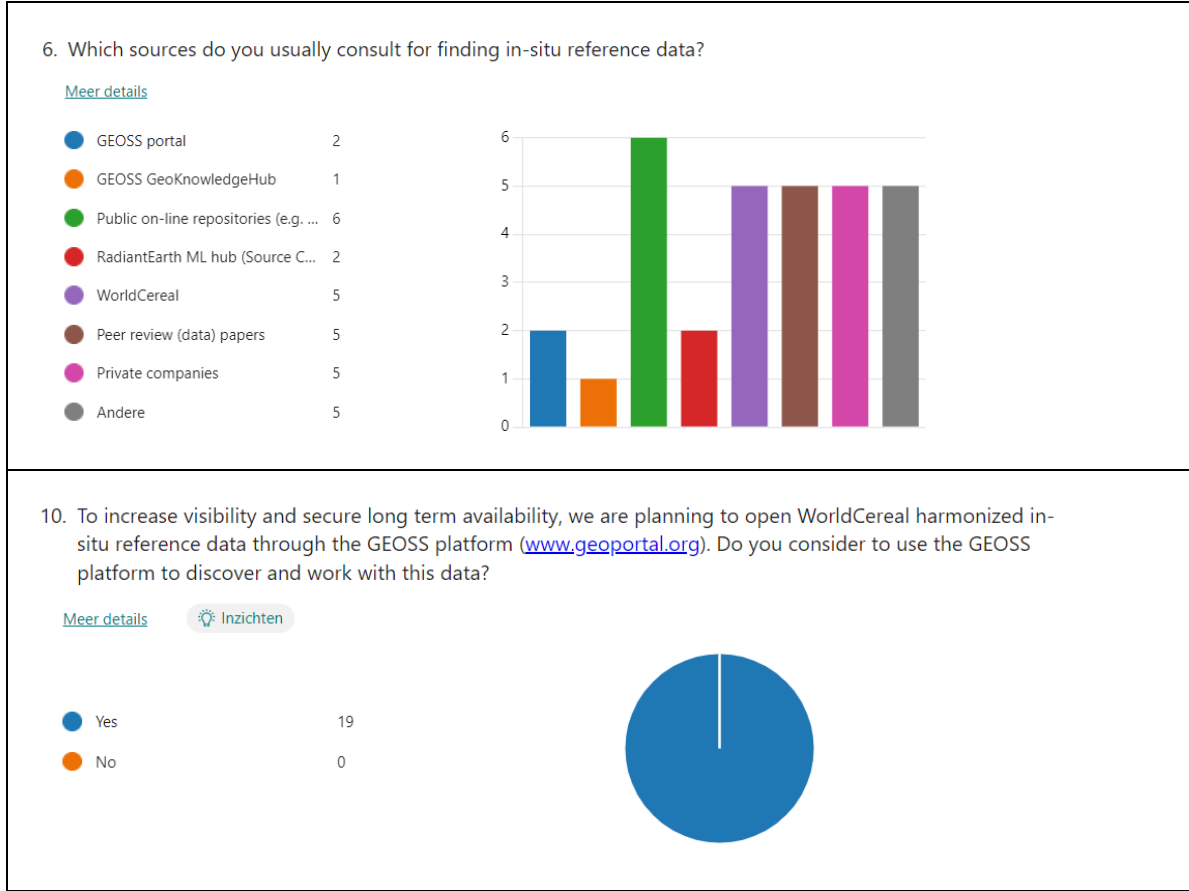
Use Case

Actors and End Users

Maps4GPP Consortium, GPP partners, WorldCereal, AGROSTAC etc. See for a complete list of possible data providers the separate document "Data-providers.docx".

Brief description

We make a list of possible data providers and approach them to register as data provider in the GEOSS platform. First, data providers will register in the yellow pages. Next, an interface will be defined within the DAB and afterwards checked for proper functioning.

Input

- Data sets of data providers

Output (actionable information)

In-situ reference data of different data providers, among them WorldCereal, will be accessible via the GEOSS platform and can be explored by the GEOGLAM community and

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directly used in dedicated applications.

Data sources

- Data sets of different data providers

Flow

The following activities are foreseen:

- Inventory data providers that offer standardized in-situ reference data
- Prioritize and select most promising data providers and ask them to register their data set in the YP (starting with WorldCereal and AGROSTAC)
- Next, analyze the access and available metadata and, together with the data provider, define an interface within the DAB
- Check and test the registered source

Related User Requirements

UR-MPS-03 – Registration of in-situ data providers

4.18.3. UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository

Identifier

UC-MPS-03

Title

Exploring and leveraging the WorldCereal harmonized in-situ reference data repository.

Background and Rationale

Once the WorldCereal harmonized in-situ reference data repository is available in the GEOSS portal the user should be able to explore the available open harmonized in-situ reference data. In our survey we asked how a user would like to select data (figure below, question 13). Users voted for a region (18), year (17), crop type (15), user defined boundary box (10) and quality level (10) to gain understanding on the data availability (note "andere" means others).
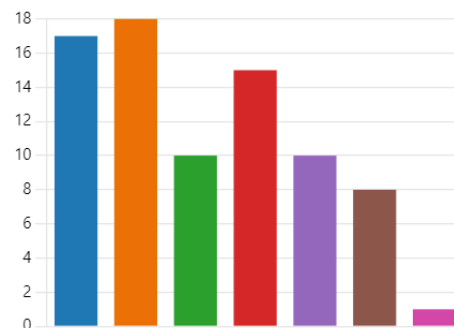
Moreover, respondents of the survey indicated that in addition they would like to visualize available data sets and they would like to download selected data.

Use Case

Actors and End Users

WorldCereal, GEOGLAM community (JECAM partners, in situ data working group), FAO, WFP, European Environmental Agency (EEA, CORDA Copernicus Reference Data Access), JRC, CGIAR-CIMMYT, Agriculture and Agri-Food Canada, NASA crop harvest, DigitalEarth Africa, INTA Argentina, RadiantEarth, UCLouvain, Tetra Tech, Ghana Space Science and Technology

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Institute, Paraguayan Space Agency (AEP).

Brief description

Users would like to explore and use the WorldCereal harmonized in-situ reference data repository sub-setting for a certain region, year, crop type, boundary box, quality level and/or original data set.

Input

- WorldCereal harmonized in-situ reference data repository

Output (actionable information)

A better understanding of the available data within the WorldCereal harmonized in-situ reference data repository and its use via the API or download in support of the EAVs of GEOGLAM.

Data sources

- WorldCereal harmonized in-situ reference data repository
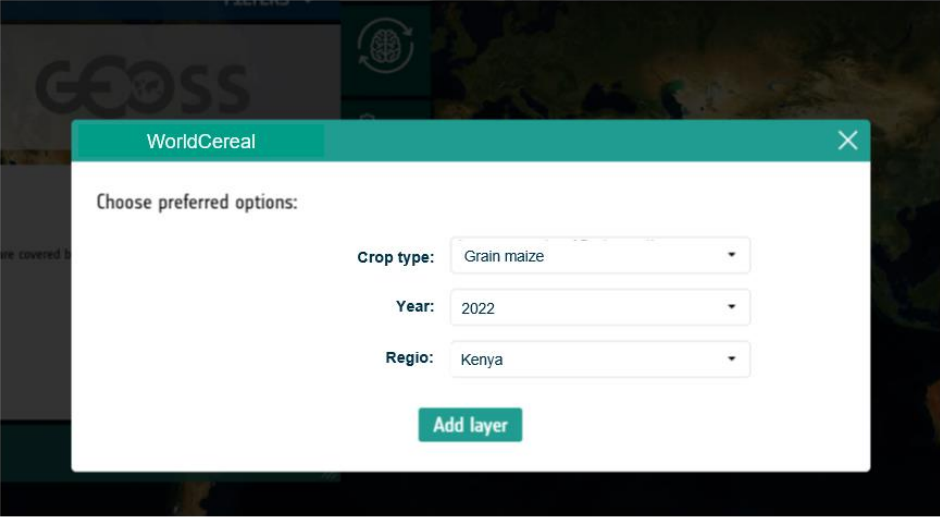
Flow

1. The user accesses the GEOSS portal;
2. The user selects the thematic area "in-situ data crops" or uses the link given under community portals "in-situ data crops" to quickly find the WorldCereal harmonized in-situ reference data set;

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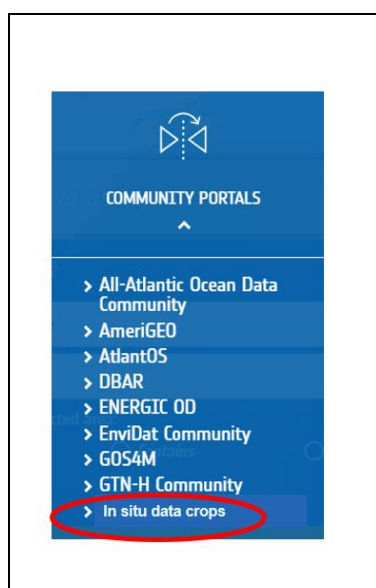
3. The user selects the WorldCereal or AGROSTAC harmonized in-situ reference data set
4. The user defines filter to find data sets for area of interest: region (or user defined boundary box), year, crop type and/or quality level geometry accuracy. See A. in the figure below.
5. A list of available harmonized data sets is provided.
6. The user selects and inspects harmonized data set (checking metadata e.g. name, provider of original data, quality, data license etc.). See B.
7. The user selects one or more data sets. See C.
8. The user downloads data of selected data sets.

A	**1) simple filtering to find data sets**
B	**2) show list of data sets and select** **3) Inspect selected data set** *(only enabled if one dataset is selected)*
C	**4) select data to download**

- UR-MPS-04 – Thematic area "in-situ data crop"
- UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data

4.18.4. UC-MPS-04 – Generate crop maps

Identifier

UC-MPS-04

Title

Generate crop maps.

Background and Rationale

Cropland and crop type maps form an essential agricultural variable (EAV) to generate actionable information in real-life applications (see https://agvariables.org/about-eavs). It is one of the "building blocks" that combines EO data with one another or with other non-EO information like in-situ reference data to provide insight into the "GEOGLAM Agricultural Indicators" – which themselves provide actionable information on the state, change, and forecast of agricultural land use and productivity.

The harmonized in situ reference data, available through the GEOSS platform, can be used to train crop classification algorithms and produce a crop map based on all available reference data shared by the community. This way available reference data is efficiently used (no need for collecting ad pre-processing data) and it will help to further improve the quality of crop maps.

The respondents of the on-line survey indicated that accessing the WorldCereal processing system through the GEOSS platform is appreciated (figure below, question 15).

15. The WorldCereal processing system will provide a graphical user interface where users can launch and monitor their own processing requests and visualize the results of these requests (i.e. the resulting crop type maps). In addition to this, do you feel it would be helpful to have similar functionality through ohter platforms such as the GEOSS platform, i.e. having the ability to generate and visualize crop type maps directly in the GEOSS platform based on the reference data that is available there?

Meer details   ☼ Inzichten

- 🔵 Yes, it would be helpful to acces... 10
- 🟠 Maybe   8
- 🟢 No, I prefer to directly logon to ...   1

Use Case

Actors and End Users

WorldCereal, GEOGLAM community (JECAM partners, in situ data working group), FAO, WFP, European Environmental Agency (EEA, CORDA Copernicus Reference Data Access), JRC, CGIAR-CIMMYT, Agriculture and Agri-Food Canada, NASA crop harvest, DigitalEarth Africa, INTA Argentina, RadiantEarth, UCLouvain, Tetra Tech, Ghana Space Science and Technology Institute, Paraguayan Space Agency (AEP).

Brief description

A user defines an area, growing season of interest, and optionally a crop type, after which the WorldCereal processing system generates a map showing the presence crop type or only the selected crop type. The map can be visualized and saved in the user's personal space in the GEOSS platform.

The first version will be based on existing global algorithms that were trained using the WorldCereal harmonized in-situ reference data repository (version June 2024). In this version the re-training of algorithms, using extra local harmonized reference data, is not possible. The re-training facility will become available later in WorldCereal Phase 2 which is running from 2024-2026. Depending on the progress of WorldCereal Phase 2 it might be feasible to demonstrate the effect of re-training using extra local harmonized reference data at the end of 2024 or first quarter 2025.

Input

- Version 1 does not use input data from GEOSS platform. Within the WorldCereal processing system pre-processed feature data and existing classification algorithms are used to generate the crop map. So no reference data is selected from the GEOSS platform.
- If the WorldCereal Phase 2 planning/progress allows, a version 2 could be implemented using harmonized reference data from GEOSS platform (e.g. WorldCereal harmonized in-situ reference data combined with other harmonized data). Note that the feature data, required for training, will be available within the WorldCereal processing system.

Output (actionable information)

A crop map which is a basic layer to explore and monitor land use, crop production and

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externalities. See also GEOGLAM EAVs (https://agvariables.org/about-eavs).

Data sources

- See input.

Support for Reproducibility, Reusability, Replicability

This case is particularly fit for Reproducibility

Flow

1. The user logs on the GEO portal as a service is only available after log-on.
2. The user selects the WorldCereal service set via the GEO portal.
3. The user activates the service. See A. This triggers the following:
   a. Log-on to the WorldCereal system (ESA based). See B.
   b. UI in which the user defines the map run (indicate AoI, season of interest, crop type). See C1. In a second version, also harmonized reference data could be selected from the GEOSS platform. See C2.

A	
B	
C1	

C2	
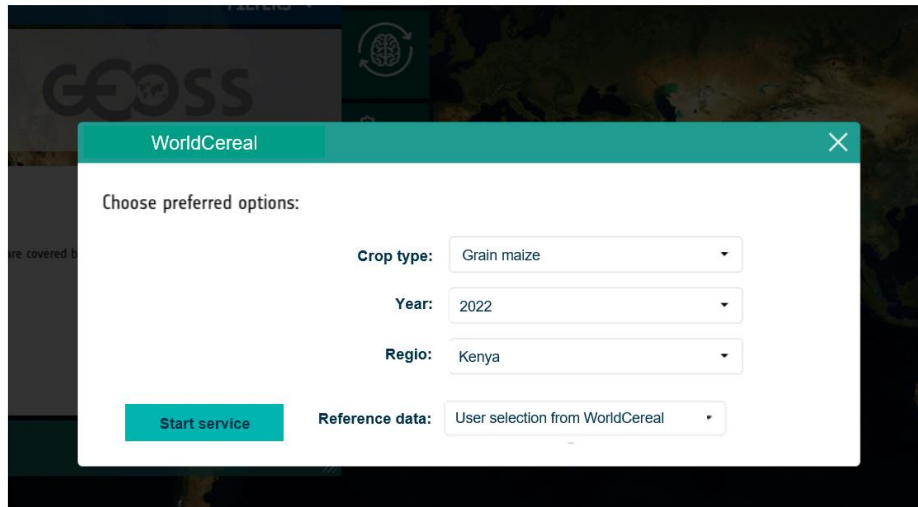
4. Version 1: The WorldCereal processing module is triggered which generates a crop map using a standard global algorithms and pre-processed feature data (Sentinel 2, 1, AgERA5).

   Version 2: (could be implemented if WorldCereal Phase 2 allows this functionality for external users): The WorldCereal processing module is triggered which selects an existing global classification algorithm and tunes the algorithm for the selected region. The WorldCereal processing module uses pre-processed feature data (Sentinel 2, 1, AgERA5) and selected harmonized in-situ reference data available in the GEO portal and further processed according RDM format. This could be a demo (e.g. Jupyter notebook) where several harmonized in-situ reference data sets, available in the GEOSS platform, are combined e.g. some data sets from WorldCereal and a data set from another provider that complies to the WorldCereal standards.

5. WorldCereal processing module returns a crop map in GeoTiff format.
6. System visualizes the crop map and saves the crop map in personal space (available when logged on). No advanced visualization is required.

Related User Requirements

- UR-MPS-06 – Crop map
- UR-MPS-07 – Access and trigger WorldCereal processing module
- UR-MPS-08 – Visualization of crop map and saving in personal workspace

4.19.   Climate Change Research for the Municipality of Milan[7]

4.19.1.   UC-HAR-01 Accessing Climate Change Data on Urban Heat Fluxes in Milan

Identifier

UC-HAR-01

Title

 Accessing Climate Change Data on Urban Heat Fluxes in Milan

Background and Rationale

The city of Milan, the second largest city in Italy, faces significant challenges related to climate change, including air pollution, urban heat island effects, and urban flooding. Understanding and mitigating these impacts is critical for the city's resilience and the well-being of its 1.4 million residents. The Harmonia project aims to provide actionable information to researchers and policymakers to address these challenges. By leveraging data produced by the Harmonia project, which are accessible through the GEOSS platform, the project offers comprehensive datasets on climate-related parameters. These datasets are crucial for analyzing and mitigating the effects of climate change in urban environments. This use case focuses on how a researcher working for the Municipality of Milan can access and utilize these datasets for studying urban heat fluxes and related phenomena.

Use Case

Actors and End Users Involved:

- **Primary Actor:** Researcher at the Municipality of Milan
- **Secondary Actors:** System Administrators, Data Providers, Municipal Authorities

Brief Description

 The researcher needs to access detailed datasets on climate change impacts, specifically focusing on urban heat fluxes and heat emissions. The Harmonia project has developed these datasets, which are discoverable through the GEOSS platform. The researcher will use these datasets to analyze the effects of urban heat fluxes, storage, and emissions within

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[7] This use case derives from the collaboration with the Harmonia H2020 project.

Milan, providing insights that can inform urban planning and climate mitigation strategies.

Data Domain

- Climate change impacts

- Urban heat fluxes

- Heat emissions

- Land use and land cover changes

- Air pollution

Flow

1. The researcher logs into the GEOSS platform.

2. The researcher searches for datasets related to urban heat fluxes and heat emissions produced by the Harmonia project [3].

3. The researcher selects relevant datasets, focusing on those specific to Milan.

4. The researcher downloads the datasets for local analysis.

5. Using the downloaded data, the researcher conducts analysis to understand patterns of urban heat fluxes and their impact on the city's microclimate.

6. The researcher compiles findings into a report to be used by municipal authorities for urban planning and policy-making.

Related User Requirements

- UR-HAR-01 – Discovery of Harmonia data on urban heat fluxes and heat emissions
- UR-HAR-02 – Access and analysis of Harmonia data on urban heat fluxes and heat emissions

5. User Requirements

5.1.   Introduction

The following sections provide detailed descriptions of the user requirements that will drive the
GEOSS Platform Enhancements. The following definitions apply:

- 'Shall': Requirements containing 'shall' are considered essential, i.e. mandatory
- 'Should': These are strongly recommended requirements although non-mandatory;
- 'Could': These are nice-to-have requirement (time and resources permitting), but the solution
  will still be accepted if the functionality is not included
- 'Will': this can be used in a requirement text to provide additional information such as background or rationale, to help understand the requirement genesis and meaning. Will statements are not subject to verification.

User requirements are categorized by thematic area/context from which they arise

Each requirement has the following attributes:

- 'Identifier': Symbolic identifier following the convention: UR-<Theme>-<Counter>, where:
  - <Theme> is a three letter identifier of the thematic area/context to which the requirement refers. The meaning is explained in the Terminology section.
  - <Counter> is a two-digit counter that uniquely identifies the requirement.

5.2.   Requirements for Community-specific portal

5.2.1.   UR-CSP-01 – Community Portal package access

Identifier

UR-CSP-001

Title

Community Portal package access

Requirement Description

Any registered and authorized user must be enabled to access the Community portal package (tool). After logging in User can enter dedicated page referring to Community Portal package and download it.

Source

UC-CSP-01 – Community Portal self-creation

Priority

High

Stability

Stable

5.2.2. UR-CSP-02 – Community Portal General Configuration

Identifier

UR-CSP-02

Title

 Community Portal General Configuration

Requirement Description

The user shall be enabled to configure the Community Portal according the user's preferences, including graphical look and feel. Details will be defined in the Functional Analysis phase.

Source

UC-CSP-01 – Community Portal self-creation

Priority

High

Stability

To be further refined

5.2.3. UR-CSP-03 – Views Selection

Identifier

UR-CSP-03

Title

Views Selection

Requirement Description

The user shall be enabled to select the views for a Community Portal among the available or request a new one.

Source

UC-CSP-01 – Community Portal self-creation

Priority

Medium

Stability

Stable

5.2.4.   UR-CSP- 04 - Views Setup

Identifier

UR-CSP-04

Title

Views Setup

Requirement Description

The user shall be enabled to provide the parameters (data sources, keywords, spatial extent) to define a new view.

Source

UC-CSP-01 – Community Portal self-creation

Priority

Medium

Stability

Stable

5.2.5. UR-CSP-05 – Link to the Community Portal from GEOSS Portal

Identifier

UR-CSP-05

Title

Link to the Community Portal from GEOSS Portal

Pre-condition

Registered user

Requirement Description

The representative of the community user shall be enabled to make available their Community Portal in the list of official GEOSS Community Portal through the GEOSS Portal.

Source

UC-CSP-02 - Community-specific portal registration on GEOSS

Priority

High

Stability

Stable

5.2.6. UR-CSP-06 – Community Portal information

Identifier

UR-CSP-06

Title

Community Portal information

Requirement Description

The representative community user shall provide:
GPP EC Grant Agreement no. 101039118

- an explanation of why and for which a community-specific portal should be generated;
- the community logo;
- the name of the community portal the user wants to create.

Source

UC-CSP-02 - Community-specific portal registration on GEOSS

Priority

Medium

Stability

Stable

5.2.7. UR-CSP-07 – Administration rights

Identifier

UR-CSP-007

Title

Administration rights

Requirement Description

If everything is in order, the representative community user must be enabled as Community portal administrator, with administrator functionalities.

Source

UC-CSP-02 - Community-specific portal registration on GEOSS

Priority

High

Stability

Stable

5.2.8. UR-CSP-08 – Add Community Portal in the Community Portal Section

Identifier

UR-CSP-08

Title

Linking a Community Portal

Requirement Description

The user shall be notified when the Community Portal has been added in the Community Portal section.

Source

UC-CSP-02 - Community-specific portal registration on GEOSS

Priority

High

Stability

Stable

5.3.   Requirements for Yellow Pages

5.3.1.   UR-YPG-01- Graphic Banner

Identifier

UR-YPG-01

Title

Graphic Banner

Requirement Description

The user shall visualize a graphic banner, which can be found on the website, which lead to the registration form.

Source

UC-YGP-01 - Registration to the GEOSS Yellow Pages

Priority

Medium

Stability

Stable

5.3.2. UR-YPG-02- Wizard Registration

Identifier

UR-YPG-02

Title

Wizard Registration

Requirement Description

The user (data provider) must be enabled to insert the provider information through a predefined form accessible throught a banner. Registration form should consider the same fields as the current one placed in Google Docs:

Provider name *

Acronym

Please specify your acronym

Short description *

Summary of provider objectives and goals

URL of the website institution

Geographical coverage to the organization *

Choose as many as you like

Global

Regional

National

Local

Other:

GPP EC Grant Agreement no. 101039118

If you have selected "National" and/or "Regional" in the previous question, please give the names of countries and/or regions

GEO affiliation *

Member

Participating Organisation

Observer

Non GEO

What is the name of the Official Focal point? *

What is the email of the Official Focal point? *

What is the name of the Technical focal point? *

What is the email of the Technical focal point? *

Type of online resource? *

Data (including imagery)

Knowledge body

Type of Knowledge Body

If your online resource is a Knowledge Body, which type is it?

Data accessibility *

Is your data accessible?

Yes - without restrictions

Yes - with login/credentials

No - but metadata available

Data policy *

The GEOSS Data Collection of Open Resources for Everyone (Data Core) is a distributed pool of documented datasets with full and open unrestricted access at no more than the cost of reproduction and distribution. More information: https://www.earthobservations.org/geoss_dsp.shtml

GEOSS Data Core

Restricted

Other:

GEOSS Data Management Principles label

This is a self-assessment done by the data provider

Discoverable - http://geolabel.info/Discoverable.htm

Accessible - http://geolabel.info/DataAccess.htm

Standard encoding using - http://www.geolabel.info/Encoding.htm

Well documented metadata- http://geolabel.info/Metadata.htm

Traceable - http://geolabel.info/Provenance.htm

Quality documented - http://geolabel.info/Quality.htm

Preserved - http://geolabel.info/Preservation.htm

Periodically verified - http://geolabel.info/Verified.htm

Reviewed and refreshed - http://geolabel.info/Processing.htm

Tagged with permanent ID - http://geolabel.info/Identifier.htmhttp://geolabel.info/Identifier.htm

Relevant SBA

Biodiversity and Ecosystem Sustainability - http://earthobservations.org/area.php?a=bes

Disaster Resilience - http://earthobservations.org/area.php?a=dr

Energy and Mineral Resource Management - http://earthobservations.org/area.php?a=emrm

Food Security and Sustainable Agriculture - http://earthobservations.org/area.php?a=fssa

Infrastructure and Transportation Management - http://earthobservations.org/area.php?a=itm

Public Health Surveillance - http://earthobservations.org/area.php?a=phs

Sustainable Urban Development - http://earthobservations.org/area.php?a=sud

Water Resources Management - http://earthobservations.org/area.php?a=wrmhttp://earthobservations.org/area.php?a=wrm

Relevant SDG

Please choose one or more Sustainable Development Goals (SDG)

Goal 1: No Poverty

Goal 2: Zero Hunger

Goal 3: Good Health and Well-being

Goal 4: Quality Education

Goal 5: Gender Equality

Goal 6: Clean Water and Sanitation

Goal 7: Affordable and Clean Energy

Goal 8: Decent Work and Economic Growth

Goal 9: Industry, Innovation and Infrastructure

Goal 10: Reduced Inequalities

Goal 11: Sustainable Cities and Communities

Goal 12: Responsible Consumption and Production

Goal 13: Climate Action

Goal 14: Life Below Water

Goal 15: Life on Land

Goal 16: Peace, Justice and Strong Institutions

Goal 17: Partnerships for the Goals

Other initiative

Service endpoint *

Organization Logo URL *

Additionally to fields, that were currently present in the form User will have additional two new ones:

Email address*

Password*

These two fields shall support account creation for the User within the Yellow Pages in case of positive consideration of the application.

Source

UC-YGP-01 - Registration to the GEOSS Yellow Pages

Priority

Medium

Stability

Stable

5.3.3. UR-YPG-03- Terms of Service Acceptance

Identifier

UR-YPG-03

Title

Terms of Service Acceptance

Requirement Description

After the information has been entered, the user (data provider) must be enabled to agree to the Terms of Service (ToS).

Source

UC-YGP-01 - Registration to the GEOSS Yellow Pages

Priority

Medium

Stability

Stable

5.3.4. UR-YPG-04- User Notifications

Identifier

UR-YPG-04

Title

User Notifications

Requirement Description

Upon submitting the data, the User should be notified that the registration request has been 1) processed and 2) accepted.

Source

UC-YGP-01 - Registration to the GEOSS Yellow Pages

Priority

Medium

Stability

Stable

5.3.5. UR-YPG-05- Data Modification\Deletion

Identifier

UR-YPG-05

Title

Data Modification\Deletion

Requirement Description

The user must have the possiility to modify or delete the data provided for the registration.

Source

UC-YGP-01- Registration to the GEOSS Yellow Pages

Priority

Medium

Stability

Stable

5.3.6. UR-YPG-06 – Data Provider Account Request

Identifier

UR-YPG-06

Title

Data Provider Account Request

Requirement Description

The data provider must be enabled to request a user account.

Source

UC-YGP-01- Registration to the GEOSS Yellow Pages

Priority

high

Stability

To be better detailed

5.3.7. UR-YPG-07- Search and Visualization of Registered Data Providers

Identifier

UR-YPG-07

Title

Search and Visualization of the Registered Data Providers

Requirement Description

The GEOSS portal user must be enabled to discover and visualize the information about the registered data providers.

Source

UC-YGP-01- Registration to the GEOSS Yellow Pages

Priority

Medium

Stability

Stable

5.3.8. UR-YPG-08- Widget download

Identifier

UR-YPG-08

Title

Widget download

Requirement Description

The Yellow Pages owner must be able to access and download the widget.

Source

UC-YGP-02 - Management of the GEOSS Yellow Pages

Priority

high

Stability

Stable

5.3.9. UR-YPG-09- Widget Installation

Identifier

UR-YPG-09

Title

Widget installation

Requirement Description

The Yellow Pages owners must be able to install the widget on their own premises.

Source

UC-YGP-02 - Management of the GEOSS Yellow Pages

Priority

High

Stability

Stable

5.3.10. UR-YPG-10 – Yellow Pages Authorization

Identifier

UR-YPG-10

Title

Yellow Pages Authorization

Requirement Description

The Yellow Pages owner should be enabled to send the authorization request to the GEO Bodies in order to be authorized.

Source

UC-YGP-02 - Management of the GEOSS Yellow Pages

Priority

high

Stability

To be better detailed

5.3.11. UR-YPG-11 – Yellow Pages Authorization Response

Identifier

UR-YPG-11

Title

YP Authorization Response

Requirement Description

The Yellow Pages owner should be enabled to send the Response of the YP authorization to the Provider.

Source

UC-YGP-02 - Management of the GEOSS Yellow Pages

Priority

High

Stability

Stable

5.3.12.   UR-YPG-12 – Data Modification

Identifier

UR-YPG-12

Title

Data Modification

Requirement Description

The YP owner must be enabled to modify the information requested to the users (e.g. adding new fields and type of questions).

Source

UC-YGP-02 - Management of the GEOSS Yellow Pages

Priority

High

Stable

5.3.13. UR-YPG-13 – Data Provider Account Management

Identifier

UR-YPG-13

Title

Data Provider Account Management

Requirement Description

The YP ower must be enabled to manage a new user account request from the data provider.

Source

UC-YGP-02 - Management of the GEOSS Yellow Pages

Priority

High

Stability

Stable

5.3.14. UR-YPG-14 – Data Provider Registration Process Status

Identifier

UR-YPG-14

Title

Data Provider Registration Process Status

Requirement Description

The entitled user could be enabled to check the status and progress of the data provider registration requests.

Source

UC-YGP-02 - Management of the GEOSS Yellow Pages

Priority

High

Stability

Stable

5.4. Requirements for semantically-enabled free text search[8]

5.4.1. UR-ECS-01 – Communication with the EIFFEL system

Identifier

UR-ECS-01

Title

Communication with the EIFFEL [2] system

Requirement Description

When submitting a free text search to the GEOSS Portal, the user shall receive a ranked list of data whose metadata are semantically relevant to the query, resulting from the interaction of the GEOSS Platform with the EIFFEL cognitive search API.

Source

UC-ECS-01 - Semantically enabled free-text search

Priority

High

Stability

Stable

5.5. Requirements for Artificial Intelligence (AI) – Powered

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[8] These requirements derive from the collaboration with the Eiffel project.

Data Discovery and Access (Proof of Concept)

5.5.1. UR-AIP-01 – Natural Language Query

Identifier

UR-AIP-01

Title

Natural Language Query

Requirement Description

Users shall be able to submit natural language queries, that the system will process and interpret opportunely.

Source

UC-AIP-01 – AI-Powered Data Discovery and Access

Priority

High

Stability

Stable

5.5.2. UR-AIP-02 – Relevant Dataset Suggestions

Identifier

UR-AIP-02

Title

Relevant Dataset Suggestions

Requirement Description

The users shall be able to receive datasets suggestions relevant to their natural language queries.

Source

UC-AIP-01 – AI-Powered Data Discovery and Access

Priority

GPP EC Grant Agreement no. 101039118

High

Stability

Stable

5.5.3.   UR-AIP-03 – Download instructions

Identifier

UR-AIP-03

Title

Download Instructions

Requirement Description

The user shall be able to download instructions for accessing datasets recommended by the system as a result of their natural language query.

Source

UC-AIP-01 – AI-Powered Data Discovery and Access

Priority

High

Stability

Stable

5.5.4.   UR-AIP-04 – Related Dataset Recommendations

Identifier

UR-AIP-04

Title

Highlighted Datasets

Requirement Description

Users shall be able to receive additional datasets recommendations (highlighted datasets) related to their query, based on their search history and preferences.

Source

UC-AIP-01 – AI-Powered Data Discovery and Access

Priority

High

Stability

Stable

5.5.5. UR-AIP-05 – User Interface for AI-Powered Search

Identifier

UR-AIP-05

Title

User Interface for AI-Powered Search

Requirement Description

The user shall be able to access a dedicated search bar for AI-powered data discovery. This interface will be intuitive and user-friendly.

Source

UC-AIP-01 – AI-Powered Data Discovery and Access

Priority

High

Stability

Stable

5.5.6. UR-AIP-06 – User data security and privacy

Identifier

UR-AIP-06

Title

User Interface for AI-Powered Search

Requirement Description

Security and privacy of user data during the search and recommendation processes shall be ensured.

Source

UC-AIP-01 – AI-Powered Data Discovery and Access

Priority

High

Stability

Stable

5.6. Requirements for Landing Page

5.6.1. UR-LPG-01 – Structured Layout

Identifier

UR-LPG-01

Title

Structured Layout

Requirement Description

The user shall be able to access a *landing page* that features a structured layout that guides users to the relevant pages as outlined in the sitemap.

The landing page will include clear navigation paths to the following pages:

- About

- Thematic Areas

- Catalogs

- Community Portals

- Use Cases

- News

Source

UC-LPG-01 – Landing Page

Priority

High

Stability

Stable

5.6.2. UR-LPG-02 – Direct Navigation

Identifier

UR-LPG-02

Title

Direct Navigation

Requirement Description

Through the landing page, users shall be directed to the GEOSS Portal and to practical highlighted use cases that encourage participation. Clear navigation paths will guide users from the landing page to the GEOSS Portal. Links to practical use cases and relevant activities will be prominently featured to encourage user participation.

Source

UC-LPG-01 – Landing Page

Priority

High

Stability

Stable

5.6.3. UR-LPG-03 – Search Engine Optimization

Identifier

UR-LPG-03

Title

Search Engine Optimization (SEO)

Requirement Description

Users shall be enabled to very easily discover the landing page when searching for relevant content. A SEO schema will be implemented to enhance search engine visibility.

Source

UC-LPG-01 – Landing Page

Priority

High

Stability

Stable

5.6.4. UR-LPG-04 – Analytics Integration

Identifier

UR-LPG-04

Title

Analytics Integration

Requirement Description

The GEOSS portal administrator shall be enabled to track user behavior and engagement metrics. Matomo analytics will be integrated so that data collected can be used to inform further improvements to the landing page.

Source

UC-LPG-01 – Landing Page

Priority

High

Stability

Stable

5.6.5.　UR-LPG-05 – Article Management

Identifier

UR-LPG-05

Title

Article Management

Requirement Description

Content Managers shall be enabled to add articles from an Administration console. This will have functionalities for Content Managers to create, edit, and publish articles. Articles added by Content Managers will be displayed in the relevant sections of the landing page.

Source

UC-LPG-01 – Landing Page

Priority

High

Stability

Stable

5.6.6.　UR-LPG-06 – Cookie Notice

Identifier

UR-LPG-06

Title

Cookie Notice

Requirement Description

Users hall be informed about cookie usage and be asked consent via a cookie notice consistent with the GEOSS Portal.

Source

UC-LPG-01 – Landing Page

Priority

High

Stability

Stable

5.7. Requirements for Land Degradation

5.7.1. UR-LDG-01 – SDG indicator 15.3.1 computation service discovery

Identifier

UR-LDG-01

Title

SDG indicator 15.3.1 computation service discovery

Requirement Description

When searching for the SDG indicator 15.3.1, the user shall receive a results list including the resources (knowledge, data and services) associated to this indicator.

Source

UC-LDG-01 - SDG15.3.1 - Towards knowledge generation on Land Degradation

Priority

High

Stability

Stable

5.7.2. UR-LDG-02 – SDG indicator 15.3.1 computation service execution

Identifier

UR-LDG-02

Title

SDG indicator 15.3.1 computation service execution

Requirement Description

The user shall be enabled to select the SDG indicator 15.3.1 calculation service, define/refine the area of interest (this depending of the level – global, regional or country, at which the indicator is provided, and inside the service-specific macro-area) and time range, select computing platform of preference among the available, and start the service execution.

Source

UC-LDG-01 - SDG15.3.1 - Towards knowledge generation on Land Degradation

Priority

High

Stability

Stable

5.7.3. UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations

Identifier

UR-LDG-03

Title

Visual representation of SDG indicator 15.3.1 computations

Requirement Description

The user shall be able to visualize a customizable dashboard as the service output, where it is possible to extract additional information and to generate report, statistics about land degradation. The user shall be enabled to visualize the values resulting from the calculation of SDG indicator 15.3.1 as a layer on the map, with storytelling feature.

Source

UC-LDG-01 - SDG15.3.1 - Towards knowledge generation on Land Degradation

Priority

High

Stability

Stable

5.7.4. UR-LDG-04 – My Workspace Dashboard

Identifier

UR-LDG-04

Title

Acceptance of the visualizations

Requirement Description

The users shall be able to add the dashboard in My Workspace menu and share it with the specified users.

Source

UC-LDG-01 - SDG15.3.1 - Towards knowledge generation on Land Degradation

Priority

High

Stability

Stable

5.7.5. UR-LDG-05- Acceptance of the visualizations

Identifier

UR-LDG-05

Title

Acceptance of the visualizations

Requirement Description

User, upon finishing working on dashboard, can send it over for verification by administrator of the portal. Administrator can accept the dashboard which will make it accessible within search (tab information) for other Users. It is also possible for Administrator to reject publication of such dashboard and provide reasons why this action has taken place to the User. User can update the dashboard according to information provided by Administrator or discard the whole process.

UC-LDG-01 - SDG15.3.1 - Towards knowledge generation on Land Degradation

Priority

Medium

Stability

Stable

5.8. Requirements for EMODnet All Atlantic

5.8.1. UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets

Identifier

UR-ATL-01

Title

Access to the EMODnet Marine Physics Datasets

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find the EMODnet Physics Datasets.

The user shall be enabled to access the following data and information:

- Data provided by EMODnet physics catalogue:

  https://catalogue.emodnet-physics.eu/geonetwork/srv/dut/catalog.search#/home

- Articles:

  https://emodnet.ec.europa.eu/en/use-case/glider-mission-planning-historical-data

Source

UC-ATC-01 – EMODnet Physics experiment access

Priority

High

Stability

Stable

5.8.2. UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service

Identifier

UR-ATL-02

Title

Access to the Brazilian Observatory Service

Requirement Description

The User shall be enabled to set the search criteria and to access to the Brazilian Obervatory service. The user is enabled to visualize details (metadata) regarding the data\products found.

The user shall be enabled to access the following data and information:

- Link to Brazilian Obervatory service:
  https://portal.brazilianseaobservatory.org/
- link to the article:
  https://marine.copernicus.eu/sites/default/files/media/pdf/2022-05/GFRANZ-All-Atlantic-Webinar-2022.pdf

Source

UC-ATC-02 – Joint Copernicus Marine – EMODnet experiment: Use of Global Ocean Model, satellite-derived and in situ data by the Brazilian Sea Observatory

Priority

High

Stability

Stable

5.9. Requirements for EMODnet marine ecosystems and biodiversity

5.9.1. UR-MEB-01 – Discovery and Access to the Ospar Data

Identifier

UR-MEB-01

Title

Data access to the Ospar Data

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find the Ospar Data and the related article.

The user shall be enabled to access the following data and information:

- Link to Ospar Assessment Portal and Ospar:

  https://www.ospar.org/

  https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/habitats/extent-physical-damage-predominant-and-special-habitats/

- Articles:

  https://emodnet.ec.europa.eu/en/use-case/ospar-intermediate-assessments-evaluation-ecological-status-marine-environment-ne-atlantic

Source

UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access

Priority

High

Stability

Stable

5.9.2. UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment

Identifier

UR-MEB-02

Title

Access to the Ospar Intermediate Assessment

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find the Ospar Intermediate Assessment metadata.

The user shall be enabled to access the following data and information:

- Link to Ospar portal:

  https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/

- Article:

  https://emodnet.ec.europa.eu/en/use-case/emodnet-seabed-habitats-crucial-assessing-extent-physical-damage-benthic-habitats-north

Source

UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment

Priority

High

Stability

Stable

5.9.3. UR-MEB-03 – Discovery and Access to the EMODnet Biology

Identifier

UR-MEB-03

Title

Access to the EMODnet Biology

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find EMODnet Biology datasets.

The user shall be enabled to access the following data and information:

- Link to EMODnet Biology website:

  https://www.emodnet-biology.eu/geoviewer/#!/

- Article:

  https://emodnet.ec.europa.eu/en/use-case/operational-zooplankton-data-service-long-term-monitoring-programme

- Datasets from EMODnet Biology

Source

UC-MEB-05 – EMODnet Biology experiment access

Priority

High

Stability

Stable

5.9.4. UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species

Identifier

UR-MEB-04

Title

Access to the EMODnet Biology – non-indigenous species

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find EMODnet Biology, non-indigenous species articles\report.

The user shall be enabled to access the following report and articles:

- Link to EMODnet Ospar Assessment Portal:

  https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/pressures-human-activities/non-indigenous/

- Article:

  https://emodnet.ec.europa.eu/en/use-case/emodnet-biology-helps-preventing-introduction-non-indigenous-species

Source

UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species

Priority

High

Stability

Stable

5.9.5. UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data

Identifier

UR-MEB-05

Title

Access to the Joint Copernicus Marine – tracking whales' data

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find Joint Copernicus Marine.

The user shall be enabled to access the following data and articles:

- Link to Joint Copernicus Marine:

  https://resources.marine.copernicus.eu/product-detail/GLOBAL_MULTIYEAR_BGC_001_033/INFORMATION

- Link to Article:

  https://marine.copernicus.eu/sites/default/files/media/pdf/2022-05/SPEREZ-All-Atlantic-Webinar-2022.pdf

- Datasets from the Joint Copernicus Marine

Source

UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic

Priority

High

Stability

Stable

5.9.6. UR-MEB-06 – Discovery and Access to the Soft Corals Article

Identifier

UR-MEB-06

Title

Access to the Soft Corals Article

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find Soft Corals Article.

The user shall be enabled to access the following information.

- Link to the following articles and report:

  https://www.nature.com/articles/srep36460.pdf

  https://emodnet.ec.europa.eu/en/use-case/identifying-previously-unknown-soft-coral-habitats

Source

UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats

Priority

High

Stability

Stable

5.9.7. UR-MEB-07 – Discovery and Access to the Ecosystem Services Article

Identifier

UR-MEB-07

Title

Access to the Ecosystem Services Article

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find Ecosystem Services Article.

The user shall be enabled to access the following articles.

- Link to find Ecosystem Services Articles:

  https://www.frontiersin.org/articles/10.3389/fmars.2014.00023/full

  https://emodnet.ec.europa.eu/en/use-case/mapping-ecosystem-services-provided-benthic-habitats-european-north-atlantic-ocean

Source

UC-MEB-03 - EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean

Priority

High

Stability

Stable

5.10. Requirements for EMODnet Chemistry

5.10.1.   UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline

Identifier

UR-MAC-01

Title

Access to the EMODnet Chemistry, EU baseline

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find EMODnet Chemistry, EU baseline article and Marine litter database report.

The user shall be enabled to access the following information.

- Link to the EU baseline report:

   https://www.emodnet-chemistry.eu/repository/2018_Addamoetal_JRC_Report_MLDatabse_EUR29469_final.pdf

- Link to the EU baseline article:

   https://emodnet.ec.europa.eu/en/use-case/emodnet-chemistry-supports-analysis-eu-baselines

Source

UC-MAC-01- EMODnet Chemistry experiment access: Supporting the analysis of EU baselines

Priority

High

Stability

Stable

5.10.2.   UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter

Identifier

UR-MAC-02

GPP EC Grant Agreement no. 101039118

Title

Access to the EMODnet Chemistry, Marine Litter

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to find EMODnet Chemistry, Marine Litter reduction reports and articles.

The user shall be enabled to access the following information.

- Link to the following articles:

    https://ec.europa.eu/environment/pdf/circular-economy/single-use_plastics_impact_assessment.pdf

    https://emodnet.ec.europa.eu/en/use-case/emodnet-chemistry-contributed-ec-impact-assessment-reducing-marine-litter-action-single-use

Source

UC-MAC-02 - EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear (contribution to EC impact assessment)

Priority

High

Stability

Stable

5.11.   Requirements for EMODnet Bathymetry

5.11.1.   UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services

Identifier

UR-MAB-01

Title

Access to the EMODnet Bathymetry services

Requirement Description

The User shall be enabled to set the search criteria and to access to the EMODnet Bathymetry service and articles. The user is enabled to visualize metadata regarding the service and article found.

The user shall be enabled to access the following data and information.

- Link to EMODnet Bathymetry service:

  https://tiles.emodnet-bathymetry.eu/
  Link to the article:
  https://emodnet.ec.europa.eu/en/use-case/enhancing-marine-topographical-data-discovery-and-access-north-atlantic
  Datasets resulting from the service

Source

UC-MAB-01- EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic

Priority

High

Stability

Stable

5.12. Requirements for EIFFEL

5.12.1. UR-EIF-01 – Discovery of Eiffel Pilot 3 data

Identifier

UR-EIF-01

Title

Discovery of Eiffel Pilot 3 data

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) and to use the following keywords: ports, air-quality data, in-situ sensors, NO2, SO2, O3 forecast, to discover the Copernicus Eiffel Pilot 3 data.

The search domain shall include the following data and information.

- Link to Eiffel Pilot website:

  https://www.portsdebalears.com/en/air-quality

- The following data:

  NO2 24-48 hour forecast

  SO2 24-48 hour forecast

  O3 24-48 hour forecast

Source

UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data

Priority

High

Stability

Stable

5.12.2. UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data

Identifier

UR-EIF-02

Title

Access and visualization of Eiffel Pilot 3 data

Requirement Description

The user shall be enabled to visualize in the map viewer and access the data, as provided by the Copernicus Eiffel Pilot 3.

Source

UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data

Priority

High

Stability

Stable

5.12.3.   UR-EIF-03 – Discovery of Eiffel Pilot 4 data

Identifier

UR-EIF-03

Title

Discovery of Eiffel Pilot 4 data

Requirement Description

The User shall be enabled to set the search criteria and to access to the Eiffel Pilot4 metadata using the following keywords: Solar, solar energy, real time, cadastre, photovoltaic, energy, rooftop, climatology. The user is enabled to visualize details (metadata) regarding the data and products found.

The search domain shall include the following data, service and information.

- Link to Eiffel Pilot service:

    http://solea.gr/athens-solar-cadastre/

- The following data:

    Solar energy potential real-time (Wh/m2)

    Solar energy potential climatology (kWh/m2)

Source

UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data

Priority

High

Stability

Stable

5.12.4.   UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data

Identifier

UR-EIF-04

Title

Access and visualization of Eiffel Pilot 4 data

Requirement Description

When selecting the Eiffel Pilot 4 data resulting from the search, the user shall be redirected to the Eiffel Application that allows viewing the data.

Source

UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data

Priority

High

Stability

Stable

5.13.   Requirements for AfriGEOSS Community Portal

5.13.1.   UR-AFG-01 - A dedicated portal for the AfriGEOSS community

Identifier

UR-AFG-01

Title

A dedicated portal for the AfriGEOSS community

Requirement Description

The AfriGEOSS users shall be enabled to access a dedicated Portal, the AfriGEOSS Portal, providing search capabilities that mirror the ones offered by the GEOSS Portal, in particular as regards the search criteria, the filtering criteria, the results browse, selection and visualization capabilities.

Source

UC-AFG-01 – AfriGEOSS Community Portal

Priority

High

Stability

Stable

5.13.2. UR-AFG-02 - The AfriGEOSS search keywords

Identifier

UR-AFG-02

Title

The AfriGEOSS search keywords

Requirement Description

The AfriGEOSS users shall be enabled to perform their searches based at list on the keywords still to be defined.

Source

UC-AFG-01 – AfriGEOSS Community Portal

Priority

High

Stability

Stable

5.13.3. UR-AFG-03 - The AfriGEOSS Region of Interest

Identifier

UR-AFG-03

Title

The AfriGEOSS Region of Interest

Requirement Description

The AfriGEOSS users shall be enabled to select as Region of Interest for their searches, in particular any geographical area in the entire Africa.

Source

UC-AFG-01 – AfriGEOSS Community Portal

Priority

High

Stability

Stable

5.13.4. UR-AFG-04 – The AfriGEOSS search domain

Identifier

UR-AFG-04

Title

The AfriGEOSS search domain

Requirement Description

The AfriGEOSS users shall be enabled to search in a domain that includes all the GEOSS resources over the Africa and, in particular, data from National, Regional and Global providers of Social, Economic, Environmental and other data, tools, applications and services (specific data still to be defined).

Source

UC-AFG-01 – AfriGEOSS Community Portal

Priority

High

Stability

Stable

5.13.5.   UR-AFG-05 - The AfriGEOSS filtering capabilities

Identifier

UR-AFG-05

Title

The AfriGEOSS filtering capabilities

Requirement Description

AfriGEOSS users should be enabled to filter the search results based on customized filter criteria including:

- Filter by Country;

- Filter by AfriGEOSS Providers

- Filter by AfriGEOSS topics

- Filter by AfriGEOSS Communities (if any, to be defined)

Source

UC-AFG-01 – AfriGEOSS Community Portal

Priority

Medium

Stability

Stable

5.13.6.   UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS

Identifier

UR-AFG-06

Title

Accessing data, information and knowledge from AfriGEOSS

Requirement Description

Users shall be enabled to search in the AfriGEOSS Community Portal, explore the relevant data with the possibility to filter by the organizations that provide them and visualize and/or access the results.

Source

UC-AFG-02 – Discovery and visualization of resources from AfriGEOSS

Priority

High

Stability

Stable

5.14. Requirements for Climate Change Impact on pandemic risk

5.14.1. UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches

Identifier

UR-CCP-01

Title

Norovirus Risk Maps Model based on ecological niches.

Requirement Description

The Norovirus Risk Maps Model, based on ecological niches, shall be exploitable in VLab.

Source

UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk

Priority

High

Stability

Unstable – Still investigating which correlation model to use.

5.14.2. UR-CCP-02 - Norovirus epidemiologic data

Identifier

UR-CCP-02

Title

Norovirus epidemiologic data

Requirement Description

Broker Norovirus epidemiologic data source

Source

UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk

Priority

High

Stability

Unstable – Still investigating which data source can be used.

5.14.3. UR-CCP-03 – Intergovernmental Panel on Climate Change (IPCC) scenarios data

Identifier

UR-CCP-03

Title

IPCC scenarios data

Requirement Description

IPCC scenarios data shall be made discoverable and accessible through the GEOSS Platform Broker (if not already available from existing data sources).

Source

UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk

Priority

High

Stability

Unstable – Still investigating which data source can be used.

5.14.4. UR-CCP-04 – Species Distribution data

Identifier

UR-CCP-04

Title

Species Distribution data

Requirement Description

The usability of GBIF data shall be assessed and other relevant species distribution data sources if needed shall be made discoverable and accessible through the GEOSS Platform.

Source

UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk

Priority

High

Stability

Stable

5.14.5. UR-CCP-05 – GEOSS Platform and Vlab Enhancement

Identifier

UR-CCP-05

Title

GWP/VLab Enhancement

Requirement Description

The user shall be able to interact with VLab via the GEOSS Portal.

Source

UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk

Priority

High

Stability

Stable

5.15. Requirements for Green Spaces Accessibility

5.15.1. UR-GSA-01 – Urban Green Spaces Accessibility Model

Identifier

UR-GSA-01

Title

Urban Green Spaces Accessibility Model

Requirement Description

The UGS Model shall be exploitable via VLab

Source

UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces

Priority

Medium

Stability

Stable

5.15.2. UR-GSA-02 – GSA Data

Identifier

UR-GSA-02

GPP EC Grant Agreement no. 101039118

Title

GSA Data

Requirement Description

The necessary data shall be made discoverable and accessible via the GEOSS Platform (if not already available).

Source

UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces

Priority

Medium

Stability

Stable

5.16. Requirements for Nutrient Pollution and Above Ground Biomass

5.16.1. UR-JRC-01 – GREEN Model[9] shared in VLab

Identifier

UR-JRC-001

Title

GREEN Model shared in VLab

Requirement Description

The GREEN model shall be available in VLab.

Source

UC-JRC-01 - Nutrient Pollution in European Inland and Coastal Waters

Priority

High

Stability

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[9] A model developed by CNR in collaboration with JRC

Stable

5.16.2. UR-JRC-02 – GREEN Model input data

Identifier

UR-JRC-002

Title

GREEN Model input data

Requirement Description

The GREEN model input data (for different river basins and different policy scenarios) shall be available for executing GREEN model in VLab.

Source

UC-JRC-01 - Nutrient Pollution in European Inland and Coastal Waters

Priority

High

Stability

Stable

5.16.3. UR-JRC-03 – GREEN Model parameters

Identifier

UR-JRC-003

Title

GREEN Model parameters

Requirement Description

The GREEN model parameters (for different river basins and different policy scenarios) shall be available for configuring the execution of GREEN model in VLab.

Source

UC-JRC-01 - Nutrient Pollution in European Inland and Coastal Waters

Priority

High

Stability

Stable

5.16.4. UR-JRC-04 – GREEN Web Application

Identifier

UR-JRC-004

Title

GREEN Web Application

Requirement Description

A dedicated GREEN Web Application shall be developed to allow users execute the GREEN model on different areas of interest and policy scenarios.

Source

UC-JRC-01 - Nutrient Pollution in European Inland and Coastal Waters

Priority

High

Stability

Stable

5.16.5. UR-JRC-05 – AGB ML Model shared in VLab

Identifier

UR-JRC-005

Title

AGB ML Model shared in VLab

Requirement Description

The trained ML models shall be available in VLab.

Source

UC-JRC-02 – Above Ground Biomass

Priority

High

Stability

Stable

5.16.6. UR-JRC-06 – Support of multiple AGB ML models in VLab

Identifier

UR-JRC-006

Title

Support of multiple AGB ML models in VLab

Requirement Description

VLab provides a list of available trained ML models for AGB

Source

UC-JRC-02 – Above Ground Biomass

Priority

High

Stability

Stable

5.16.7. UR-JRC-07 GEO DAB Sentinel Products Coverage query

Identifier

UR-JRC-007

Title

GEO DAB Sentinel Products Coverage query

Requirement Description

GEO DAB new type of queries, i.e., provide the list of Sentinel Products covering an AOI in a specific YOI

Source

GPP EC Grant Agreement no. 101039118

UC-JRC-02 – Above Ground Biomass

Priority

High

Stability

Stable

5.16.8. UR-JRC-08 – GEOSS Portal enhancements for input selection

Identifier

UR-JRC-008

Title

GEOSS Portal enhancements for input selection

Requirement Description

Enhance the GWP to allow a simple and user-friendly interface for the definition of the inputs for the model, as well as for the visualization of the Sentinel Products coverage.

Source

UC-JRC-02 – Above Ground Biomass

Priority

High

Stability

Stable

5.16.9. UR-JRC-09 GEOSS Portal enhancements for ML models

Identifier

UR-JRC-009

Title

GEOSS Portal enhancements for Machine Learning (ML) models

Requirement Description

Enhance the GEOSS Portal to allow the retrieval, display and user selection of available trained ML models.

Source

UC-JRC-02 – Above Ground Biomass

Priority

High

Stability

Stable

5.16.10. UR-JRC-10 GEOSS Portal dashboard for Above Ground Biomass (AGB) maps

Identifier

UR-JRC-010

Title

GEOSS Portal dashboard for AGB maps

Requirement Description

Enhance/Refine the GEOSS Portal dashboard for the display of calculated AGB maps and differences between maps calculated with different ML models.

Source

UC-JRC-02 – Above Ground Biomass

Priority

High

Stability

Stable

5.17. Requirements for Automated Gross Primary Production for Monitoring Ecosystem Health within GEOSS (AGAME)

5.17.1. UR-AGA-01 – Gross Primary Production product

discovery

Identifier

UR-AGA-01

Title

Gross Primary Production product discovery

Requirement Description

When searching for the Gross Primary Production, the user shall receive a results list including the resources associated with the product based on matching keywords. These keywords could include terms such as 'validated', Gross Primary Production maps', 'spatial resolution', 'temporal resolution'.

Source

UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Priority

High

Stability

Stable

5.17.2. UR-AGA-02 – Gross Primary Production product visualization

Identifier

UR-AGA-02

Title

Gross Primary Production product visualization

Requirement Description

When selecting the Gross Primary Production product of their interest, the user shall be able to visualize the product on the dashboard and to extract additional information, such as quality metrics information. Products shall be visualized in the form of maps and tabular data.

Source

UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Priority

High

Stability

Stable

5.17.3. UR-AGA-03 – Gross Primary Production training materials discovery

Identifier

UR-AGA-03

Title

Gross Primary Production training materials discovery

Requirement Description

The user shall receive a results list including detailed training/communication materials associated with the product. The materials need to ensure reproducibility and awareness of the product. These training materials can come in the form of Jupyter notebooks on Github, product factsheets, presentations, dedicated web pages, and video demonstrations.

Source

UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Priority

High

Stability

Stable

5.17.4. UR-AGA-04 – Gross Primary Production computation service execution

Identifier

UR-AGA-04

Title

GPP EC Grant Agreement no. 101039118

Gross Primary Production computation service execution

Requirement Description

The user could be enabled to select Gross Primary Production computation services, defining the area of interest, the time range and the model.

Source

UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Priority

Medium/Low

Stability

Stable

5.17.5. UR-AGA-05 – Gross Primary Production product specification/definition

Identifier

UR-AGA-05

Title

Gross Primary Production product specification/definition

Requirement description

Gross Primary Production products shall be provided to the user with the finest spatial resolution achievable. The products shall be available in a daily temporal resolution. The preferred format for these products is GeoTIFF.

Source

UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Priority

High

Stability

Stable

5.17.6. UR-AGA-06 – Gross Primary Production product

Identifier

UR-AGA-06

Title

Gross Primary Production product support/feedback

Requirement description

The user shall be able to obtain support and/or assistance via email. Feedback shall be used to optimise the data product until full endorsement and product labelling.

Source

UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product

Priority

High

Stability

To be better defined

5.17.7. UR-AGA-07 – Gross Primary Production product /workflow integration into eLTER cyberinfrastructure

Identifier

UR-AGA-07

Title

Gross Primary Production product /workflow integration into eLTER cyberinfrastructure

Requirement description

The user expects that AGAME Gross Primary Production products seamlessly fit into the eLTER workflows. This involves integrating them into existing components such as the geospatial aspect of CDN (minIO, geoserver, pyCSW) for providing data sets as services. Additionally, the user anticipate utilizing B2Share for storing and publishing stable snapshots of data sets, complete with issuing DOIs for enhanced discoverability and citation purposes.

Source

UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster

Priority

Medium/High

Stability

Stable

5.17.8. UR-AGA-08 – Gross Primary Production product documentation

Identifier

UR-AGA-08

Title

Gross Primary Production product documentation

Requirement description

The user shall be able to access documentation to learn more about the products. This should be made available on Github, including scripts and models used. The eLTER template for data product could be used here. Information on uncertainty could also be provided.

Source

UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster

Priority

High

Stability

To be better defined

5.17.9. UR-AGA-09 – Gross Primary Production training materials discovery

Identifier

UR-AGA-09

Title

Gross Primary Production training materials discovery

Requirement description

The user should be able access to training material, and be informed about live training opportunities. Online training materials could include webinar recordings, videos, example scripts for access, processing of data and analysis. Hands-on training events could also be provided in the form of hackathons.

Source

UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster

Priority

Medium/High

Stability

To be better defined

5.17.10. UR-AGA-10 – Gross Primary Production product Metadata

Identifier

UR-AGA-10

Title

Gross Primary Production Metadata

Requirement description

The user should be able access metadata related to the project. Metadata can follow ISO19115/19139 standards. Custom metadata elements for description of codes and scripts should be provided. DEIMS-SDR could be used for the documentation of long-term eLTER observation facilities as it follows community standards.

Source

UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster

Priority

High

Stability

Stable

5.17.11. UR-AGA-11 – Gross Primary Production Product support/feedback

Identifier

UR-AGA-11

Title

Gross Primary Production product support and feedback

Requirement description

The user should be able to obtain support and provide feedback. This shall be possible through one of the following options: HelpDesk, direct contact (e.g. webinars), or interactive forums, including eLTERs site and Platform forum. Feedback shall be used to optimise the data product until full endorsement and product labelling.

Source

UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster

Priority

Medium/high

Stability

To be better defined

5.17.12. UR-AGA-12 – Gross Primary Production product specification / definition

Identifier

UR-AGA-12

Title

Gross Primary Production product specification / description

Requirement description

Gross Primary Production products should be provided to the user with monthly temporal resolution. The products should be spatially downscalable to a site-relevant spatial resolution of 10 m. The preferred format for these products is GeoTIFF.

Source

UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster

Priority

High

Stability

Stable

5.17.13. UR-AGA-13 – Gross Primary Production Metadata specification and provision

Identifier

UR-AGA-13

Title

Gross Primary Production Metadata specification and provision

Requirement description

The user expects that metadata will comply with relevant community standards, especially the ISO 19115/19139 standard for geospatial data. This entails meeting certain minimum requirements for metadata specifications, including the provision of a title, abstract, keywords, instrument details, platform information, measured attribute (parameter), geographic bounding box or polygon (including reference to eLTER facility), temporal extent, responsible party name, and contact email address.

Source

UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment

Priority

High

Stability

Stable

5.17.14. UR-AGA-14 – Gross Primary Production product API - data provision

Identifier

UR-AGA-14

Title

Gross Primary Production product API - data provision

Requirement description

The user expects metadata to be accessible either through the eLTER CSW endpoint or a dedicated AGAME endpoint. Data and knowledge providers must be authenticated users. Necessary API documentation should include the public endpoint URL and details about the server metadata standard, referencing *UR-xxx-yy - Gross Primary Production Metadata specification and provision*. Testing the CSW functionality can be done using the current eLTER CSW instance.

Source

UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment

Priority

Medium/high

Stability

To be better defined

5.17.15. UR-AGA-15 – Gross Primary Production product documentation/knowledge package

Identifier

UR-AGA-15

Title

Gross Primary Production product documentation/knowledge package

Requirement description

The user anticipates a clear documentation of AGAME outcomes, encompassing data, code, feedback, and related materials, all consolidated into one or multiple knowledge packages. These packages should provide comprehensive documentation, including details on data, software, models, algorithms, and training materials, ensuring thorough understanding and effective utilization of the products.

Source

UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment

Priority

Medium/Low

Stability

To be better detailed

5.17.16. UR-AGA-16 – Gross Primary Production product quality check

Identifier

UR-AGA-16

Title

Gross Primary Production product quality check

Requirement description

The user expects that before data is published, interoperability checks will be conducted to guarantee its quality. The data should be suitable for its intended purpose and accompanied by a comprehensive description of its application to ensure users understand its relevance and usability.

Source

UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment

Priority

GPP EC Grant Agreement no. 101039118

High

Stability

Stable

5.17.17. UR-AGA-17 – Gross Primary Production product communication channels

Identifier

UR-AGA-17

Title

Gross Primary Production product communication channels

Requirement description

Gross Primary Production product communication channels for the AGAME Knowledge Packages, after the end of the AGAME project, shall be in charge of the Geo Knowledge Hub.

Source

UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment

Priority

Low

Stability

Stable

5.17.18. UR-AGA-18 – Gross Primary Production product data policies

Identifier

UR-AGA-18

Title

Gross Primary Production product data policies

Requirement description

The user expects that data access, citation, and ownership policies will align with GPP EC Grant Agreement no. 101039118

recommendations from the Data working Group within the GEO Knowledge Hub. They may also seek further guidance and support from the GEO Secretariat to ensure compliance and best practices in managing data-related policies.

Source

UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment

Priority

Medium

Stability

To be better defined

5.18. Requirements for Harmonized in situ data for crop mapping (MAPS4GPP)

5.18.1. UR-MPS-01 – Host WorldCereal repository

Identifier

UR-MPS-01

Title

Host WorldCereal repository

Requirement Description

Users shall be able to count on the long term hosting of the WorldCereal harmonized in-situ reference data repository.

Source

UC-MPS-01 - Host WorldCereal repository

Priority

High

Stability

Stable

5.18.2. UR-MPS-02 – Register WorldCereal in-situ data and

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Identifier

UR-MPS-02

Title

Registration of WorldCereal in-situ data and guidelines

Requirement Description

WorldCereal harmonized in-situ reference data repository including guidelines on sharing and harmonizing in-situ reference data shall be registered in the Platform.

Source

UC-MPS-01 - Host WorldCereal repository

Priority

High

Stability

Stable

5.18.3. UR-MPS-03 – Registration of in-situ data providers

Identifier

UR-MPS-03

Title

Registration of in-situ data providers and definition of interfaces

Requirement Description

Registration of in-situ data providers shall be enabled in the GEOSS platform, and corresponding interfaces shall be defined. See Annex D for a complete list of possible data providers.

Source

UC-MPS-02 - Register in-situ data providers

Priority

High

Stability

Stable

5.18.4. UR-MPS-04 – Thematic area "in-situ data crop" accessibility through the GEOSS Portal

Identifier

UR-MPS-04

Title

Thematic area "in-situ data crop" accessibility through the GEOSS Portal

Requirement Description

Users shall be provided with a quick access to the crop in situ data (e.g. link to the corresponding thematic area in the GEOSS Portal Community Portals menu or other).

Source

UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository

Priority

High

Stability

Stable

5.18.5. UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data

Identifier

UR-MPS-05

Title

Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data

Requirement Description

Users shall be enabled to find, inspect, select and download WorldCereal or AGROSTAC harmonized in-situ reference data via an opportune user interface according to certain criteria (region, year, crop type, boundary box, quality level).

Note: the region is not yet supported by the WorldCereal REST API.

Source

UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository

Priority

High

Stability

Stable

5.18.1.   UR-MPS-06 – Crop map generation parameters definition

Identifier

UR-MPS-06

Title

Crop map generation parameters definition

Requirement Description

The user shall be enabled to define the parameters for crop map generation (processing) including region, crop type, year/season after selecting the WorldCereal harmonized in-situ reference data. In a second version, a combined set of harmonized reference data, available in GEOSS platform, could be selected and used to re-train a selected algorithm.

Source

UC-MPS-04 – Generate crop maps

Priority

Medium

Stability

Stable

5.18.1. UR-MPS-07 – Access and trigger WorldCereal processing module

Identifier

UR-MPS-07

Title

Access and trigger WorldCereal processing module

Requirement Description

Upon user request, the WorldCereal processing module shall be triggered to generate a crop map for the specified region, season and crop using the WorldCereal pre-processed feature data and algorithms.

Source

UC-MPS-04 – Generate crop maps

Priority

High

Stability

Stable

5.18.2. UR-MPS-08 – Visualization of crop map and saving in personal workspace

Identifier

UR-MPS-08

Title

Visualization of crop map and saving in personal workspace

Requirement Description

The user shall be enable to visualize in the GEOSS Platform viewer and to save in a personal workspace that is available after logging to the GEOSS Portal the crop map(s) returned by the WorldCereal processing module.

Source

UC-MPS-04 – Generate crop maps

Priority

High

Stability

Stable

5.19. Requirements for Climate Change Research for the Municipality of Milan[10]

5.19.1. UR-HAR-01 – Discovery of Harmonia data on urban heat fluxes and heat emissions

Identifier

UR-HAR-01

Title

Discovery of Harmonia project [3] data on urban heat fluxes and heat emissions

Requirement Description

The User shall be enabled to set the search criteria (search text, time range, etc,) to discover data from the Harmonia project [3], in particular relevant to urban heat fluxes and heat emissions in the municipality of Milan (Italy).

Source

UC-HAR-01 Accessing Climate Change Data on Urban Heat Fluxes in Milan

Priority

High

Stability

Stable

5.19.1. UR-HAR-02 – Access and analysis of Harmonia data on

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[10] These requirements derive from the collaboration with the Harmonia H2020 project.

urban heat fluxes and heat emissions

Identifier

UR-HAR-02

Title

Access and analysis of Harmonia data on urban heat fluxes and heat emissions

Requirement Description

The user shall be enabled to download data, as provided by the Harmonia project [3], for report development and analysis.

Source

UC-HAR-01 Accessing Climate Change Data on Urban Heat Fluxes in Milan

Priority

High

Stability

Stable

6. GEOSS Platform Usability Enhancements

The GEOSS team gathered some ideas to enhance the usability of the GEOSS platform, which are described in the table below, where the first column indicates the components to be enhanced and the second column describes details.

Table 2 Needs to enhance the GEOSS platform usability

First requirements identified	
Search results	Titles should be understandable by users. This action may require changes on the data provider side.
	The description of datasets should be easy to understand by users. This action may require changes on the data provider side.
	It should be necessary a sorting option (relevance, a-z, z-a, top views). This action may require changes on the data provider side.
	An option for users to decide how the search results should be displayed, in order to improve the Thumbnails visualization, should be added. This may require Data provider to force Users uploading data to insert thumbnail pictures.
	It could be necessary to expand the space for search results - from the portal (expand the page in its length to present more results).
	Use one only dataset per line in the search results;
	Use keywords instead of partial abstract;
	Improve/refine keywords;
	Do not open a new window to show the abstract.
Homepage	It could be necessary to add "sign in" option next to langue choice in the header of the page.
	A landing page shall be included to improve communication and make more evident and easily accessible the main use cases implemented.

GPP EC Grant Agreement no. 101039118

Tools	It should be necessary to redesign the icons of the tools.
	It should be necessary to enhance the search via AOI: instead of displaying search portlet as soon as Users chooses to search with AOI the search should slide off the page. After User is done with checking the AOI.
Shape files usage	It should be necessary to inform Users about the shape drag and drop on the map.

7. Collaborations with GEO Work Programme activities

7.1. Engagement calls

The identification of the needs of the different GWP is performed through calls with a representative member of the GWP. In the following paragraphs it will be explained the information gathered through the meetings with each GWP team.

7.2. TWIGA (Transforming Water, Weather, and Climate Information through In Situ observations for Geo-Services in Africa)

7.2.1. Overview and objectives

TWIGA (Transforming Water, Weather, and Climate Information through In Situ observations for Geo-Services in Africa) connected to GEO Global Water Sustainability (GEOGloWS) Initiative, is a Horizon 2020 project with the aim to provide currently unavailable geo-information on weather, water, and climate for sub-Saharan Africa by enhancing satellite-based geo-data with innovative in situ sensors and developing related information services that answer the needs of African stakeholders and the GEOSS community.

The concept is to create a systematic feedback loop to reciprocally validate in situ measurements and satellite data in one integrated model with over 500 in-situ measurement stations using citizen science.

TWIGA also works with the Trans-African Hydro-Meteorological Observatory (TAHMO) to implement new weather stations with atmospheric measurements running at low cost (50$ per month per station). Using these measurements, TWIGA develops services that are suitable for commercial exploitation.

7.2.2. Needs and GEOSS Platform role

The meeting with TWIGA team revealed the following aspects in which the GEOSS Platform team can provide support:

- the need to improve the discoverability of TWIGA/TAHMO resources, in particular: stations description; keywords and metadata optimization.

- the possibility to add new information (such as the early warning flood system and short-term solar energy prediction) which could represent good advertising for TWIGA.

- the possibility of a Community Portal creation.

- the possibility to utilise "Services with a fee" as part of the discoverable data and services.

7.3. EO4HEALTH (Earth Observations for Health)

7.3.1. Overview and objectives

The use of Earth observation (EO) data among interdisciplinary and multi-agency teams can significantly advance scientific knowledge of existing public health threats to human, animal, and ecosystem health. The analysis of these geospatial data can enhance the understanding of the dynamic processes of the surrounding ecosystem and influence on human health. These data can also support disease preparedness and response actions in disease epidemic or humanitarian efforts.

The Earth Observations for Health (EO4HEALTH) Initiative aims to serve a global network of governments, organizations, and observers to improve health decision-making at the international, regional, country, and district levels.

The overall goal is to support the systematic collection, analysis, and application of relevant information about areas of impending risk that inform the development of strategic responses to anticipate risks and opportunities and their evolution and communicate options to critical actors for the purposes of decision-making and response.

7.3.2. Needs and GEOSS Platform role

The meeting with EO4HEALTH revealed the following aspects in which the GEOSS Platform team can provide support:

- The need to filter and refine the results with cross referencing parameter with location, in order to not have too many results during the search
- The idea to make some data open and to provide additional input – output data.
- The possibility to have a community portal (this information is written in the survey they completed).

7.4. Global Crop Pest and Disease Habitat Monitoring & Risk Forecasting

7.4.1. Overview and objectives

Pests and diseases are major threats to food security in the world, especially for wheat, rice, and soybeans, the world's dominant food crops. More than 10 percent yield loss is caused by pests and disease every year, while in some regions the loss may be higher than 30 percent.

GPP EC Grant Agreement no. 101039118

Crop pests and diseases habitat monitoring and risk forecasting at continental and global scale are important to assess the effect of global change on agriculture production. Earth observation is very important for global crop monitoring and pest & disease forecasting due to its capability of collecting large scale data quickly and efficiently.

In 2018 and 2019, Global Crop Pest and Disease Habitat Monitoring & Risk Forecasting integrated satellite images, meteorological data (temperature, humidity, wind, radiation, etc.), and plant protection datasets to monitor global wheat, rice, and soybeans growth, habitat of main pests and diseases, and then released the first global crop pest and disease monitoring and forecasting products and reports. This project focuses on the dominant food crops, such as wheat, rice, soybeans etc., aiming to map main pests and diseases for these crops.

7.4.2. Needs and GEOSS Platform role

The meeting with Global Crop Pest and Disease Habitat Monitoring & Risk Forecasting revealed that there is the idea to share data on the platform and tools to make their products accessible; they also mentioned the possibility to provide different level of generalization of the service.

From their side, they could provide an end to end software packages included the needed datasets, to be run on the platform, or integrate somehow the GEOSS Platform with their service, or provide API in order to integrate with GEOSS platform.

To achieve these goals, follow up contacts and discussions need to be checked through dedicated technical meeting to understand the integration approaches, the datasets and services that can be made discoverable and or accessible, communication protocols, APIs etc.

Lastly, in the survey, they mentioned that they would benefit from a community portal.

7.5. Forest Biomass Reference System

7.5.1. Overview and objectives

The aim of GEO-TREES is to support the establishment and development of a global activity of in situ biomass reference measurement sites, the Forest Biomass Reference System (FBRS), in order to complement existing and planned space-based forest biomass observation instruments.

The objective is to provide integrated, multi-observational, multi-scale reference data to support global space-based forest biomass mapping and to include high-quality georeferenced data on tree biodiversity. Climate change concerns impose an immediate and urgent demand for verifiable and consistent measures of forest biomass in order to reduce the major uncertainties in calculations of carbon stocks and fluxes associated with the terrestrial

biosphere. International agreements have made it imperative to obtain accurate estimates of biomass and its changes: under the Paris Agreement (Article 4, paragraph 2) each nation needs to prepare, communicate and maintain successive Nationally Determined Contributions (NDCs) that it intends to achieve.

7.5.2. Needs and GEOSS Platform role

The meeting with GEO-TREES revealed the following aspects:

- The idea to harvest GEO-TREES data, coming from different providers, on the GEOSS platform.

- The need to investigate a bit more into the GEOSS Platform functionalities and have a follow-up discussion.

7.6. GOS4M (Global Observation System for Mercury)

7.6.1. Overview and objectives

The Global Observation System for Mercury (GOS4M) is part of the GEO Work Programme (2016-2025) and Group on Earth Observation (GEO – www.earthobservations.org). GOS4M has a strong foundation on the outcomes of the former GEO Task on Health Surveillance [HE-02 "Tracking Pollutants"] established as a part of the GEO Work Plan (2009-2015). GOS4M is aimed to support all interested Parties in the implementation of the Minamata Convention. The overarching goal of GOS4M is to promote actions aiming to provide comparable global monitoring mercury data and validated modelling frameworks. In order to achieve this objective, GOS4M's key goal is to promote the establishment of a federation of existing regional and global monitoring networks that would allow to provide global comparable monitoring data for the purpose of the Minamata Convention on Mercury (MCM). The availability of comparable mercury monitoring data would foster the validation of numerical and statistical models used to assess the fate of mercury from local to global scales with changing emission regimes and climate, and source-receptor relationships. Another important goal of GOS4M is to support Nations and all interested Parties in developing their own national or/and regional monitoring programme by providing technical assistance and promoting capacity building initiatives for setting up new monitoring sites in areas where no mercury monitoring facilities and expertise are available.

7.6.2. Needs and GEOSS Platform role

The meeting with GOS4M revealed the following aspects:

- The need to understand how discovery and access of GEOSS services can be enhanced to support GOS4M activities.
- The idea that GOS4M team would think about further improvements for GEOSS platform.

7.7. GEOGLAM (Group of Earth Observation Global Agricultural Monitoring Initiative)

7.7.1. Overview and objectives

The purpose of Group on Earth Observations Global Agricultural Monitoring Initiative (GEOGLAM) is to increase market transparency and improve food security by producing and disseminating relevant, timely, and actionable information on agricultural conditions and outlooks of production at national, regional, and global scales. It achieves this by strengthening the international community's capacity to utilize coordinated, comprehensive, and sustained Earth observations.

The GEOGLAM policy mandate initially came from the Group of Twenty (G20) Agriculture Ministers during the French G20 Presidency in 2011. The mandate has expanded parallel to the G20 mandate to include food security concerns and we now work to support early warning for international agency response to emerging food emergencies. GEOGLAM has produced Stocktaking reports for the G20 in recent years. These reports are available for 2018, 2019 and 2020.

GEOGLAM is working on a response to the three big policy drivers of our time: UN Sustainable Development Goals; the Paris Accord on Climate Change; and the Sendai Framework on Disaster Risk Reduction. Through the development of quantified metrics GEOGLAM will be able to work with other science communities and statistical agencies to develop policy relevant information in support of sustainable food production.

7.7.2. Needs and GEOSS Platform role

The meeting with GEOGLAM revealed the following aspects:

- The need to start a dialog and provide requirements to the GEOSS team, in order to understand how the GEOSS portal can support their work.
- The idea to create a Community Portal.

7.8. GEO VENER (GEO Vision for Energy)

7.8.1. Overview and objectives

The GEO-VENER initiative was launched in September 2016, to ensure a more efficient link between the renewable energy community and the GEO Community and to stress the benefits of Earth Observation (EO) data for decision-making in the development of renewable energies (RE). GEO-VENER built on the community portal Webservice-energy.org, to serve the development of RE by providing an easy interoperable and GEOSS compliant access to documented, precise, trustable (or bankable) data, observation, information, knowledge and services related to RE.

Five key objectives were defined in the 2017-2019 implementation plan, including: 1) Define structures of governance, 2) Define essential renewable energies variables (EREV), 3) Conduct gap analysis, 4) Develop in-situ meta-networks for RE, and 5) further develop the webservice-energy.org platform. Some progresses have been achieved, but there is a need to revisit and to adapt them to the new vision of a results-oriented GEOSS and expanding opportunities and challenges in the energy sector (e.g., infrastructure resilience).

7.8.2. Needs and GEOSS Platform role

The meeting with GEO VENER revealed that some data transformation services are already available in the GEO Knowledge Hub and could be possibly connected to the GEOSS Platform.

The GEO VENER activity is not interested in a Community Portal, since they have their own HCI, which could be linked to the GEOSS Portal (in the Community Portal section). In particular the meeting revealed the following aspects:

- GEOSS Platform team should connect to the GEO VENER team for the e-shape knowledge package and pilots, in order to start a collaboration.
- GEOSS Platform team should discuss with GEO VENER on the creation of a Community Portal that will include the web service energy portal.

7.9. GEO BLUE PLANET ("Oceans and Society: Blue Planet" Initiative)

7.9.1. Overview and objectives

GEO Blue Planet is a network of ocean and coastal-observers, social scientists and end-user representatives from a variety of stakeholder groups, including international and regional organizations, NGOs, national institutes, universities and government agencies. GEO Blue Planet aims to ensure the sustained development and use of ocean and coastal observations for the benefit of society.

GEO Blue Planet's mission is to:

- advance and exploit synergies among the many observational programmes devoted to ocean and coastal waters;
- improve engagement with a variety of stakeholders for enhancing the timeliness, quality and range of services delivered; and
- raise awareness of the societal benefits of ocean observations at the public and policy levels

7.9.2. Needs and GEOSS Platform role

The meeting with GEO BLUE PLANET revealed the following aspects:

- The idea to create a community portal.
- The possibility to harvest some data sources on GEOSS, like optical water quality validation for inland and coastal waters, and to provide a wish list of currently unavailable datasets and critical datasets that are currently being used for optical water quality validation data.
- Work towards the registration of those existing data sources in the GEOSS portal.

- The idea to make some data OGC interoperable (WaterML) and connect with webservices with GEOSS.
- Organize another call once the list is received to follow up and coordinate future actions.

7.10. GEO Mountains

7.10.1. Overview and objectives

GEO Mountains – officially, the Group on Earth Observations (GEO) Global Network for Observations and Information in Mountain Environments – is a GEO Work Programme Initiative that seeks to identify, collate, and make accessible transboundary and inter- and transdisciplinary data and information pertaining to environmental, ecological, and societal systems and their changes in mountainous regions globally.

In so doing, it hopes to increase the ease with which the scientific research community, local, national, and regional decision makers, and other interested parties can access and use such data and information.

7.10.2. Needs and GEOSS Platform role

The meeting with GEO Mountains which took place in the first project phase, has had a follow up in the last phase of the project, to which the present version of this document refers.

GEO Mountains team has shown interest in improving the usage of the Community Portal already existing in the preoperational environment, according to the following requirements:

- Showing the latest global mountain ranges on the global map (shapefiles provided);
- Identifying global datasets already in GEOSS which i) intersect mountain extents (as per the shapefiles) and potentially ii) are deemed suitable by experts for mountain applications - only this subset of all datasets shall be shown;
- Potentially intersect and download only the mountainous regions (though since GEOSS is a metadata inventory, that may not be possible);
- Show the locations of in situ stations / networks in mountains, with links to access the data where applicable.

These requirements are under analysis at the time of writing this document.

8. Traceability Matrix

	Use Case	User Requirements
1.	UC-CSP-01 – Community Portal self-creation	UR-CSP-01 – Community Portal package access UR-CSP-02 – Community Portal General Configuration UR-CSP-03 – Views Selection UR-CSP- 04 - Views Setup
2.	UC-CSP-02 - Community-specific portal registration on GEOSS	UR-CSP-05 – Link to the Community Portal from GEOSS Portal UR-CSP-06 – Community Portal information UR-CSP-07 – Administration rights UR-CSP-08 – Add Community Portal in the Community Portal Section

	Use Case	User Requirements
3.	UC-YGP-01 - Registration to the GEOSS Yellow Pages	UR-YPG-01- Graphic Banner
		UR-YPG-02- Wizard Registration
		UR-YPG-03- Terms of Service Acceptance
		UR-YPG-04- User Notifications
		UR-YPG-05- Data Modification\Deletion
		UR-YPG-06 – Data Provider Account Request
		UR-YPG-07- Search and Visualization of Registered Data Providers
4.	UC-YGP-02 – Management of the GEOSS Yellow Pages Widget	UR-YPG-08- Widget download
		UR-YPG-09- Widget Installation
		UR-YPG-10 – Yellow Pages Authorization
		UR-YPG-11 – Yellow Pages Authorization Response
		UR-YPG-12 – Data Modification
		UR-YPG-13 – Data Provider Account Management
		UR-YPG-14 – Data Provider Registration Process Status

	Use Case	User Requirements
5.	UC-ECS-01 - Semantically enabled free-text search	UR-ECS-01 – Communication with the EIFFEL system
6.	UC-AIP-01 – AI-Powered Data Discovery and Access	UR-AIP-01 – Natural Language Query UR-AIP-02 – Relevant Dataset Suggestions UR-AIP-03 – Download instructions UR-AIP-04 – Related Dataset Recommendations UR-AIP-05 – User Interface for AI-Powered Search UR-AIP-06 – User data security and privacy
7.	UC-LPG-01 – Landing Page	UR-LPG-01 – Structured Layout UR-LPG-02 – Direct Navigation UR-LPG-03 – UR-LPG-04 – Analytics Integration UR-LPG-05 – Article Management UR-LPG-06 – Cookie Notice

	Use Case	User Requirements
8.	UC-LDG-01 - SDG15.3.1 Towards knowledge generation on Land Degradation	UR-LDG-01 – SDG indicator 15.3.1 computation service discovery UR-LDG-02 – SDG indicator 15.3.1 computation service execution UR-LDG-03 – Visual representation of SDG indicator 15.3.1 computations UR-LDG-04 – My Workspace Dashboard UR-LDG-05- Acceptance of the visualizations
9.	UC-ATC-01 – EMODnet Physics experiment access	UR-ATL-01 – Discovery and Access to the EMODnet Marine Physics Datasets
10.	UC-ATC-02 – Joint Copernicus Marine – EMODnet experiment: Use of Global Ocean Model, satellite-derived and in situ data by the Brazilian Sea Observatory	UR-ATL-02 – Discovery and Access to the Brazilian Observatory Service
11.	UC-MEB-01 – EMODnet Seabed Habitats - Ospar experiment access	UR-MEB-01 – Discovery and Access to the Ospar Data
12.	UC-MEB-02 – EMODnet Seabed Habitats experiment access: helping to identify previously unknown soft coral habitats	UR-MEB-06 – Discovery and Access to the Soft Corals Article

	Use Case	User Requirements
13.	UC-MEB-03– EMODnet Seabed Habitats experiment access: mapping ecosystem services provided by benthic habitats in the European North Atlantic Ocean	UR-MEB-07 – Discovery and Access to the Ecosystem Services Article
14.	UC-MEB-04 – EMODnet Seabed Habitats experiment access – Ospar intermediate assessment	UR-MEB-02 – Discovery and Access to the Ospar Intermediate Assessment
15.	UC-MEB-05 – EMODnet Biology experiment access	UR-MEB-03 – Discovery and Access to the EMODnet Biology
16.	UC-MEB-06 – EMODnet Biology experiment access: Preventing the introduction of non-indigenous species	UR-MEB-04 – Discovery and Access to the EMODnet Biology - non-indigenous species
17.	UC-MEB-07 – Joint Copernicus Marine - EMODnet experiment access: Tracking whales in the North Atlantic	UR-MEB-05 – Discovery and Access to the Joint Copernicus Marine – tracking whales' data
18.	UC-MAC-01 – EMODnet Chemistry experiment access: Supporting the analysis of EU baselines	UR-MAC-01 – Discovery and Access to the EMODnet Chemistry, EU baseline
19.	UC-MAC-02 – EMODnet Chemistry experiment access: Marine Litter - action on single use plastics and fishing gear	UR-MAC-02 – Discovery and Access to the EMODnet Chemistry, Marine Litter
20.	UC-MAB-01 – EMODnet bathymetry experiment access: Enhancing marine topographical data discovery and access in the North Atlantic	UR-MAB-01 – Discovery and Access to the EMODnet Bathymetry services

	Use Case	User Requirements
21.	UC-EIF-01 – Access to the Eiffel Pilot 3 Infrastructure & Transport Management Regional Scale and corresponding data	UR-EIF-01 – Discovery of Eiffel Pilot 3 data UR-EIF-02 – Access and visualization of Eiffel Pilot 3 data
22.	UC-EIF-02 - Access to the Eiffel Pilot 4 Sustainable Urban Development Local | Regional Scale and corresponding data	UR-EIF-03 – Discovery of Eiffel Pilot 4 data UR-EIF-04 – Access and visualization of Eiffel Pilot 4 data
23.	UC-AFG-01 – AfriGEOSS Community Portal	UR-AFG-01 - A dedicated portal for the AfriGEOSS community UR-AFG-02 - The AfriGEOSS search keywords UR-AFG-03 - The AfriGEOSS Region of Interest UR-AFG-04 – The AfriGEOSS search domain UR-AFG-05 - The AfriGEOSS filtering capabilities
24.	UC-AFG-02 – Discovery and visualization of resources from AfriGEOSS	UR-AFG-06 - Accessing data, information and knowledge from AfriGEOSS

	Use Case	User Requirements
25.	UC-CCP-01 – Climate Change Impact on Norovirus Pandemic Risk	UR-CCP-01 - Norovirus Risk Maps Model based on ecological niches UR-CCP-02 - Norovirus epidemiologic data UR-CCP-03 – Intergovernmental Panel on Climate Change (IPCC) scenarios data UR-CCP-04 – Species Distribution data UR-CCP-05 – GEOSS Platform and Vlab Enhancement
26.	UC-CCP-02 – The effect of Environment on Norovirus infectious events	N.A.
27.	UC-GSA-01 – SDG11.7: Accessibility to Urban Green Spaces	UR-GSA-01 – Urban Green Spaces Accessibility Model UR-GSA-02 – GSA Data
28.	UC-JRC-01 – Nutrient Pollution in European Inland and Coastal Waters	UR-JRC-01 – GREEN Model shared in VLab UR-JRC-02 – GREEN Model input data UR-JRC-03 – GREEN Model parameters UR-JRC-04 – GREEN Web Application

	Use Case	User Requirements
29.	UC-JRC-02 – Above Ground Biomass (AGB)	UR-JRC-05 – AGB ML Model shared in VLab
		UR-JRC-06 – Support of multiple AGB ML models in VLab
		UR-JRC-07 GEO DAB Sentinel Products Coverage query
		UR-JRC-08 – GEOSS Portal enhancements for input selection
		UR-JRC-09 GEOSS Portal enhancements for ML models
		UR-JRC-10 GEOSS Portal dashboard for Above Ground Biomass (AGB) maps

	Use Case	User Requirements
30.	UC-AGA-01 – Discovery, access, usage and uptake of Gross Primary Production data product	UR-AGA-01 – Gross Primary Production product discovery
		UR-AGA-02 – Gross Primary Production product visualization
		UR-AGA-03 – Gross Primary Production training materials discovery
		UR-AGA-04 – Gross Primary Production computation service execution
		UR-AGA-05 – Gross Primary Production product specification/definition
		UR-AGA-06 – Gross Primary Production product support/feedback

	Use Case	User Requirements
31.	UC-AGA-02 – Integration of Gross Primary Production as element of the eLTER Site Information Cluster	UR-AGA-07 – Gross Primary Production product /workflow integration into eLTER cyberinfrastructure UR-AGA-08 – Gross Primary Production product documentation UR-AGA-09 – Gross Primary Production training materials discovery UR-AGA-10 – Gross Primary Production product Metadata UR-AGA-11 – Gross Primary Production Product support/feedback UR-AGA-12 – Gross Primary Production product specification / definition

	Use Case	User Requirements
32.	UC-AGA-03 – Integration of Gross Primary Production data product into the GEOSS environment	UR-AGA-13 – Gross Primary Production Metadata specification and provision
		UR-AGA-14 – Gross Primary Production product API - data provision
		UR-AGA-15 – Gross Primary Production product documentation/knowledge package
		UR-AGA-16 – Gross Primary Production product quality check
		UR-AGA-17 – Gross Primary Production product communication channels
		UR-AGA-18 – Gross Primary Production product data policies
33.	UC-MPS-01 - Host WorldCereal repository	UR-MPS-01 – Host WorldCereal repository
		UR-MPS-02 – Register WorldCereal in-situ data and guidelines
34.	UC-MPS-02 - Register in-situ data providers	UR-MPS-03 – Registration of in-situ data providers

	Use Case	User Requirements
35.	UC-MPS-03 – Exploring and leveraging the WorldCereal harmonized in-situ reference data repository	UR-MPS-04 – Thematic area "in-situ data crop" UR-MPS-05 – Discovery, access and inspection of WorldCereal or AGROSTAC harmonized in-situ reference data
36.	UC-MPS-04 – Generate crop maps	UR-MPS-06 – Crop map UR-MPS-07 – Access and trigger WorldCereal processing module UR-MPS-08 – Visualization of crop map and saving in personal workspace
37.	UC-HAR-01 Accessing Climate Change Data on Urban Heat Fluxes in Milan	UR-HAR-01 – Discovery of Harmonia data on urban heat fluxes and heat emissions UR-HAR-02 – Access and analysis of Harmonia data on urban heat fluxes and heat emissions

Annex A. References

[1]   GPP: GEOSS Platform Plus – GPP

[2]   EIFFEL – GEOSS Applications for Climate Change EIFFEL - Home (eiffel4climate.eu)

[3]   Harmonia - Development of a Support System for Improved Resilience and Sustainable Urban areas to cope with Climate Change and Extreme Events Home - Harmonia (harmonia-project.eu)

[4]   European Marine Observation and Data Network (EMODnet) - Home | European Marine Observation and Data Network (EMODnet) (europa.eu)

Annex B. Figures and Tables

B.1 List of Figures

B.2 List of Tables

Annex C. Terminology

Acronyms and Abbreviations

AFG	AfriGEOSS
AGA	AGAME
AGB	Above Ground Biomass
AI	Artificial Intelligence
AIP	Artificial Intelligence-Powered
ATC	All Atlantic
CCP	Climate Change Impact on Pandemic Risk
CNR-IIA	Consiglio Nazionale delle Ricerche – Istituto per l'Inquinamento Atmosferico
CSP	Community-Specific Portal
EC	European Commission
ECS	Eiffel Cognitive Search
EIF	Eiffel
EO	Earth Observation
EOP	Earth Observation Programme
ESA	European Space Agency
ESRIN	European Space Research Institute
EU	European Union
GDPR	General Data Protection Regulation
GEO	Group on Earth Observation
GEO DAB	GEO Discovery and Access Broker
GEOSS	Global Earth Observation System of Systems
GIDDT	GEOSS Infrastructure Development Task Team

GPP	GEOSS Platform Plus
GSA	Green Spaces Accessibility
H2020	Horizon 2020
JRC	Joint Research Center
HAR	Harmonia
IPCC	Intergovernmental Panel on Climate Change
LDG	Land Degradation
LPG	Landing Page
MAB	Marine Bathymetry
MAC	Marine Chemistry
MEB	Marine Ecosystems and Biodiversity
ML	Machine Learning
MOM	Minutes of Meeting
MPS	MAPS4GPP
PIMB	Project Implementation Management Board
PoC	Proof of Concept
PQMP	Project Quality Management Plan
QA	Quality Assurance
SDG	Sustainable Development Goal
WBS	Work Breakdown Structure
WGISS	Working Group on Information Systems and Services
WP	Work Package
WPL	Work Package Leader
YPG	Yellow Pages

Annex D. MAPS4GPP Data Providers

This tables includes a list of possible MAPS4GPP data providers.

Name	Organization	Description	URL	Data access	Priority
AGROSTAC	WUR/VITO	AGROSTAC collects, harmonizes and opens key agronomy observations such as crop type, phenology, biomass, yield and leaf area	https://agrostac.org/en https://agrostac.org/sites/agrostac/files/downloads/AGROSTAC-API-crop.pdf	API	High
Annual Crop Inventory Ground Truth Data	Government of Canada	The Earth Observation Team of the Science and Technology Branch (STB) at Agriculture and Agri-Food Canada (AAFC) collected ground truth data via windshield surveys.	https://open.canada.ca/data/en/dataset/503a3113-e435-49f4-850c-d70056788632	ArcGIS REST Services	Medium
CGIAR-GARDIAN	CGIAR	GARDIAN, the Global Agricultural Research Data	gardian.bigdata.cgiar.org	Search portal, no machine-readable	Low

		Innovation & Acceleration Network, is the CGIAR flagship data harvester. GARDIAN enables the discovery of publications and datasets from the thirty-odd institutional publications and data repositories across all CGIAR Centers		access to data	
COPERNICUS-GEOGLAM	Joint Research Centre Data Catalogue	Data are produced by the Copernicus4GEOGLAM service of Copernicus Global Land in various countries. Data includes (among others): i) ground reference data collected during field survey (georeferenced points and	https://data.jrc.ec.europa.eu/collection/id-00356	Data set in JRC repository, no machine-readable access to data	Low

		polygons, photos) and ii) in-season and end-of-season crop type maps and crop masks; iii) crop area estimates.			
Digital Earth Africa – Cropland Extent Map	Digital Earth Africa	DEA produces crop type maps of Africa. Label data is based on interpretation of high-resolution imagery and other reference data. They also offer cropland extent maps	https://docs.digit alearthafrica.org/ en/latest/data_s pecs/Cropland_e xtent_specs.html #Data-Access

https://github.co m/digitalearthafri ca/crop-mask/tree/main/t esting

www.digitalearth africa.org | API for cropland extent maps, in situ data via GeoJSON files (training) and shape files (validation) in Github. Training data has several versions | Low |
| EEA - CORDA Copernicus Reference Data Access | EEA | The Copernicus In Situ Component maps the landscape of in situ data availability, identifies data access gaps or bottlenecks, supports the | https://corda.eea .europa.eu

jose.rubio@eea. europa.eu | User account required, search portal, no in situ data for crop mapping | Low |

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		provision of cross-cutting data and manages partnerships with data providers to improve access and use conditions.			
EuroCrops	Technical University of Munich	EuroCrops is a dataset for automatic vegetation classification from multi-spectral and multi-temporal satellite data, annotated with official LPIS (Land Parcel Identification System) reporting data from countries of the European Union, harmonized by the Technical University of Munich and GAF AG.	https://github.com/maja601/EuroCrops?tab=readme-ov-file#github_structure https://zenodo.org/records/10118572 www.eurocrops.tum.de	Data (shapefiles) can be downloaded via Zenodo	Low
FAO-WAPOR	FAO	Field data collected in the	https://www.fao.org/in-action/remote-	Data not publicly	Low

		frame of FAO Water Productivity Open-access portal (WaPOR).	sensing-for-water-productivity/en/	available	
GEOWIKI	IIASA	IIASA collects reference data via tools such as Geo-Wiki and LACO-Wiki as well as mobile apps such as PicturePile and CropObserve.	www.geo-wiki.org	Data available via Zenodo	Low
INTA-field data	INTA	In situ data (windshield surveys) collected by INTA (Instituto Nacional de Tecnología Agropecuaria). INTA also has HR crop type maps for different regions in Argentina.	INTA - Diego Al Abayera & Santiago Veron	Data not publicly available, ad-hoc via contacts	Low
JECAM	JECAM	The Joint Experiment for Crop Assessment and Monitoring (JECAM) is an	jecam.org	Ad-hoc via national contacts, some publish in public	Low

		initiative created by the GEO Agriculture Monitoring Community of Practice		repository	
NASA Harvest - CropHarvest	NASA Harvest	Consortium of multidisciplinary and multisectoral actors from around the world, led and implemented by the Harvest Hub at the University of Maryland. NASA Harvest recently published the CropHarvest dataset, a crop dataset of geo-referenced labels with satellite data inputs, each consisting of latitude, longitude, the associated crop type label, and a satellite pixel time series.	github.com/nasaharvest/cropharvest https://zenodo.org/records/5828893 nasaharvest.org	Published in Zenodo (GeoJSON)	Low

Radiant MLHub	Radiant Earth	Non-profit organization actively working to develop Earth observation machine learning libraries and models through an open source hub. Fosters a community of practice to develop standards around machine learning for Earth observation. Offers access to several, well annotated in-situ data sets via ML hub.	https://source.coop www.radiant.earth	Data available via standard HTTP methods	High
WFP	WFP	World Food Program (WFP) crop field surveys	www.wfp.org	Data not publicly available, ad-hoc via contacts	Low
WorldCereal	VITO	WorldCereal: a dynamic open-source system for global-scale, seasonal, and	https://worldcereal-rdm.geo-wiki.org/map/ https://esa-worldcereal.org/	API	High

		reproducible crop and irrigation mapping	en		