PROGRAMME OF THE EUROPEAN UNION

Copernicus Spatial Data Themes (GEOID)

Specific Contract 4 End-of-contract Report

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List of Abbreviations

Abbreviation	Name
AoI	Areas of Interest
BS	Border Surveillance (Service)
CEMS	Copernicus Emergency Management Service
CIS^2	Copernicus In Situ Component Information System
CLCplus	CORINE Land Cover plus
CLMS	Copernicus Land Monitoring Service
COINS	Copernicus Observations In-Situ
CORDA	Copernicus Reference Access Data

CSS	Copernicus Security Service
CUF	Copernicus User Forum
CZ	Coastal Zones
(DG) DEFIS	European Commission (Directorate-General) for Defence Industry and Space
DSM	Digital Surface Model
DTM	Digital Terrain Model
EAGLE	EIONET Action Group on Land monitoring in Europe
EC	European Commission
EDW	Eau de Web
EE	Entrusted Entity
EEA	European Environment Agency
EEA38 + UK	EEA member countries plus United Kingdom
EFTAS	Development Projects, Remote Sensing, Technology Transfer, Applied Ecology, Systems Consulting
EGMS	European Ground Motion Service
EMS	Emergency Management System
EO	Earth Observation
ETC	European Topic Centre
EWM	European Wetland Map
FWC	Framework Contract
GEOID	GEOspatial In-situ Data consortium
GHSL	Global Human Settlement Layer
HR Water	High Resolution Water
HRL SLF	High Resolution Layer Small Landscape Features
HRL VLCC	High Resolution Layer Vegetated Land Cover Characteristics
HVD	High Value Datasets
HVLSP	High Value Large Scale Prototype
IIASA	International Institute for Applied Systems Analysis

ITHACA	Information Technology for Humanitarian Assistance, Cooperation and Action
JRC	Joint Research Centre
LAEA	Lambert Azimuthal Equal Area
LC	Land Cover
LiDAR	Light detection and ranging
LULUCF	Land Use, Land-Use Change, and Forestry
MMU	Minimum Mapping Units
MMW	Minimum Mapping Widths
NMCAs	National Mapping and Cadastral Agencies
NVLCC	New Vegetated Land Cover Characteristics
SoP	State of Play
OME2	Open Maps for Europe 2
QA	Quality Assessment
SC02	Specific Contract 2
SC04	Specific Contract 4
SESA	Support to EU External and Security Actions
VPP	Vegetation Phenology and Productivity Parameters
WG	Working Group

Introduction

The GEOID Specific Contract 4 End-of-Contract Report presents a comprehensive overview of the activities carried out by the GEOID consortium—led by e-GEOS, GAF, EVENFLOW, ITHACA, ISPRA, and EUROGEOGRAPHICS—under the framework of the EEA's Copernicus In-Situ Component. Between August 2023 and October 2024, the consortium delivered a wide range of outputs, including the 2024 State of Play report, regular updates and maintenance of the CIS^2 database, and the preparation of Country Reports for the 29 Copernicus participating states. Contributions also included harmonising wetland and river datasets across borders, supporting the LUCAS 2022 review, and promoting data sharing within the Copernicus network, by engaging with data providers and stakeholders, hosting thematic workshops and meetings, and offering communication support. The report emphasises the need for cross-cutting contributions to Copernicus services in the areas of data access, harmonisation and standardisation, while identifying gaps, challenges, and opportunities for future improvement. Each activity is accompanied by recommendations aimed at enhancing the use of in-situ data, improving coordination across stakeholders, and advocating for open, standardised access to observational datasets.

A final review meeting of the GEOID partners under the specific contract was help on 24th and 25th of October 2024, in which representatives of all partners participated, with José Miguel Rubio Iglesias (EEA) in the chair. In the annex, the agenda and the list of participants can be found.

Determine State of Play

State of Play Reports

Leader: e-GEOS

Contributor: GAF, ITHACA, ISPRA, EVENFLOW

The State of Play reports describe the cross-programme status of the 'Copernicus In-Situ Data Component' concerning requirements, datasets, and providers by highlighting the main gaps and challenges and by providing recommendations for improvement.

It explores how far the provision of in-situ data meets the needs of the Copernicus Services and explains the value of the EEA's role as coordinator of Copernicus' access to in-situ data.

The intended audience of the SoP is DEFIS as Copernicus Governance Bodies, the Entrusted Entities (EE) and the Data Providers. The SoP shall support in-situ data related discussions across the EEs, between the EEA and DEFIS, between the EEs and DEFIS, and between the Copernicus Programme and data providers.

Several iterations were carried out with COINS to define the structure and ensure that the approach and level of detail of the text were consistent across consortia.

The following different types of SoP reports have been produced:

- **'SoP Summary'** → a single document that includes both specific and cross-cutting elements for all Service Components from observation to geospatial data. The main audience is the European Commission (EC) and the Copernicus Governance Bodies.
- **'SoP Data Provider landscape'** → an overview of the Copernicus In-Situ Data Provider landscape (European networks, Research infrastructures and programmes, International organisations and networks) that provides in-situ data to the Copernicus Services.
- **'SoP Briefs'** → a description of the current state of each Copernicus Service Component: Emergency Management Service, Land Monitoring Service and Security Service. SoP Briefs serve as background information for the EC, the Copernicus Governance Bodies, the Data Providers, and the general audience.

The main steps carried out in the SC04 are listed below with the summary table (fig. 1) relevant to the reports by the GEOID Team:

- ✓ Definition of the outline of the brief report (in close cooperation with COINS) → mid-October 2023;
- ✓ Delivery first draft version (CEMS On-demand Mapping, CLMS, CSS) → end-October 2023;
- ✓ Presentation at the WG Meeting → mid-November 2023;
- ✓ Delivery second draft version → mid-December 2023;
- ✓ Review by Entrusted Entities → February 2024;
- ✓ Presentation at the CUF → mid-March 2024;
- ✓ Delivery final version to the EEA → end-March 2024;
- ✓ Delivery final version of CEMS-Exposure Mapping brief → August 2024;
- ✓ Providing of the requested contents for the website (State of Play section) → September 2024.

SoP REPORTS	AUTHORS	STATUS
CLMS	COINS - GAF. Reviewed by COINS (Henrik)	Final draft version delivered to EEA at end of February 2024
CEMS ON DEMAND MAPPING	ITHACA Reviewed by GAF and Joint Research Center	Final version delivered to EEA at end of February 2024
CEMS EXPOSURE MAPPING	ITHACA Reviewed by Joint Research Center	Delivered to EEA on end-August 2024
CSS SESA	e-GEOS Reviewed by SatCen	Final version delivered to EEA on mid-March 2024
CSS BS	e-GEOS Reviewed by FRONTEX	Final version delivered to EEA on mid-March 2024
CSS MS	e-GEOS Reviewed by EMSA Reviewed by EVF	Final draft version delivered to EEA in early April 2024. (Still waiting for feedback from EMSA).

Figure 1: Status of the SoP reports per Component.

The information available in SoP reports is supplemented and further detailed in CIS^2, Country reports and Use cases.

It is composed of 4 elements:

- ✓ CIS^2 - Copernicus In-Situ Component Information System → online database (updated every six months);
- ✓ Country Reports → list of in-situ institutional data providers per country, from CIS^2 and CORDA, from the 29 Copernicus participating states;
- ✓ Use Cases → illustrating Copernicus' use of in-situ data on a national/subnational level from CEMS and CLMS (CSS if any).
- ✓ State of Play reports → Summary + Briefs.

<u>Conclusions and recommendations:</u>

- SoP reports briefly summarise the requirements and gaps of the in-situ data;
- Cooperation from the Copernicus Services has been vital for the proper drafting of the contents of the reports;
- It is crucial to improve and promote access to open in-situ data by making it freely available to Copernicus by data owners and providers (European and non-European);
- There is the need to continue improving the cooperation with European/National/Regional data providers (Institutions, Agencies and brokering data and information entities);
- It is recommended to encourage cooperation not only with institutional providers but also with European organisations, networks, and research infrastructures;
- Updating the SoP briefs per Copernicus Component every two years will ensure they reflect the latest progress.

Conclusions and feedback by the EEA:

- The SoP reports form the basis for future updates and activities. Continuing the regular production of these reports is a relevant task for the future;
- To harmonise briefing types and content, there is the need of a dedicated responsible with a comprehensive view over the two consortia and themes within Copernicus;
- Maintaining close collaboration with the EEs is of vital importance in which the EEA has strong advantages being involved in the various Services.

Published deliverables:

- The SoP Summary Report, covering the importance of in-situ data activities within Copernicus, its current needs, gaps and challenges.
- SoP Briefs on each Copernicus Service and the Space Component, providing insights on activities with respect to in-situ data requirements, datasets and providers, main activities, gaps and challenges and provides recommendations and solutions for the future.
- Elaboration on the Copernicus data provider landscape.

Copernicus In-Situ Component Information System (CIS^2)

Leader: e-GEOS

Contributor: GAF, ITHACA, ISPRA

Update and maintenance

The Copernicus In-Situ Component Information System (CIS^2) has gone through the third round of content updates and validation for the current specific contract (SC04).

Before starting the updating phase, several coordination meetings both internal to GEOID and with COINS (with support from Eau de Web (EDW), when necessary) where held to ensure consistency of all ingested information at Service and Component level and to monitor planned activities:

- Review of Data types and their content and introduction of the checkbox 'Copernicus Service Product'[1] in the Data sheet;
- Reclassification of CLMS Components and Products based on the new product portfolio and following implementations in CIS^2;
- Including the new 'Exposure Mapping' CEMS Component with relevant requirements, datasets, data providers, and meetings with the Joint Research Center (JRC) in CIS^2;
- Review of CLMS - EGMS Products (Basic, Calibrated, Ortho) with relevant requirements, datasets, and data providers and meetings with the EEA;
- Correction of issues (duplicates, names, websites) on data providers that arose during the production of the Country Reports;

[1] Datasets with significant in-situ contributions, produced by a Copernicus Service and used by other Copernicus Services for production or validation.

- Monitoring of the Copernicus Services portfolio and possible contacts with the EEs for any additional information needed to update CIS²;
- Validation of the new/updated entries;
- Overall quality assessment of all CIS² entries entered by the GEOID Team;
- Release the updated CIS² Handbook;
- List of changes made for each Service Component during the last CIS² update, to be considered for the new CIS² release.

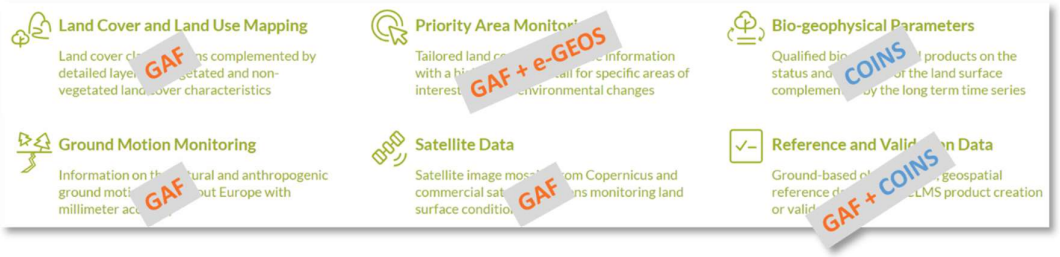

Figure 2: New CLMS Components and their responsibilities.

There is no immediate need to update 'CIS² Standard reports', as they are not planned for publishment on the Copernicus In-Situ website.

Regarding the CIS² update, the following part summarises the updates made to geospatial data in CIS² during three update cycles (December 2023, June 2024, October 2024).

CEMS

On demand Risk and Recovery:

4 new datasets.

Exposure Mapping:

1 new component (Exposure Mapping);

1 new product (Global Human Settlement Layer);

2 new requirements (Built-up surface and Population Grid);

15 new datasets.

CLMS

New Components (in charge of GEOID):

LCLU Mapping;

Priority Area Monitoring;

Reference and Validation Data;

Ground Motion Monitoring;

Satellite Data.

Changes cross all five new components:

48 new/updated products;

37 new/updated requirements;

96 new/updated datasets;

38 new/updated data providers.

CSS

Changes in the Border Surveillance component (information provided by FRONTEX (Katalin Bodis)):

Renaming of most old products

1 new product;

2 products deleted no longer active).

Component renaming:

Renamed SEA to SESA (Support to EU External and Security Actions).

No updates for:

CEMS-On Demand Rapid Mapping;

CSS-Maritime Surveillance.

Below is the summary table (fig. 3) of the numbers of objects per Service Component available in the CIS^2 system entered by the GEOID Team.

	CEMS			CLMS					CSS		
CIS^2 OBJECTS	On demand RM	On demand RRM	Exposure Mapping	LCLU Mapping	Priority area monitoring	Satellite data	Reference and Validation Data	Ground Motion Monitoring	Border Surveillance	Maritime Surveillance	Supp. to EU External and Security Actions
PRODUCTS	4	36	1	28	12	4	1	3	11	10	10
REQUIREMENTS	13	27	2	26	19	3	4	7	13	11	22
DATASETS	73	106	14	82	76	15	24	89	17	11	18
DATA PROVIDERS	37	51	1	33	32	12	16	35	10	10	15
TOTAL	127	220	18	169	139	34	45	134	51	42	65

Figure 3: Situation as of 15 October 2024.

The collaboration of the EEs was essential to ensure the correctness and completeness of the information to be entered in the CIS^2 system.

In the specific case, support came from:

CEMS – Exposure Mapping → Support of JRC (Michele Melchiorri);

CLMS – EGMS → Support of EEA (Lorenzo Solari);

CSS – BS → Support of FRONTEX (Katalin Bodis);

CSS – SESA → Support of SatCen (Alexandre Arnal).

Overall Quality Assessment

In addition to the regular update of the CIS^2 system, a comprehensive 'Overall Quality Assessment' was conducted by GEOID, reviewing all entries related to products, requirements, data, and data providers.

The main actions taken are outlined below:

- Definition of a common validation process by the two consortia supporting the EEA, aimed at ensuring consistency in the In-Situ Component data entered by the two consortia;
- Harmonisation of CIS^2 entries, in particular for data and requirements, to ensure they refer exclusively to in-situ information;
- Identification of structural criticalities in CIS^2, from an architectural perspective, to enhance support for validation, analysis and quality assessment.

Regarding the validation process, three rounds of validation were performed following the relevant CIS² updates, focusing on the standardisation of information between GEOID and COINS consortia:

- December 2023
- mid-June 2024
- mid-October 2024

Key points and recommendations following the validation and QA process:

- To avoid inconstancies during the 'Overall Quality Assessment', it is essential that both consortia apply the same criteria validation methods, as agreed at the beginning of SC04;
- It would be beneficial to develop a tool that spots double entries and counts data/requirements/providers per service product;
- Ensure that each data provider includes at least one contact detail to meet CIS^2 requirements, while opting for generic email addresses (like info@) to avoid using personal in compliance with GDPR (EU Regulation 2026/679);
- Regularly verify the operation of data providers' weblinks, ensuring they lead to main pages since sub-links could change;
- Minimise the use of 'N/A';
- Avoid using acronyms as much as possible, particularly for data names, to ensure clear and explicit naming (data providers should keep their acronyms alongside their written out names).

Conclusions and feedback by the EEA:

- The main identified issue is the need for a tool to remove and avoid duplicate data by different providers and users in the database;
- There is the urgent need for an established validation process and the creation of a comprehensive document detailing the standardised approach for entering and validating information;
- Identifying these issues is a valuable step forward;
- The CIS^2 database is a key milestone for the future.

Published deliverables:

- Updates in the CIS^2 database.

Country Reports

Leader: e-GEOS

Contributor: GAF, ITHACA, ISPRA

The Country Reports for the **29 Copernicus participating States**, including Norway and Iceland, are produced to inform national data providers about the importance of their data for the Copernicus products of Emergency and Land Services.

The final goal is to foster fruitful discussions with the National Mapping and Cadastral Agencies (NMCAs) to ensure optimal access to authoritative national datasets released by the Member States.

As requested by the EEA, the focus is on **Institutional data Providers** from the **CORDA** portal and **CIS²**.

The main steps of the Country Reports carried out in the SC04 are listed below:

- ✓ Definition of structure and content of the reports → mid-October 2023
- ✓ Delivery of the first version spreadsheet (29 Copernicus participating countries) → mid-November 2023
- ✓ Delivery of the final version spreadsheet → end January 2024
- ✓ Check and correction of issues (names, links) in CIS² and CORDA → March 2024
- ✓ Delivery of the final reviewed version spreadsheet → early-April 2024
- ✓ Contributing activities for the website (data providers' section) → May to October 2024

Figure 4 presents an extract from the final table, showing the sheet for Denmark. The full table includes the 29 sheets, one per each Copernicus participating country. The table structure was established in agreement with the EEA at the beginning of the task.

Data provider (English)	Data provider (native language)	Website	CIS2	CORDA
National Civil Protection Agencies	Beredskabsstyrelsen	https://www.brs.dk/en/	X	
National Environmental Protection Agencies	Miljøstyrelsens	https://epanet.eea.europa.eu/ https://mst.dk/erhverv	X	
National Geological Surveys	De Nationale Geologiske Undersøg	https://eurogeosurveys.org/ https://www.geus.dk/	X	
National Mapping and Cadastral Agencies	e.g. Geodatastyrelsen	https://eurogeographics.org/ https://gst.dk/	X	
National Statistical Agencies		https://www.dst.dk/en/Statistik.aspx	X	
Road directorate (VD)	Vejdirektoratet	http://geocloud.vd.dk/help/Naboretsdata/index.html?naboretsdata_-_introduktion.htm		X
Danish Agricultural Agency	Landbrugsstyrelsen	https://www.geodata-info.dk/srv/eng/catalog.search#/home https://miljoegis.mim.dk/spatialmap?profile=lbst		X

Figure 4: Extract of the final Country Report table of Denmark

This task was carried out in close collaboration with EuroGeographics and the CORDA team to improve the identification of the data providers in the Copernicus Services.

EuroGeographics provided a list of NMCAs that have signed the FWC agreement to provide data to the Copernicus Services (CEMS, CLMS, CSS). Subsequently, e-GEOS cross-checked the 27 organisations provided by EuroGeographics with the data providers in CORDA to confirm who is providing the data. The CORDA team then verified the data providers listed in the EuroGeographics list but not found in the CORDA portal. In addition, GEOID made the necessary changes in CIS² and provided the CORDA team with a list containing the weblinks and data provider names per country that needed modification. Finally, a complete list of data providers contributing to Copernicus, was added to the In-Situ Website.

Conclusions and recommendations:

- The data providers listed on the website are categorised in stakeholders that are located in one of the 29 Copernicus participating countries, that are part of a network, and a compilation of all data providers in Copernicus;
- It would be beneficial to develop a tool or function that generates a country-specific, territory-based report displaying only entities from the selected country;
- Implementing a clickable country flag feature could allow users to easily access the relevant country report;
- When selecting a 'Network', it would be useful to provide a link to Copernicus Services, indicating which services depend on the selected network or providing similar information.

Conclusions and feedback by the EEA:

- The EEA requires a clear distinction between CIS² (used in Copernicus Product Services) and CORDA (potentially used in Copernicus Services). A solution could be two separate windows, one displaying CIS² content and the other showing CORDA information;
- Depending on the tool's capabilities, it may be possible to incorporate some of the suggestions in a future release, including filtering options;
- The suggestion to include a link to the relevant Copernicus Service on the database is seen as highly valuable.
- The EEA is currently still in discussion about possible improvements to content and information already displayed on the In-Situ Website.

Published deliverables:

- Copernicus Data Provider page within the Copernicus In-Situ website, featuring different European and international data providers and networks contributing to Copernicus.

Provide access to data

The current contract foresees the execution of 5 tasks aiming at improving the operational provision of selected in-situ data in accordance with the EE's needs.

Preparatory work for a crowdsourcing campaign in land and emergency mapping

Leader: GAF

Contributor: e-GEOS

One of the consortium's tasks is to prepare a roadmap for a potential crowdsourcing campaign in land and emergency mapping. Building on the assessment results gathered in SC02, and in coordination with the EEA, the consortium selected the HRL VLCC GRAM (grassland mowing product) as the target product for a potential campaign in 2025/2026.

The aim of this campaign is to assess the feasibility of crowdsourcing, engage with relevant stakeholders and to contribute to reducing existing data gaps of ground truth data for mowing events. A roadmap has the potential to serve as tool to collect and analyse the prerequisites for implementing crowdsourcing activities and integrating campaign results into an operational context, such as training or validation purposes.

As a basis for the development of the roadmap, the HRL VLCC GRAM service provider was contacted and interviewed by the consortium in order to collect and analyse its requirements for data collection and integration into GRAM production. In addition, the EEA contracted IIASA as consulting partner to benefit from their experience in crowdsourcing app development and campaign implementation.

The version of the roadmap presented at the 2nd Team Meeting (17/06/2024) divides the campaign into five main phases (fig.5):

- The Set-Up Phase focuses on preparatory tasks, including contracting, defining the scope, budgeting, and defining the legal framework. This task falls entirely within the EEA's responsibility.
- The subsequent phases – the Engagement and Consultation Phase, Design and Testing Phase, Campaign Phase, and Post-Campaign Phase – are in the responsibility of the contractor(s). These phases contain the actual implementation of the campaign, including the analysis and evaluation of results and an assessment of a second campaign phase if appropriate.

The roadmap clearly assigns tasks and decision-making responsibilities across each phase, outlining potential networks and partners that may have interest in participating in a crowdsourcing campaign or using its results.

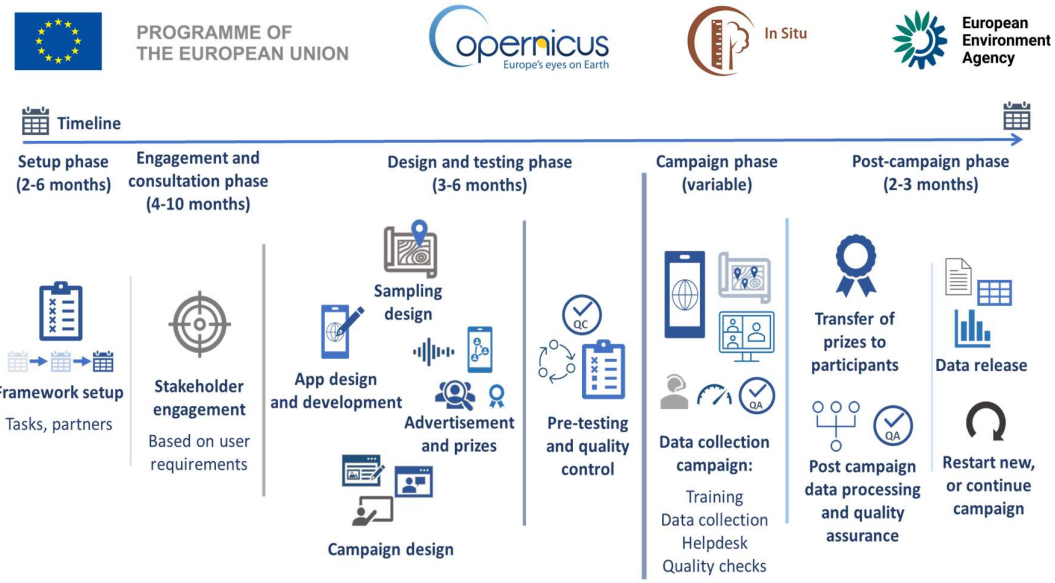

Figure 5: different phases of a potential crowdsourcing campaign.

To incorporate resource estimates for various scenarios into the roadmap, IIASA contributed with their experience in planning and implementing crowdsourcing campaigns and developing crowdsourcing mobile apps. This made it possible to identify combinable components in the campaign planning and potential app developments. Two main variants of mobile applications were presented:

- A single-use case application which is specifically tailored to a single use case, such as the HRL VLCC GRAM product. After the first campaign, it can only be reused for this exact use case, not for other thematic use cases or multiple campaigns at the same time.
- A multitask, scalable mobile application, which is designed from the outset to be used for multiple thematic use cases and that simultaneous can handle various campaigns. This variant is internally referred to as Copernicus/EEA app.

The range of functions and scalability significantly influence the resources needed for the app development. The Copernicus/EEA app is resource-intensive but more suitable for long-term, versatile use.

In addition to effort estimates, the roadmap also addresses various operational, technical, organisational, and administrative risks that need to be considered when implementing a crowdsourcing campaign. Operational risks include, among other things, a lack of participation, low campaign awareness, insufficient data quality, as well as clustering effects in data distribution. Technical risks include functional errors in the mobile application or data storage solutions, and organisational and administrative risks include uncertainties in budget or time planning.

A final conclusion and transferability section summarises the roadmap's recommendations. To ensure cost-efficiency and an informed and trained user community in the subsequent seasons, it recommended to plan and implement a test campaign over at least two seasons.

In addition, a combined approach for sample collection, combining a guided (directed) and an opportunistic approach, is recommended to maximise participation and observations.

This task and topic, though complex, has the potential to be highly beneficial to collect in-situ data for CLMS. As the EEA plans to issue a specific call for tenders for a crowdsourcing pilot campaign, an early decision is crucial to ensure that any crowdsourcing data collected is available in time for the production of the HRL VLCC GRAM product.

Conclusions and feedback by the EEA:

- The report provides a valuable analysis of different scenarios and opportunities, despite the challenging nature of the topic;
- A call for tenders is expected to launch in early 2025.

Published deliverable:

- Roadmap for a crowdsourcing campaign for in-situ data collection to support Copernicus Land Monitoring Service (CLMS) activities

Wetland data for CLCplus

Leader: GAF

Contributors: ITHACA

The SC02 assessment of European and global wetland datasets showed the need for high-quality wetland datasets (e.g. in regards to LULUCF). Following specific requirements from CLMS and other entities, the availability, characteristics, and usefulness of national and regional wetland datasets for Europe must now be investigated. This includes the assessment of gaps and potential applications for CLCplus Instances in particular.

The EEA coordinated an exercise to identify synergies and gaps in collaboration with the ETC. The latest results from the ETC task were provided, however only a limited number of countries (AT, CZ, LU, DE, FR, IT, ES, PT, GR) have been analysed so far. This exercise was followed by an exchange and review with the CLCplus LULUCF Instance consortium to better understand their needs for national and regional wetland data. The analysis showed that there is currently no demand from the CLCplus Instances for further assessment and research of national wetland datasets. As a result, this task was first deprioritised and then adapted (see next paragraph).

As the ALFAwetlands[2] project and the Wetlands International team work on a European wetland map (EWM v1) and wetland databases (see Figure 6), collaboration with these teams was initiated to assess potential synergies. Two meetings have taken place (23/01/2024, 27/05/2024), during which the preliminary dataset was reviewed. The review showed that the current version of the European wetland map is only partially suitable for CLCplus Instances. The main reasons were that the dataset contains only limited attribute information and that more detailed information, e.g. on the management status of wetlands, is needed. In addition, input data from different reference years are combined and no annual updates are planned for the dataset. Lastly, there are translation difficulties to EAGLE barcodes, which is essential for its use within the CLCplus Core system for the creation of a CLCplus Instance.

[2] https://alfawetlands.eu/

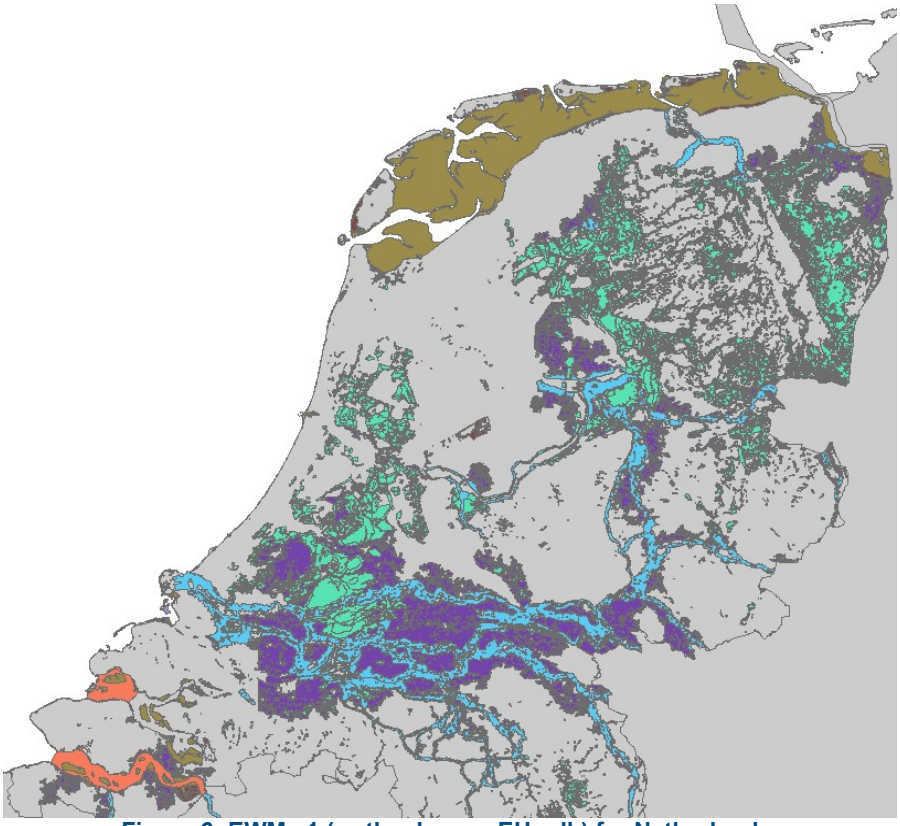

Figure 6: EWM v1 (wetland_map_EU.gdb) for Netherlands.

The planned update of the EU wetland dataset (v2) is expected in Autumn 2024, but unfortunately falls outside the timeframe of this SC4. The updated version will carry further attribute information on e.g. peatland types, EUNIS habit types, and harmonised regional classes and should be investigated for its potential to increase the usability for CLCplus Instances. The usability of the current dataset is limited to general cross checking and potential validation analyses of wetland classes, particularly outside of the core system.

For the WET Horizon end user workshop (24/09/2024), specific CLMS requirements for wetland datasets were identified:

- Spatial coverage: EEA38 + UK;
- Temporal coverage: annual updates preferred with a minimum update frequency of 3 years;
- Reference years: 2018, 2021, 2022 onwards;
- Format: vector or raster;
- Resolution: 0.5ha MMU (vector), 10m (raster);
- Licensing: free and open, or for Copernicus projects use;
- EAGLE compliance
- Projection in LAEA
- Accuracy: about 80% overall accuracy
- Nomenclature: differentiation between water and wetland types, including inland wetlands incl. inland marshes, peatbogs (exploited, unexploited), coastal wetlands incl.

salt marshes, saline, intertidal flats, water courses, lakes, and reservoirs, transitional waters, sea & ocean, differentiation of inland water and sea water;
- Usability: applicable for visual interpretation and semi-automatic processing.

In conclusion, wetland data remains a significant data gap for CLMS and the limited availability of additional data sets is one of the main problems. It is recommended that this task be continued to keep track of upcoming European wetland datasets. Once EWM v2 is available, all relevant CLMS projects should be made aware to analyse if it could be of use.

Conclusion and feedback by the EEA:

- The task was handled with appreciated flexibility;
- Given the critical role of wetland data, the continuation is highly recommended.

Pan-European dataset of waterbodies centrelines

Leader: e-GEOS
Contributor: GAF, ITHACA

At the end of the first phase of this task, it was found that only **31** out of **38** EEA countries could download and collect river network data from the national agencies or other external sources.

Key findings from the first phase:

- Countries without an available river dataset

  Several countries do not have publicly available river datasets on any platform. This issue was found for **Sweden**, **Poland**, and a large part of Eastern Europe (**Albania**, **Bosnia**, **Serbia, Montenegro, North Macedonia**. No river dataset could be downloaded for these countries on any platform.

- Countries where national datasets are less detailed than the EU-Hydro dataset

  For some countries, the available national river dataset appears to be coarser and less detailed. This is the case in **Latvia**, **Greece**, **Turkey**, **Kosovo**, and **Hungary**, Eu-Hydro River dataset shows more density than the national dataset.

The goal of the second phase was to evaluate the feasibility of harmonising all collected national waterbodies' centreline datasets into a consistent pan-European dataset.

The river networks harmonisation process involves combining data originating from heterogeneous data sources, which vary in file formats, feature types (lines, polygons), scale, attribute table structure, and projections.

As part of this phase, pilot countries were selected to test the harmonisation, focusing mostly on country boundaries where national river datasets usually stop or conflict, and where the major integration problems are expected.

Main inconsistencies identified:

- Inconsistent level of scale and detail between different countries
- Inconsistent data quality standards, including
  - missing values in the national datasets' attribute table.;
  - river datasets only available as polygon features;
  - geometry inconsistencies and errors.
- Geometric inconsistencies along country boundaries, such as:
  - disconnected river networks between country borders;
  - overlapping datasets along country borders.

To accelerate the harmonisation process and improve the Pan-European river dataset, the involvement of the CORDA team is seen as highly valuable. This would help verify and enhance existing multi-country datasets to meet the requirements and to expand the pool of datasets, particularly for Balkan countries.

In addition, collaboration between EuroGeographics and the EU-Hydro consortium should be continued, beyond this In-Situ contract. EuroGeographics has offered to share their data model with the EU-Hydro consortium to explore synergies.

Harmonisation of coastlines within CLMS and CEMS

Leader: GAF

Contributors: ITHACA

The goal of this feasibility study was to understand to what extent coastlines used in CLMS and CEMS products can be harmonised and to assess the most suitable coastline dataset for CLMS and CEMS mapping products. This includes the collection of user requirements, the assessment of the current use of coastline datasets in the CLMS and CEMS mapping portfolio, and the mapping of potential harmonisation possibilities for the future. Since several products depend on the EU-Hydro coastline, it is necessary to evaluate if a harmonised coastline could be applicable for the production of a future EU-Hydro update.

The task began with a summary report for the EEA, which could be used as input for the preparation of the EU-Hydro tender. This was followed by the selection and analysis of five test sites (fig. 7), an evaluation process, and the distribution of a questionnaire aimed at collecting feedback from service providers and product owners of CLMS and CEMS products regarding observed issues with existing coastline datasets. The goal was to identify problems in coastline data in production and to obtain recommendations for the future update of the coastline datasets.

Feedback from CLMS products was received for the following products:

- CLCplus Backbone (CLCplus BB);
- HRL Non-Vegetated product (NVLCC);
- Coastal Zones (CZ) products;
- CLMS water products (in general).

Feedback from CEMS products was received for the following product:

- Global Human Settlement Layer (GHSL).

For the On-Demand Mapping component no official feedback was received.

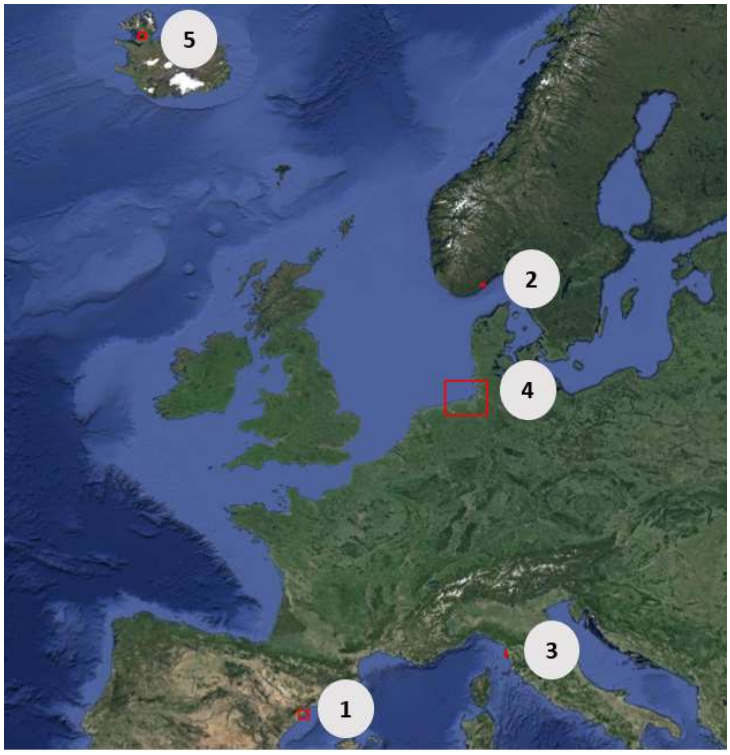

Figure 7: Test sites (1: Spain, Ebro Delta, 2: Norway, Arendal, 3: Italy, Livorno, 4: Germany Frisian Islands, 5: Iceland NW coast).

Conclusions and recommendations were derived from both the questionnaire and the analysis of the test areas. These are summarised in the corresponding cover note (Cover_Note_Coastline_harmonization_v1.0.pdf) and provided alongside the factsheets on the test areas and the individual questionnaire responses for each product that were provided as part of the delivery.

Each of the factsheets per test site (fig. 7) contains, besides an overview of the examined coastline datasets available, a short descriptions of individual findings/issues per dataset, a summary of main findings and observed issues within the respective test area (example see fig. 8), as well as conclusions concerning the usability of the analysed coastline datasets for CLMS productions and the updating of the EU-Hydro coastline.

As a result, it can be stated that a harmonisation of the coastline dataset is less critical for CEMS products as it is for CLMS products, as most CEMS products rely on current EO data. Therefore, in many cases, the OpenStreetMap (OSM) coastline dataset as one of the most frequently updated datasets is used in CEMS production to align with reference satellite data.

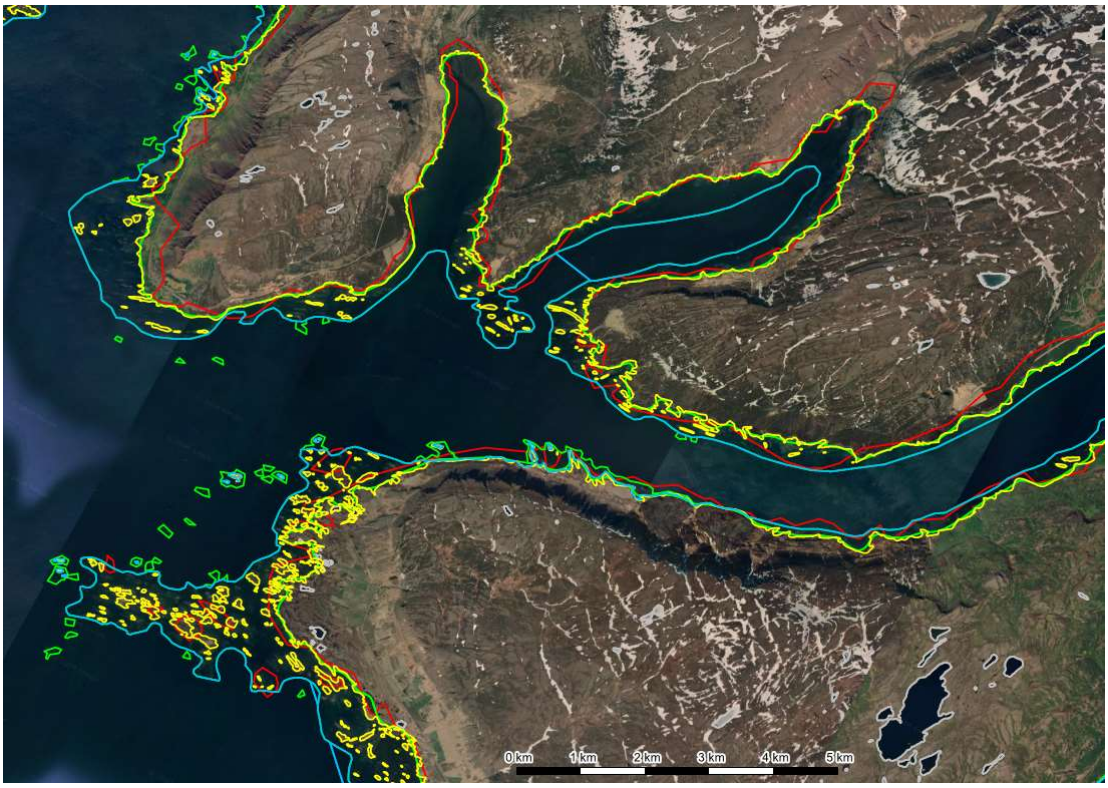

Figure 8: North – Western part of the test area 5 with large deviation of the assessed coastlines for fjord areas (incl. © OpenStreetMap data licenced under the ODbL and CC BY-SA 2.0)

The analysis showed significant deviations among the analysed coastline datasets, with variations in the different areas. As a result, there is no coastline that can be recommended without reservation for its use in CLMS productions or for updating of the EU-Hydro coastline.

As a starting point, it is recommended to further analyse and assess the EU-Hydro (v1.1) coastline, which was used and adapted in the CZ 2018 production. However, further analysis of the proposed coastline has not been conducted within the scope of this task. It is therefore recommended to conduct a more detailed analysis as part of the update of EU-Hydro. Additional recommendations from the CLMS perspective include ensuring consistency and plausibility checks, standardisations, defining the minimum geographical scope covering the areas of production (AoIs) of CLMS products, establishing Minimum Mapping Units and Minimum Mapping Widths (MMU/MMW), and incorporating additional attributive distinctions where needed.

Since the EU-Hydro Update project had already started at the time of this study's completion, the conclusions and recommendations were shared with the EU-Hydro consortium for further evaluation, and the analysis will be continued within the EU-Hydro project.

<u>Conclusions and feedback by the EEA:</u>

- The study provided valuable recommendations, and the outcomes and deviations between coastlines were expected;
- The final cover note lacked a detailed analysis of the recommended CZ 2018 coastline for each test site to be used as basis for EU-Hydro;

- Outcomes were shared with CLMS colleagues and experts within EEA.

Inter-service data sharing

Leader: ITHACA
Contributors: e-GEOS, GAF

The objectives of this task are to evaluate efficiency gains and challenges in sharing reference data across Copernicus Services (CEMS, CLMS, CSS) and to provide background and supporting material for discussions with relevant Entities concerning the potential in-situ data sharing within the Copernicus programme.

In January 2024 a first version of the inventory table was finalised, followed by the development of a methodology for its analysis and presentation. This was elaborated and presented to the EEA. The inventory table consisted of a list of datasets used within the different Copernicus Services (CEMS, CLMS, CSS).

As agreed in PM06, a first set of statistics regarding the prepared inventory table was prepared and presented during the meeting.

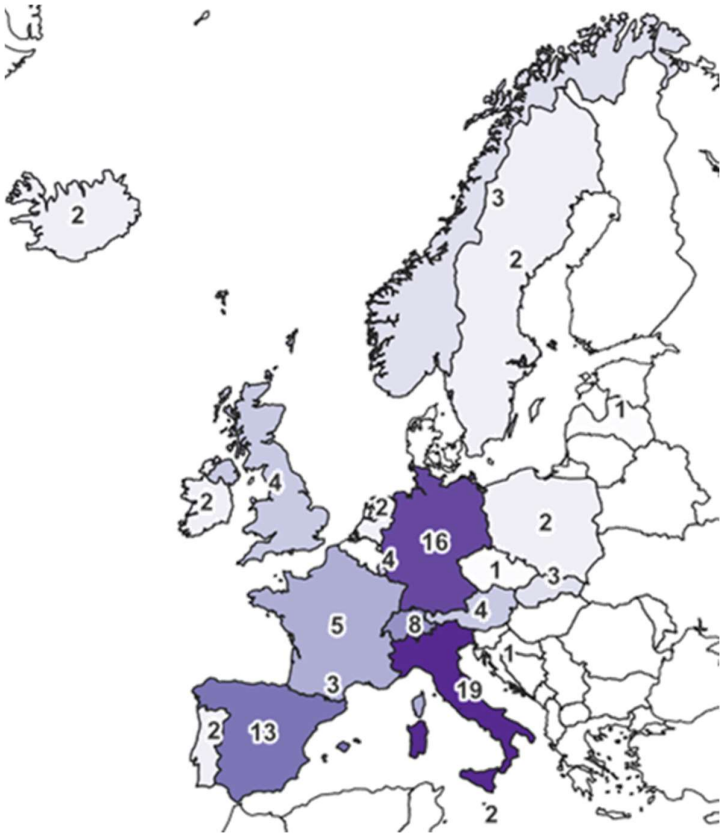

Figure 9: Example of statistic extracted - Number of in-situ DEM dataset for each country in the inventory table

During the summer, the list of datasets for CLMS was expanded to include additional datasets such as CLCplus, HRL VLCC, HR Water, Snow and Ice (lots 1 & 2), NVLCC 2021, VPP, Urban Atlas, HRL SLF, EGMS. Moreover, a new field describing each dataset was added in the records of the

inventory table and all different data entries were harmonised and refined within all Copernicus Services involved in the project. Additionally, a cover note was prepared to complement the inventory table with a more extensive description of the work.

Finally, the last activity focused on the identification datasets that the three Copernicus Services have in common and that could potentially be used within CLMS or across the Services.

Dataset	CLMS	CEMS	CSS
Copernicus Corine Land Cover (CLC)	x	x	
Database of Global Administrative Areas (GADM)		x	x
Global Administrative Unit Layers (GAUL)		x	x
High Resolution Settlement Layer (HRSL)		x	x
Open Street Map (OSM)	x	x	x
Shuttle Radar Topography Mission Digital Elevation Model (SRTM DEM)		x	x
Wikimapia		x	x
ESA Worldcover	x	x	
Copernicus DEM	x	x	
Global Human Settlement Layer (GHSL)	x	x	
High Resolution Layer - Imperviousness	x	x	
LiDAR Data Spain	x	x	
World Settlments Footprint (WSF)	x	x	
LiDAR Data Poland	x	x	

Figure 10: Table showing the common datasets within each Copernicus Service (CEMS, CLMS and CSS).

The work carried out for this subtask led to the following conclusions:

- The inventory table serves as a good starting point, providing valuable insights into datasets that may be useful to other Services;
- For CEMS, most datasets have global or European coverage. There is a general interest in incorporating more national and regional datasets (e.g., elevation and land use/land cover datasets). However, these datasets need to be adapted to the current data model;
- For CLMS, most datasets listed are linked to former or ongoing productions, making data sharing difficult. One suggestion is to assess, at the beginning of upcoming projects, whether there are datasets that can be shared. Before sharing, the different land use/land cover classes have to be translated and harmonised, but once this process is completed, it would be beneficial for avoiding duplicated efforts;
- For CSS, due to the specific nature of the data and the access restrictions, datasets used within the service are not intended for public use but only for authorised users.

Recommendations for the future:

- Continuously monitor the datasets used in the different Services, keeping the list updated;
- Establish standardised procedures like platforms for datasets exchange;
- Prioritise the exchange of datasets that have licence limitations rather than those that are freely available and already accessible to all Services;
- Actively engage Service Providers in the process.

Next Steps:

- Expand the project to other Copernicus Services and add their datasets to the inventory table;
- Address questions related to validation:

- Identifying areas where validation may be problematic due to lack of in-situ data;
- Focusing on the main temporal and thematic gaps in available datasets;

- Conduct a feasibility study on sharing LiDAR-derived products (e.g. DTM and DSM) among services.

During the meeting, it was suggested to evaluate the compatibility of the inventory table with the datasets listed on CIS[2]. In addition, the growing importance of LiDAR and LiDAR-derived products was stressed, as they receiving increasing attention and can represent an important field of investigation in the future.

Engagement with Data Providers

Subtask 1 - Use cases

Leader: ITHACA

Contributors: GAF, e-GEOS

The aim of this activity is to highlight the value of Member States' geospatial data for Copernicus Services. This objective is achieved through a report showcasing examples of Copernicus Products from CEMS and CLMS that incorporate national and regional authoritative data from National Mapping and Cadastre Agencies (NMCAs).

The first set of 10 use cases was delivered by November 1st, 2023, consisting of five CEMS and five CLMS use cases. The second deliverable, initially scheduled for March 1st, 2024, originally included five CEMS and four CLMS. Two additional CLMS use cases were later added after receiving feedback, bringing the total to 11 use cases. This deliverable also explored the possibility of including a use case from CSS in consultation with the EEs (Frontex and Satcen). Although Frontex was unable to contribute to this edition of the report, they expressed interest in participating in future reports. The final version of the deliverable was published in April 2024 following feedback and validation.

The task and several use cases were presented at two important events in the NMCA and Copernicus user community: the INSPIRE Conference in November 2023 in Brussels, where an oral presentation was given, and the CLMS General Assembly in Antwerp in June 2024, where a poster presentation was performed.

As for the activities related to the new Use Case database as part of the revamped Copernicus In-Situ website, the working group participated in an online demo session organised by the EaudeWeb team in February, providing feedback from the GEOID perspective. Subsequently, a glossary describing the fields of the use case template for both CEMS and CLMS was shared with the EaudeWeb team in April 2024.

The task has also been supporting the EuroGeographics 's use case tailoring. The initial proposal from EuroGeographics was to produce four use cases, two for CEMS and two for CLMS. However,

their final decision was to focus on three CEMS use cases (#1 Slovenia[3], #3 Portugal[4], and #7 Latvia[5]) and one CLMS use case (#21 Poland[6]). This is still an ongoing task.

The time plan along the SC4 and the main steps undertaken are illustrated in the figure below (fig. 11):

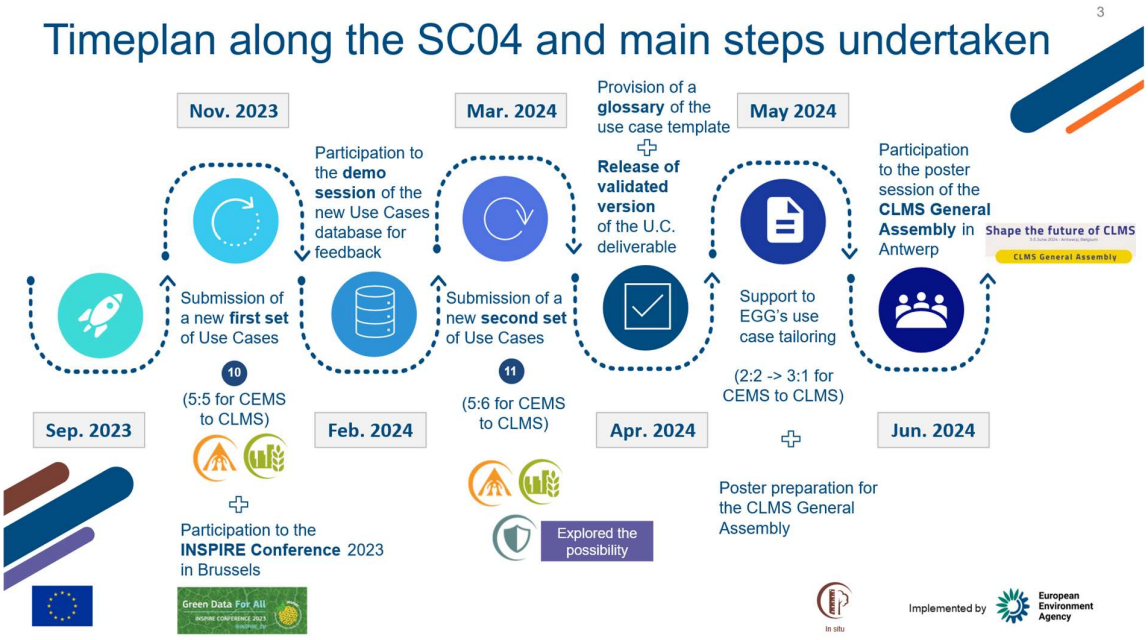

Figure 11: Time plan along the SC04 and main steps undertaken in the Use Cases task

Recommendations for next steps:

The task will focus on revising the Use Cases database once the revamped website is launched, which is expected in September 2024 after the summer break. According to Jose Miguel Rubio Iglesias, this task is expected to continue under the next contract.

Regarding the content, two additional points were discussed as potential future developments: considering the extension of use cases beyond European to include global examples, and reassessing the feasibility of involving CSS again, provided there is interest and no confidentiality concerns.

Published deliverable:

- Use Cases available in the Copernicus In-Situ website.

[3] *Post disaster soil erosion and landslide risk assessment*
[4] *Monitoring areas damaged by forest fires*
[5] *Windstorm forest damage assessment*
[6] *LIDAR – UA Building Block Height*

Subtask 2 - EuroGeographics signs Copernicus Framework License and reviews Copernicus Emergency Management Service annex

Leader: EuroGeographics

This activity focusses on addressing legal barriers to enabling access to members data.

The EMS annex revision was completed in early February 2024 and approved by the EEA. It was sent to existing EMS signees in February 2024, with a reminder sent in March 2024. Of the 26 members who have signed the original annex, 15 have signed the revised version, while three confirmed they cannot offer the added datasets and are therefore unable to sign. In these cases, the existing permissions for EMS remain in place.

Between March 2024 and the end of the project, EuroGeographics continued to engage with its members, including those who had never signed the Framework Agreement. As a result, one additional member has signed, another is in the process of signing, and there are discussions ongoing with a third, who is expected sign soon.

The final result is that 27 members have signed the Copernicus Services Framework Agreement, and 17 have signed the revised EMS annex, with a total of 27 members having signed the EMS annex. For those unable to sign the revised EMS annex, the existing permissions remain in place under the first annex.

As part of this process, EuroGeographics has also encouraged members who had not signed the CLMS and CSS annexes to consider doing so. By the end of the activity, 23 members have signed these additional annexes, marking and increase of seven compared to the start of this contract.

EuroGeographics members who have not signed the agreement or the annexes state various reasons not to, including the country being in a state of emergency, lack of political will, unstable political situations, insufficient resources to process the agreements, lack of responsibility for the data requested, or no response. One member, unable to sign the main framework agreement because their data is already openly available, has indicated they are happy for the services to access the data without signing.

Below is a summary table of the EuroGeographics Members who have signed the Framework Agreement and associated annexes (as of October 2024).

Country	Organisation	FLA	EMS	EMS2	CLMS	CSS
Belgium	National Geographic Institute	✓	✓	✓	✓	✓
Croatia	State Geodetic Administration of the Republic of Croatia	✓	✓	✓	✓	✓
Cyprus	Cyprus Department of Lands and Surveys	✓	✓	x	✓	✓
Czech Republic	Czech Office for Surveying, Mapping and Cadastre	✓	✓	✓	✓	✓
Denmark	Agency for Data supply and Efficiency	✓	✓	✓	✓	✓
Estonia	Estonian National Land Board	✓	✓	✓	✓	✓
Finland	National Land Survey of Finland	✓	✓	✓		
France	National Geographic Institute - France	✓	✓		✓	✓
Georgia	National Agency of Public Registry	✓	✓			
Germany	Federal Agency for Cartography and Geodesy (and ADV)	✓	✓		✓	✓
Germany	Germany AdV	✓	✓		✓	✓
Iceland	National Land Survey of Iceland	✓	✓	✓	✓	✓
Ireland	Ordnance Survey Ireland	✓	✓		✓	✓
Latvia	Latvian Geospatial Information Agency	✓	✓		✓	✓
Malta	Malta Environment and Planning Authority	✓	✓	✓	✓	✓
Moldova	State Agency for Land Relations and Cadastre	✓	✓	✓	✓	✓
Northern Ireland	L&PS Northern Ireland	✓	✓			
Netherlands	Cadastre and Land Registry Agency	✓	✓	✓	✓	✓
Norway	Norwegian Mapping Authority	✓	✓			
Poland	Head Office of Geodesy and Cartography	✓	✓	✓	✓	✓
Portugal	Portuguese Geographical Institute	✓	✓	✓	✓	✓
Slovakia	Geodesy, Cartography and Cadastre Authority of the Slovak Republic	✓	✓	✓	✓	✓
Slovenia	Surveying and Mapping Authority of the Republic of Slovenia	✓	✓	✓	✓	✓
Spain	General Directorate for the Cadastre	✓	✓	x	✓	✓
Spain	National Geographic Institute	✓	✓	✓	✓	✓
Sweden	The Swedish mapping, cadastral and land registration authority	✓	✓	x	x	x
Austria	Federal Office of Metrology and Surveying	data is open				
Albania	State Authority for Geospatial Information	expected				
Latvia	The State Land Service (Cadastre)	expected				
Lithuania	National Land Service under the Ministry of Agriculture	expected				
Great Britian	Ordnance Survey GB	chasing now				
		26	26	15	21	21

Country	Organisation	FLA	EMS	EMS2	CLMS	CSS
Albania	State Authority for Geospatial Information	✓		✓	✓	✓
Austria	Federal Office of Metrology and Surveying	Data is open				
Belgium	National Geographic Institute of Belgium	✓	✓	✓	✓	✓
Croatia	State Geodetic Administration of the Republic of Croatia	✓	✓	✓	✓	✓
Cyprus	Cyprus Department of Lands and Surveys	✓	✓	x	✓	✓
Czech Republic	Czech Office for Surveying, Mapping and Cadastre	✓	✓	✓	✓	✓
Denmark	Agency for Data supply and Infrastructure	✓	✓	✓	✓	✓
Estonia	Estonian Land Board	✓	✓	✓	✓	✓
Finland	National Land Survey of Finland	✓	✓	✓	✓	✓
France	National Institute of Geographic and Forest Information	✓	✓		✓	✓
Georgia	National Agency of Public Registry	✓	✓		x	x
Germany	Federal Agency for Cartography and Geodesy	✓	✓		✓	✓
Germany	Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany	✓	✓		✓	✓
Great Britian	Ordnance Survey	Expected				
Iceland	National Land Survey of Iceland	✓	✓	✓	✓	✓
Ireland	Tailte Éireann	✓	✓		✓	✓
Latvia	The State Land Service	Expected				
Latvia	Latvian Geospatial Information Agency	✓	✓	✓	✓	✓
Lithuania	National Land Service under the Ministry of Agriculture	Expected				
Malta	Malta Planning Authority	✓	✓	✓	✓	✓
Moldova	Agency for Geodesy, Cartography and Cadastre of the Republic of Moldova	✓	✓	✓	✓	✓
Netherlands	Cadastre, Land Registry and Mapping Agency	✓	✓	✓	✓	✓
Northern Ireland	Land and Property Services	✓	✓			
Norway	Norwegian Mapping Authority	✓	✓		x	x
Poland	Head Office of Geodesy and Cartography	✓	✓	✓	✓	✓
Portugal	Directorate General for Territory	✓	✓	✓	✓	✓
Slovakia	Geodesy, Cartography and Cadastre Authority of the Slovak Republic	✓	✓	✓	✓	✓
Slovenia	Surveying and Mapping Authority of the Republic of Slovenia	✓	✓	✓	✓	✓
Spain	General Directorate for the Cadastre	✓	✓	x	✓	✓
Spain	National Geographic Institute of Spain	✓	✓	✓	✓	✓
Sweden	The Swedish mapping, cadastral and land registration authority	✓	✓	x	x	x
TOTAL		27	26	17	23	23

Table 1: Summary table of the EuroGeographics Members who have signed the FLA and Annexes (October 2024).

Recommendations for next steps:

EuroGeographics will continue to engage with its members. Since the start of this work under the GEOID contract, more members have made their data openly available. As a result, EuroGeographics are increasingly receiving inquiries questioning the necessity to sign annexes for open data. This is a valid consideration, and it should be considered how to manage this increase in open data while ensuring relevant permissions stay in place and that there is a clear process of communicating this to CORDA and the relevant services.

These processes take time in certain countries, and it is essential to explain the importance of signing these annexes and the benefits for both the member and the Copernicus Services. Individual outreach can help in progressing the signing of the agreements. It is recommended that licensing efforts continue, with a focus on supporting CORDA in engaging members, when reviewing what data is available and what data should be made available.

Published deliverable:

- Addressing barriers to access of EuroGeographics' Members' data for use by Copernicus

Subtask 3 - Coordination and facilitation activity between CORDA and EuroGeographics members

Leader: EuroGeographics

This activity focussed on removing technical barriers to CORDA accessing members' data and enabling greater access to datasets.

The first priority was to facilitate a link between member technical contacts and CORDA. A new process for confirming technical contacts was set up, and communicated to members, and implemented by EuroGeographics. This was completed successfully for all members who had signed the agreements. This was a straightforward activity and it proved to be highly effective.

EuroGeographics also supported CORDA with their audit results, in which data accessibility for each member of EuroGeographics has been assessed. In some cases, the member had given permission for data access, but CORDA had no way of retrieving the data, or where CORDA had access to a dataset but there was no recorded permission from the EuroGeographics member.

EuroGeographics reviewed these discrepancies and provided CORDA with an updated list of all datasets by service that permissions have been given for. Members were also individually contacted to clarify specific cases or ask for permissions, specifically for Ortho Imagery data and Watercourse requirements.

As part of this activity, direct engagement with members was undertaken to communicate the criticality of this activity. A set of FAQs was finalised in March 2024, published on the EuroGeographics website and promoted in the members newsletter, the webinar in April 2024, and in all Copernicus-related communications. During the course of this activity, two webinars were held with the support of the EEA and CORDA, explaining the importance of data sharing, how CORDA functions, and the steps being taken to support data access. These sessions were well attended, and the input from the EEA and CORDA was highly valued. Presentations from these webinars are available on the members' section of the EuroGeographics website.

To further emphasise the importance of NMCA data access for Copernicus Services, the EEA was invited to speak at the EuroGeographics General Assembly in Seville in March 2024, a contribution that was well received.

Supporting this communication, four case studies were developed, selected from the Use Cases work conducted by ITHACA. The aim of these was to demonstrate the benefits of making data available to the Copernicus Services, featuring three EMS examples and one CLMS example from Latvia, Slovenia, Portugal and Poland. Published on the EuroGeographics website and promoted through newsletter, these use cases highlight the challenges in finding use cases where NMCA data has been used by the EuroGeographics members.

A Barriers report summarising all these efforts was reviewed by the EEA, updated, and submitted in September 2024.

Recommendations for next steps:

Understanding the exact issues continues to be key, and communication plays a critical role. While identifying the issues that CORDA is facing took time, once understood, it has proven highly effective to enable targeted support, such as establishing technical support.

It is recommended to continue efforts to address the discrepancy between data access and permissions and to ensure effective communication between CORDA and EuroGeographics members. Some issues, such as an inaccessible INSPIRE portal are beyond members' control but should continuously be monitored as the situation continues to evolve

Engagement with EuroGeographics members continues but there are still some cases where the importance of giving access to their official NMCA data has not been fully understood. While political factors are beyond EuroGeographics' influence, these situations are being monitored and should continue to be so. Continuing the outreach through webinars, newsletters, direct emails, and events-particularly EEA's participation in the Annual General Assembly-will help maximise participation.

A key challenge is that not all required data is available from EuroGeographics members, as the data provision may not be their responsibility. Partnerships with other data providers could help increase access to more data.

Finding case studies that use NMCA data has been difficult. As more NMCA data is made available and used by the Copernicus Services, identifying relevant case studies should become easier. However, the usability of data remains an issue that needs further work.

This activity has been successful, and the collaboration with CORDA has been essential. However, further improvements are possible. For example, working more closely with the CORDA team to communicate additional data requirements, such as more detailed attributes of specific datasets, data enhancements, and notification of open data, would be beneficial. EuroGeographics could help facilitate engaging with members in the form of webinars, and further guidance materials.

EuroGeographics could share these activities with other data providers, with the aim of improving the challenges in licensing and data access, ultimately supporting wider availability of data for the Copernicus Services.

Subtask 4 - HVD Implementing Regulation

Leader: EuroGeographics

This activity builds on the High Value Datasets (HVD) task from the previous contract and the audit of EuroGeographics member data carried out in 2021-2022.

A specific report on Address and Cadastral HVD was completed and submitted to EEA in May 2024 and is available on demand.

The desk-based study on the HVDs was finalised in April 2024. It reviewed all members' geoportals to assess which HVD were available and in what format. A new template spreadsheet was developed and completed for each member with this information. These spreadsheets were then sent to the relevant members for validation. The feedback on these was then analysed and used to draft a report, which was sent to the EEA, then revised and a final version submitted in September 2024.

Overall, the 2024 audit shows enhanced data availability and greater compliance with the HVD regulation by EuroGeographics members. In total, 251 datasets fulfil the HVD criteria, and 156 of those have sufficient arrangements in place for dataset publication and re-use.

However, there is a significant difference between the number of datasets that meet the HVD regulation criteria and those that have sufficient arrangements for publication and re-use. There is still a long way to go to achieve complete coverage of datasets that fulfil the HVD requirements across geographical Europe.

Although this work demonstrates the progress made by EuroGeographics members in making HVDs available, it also highlights that there is still significant work to be done in making geospatial data accessible and reusable in line with the HVD regulation. Special attention is needed to align existing HVDs with the required standards for publication and reuse.

The implementation of HVD is seen as extremely useful to the Copernicus Services, and efforts should continue to enable access to members' national data.

Recommendations for next steps:

It is clear that there is still progress to be made in aligning HVDs with the regulation. Some EuroGeographics members have conflicting national policies that might affect them making HVDs available under the terms of the implementing act. While EuroGeographics does not have the mandate to influence national policy, it can continue to engage with members to explain the importance of the datasets and who relies on them.

In terms of HVDs, the EEA also does not have a mandate, but it is seen as useful to explore ways to better communicate their value by highlighting success stories from members who have released their HVDs and how this data has been used by the Copernicus In-Situ Component. These examples can help encourage further engagement.

Published deliverable:

- EuroGeographic Members' High-Value Datasets - Audit review 2024

	HVD Requirements/Dataset Aspects		Arrangement for dataset publication and re-use									
Dataset	Geographical Coverage	Key Attributes	CC BY 4.0 or Equivalent Licence	Machine Redabale	Provided via API	Provided as bulk download	The most up to date version	Metadata conform to EC 1205/2008	Datasets described in a complete and publicly available online documentation describing atleast the data structures and semantics.	The dataset uses Union or internationally recognised and publicly documented controlled vocabularies and taxonomies, where available.	HVD Requirements Fulfilled	Sufficient Arrangements
Addresses	48	47	38	47	38	42	42	39	*NA*	*NA*	39	26
Cadastral Parcels	46	45	33	45	38	30	37	38	*NA*	*NA*	39	22
Buildings	37	39	31	38	35	28	31	32	*NA*	*NA*	29	21
Administrative Units	48	49	39	46	38	40	39	38	*NA*	*NA*	41	22
Geographical Names	36	34	25	31	28	28	27	29	*NA*	*NA*	28	17
Hydrography	40	n/a	40	43	34	40	38	38	41	38	32	19
Orthoimagery	32	n/a	19	24	25	17	17	18	20	19	16	11
Industrial Production	13	n/a	6	9	9	6	8	6	6	7	8	6
Transport Networks	22	24	29	20	20	19	15	19	18	18	19	12
Total	322	238	260	303	265	250	254	257	85	82	251	156

Table 2: Summary table of HVD Requirements/Datasets and their publication and re-use.

Subtask 5 - Links between the OME2 project and the Copernicus Services

Leader: EuroGeographics

EuroGeographics has engaged with the EEA and CORDA to provide updates on the OME2 project, to understand their specific user requirements and include these in future planning. This included inviting the EEA and CORDA to the OME2 user requirement workshops held in September 2023 and November 2024, as well as organising specific meetings between EuroGeographics, the EEA and CORDA. Both the EEA and CORDA were also invited to provide feedback on the first release of the High Value Large Scale (HVLSP) prototype. Corda submitted very useful and comprehensive feedback in June 2024.

It is important to identify opportunities for synergies and efficiencies.

Recommendations for next steps:

Understanding the user requirements of the Copernicus In-Situ Component is essential. It is therefore needed to communicate this to all members so they understand the "why", and to support them in the operational aspects. Improving the feedback loop between Copernicus Services, NMCAs, and EuroGeographics, or other data providers, is another important step. If services can share how they have used the data, giving concrete examples and explaining its value, it helps data providers to clearly see their impact by contributing. This could be enhanced with understanding issues the services had in accessing or using the data, to address them more effectively. EuroGeographics proposes organising an event to facilitate a direct exchange between data providers and Copernicus Services.

As a small non-profit organisation like EuroGeographics, it is essential to avoid duplication of effort and to work efficiently. Supporting Copernicus through EuroGeographics' work is valuable, but aligning activities even more closely with Copernicus requirements would be even better. This requires a deeper understanding of those requirements, and while this task has made significant progress, there still more to be done.

EuroGeographics has underpinned all of this work with communication, by keeping its members informed via newsletters and an external Messenger newsletter. Several press releases including one in October 2024 highlighted the case studies, which have also been promoted through social media channels. Looking ahead, there are strong member stories to build on, which should be continued to be amplified.

General support

Review of the LUCAS report from SC02

Leader: GAF

As a follow up of the LUCAS assessment within SC02, this task focussed on providing support and expertise on the use and requirements of LUCAS survey data in Copernicus products and services, contributing to the Eurostat study on the future of LUCAS.

In SC04, actions included supporting the EEA with feedback to Eurostat on the SC02 LUCAS report and contributing to the "LUCAS future" survey with regards to CLMS. Furthermore, an initial assessment and comparison of LUCAS2018 and LUCAS2022 data was carried out with regards to their usability for CLMS and the provision of updates on issues related to LUCAS.

Main results of the assessment are based on the LUCAS 2022 technical document and indicate that the classifications in LUCAS 2022 and 2018 do not differ fundamentally. Main changes include a specific classification for the photointerpretation campaign and the introduction of a new module on landscape features. The comparison confirmed that the number of samples in the Copernicus module has at least doubled in LUCAS 2022, which is in line with the recommendation identified in the SC02 report. Further, changes on the classification level of the Copernicus module were implemented to provide more detailed information at LUCAS Land Cover (LC) Level 3.

The continued assessment of LUCAS data led to updated recommendations, including reintroducing the forest type attribute, which was missing in LUCAS 2022, and improving documentation in the case of changes to the LUCAS attributes. Making LUCAS data available for CLMS productions as soon as it becomes available, e.g. for specific countries, could further enhance its usability. Further recommendations include increased exchange between Service Providers and LUCAS experts, such as those from EFTAS, to explore the benefits of certain LUCAS modules for CLMS.

A detailed analysis of the LUCAS 2022 Copernicus module polygons lead to recommendations for geometric and topological optimisations, resulting in more performant and user-friendly datasets. The thematic evaluation of the Copernicus polygons revealed issues regarding the accuracy of polygon locations, especially for small polygons (smaller than 100 m^2), the inclusion of narrow LC areas that are not detectable within CLMS productions, and in some cases, observations of LC features are not visible from an EO perspective.

A summary of updated conclusions and recommendations was prepared and discussed with the EEA.

Final proposals for a possible follow-up contract include further support to the EEA where necessary, exploring the usability of LUCAS for CLMS by analysing small adaptations and refinements of the LUCAS nomenclature, and advising on densifying LC sample points in certain areas or regions, and evaluating the use of the "homogenous plot fills extended window" for CLMS.

Conclusions and feedback by the EEA:

- The support provided is highly appreciated by the EEA, given the complexity of the topic;
- Exchange and support may continue if needed, especially in advance of finding interim solutions under the next In-Situ framework contract.

Published deliverable:

- Assessment of the current usage of LUCAS survey in production activities of Copernicus

Communication activities

Leader: EVF

Evenflow managed a range of responsibilities to contribute to the contract. These included reviewing and producing the SoP report package, contributing to the styling, graphics, and summaries. Additionally, the team was responsible for conducting a content review of the Copernicus In-Situ website. Evenflow was also actively involved in the creation of articles, news items, and communication materials related to Copernicus In-Situ activities and in the provision of access to data.

The first outcomes included the timely submission of an article for review on 13/12/2024. Followed by an internal review process, the article was published on 18/01/2024.

During the first team meeting, input from the EEA highlighted the need to prioritise the revamping of the Copernicus In-Situ website, alongside developments and improvements of the SoP. Future article production was deprioritised with an exception for the article already submitted and published.

During the second team meeting, the EEA again emphasised the need of content review and website revamp.

In the final months of the contract, the website revamp was brought to completion, with the following updates:

- Definition of editorial guidance and standards for common elements;
- Complete review and in many cases, re-writing, of all legacy text and all SoP-related inputs;
- Harmonisation of web page structure and templates;
- Selection of new imagery supporting the web text;
- Creation of new banners, combining photography of environmental observation infrastructure with overlays of geospatial information layers. A page providing context on the story behind each of these banners was also provided ("Image Stories").
- Creation of a set of new icons for the representation of the various elements within the Copernicus In-Situ Component.

Whilst the creation of PDF versions of the SoP reports (initially planned) was not carried out, two proposals for cover images were delivered.

Comments received during the final review meeting included the following:

- While recent progress was appreciated and the result was well-received, it was noted that the task overall proceeded slower than expected;
- The CIS^2 icon should take the form of a checklist rather than a database;
- The cross-cutting data section should include a dynamic table, pulling from the reports database (to be implemented by the web developer);
- A quote was to be added to the homepage (this was completed);
- Use cases should be filterable by country (to be implemented by the web developer).

Conclusions, recommendations, and next steps

Throughout the duration of SC4, the consortium has worked in close collaboration with the EEA to support the Copernicus In-Situ Component. The work has focused on maintaining and enhancing CIS^2, engaging with EEs, and improving access to in-situ data critical to the functioning of the Copernicus services. By identifying key data needs, assessing data availability, and proposing actionable recommendations, the contract has continued to strengthen the in-situ foundation that significantly supports Copernicus.

Regular dialogue with the EEs has been essential in identifying evolving in-situ requirements, and the expansion and refinement of the CIS^2 database, together with targeted gap analyses and thematic deep dives, and the SoP Report have enabled a clearer understanding of the in-situ data landscape across domains. These efforts have also supported increased visibility and usability of in-situ information within the Copernicus programme.

Looking ahead, the findings and recommendations from this contract provide a solid basis for further developments within the In-Situ Component. Continued collaboration with EEs and data providers, such as EuroGeographics members, will be critical, as will improved coordination with the broader in-situ data community, data availability and further consolidation of different datasets. Future work should prioritise practical steps to improve sustainable access to essential in-situ datasets across all Copernicus services.

The EEA, as coordinator of the In-Situ Component, is well positioned to lead this work. Its role in facilitating cooperation between data providers, service operators, and policy actors remains vital to securing the long-term availability and quality of in-situ data, which remains a key aspect of Copernicus' value and impact. The consortium under this contract has played a key role in supporting the EEA through technical expertise, stakeholder engagement, and the operational delivery of core tasks.

Annex - Agenda and participation list

Services supporting the EEA's implementation of cross-cutting activities for coordination of the in-situ component of the Copernicus Programme

Specific Contract no. 3506/R0-COPERNCA/EEA.59569

SC4 Final Review Meeting
24 and 25 October 2024 – online

1st day Agenda

Time	Topic	Presenter
14:00- 14:05	Welcome and meeting objectives	EEA/e-GEOS
14:05 - 14:50	**Task A - Determine State of Play** Overview, achievements and recommendations: • State of Play reports • CIS^2 update and maintenance • CIS^2 Quality Assessment • Country Reports	 e-GEOS e-GEOS e-GEOS ISPRA e-GEOS
14:50-15:30	**TASK B - Provide Access to Data** Findings and recommendations: • Crowdsourcing campaign in land and emergency mapping *[30']* • Wetland data for CLC+ *[10']*	 GAF GAF
15:30- 15:45	*Coffee break*	
15:45- 16:50	**TASK B - Provide Access to Data** Findings and recommendations: • Pan-European dataset of waterbodies centrelines *[15']* • Harmonisation of coastlines within CLMS and CEMS *[20']* • Inter-service data sharing *[15']* • LUCAS support and assessment *[15']*	 e-GEOS GAF ITHACA GAF
16:50 - 17:15	**AoB and first day meeting conclusions**	All

2nd day Agenda

Time	Topic	Presenter
09:30- 09:40	Welcome and meeting objectives	EEA/e-GEOS

09:40-10:30	**Task C - Engagement with Data Providers** Achievement and recommendations: • Use cases • FLA signature • Coordination and facilitation activity between CORDA and EGG members • HVD Implementing Regulation • Links between the OME2 project and the Copernicus Service	 ITHACA EGG EGG EGG EGG
10:30-10:45	*Coffee break*	
10:45-11:30	**Communication activities** • Review of the Copernicus In-situ website • Articles, news and communication material • Coordination with EGG	Evenflow
11:30-12:00	**Project Coordination** • FWC overview • SC04 Milestones and deliverables • Administrative and financial status	e-GEOS
12:00 - 12:30	Wrap up and meeting closure	All

Participant list

Name	Company
Jose Miguel Rubio Iglesias	EEA
Francesca Lorenzon	e-GEOS
Cristina Negri Arnoldi	e-GEOS
Paolo Sorini	e-GEOS
Stephanie Wegscheider	GAF
Amelie Lindmayer	GAF
Thomas Renner	GAF
Linda Moser	GAF
Ines Ruiz	GAF
Franca Disabato	ITHACA
Burcu Kocoglu	ITHACA
Matilde Oliveti	ITHACA
Dimitri Papadakis	EVENFLOW
Angela Baker	EUROGEOGRAPHICS