Reinforcing the AI4EU Platform by Advancing Earth Observation Intelligence, Innovation and Adoption

# D3.3: AI4Copernicus and the European AI and Copernicus ecosystems report II (final)

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## Executive Summary

In this deliverable we present the activities we carried out from July 2022 to June 2023 in order to position AI4Copernicus in the two relevant European ecosystems: the Artificial Intelligence ecosystem and the Copernicus programme ecosystem. We monitored activities in these two ecosystems and collaborated closely with some of them, especially with the other ICT-49 projects, and participated in new activities in these ecosystems (e.g., the AI4Europe project).

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## List of Terms & Abbreviations

| Abbreviation | Definition |
|---|---|
| AI | Artificial Intelligence |
| ML | Machine Learning |
| EO | Earth Observation |
| ESA | European Space Agency |
| RS | Remote Sensing |
| NN | Neural Networks |
| DL | Deep Learning |

# 1 Introduction

The use of Artificial Intelligence (AI) technologies in Earth Observation (EO) goes back to the 1990s. For example, see early papers on neural network (NN) techniques for EO [Benediktsson et. al, 1991, Serpico et al. 1996, Bruzzone et al., 1997] (the last two papers were co-authored by our colleague Prof. Lorenzo Bruzzone, leader of the University of Trento node in AI4Copernicus). By 2000, there was a small community of Remote Sensing (RS) researchers working on applying NN to EO problems. Then, around 2004/2005, there was the first strong push with Support Vector Machines (SVM) and kernel methods (Prof. Bruzzone and colleagues introduced this to the RS community with the papers [Melgani and Bruzzone, 2004] and [Camp-Valls and Bruzzone, 2005]). For many years there was a large interest in kernel methods with many more researchers using these techniques. The final big push came around 2016 when Computer Vision started having a lot of successes using Deep Learning (DL) techniques on very large datasets like ImageNet. Since then, ML has become pervasive in RS.

Another set of AI technologies that have been used in EO for quite some time are semantic technologies (mainly ontologies and linked data). The European Space Agency (ESA) has funded various projects initially in the context of the Global Monitoring for Environment and Security (GMES) Programme (the precursor to Copernicus). One of the most important of these projects was Heterogeneous Missions Accessibility (HMA) which concentrated on standardisation and interoperability [Usländer, et al., 2012]. More recent projects include RARE and Prod-Trees; partner UoA participated in the latter [Karpathiotaki et al. 2014]. Around the same time, the European Commission funded projects TELEIOS (2010-2013) [Koubarakis et al., 2016], LEO (2013-2015) [Burgstaller et al., 2017] and MELODIES (2013-2016) [Blower et al., 2014]. The first two projects were coordinated by the partner UoA which leads this deliverable and the third one by the University of Reading. Various other projects funded by ESA or the European Commission followed.

With respect to the Copernicus programme, an important milestone has been the creation in 2018 of the five Data and Information Access Services (DIAS). These are CREODIAS[1], WEkEO[2], ONDA[3], SOBLOO[4] and Mundi[5]. They are cloud platforms that bring computing power close to Copernicus data to enable the development of EO applications.

Another important milestone, this time in the area of European AI, has been the funding of the H2020 project AI4EU (2019-2021) which developed the AI-on-demand (AIoD) platform[6]. The platform is a one-stop-shop for anyone looking for AI knowledge, technology, tools, services and experts. The core AIoD platform is currently being sustained and developed further as part of the ongoing AI4Europe project.

[1] https://creodias.eu/
[2] https://www.wekeo.eu/
[3] https://www.onda-dias.eu/
[4] https://sobloo.eu/
[5] https://mundiwebservices.com/
[6] https://www.ai4europe.eu/

AI4Copernicus capitalizes on the results of the above activities. Its main objective is to make the AIoD platform the platform of choice for users of Copernicus data, and in this way, give rise to a new wave of commercial activities involving AI technologies and Copernicus data.

### 1.1 Purpose and Scope

The purpose of this deliverable is to present the activities that we carried out from July 2022 to June 2034 of the project in order to position technically AI4Copernicus in the changing landscapes of AI and Copernicus.

### 1.2 Approach for Work Package and Relation to other Work Packages and Deliverables

Work package WP3 (Technical positioning and architecture) started at M1 and ended at M30 of the project. It is led by partner UoA with the collaboration of partners NCSR-D, TAS, CF and UNITN. WP3 positions technically AI4Copernicus in the European AI and Copernicus ecosystems. In addition, it developed the software architecture of the project.

WP3 has the following three tasks:

- Task 3.1 Architecture specification, tools and components (M1-M18, lead: UoA, contributors: NCSR-D, TAS, CF, UNITN). The technical contribution of this task is the development of the software architecture of the project with a specific emphasis to interfacing with the AIoD platform, CREODIAS and WEkEO.
- Task 3.2 Design of the semantic catalogue and the semantic search and discovery functionality (M1-M9, lead: UoA, contributor: NCSR-D). The technical contributions of this task are the development of the EarthQA question answering engine for discovering Copernicus data available on CREODIAS, and the development of the Copernicus ontology.
- Task 3.3 Positioning of AI4Copernicus in the European AI and Copernicus ecosystems (M7-M30, lead: UoA, contributors: TAS, UNITN). This task monitors the AI and Copernicus landscape in Europe and positions technically AI4Copernicus in this landscape.

The present deliverable D3.3 is the third deliverable of WP3 and contains the contributions of the project to Task 3.3 from July 2022 to July 2023. It is the final version of the following deliverable:

- D3.2 AI4Copernicus and the European AI and Copernicus ecosystems I (M18, R, PU, UoA)

### 1.3 Organisation of the Deliverable

The rest of the deliverable is organised as follows. Section 2 positions AI4Copernicus in the European AI ecosystem. Section 3 positions AI4Copernicus in the Copernicus ecosystem. Section 4 concludes the deliverable.

## 2 AI4Copernicus in the European AI Ecosystem

The AI landscape in Europe is currently been shaped by the European AI strategy[7] partly guided by the High-Level Expert Group on Artificial Intelligence[8]. In addition, there is the current proposal for a "Regulation of the European Parliament and of the Council laying down harmonised rules on

[7] https://digital-strategy.ec.europa.eu/en/library/communication-artificial-intelligence-europe
[8] https://digital-strategy.ec.europa.eu/en/policies/expert-group-ai

Artificial Intelligence (Artificial Intelligence Act) and amending certain Union legislative acts.[9] On June 14, 2023 the European Parliament approved its negotiating position on the proposed Artificial Intelligence Act. The Parliament will now negotiate with the EU Council and the European Commission so that the final version of the act is formulated and voted on.

From a technical point of view, the European approach to AI focuses on two areas: excellence in AI and trustworthy AI. Both areas are served by the AIoD platform, which AI4Copernicus contributes to.

The first contribution of AI4Copernicus to the European AI ecosystem is to bring Copernicus data to the AIoD platform.

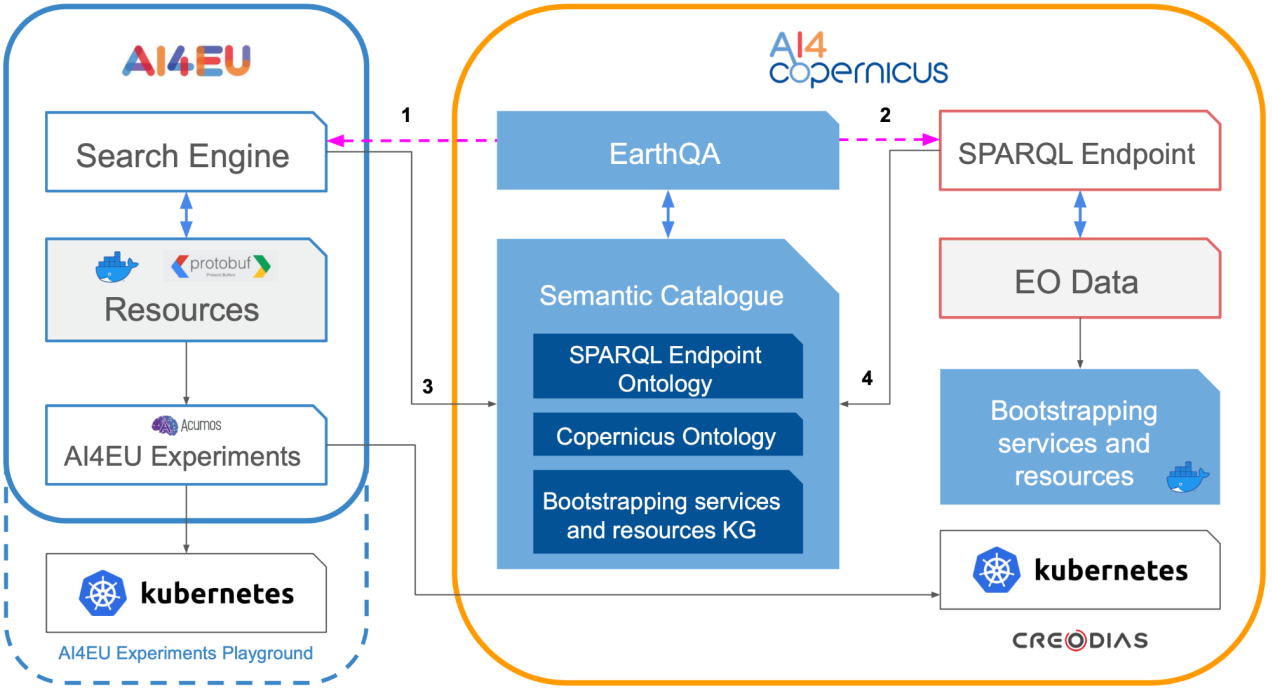


**Figure 2.1:** The AI4Copernicus architecture

The above figure shows the software architecture of AI4Copernicus and its interoperation with the AIoD platform. The main technical contributions of our work are:

- The provision of bootstrapping services and resources (e.g., ML algorithms for EO data).
- The availability of CREODIAS, where the above services and resources can be deployed using Kubernetes dockers.
- The option to use the AI4Experiments components (currently collectively also known as Eclipse Graphene[10]) to create deployable Kubernetes dockers, which users can deploy on CREODIAS.
- The definition of the Copernicus ontology for annotating services and resources.

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206
[10] https://projects.eclipse.org/projects/technology.graphene

- The development of the EarthQA question answering engine for discovering Copernicus data and its interfacing with the search engine of the AIoD platform.

Deliverable D3.1 (Architecture, semantics and discovery report) and other deliverables of WP4 and WP5 present in detail the above contributions to the AIoD platform. The interested reader is referred to those deliverables for more details.

The second contribution of AI4Copernicus to the AI4EU and AI4Europe projects has been the participation of our Technical Manager Prof. Manolis Koubarakis from UoA to the Technical Contributors Board of the AIoD platform (https://github.com/ai4eu/Technical-Contributors-Board). The Technical Contributors Board facilitates contributions to the AIoD platform by presenting and discussing new contributions and releases, connecting experts for collaboration and advice, voting on critical additions or changes to the architecture, creating new concepts for technical integrations, and accepting requests for presentations.

The third contribution of AI4Copernicus to the AI4EU and AI4Europe projects has been the participation of project members to the AI Ontology Working Group (https://www.ai4europe.eu/ai-community/working-groups/working-group-ontology). This Working Group aims to define the directions and coverage of the ontological specifications produced by the participating projects, in order to ensure that all ontologies are aligned to the central conceptual model of the AIoD platform, while also contributing to its enrichment with generally required constructs.

The members of AI4Copernicus that are participating in this working group are:

- Antonis Koukourikos (NCSR-D). Antonis was the main designer and developer of the AIoD conceptual model and coordinates the alignment efforts of the different projects, while specifying foreseen extensions of the conceptual model itself as new requirements emerge from the discussions. As he is also leading the development of the updated metadata model that will inform the AIOD platform, he is responsible for integrating requests for entity inclusion and definition in the AIoD model, to ensure that the latter incorporates different facets of information at the appropriate level of detail to maintain generality while ensuring sufficiency of representation. In the context of the Ontology Working group, he participates in the efforts for formally defining core AI-related concepts, and including or mapping them to the relevant taxonomical level at the AIoD model.
- Eleni Tsalapati (UoA). Eleni has been working on the Copernicus ontology which is presented in Deliverable D3.1; this ontology is connected to the AI Assets ontology. Being part of the Ontology Working Group (OWG), she has been working on the upper-level ontology that will be common across the ICT-49 projects and the AIoD. Initially, the participating projects presented their ontologies and the interlinks with the AI4EU ontology. Then, starting from the ontology developed for StairwAI we identified the commonalities among the projects. Then we started collecting the terminology based on two official documents: The “German standardisation roadmap on artificial intelligence” [DIN et al., 2022], and the “AI watch, defining artificial intelligence 2.0” from the European Commission [Samoili et al., 2021]. We identify the generic terms that cover the needs of OWG, such as “AI Technique”, “Research

Domain", "Method", and based on the aforementioned documents we define formally their semantics. At the same time, several ontology representation tools (e.g., graphology, vocbench), are being tested to work efficiently in shared mode.

Another important contribution of AI4Copernicus to the AI ecosystem in Europe is the joint work with the other projects funded under the ICT-49 call, which are the following:

- AIPlan4EU: Bringing AI Planning to the European AI On-Demand Platform.[11]
- BonsAPPs: AI-as-a-Service for the Deep Edge[12]
- DIH4AI: AI on-demand platform for regional interoperable Digital Innovation Hubs Network[13]
- I-NERGY: Artificial Intelligence for Next Generation Energy[14]
- StairwAI: Ease the Engagement of Low-Tech users to the AI-on-Demand platform through AI[15]

The six projects have recently organised their collaboration around the following six working groups: Coordinators, Trustworthy AI, Financial Support for Third Parties (Open Calls), Communication, Technical Integration and Exploitation. AI4Copernicus participates actively in these working groups.

The Technical Working Group is led by our colleague Dr Iraklis Klampanos from the coordinating node NCSR-Demokritos. The goal of this working group is twofold: (a) to coordinate potentially common technical directions across ICT-49 projects and (b) to facilitate the elicitation of common technical requirements against the AIoD platform. More specifically, directions covered by the Technical Working Group include:

(1) The organisation of user-stories and requirements in a format usable across the ICT-49 projects, therefore providing opportunities for developing common vocabularies and synergies

(2) The integration of common architectural and integration elements, e.g. common tools for deploying workflows onto 3rd party clouds from within AI4Experiments

(3) Standardisation of descriptive semantics for products developed across all projects in order to achieve a common presentation on Catalogues

(4) Common approach towards technical support, especially after the completion of the ICT-49 projects.

It is expected that some of these directions will require coordination across WGs, therefore widening the collaboration amongst projects even further. All directions require close coordination with the AIoD platform and its current developer, the AI4Europe project.

At the same time, AI4Copernicus is positioning itself in sync with the aforementioned ICT-49 projects in order to result in a cohesive offering under the AIoD platform umbrella. We can distinguish two directions of platform evolution through ICT-49 actions: evolution through the

[11] https://www.aiplan4eu-project.eu/
[12] https://bonsapps.eu/
[13] https://www.dih4ai.eu/
[14] https://i-nergy.eu/
[15] https://stairwai.nws.cs.unibo.it/

simultaneous development in different *verticals*, and evolution of horizontal services and knowledge assets.

Horizontal services are already being taken into account for the implementation of AI4Copernicus. Collaboration pathways are built firstly over the sharing and alignment of representation frameworks used by the different projects. Distinct ontologies are designed for the Energy and Planning domains, both mapping to the AI4EU conceptual model as the AI4Copernicus Ontology. Furthermore, higher-level ontologies such as the ones used by StairwAI and BonsApps respect the standards previously set by AI4EU, and currently under further development on the AIoD platform, on the descriptive and resource deployment level, as they have been set by the AIoD ontology and the AI4Experiments platform respectively. In this regard, all actions are positioned to provide a uniform means of discoverability and integration through the solutions built by AI4Europe and StairwAI, while streamlining and obscuring the testing and deployment process via the platforms and frameworks built e.g., by BonsApps.

The full exploitation of developments in verticals is a more complex endeavour that requires coordination on the AIoD level. Nevertheless, the alignment at the technical level is important beforehand, as the focal applications domains of AI4Copernicus, I-NERGY and AIPlan4EU call for combined solutions that, for example, seamlessly integrate planning and energy optimization in EO analytics. To this end, the technical working group has facilitated communication amongst the relevant projects in order to ensure a deeper knowledge of services brought on the table and to understand how best to collaboratively exploit them in larger-scale solutions.

Another contribution of AI4Copernicus to the European AI ecosystem has been the active monitoring of the following Networks of Excellence funded under the ICT-48 call:

- TAILOR: A Network for Trustworthy Artificial Intelligence.[16] Partner UoA participates in TAILOR and monitors the work on Trustworthy AI in case any of it can be transferred to AI4Copernicus. So far, there has been no techniques or technology that we could use from that project.
- Humane AI-Net: European Network of Human Centered Artificial Intelligence.[17] No partners of AI4Copernicus participate in this network but we are monitoring their work through their website and social networks. So far, there has been no techniques or technology that we could use from that project.
- AI4Media: A Centre of Excellence delivering next generation AI Research and Training at the service of Media, Society and Democracy.[18] No partners of AI4Copernicus participate in this network but we are monitoring their work through their website and social networks. So far, there has been no techniques or technology that we could use from that project.

The final contribution of the AI4Copernicus to the European AI ecosystem has been the dissemination of the project in events of the Big Data Value Association (BDVA) and the AI, Data and Robotics Public Private Partnership. AI4Copernicus will be presented at the European Big Data Value

[16] https://tailor-network.eu/
[17] https://www.humane-ai.eu/
[18] https://www.ai4media.eu/

Forum 2023 (EBDVF 2023) which will take place in Valencia, Spain on 25 - 27 October with the central theme "Data and AI in action: Sustainable impact and future realities." Further, we will present AI4Copernicus developments at the 9th IEEE International Conference on Big Data Computing Service and Machine Learning Applications, to take place from July 17-20, 2023 in Athens, Greece [Troumpoukis et al., 2023].

AI4Copernicus participates in the Funding Support To Third Parties (FSTP) Working Group, which involves at least one representative from each project from ICT49 cluster, and is led by BonsAPPs and Fundingbox. Its aim is to strengthen synergies across ICT49 projects and enhance the EU AI on-demand platform in the realm of Open Calls and redistribution of grants. The FSTP WG identified the main obstacles faced by the projects and the good practices to be implemented in the future, and presented them in a "lessons learnt" report. Moreover, AI4Copernicus, together with the remaining members of the FSTP WG, co-authored a paper summarising the WG results, accepted in IISA2023 [Markaki et al. 2023].

AI4Copernicus currently collaborates with the two projects shaping the AIoD platform:

- AI4Europe (https://www.ai4europe.eu/, An AI-on-demand platform to support research excellence in Europe) which is a continuation of AI4EU and it is coordinated by University College - Cork, Ireland. Following AI4EU, AI4Europe is the current developer of the AIoD platform. From the partners of AI4Copernicus, the coordinating partner NCSR-D participates in AI4Europe. The main goal of this project is to extend the AI-on-demand platform with new functionalities so that it becomes the platform of choice for AI researchers in Europe for doing their excellent research.
- Pre-PAI (https://www.ai4europe.eu/ai-community/projects/pre-pai). The project will carry out a comprehensive requirement analysis for different stakeholder groups, mainly SMEs, industrial sectors, and public administration. These requirements analyses will lead to an overall roadmap and plan to build and consolidate the AI-on-demand platform. The coordinating partner NCSR-D participates in Pre-PAI.

Finally, AI4Copernicus partners NCSR-D and SatCen participate in Horizon project ENEXA (https://enexa.eu/, 2022-2025) which builds explainable knowledge graphs. SatCen is developing its use case built on top of the technical knowledge acquired in AI4Copernicus (e.g., the use of docker containers for EO processing tools).

# 3 AI4Copernicus in the Copernicus Ecosystem

In addition to positioning our project in the European AI ecosystem, we have been working hard to position AI4Copernicus in the Copernicus ecosystem. This ecosystem is currently shaped by the various activities of ESA (Φ Lab, DIASes, AI4EO, Big Data from Space Conference etc.) and other stakeholders such as the European Association for Remote Sensing Companies (EARSC). Pierre-Philippe Matthieu, head of the Φ Lab explore office, is part of the AI4Copernicus Advisory Board.

One of the goals of AI4Copernicus is to connect two of the DIASes (CREODIAS and WEkEO) to the AIoD platform. An initial presentation of this work has been given in Deliverable D3.1 where the architecture of AI4Copernicus has been presented. In more recent work, CloudFerro developed the CREODIAS deployer (https://github.com/CloudFerro/creodias-deployer) which is based on the playground deployer of the Eclipse Foundation (https://gitlab.eclipse.org/eclipse/graphene/playground-deployer). The CREODIAS deployer uses the Kubernetes API in order to deploy solutions to a remote cluster running in the CREODIAS cloud infrastructure. In the context of AI4Copernicus, the deployer is meant to be run in the AI4Experiments service of the AIoD platform.

Another important activity in this area is the recent development of the Copernicus Data Space Ecosystem (https://dataspace.copernicus.eu/) by a consortium of seven partners, including AI4Copernicus partner CloudFerro. This dataspace is a more visionary activity than the Copernicus Open Access Hub and the five DIASes. According to the web page https://dataspace.copernicus.eu/ecosystem:

> *The Ecosystem offers immediate access to large amounts of open and free Earth observation data and scalable interfaces on top the Copernicus Sentinel satellites, including both new and historical Sentinel images, commercial datasets, as well as Copernicus Contributing Missions.*
>
> *The goal? To empower third parties with tools and resources they need to unlock the full potential of this data. This allows to build a thriving, open and expanding Ecosystem to increase the impact of Earth Observation data for a sustainable society.*

AI4Copernicus also contributes to the ESA project "DA4DTE: Demonstrator Precursor Digital Assistant Interface for Digital Twin Earth" through the participation of partner UoA in it. In DA4DTE UoA will develop a new version of EarthQA using deep learning techniques and large language models. This new engine will be one of the engines to be deployed in the Digital Assistant developed by this ESA project.

AI4Copernicus also contributes to the Copernicus ecosystem through various relevant activities of the Remote Sensing Laboratory (RSLab) at the University of Trento. The lab recently has focused on AI and deep learning methodologies for Earth Observation, with a particular interest on computational algorithms and big data technologies applied to remote sensing data. Currently, the RSLab is involved in several national and international projects focused on AI for the analysis of hyperspectral and multispectral images. Among them, we mention the projects PrismaLearn and AFORISMA funded by the Italian Space Agency, which address the development of deep learning methodologies for the analysis of hyperspectral Prisma images to produce crop type maps and forest land-cover maps at sub-pixel level to detect forest type and species composition. The RSLab is also the principal investigator of the ESA CCI High Resolution Land Cover project, where a processing chain based on machine learning has been developed to produce high-resolution land-cover and land-cover change products over long time series of data in the period 1990-now, considering sub-continental and regional areas.

Partner SatCen is participating in Horizon Europe Project "SDGs-EYES" (2023-2025) is building a system to facilitate the monitoring of Sustainable Development Goals (SDGs) with the use of

Copernicus services and other data. SatCen is leading the development of a pilot based on the use of models and services also deployed in AI4Copernicus.

In the context of AI4Copernicus dissemination activities, the project was presented (or is scheduled to participate) in various events organised by Copernicus stakeholders. A few highlights are showcased below:

1. EU Regions Week, 10-13 October 2022. AI4Copernicus along with ICT-49 projects co-organised a world cafe titled “AI across different sectors and regions in Europe - World Café'' which was held online on 13 October.
2. SnapEarth Final Conference, 28 November 2022. AI4Copernicus and the ICT49 projects were presented during this event organised by SnapEarth, a project of the Copernicus Ecosystem, while he mentioned the collaboration of the ICT49 cluster projects as one of the primary activities of AI4Copernicus
3. European Geosciences Union (EGU) 2023 General Assembly, April 24, 2023. The Technical Manager Prof. Manolis Koubarakis gave the presentation “EarthQA: A question answering engine for Earth observation data archives“ (co-authors: Dharmen Punjani and Eleni Tsalapati).
4. Organisation of the AI Ecosystem Forum, 29 - 30 June 2023. Project coordinator NCSR Demokritos organised in Athens a multifaceted event bringing together the Artificial Intelligence and Earth Observation communities, and welcomed all sibling projects of the ICT49 cluster, the AI4Europe project and the community of the AI on Demand Platform.
5. The International Geoscience and Remote Sensing Symposium (IGARSS2023), 16-21 July 2023. The Technical Manager Prof. Manolis Koubarakis will present the paper “EarthQA: A question answering engine for Earth observation data archives“ (co-authors: Dharmen Punjani and Eleni Tsalapati).
6. Big Data from Space Conference (BiDS 2023), 6-9 November 2023. AI4Copernicus submitted a proposal, and it was accepted, for a tutorial on “AI4Copernicus tools and methods for bridging AI and EO”.

7. ESA Living Planet Symposium in May 2022, Michele Lazzarini from SatCen presented in the “Climate Security - The key role of R&I and cooperation to address global threats” session the work “Geospatial Intelligence applications to address Climate Security issues” where SR4C3 (AI4Copernicus open call funded project) climate security use case was presented.

8. AI4Copernicus conference in May 2023, Sergio Albani from SatCen presented in SESSION 3: CLIMATE CHANGE AND ENERGY "Climate and Energy Security Initiatives at Satcen" where AI4Copernicus project was introduced.

9. Big Data from Space Conference 2023, a paper on “Innovative GEOINT services exploiting Big Data for Decision-Makers in the field of security” has been submitted. The paper introduces bootstrapping services and outcomes from AI4Copernicus ecosystem.

10. Presentation and proceedings of IGARSS 2022 with the SatCen paper "New Scenarios Shaping a Digital Twin Earth for Security (New Scenarios Shaping a Digital Twin Earth for Security", with the description of bootstrapping services also deployed for AI4Copernicus.

11. EDA "Exploratory Workshop on Digital Twins in Defence", where Paula Saameno from SatCen presented "A Digital Twin Earth for Defence and Security" with EO models also based on the deployed AI4Copernicus SatCen services.

12. Other participation in events/presentations are available in the *News* section of the AI4Copernicus website.

The *Destination Earth Initiative (DestinE)*[19] is another flagship European project related to AI4Copernicus due to the importance of Copernicus data in its activities. DestinE will develop a high precision digital model of the Earth to monitor and simulate natural and human activity. The first two digital twins to be developed by DestinE will focus on weather-induced and geophysical extremes, and on climate change adaptation. They will be very high precision digital replicas of our planet which will help monitor, visualise, and forecast natural and human activity on the planet in view of weather-induced and geophysical extremes and climate change. The digital twins will be able to monitor the health of the planet, perform simulations of Earth's interconnected system with human behaviour, and support sustainable development. As a result, they will reinforce Europe's efforts for a better environment to respond to the urgent challenges and targets addressed by the Green Deal. By opening up access to public datasets across Europe, DestinE will also represent a key component of the European Strategy for Data.

The DestinE system will comprise the following functional components: the Core DestinE Platform, the Data Lake and the Digital Twin Engine. These will be developed as part of the Commission's Digital Europe programme by the ESA which will develop the Core Platform, the European Centre for Medium-Range Weather Forecasts (ECMWF, a partner of AI4Copernicus) which will develop the Digital Twin Engine and the first two digital twins, and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) which will develop the Data Lake. Horizon Europe will provide research and innovation opportunities that will support the further development of DestinE.

Partner ECMWF is keeping us up-to-date with respect to DestinE activities so that ideas and technology from this project could be used in AI4Copernicus if it is deemed useful.

# 4 Conclusions

In this deliverable, we presented the activities we carried out in M19-M30 of AI4Copernicus in order to position the project in the European AI ecosystem and the Copernicus ecosystem. We monitored the most important activities taking place in these ecosystems, collaborated closely with some of them, especially with the other ICT-49 projects, and participated in new activities.

[19] https://digital-strategy.ec.europa.eu/en/policies/destination-earth

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