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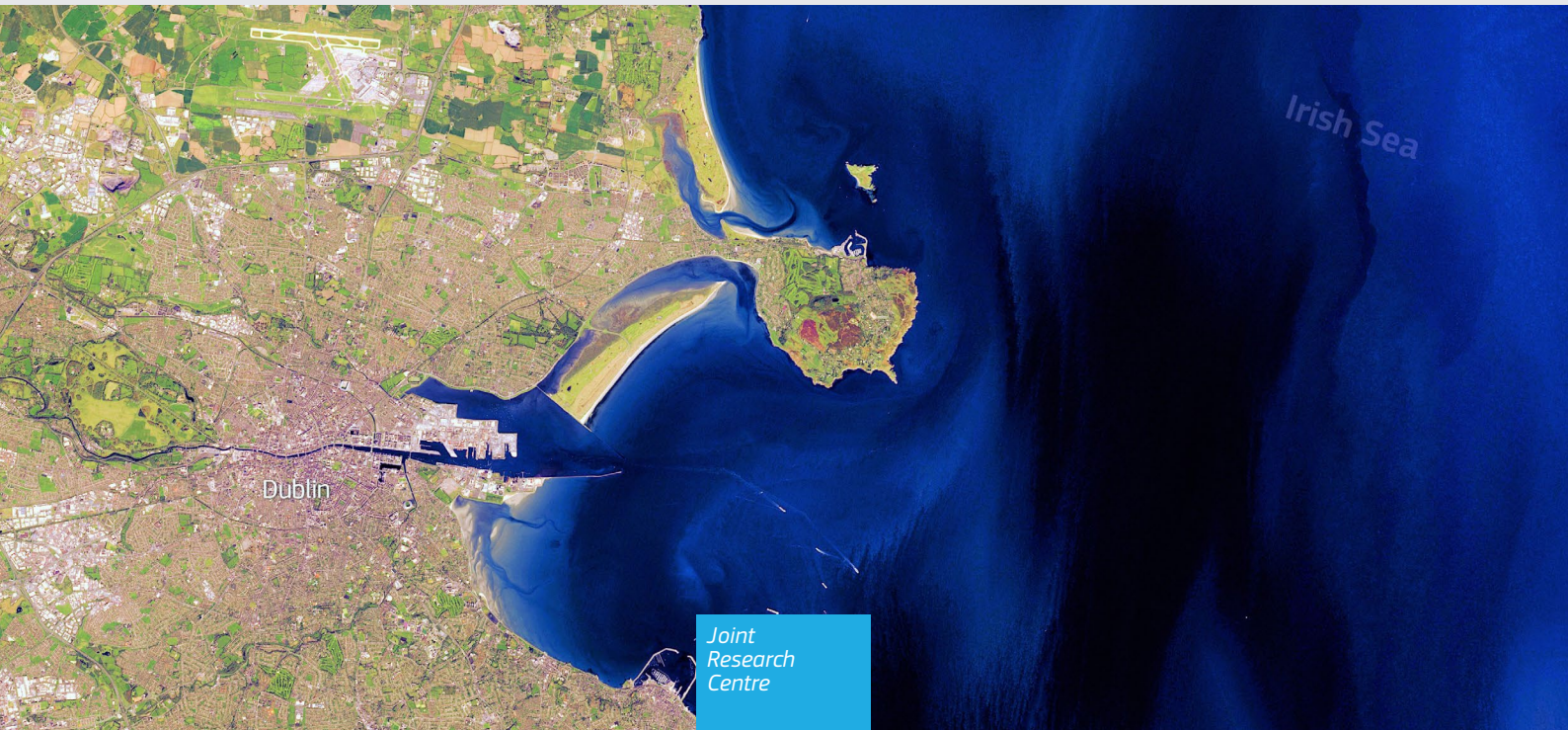
The 2022 COPERNICUS Emergency Management Service General Assembly

Ceccato, P., Moreira Agrela Gonçalves, A., Pekel, J.-F., Kemper, T., Spruyt., P., Salamon, P., Toreti, A., San-Miguel, J. and De Groeve, T.

2023



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The 2022 COPERNICUS Emergency Management Service General Assembly

13-14 October 2022

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ABSTRACT

This report presents the **CEMS General Assembly** which was held on October 13-14, 2022.

This report highlights the main points discussed at the event: CEMS' newest innovations implemented over the last year and also what can be expected for the next 2 years.

The outcome of these events underlined the commitment and dedication of the community that CEMS both supports and relies upon. As for the participants, it was a good opportunity to discuss and share ideas on how to best move forward, towards new successes and innovations.

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1 INTRODUCTION

This year's CEMS General Assembly provided the opportunity to celebrate the 10th anniversary, remember past milestones and deliver in-depth insight into current CEMS activities and planned future evolutions and product upgrades.

Unlike the 2021 Copernicus Emergency Management Service (CEMS) General Assembly, which was held over a full week, this year's edition lasted two days (see Figure 1).

The outcome of this event underlined the commitment and dedication of the community that CEMS both supports and relies upon. As for the participants, it was a good opportunity to discuss and share ideas on how to best move forward, towards new successes and innovations.

This report highlights the main points discussed at the event: CEMS' newest innovations implemented over the last year and also what can be expected for the next 2 years.

A large number of CEMS users, representatives of other European Commission Directorates, experts and scientists joined the event. They were delivered an overview of the various components of the Copernicus Emergency Management Service and its importance in helping to prevent, monitor, and support field operations during disaster management operations on European territory and beyond.

The day of the year chosen for the beginning of the General Assembly had special significance for the CEMS community. It coincided with the United Nations Day for Disaster Risk Reduction: helping underline and hook the importance of the services and products offered by CEMS to the Sendai Framework.

CEMS Assembly 2022

Copernicus Emergency Management Services General Assembly

Agenda DAY 1 – October 13

9:00 – 9:30 Opening and Welcome

Speakers:
- **T. De Groeve** *Joint Research Center* ***(JRC)***
- **M. Facchini** *Directorate-General for Defence Industry and Space* ***(DG DEFIS)***
- **O. Imperiali** *Directorate-General for European Civil Protection and Humanitarian Aid Operations* ***(DG ECHO)***

9:30 – 10:00 Celebrating 10 Years of CEMS

Speaker: **P. Salamon** (***JRC***)

10:00 – 11:00 CEMS' latest innovations

Moderator: **J.-F. Pekel** (***JRC***)
Speakers:
- Aerial Component (**P. Spruyt**, ***JRC*** and **A. Engelfried**, ***Fairfleet***)
- First Global Human Settlement release under Copernicus (**T. Kemper**, ***JRC***)
- Updates on European Forest Fire Information Systems applications (**J. San-Miguel**, ***JRC***)
- Updates on European and Global Drought Observatory (**A. Toreti**, ***JRC***)
- Global Flood Monitoring (**D. Milinkovic**, ***Earth Observation Data Centre for Water Resources Monitoring***)

11:00 – 11:15 Break

11:15 – 12:30 Sharing of best practices across users and partners in EU and the World

Moderator: **P. Salamon** (***JRC***)
Speakers:
- Supporting census operations with the GHSL data – examples from Papua New Guinea and South Africa (**T. Kemper**, ***JRC***)
- East Africa Drought Watch (**V. Otieno**, ***Intergovernmental Authority on Development***)
- Mapping use cases (La Palma Volcano eruption, Australian Floods) (**L. Luzietti**, ***e-Geos***)
- Global flood forecasting for anticipatory humanitarian action (**L. Stephens**, ***University of Reading, Red Cross Red Crescent Climate Centre***)

12:30 – 14:00 Lunch

14:00 – 15:00 CEMS components and support to European Policy

Moderator: **P. Spruyt** (***JRC***)
Speakers:
- Copernicus Emergency Management Services implementation in the Civil Protection Mechanism (**I. Homeag**, ***DG ECHO***)
- How Copernicus has promoted a global definition of urbanization (**L. Dijkstra**, ***DG Regional and Urban Policy***).
- European Drought Observatory for Resilience and Adaptation (EDORA) project – supporting EU water resilience agenda (**D. Behrendt Kaljarikova**, ***DG Environment***)

15:00 – 16:00 Partnerships and synergies within the Copernicus Ecosystem

Moderator: **J. San-Miguel** (***JRC***)
Speakers:
- Copernicus Marine Environment Monitoring Service (CMEMS) (**P.-Y. Le Traon**, ***MERCATOR***)
- European Ground Motion Service (**H.S. Andersen**, ***European Environment Agency***)
- Copernicus Reference Data Access (CORDA) (**J.M.R. Iglesias**, ***European Environment Agency***)
- Copernicus Climate Change Service (C3S) (**S. Burgess**, ***European Centre for Medium-Range Weather Forecasts***)

10 YEARS OF SERVICE

CEMS Assembly 2022

Copernicus Emergency Management Services General Assembly

Agenda

DAY 2 – October 14

9:00 – 9:05 **Opening**

Speaker: **P. Salamon** ***(JRC)***

9:05 – 10:00 **Research Projects Lightning Talks**

Moderator: **T. Kemper** ***(JRC)***
Speakers:
- A National Early Warning System for Atmospheric and Hydrological Extremes. (**E. Xoplaki**, ***Justus-Liebig-University***).
- European Coastal Flood Awareness System (**C. Armaroli**, ***Istituto Universitario di Studi Superiori of Pavia***)
- CLImate INTelligence (CLINT) project (**E. Scoccimarro**, ***Euro-Mediterranean Center on Climate Change***)
- Deep Learning for Fire Danger Forecasting (DEEP CUBE) project (**I. Papoutsis**, ***National Observatory of Athens***)
- CENTAUR project (**S. Clandillon**, ***SERTIT***)
- OVERWATCH project (**V. Fissore**, ***ITHACA***)

10:00 – 11:00 **Innovation key notes**

Moderator: **A. Toreti** ***(JRC)***
Speakers:
- Artificial Intelligence for Natural Disaster Management (**M. Kuglitsch**, ***Fraunhofer HHI***)
- Climate Centre International Federation of Red Cross and Red Crescent (**K. Guigma**, ***Red Cross Red Crescent Climate Centre***)

11:00 – 11:15 **Break**

11:15 – 12:15 **A glimpse into the future of CEMS**

Moderator: **P. Ceccato** (***JRC***)
Speakers:
- Global Wildfire Information System (**J. San-Miguel**, ***JRC***)
- European Drought Observatory (**A. Toreti**, ***JRC***)
- Towards Hyper-Resolution Flood Forecasting for EFAS and GloFAS (**P. Salamon**, ***JRC***)
- Global Human Settlement (**T. Kemper**, ***JRC***)
- New Products and Expanded Activation Possibilities for On-Demand Mapping Users (**J.-F. Pekel**, ***JRC***)
- Social Media for Urban Flood Mapping (**V. Lorini**, , ***JRC***)

12:15 – 12:30 **Conclusions and an outlook on the future**

Speakers: **P. Salamon**, ***(JRC)***

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Figure 1. CEMS General Assembly Agenda.

2 CEMS GENERAL ASSEMBLY HIGHLIGHTS

On 13 October, Tom De Groeve, Acting Head of Unit for Disaster Risk Management at the European Commission's Joint Research Centre, Mauro Facchini, Head of Unit for Earth Observation at the European Commission's Directorate-General for Defence Industry and Space, and Olimpia Imperiali, Programme Officer for Security and Situational Awareness at the European Commission's Directorate-General for European Civil Protection and Humanitarian Aid Operations, introduced the session with an overview of the Service's past milestones and next steps.

The increasing demand for CEMS data to support decision-making in disaster and risk management activities, as well as the growing impact of climate change and Member States' increasing reliance on geospatial information, remained a common thread among high-level introductory speeches.

Clear examples of this trend are the drought and wildfire crisis that characterised the summer of 2022 and this year's devastating floods in Australia and Pakistan.

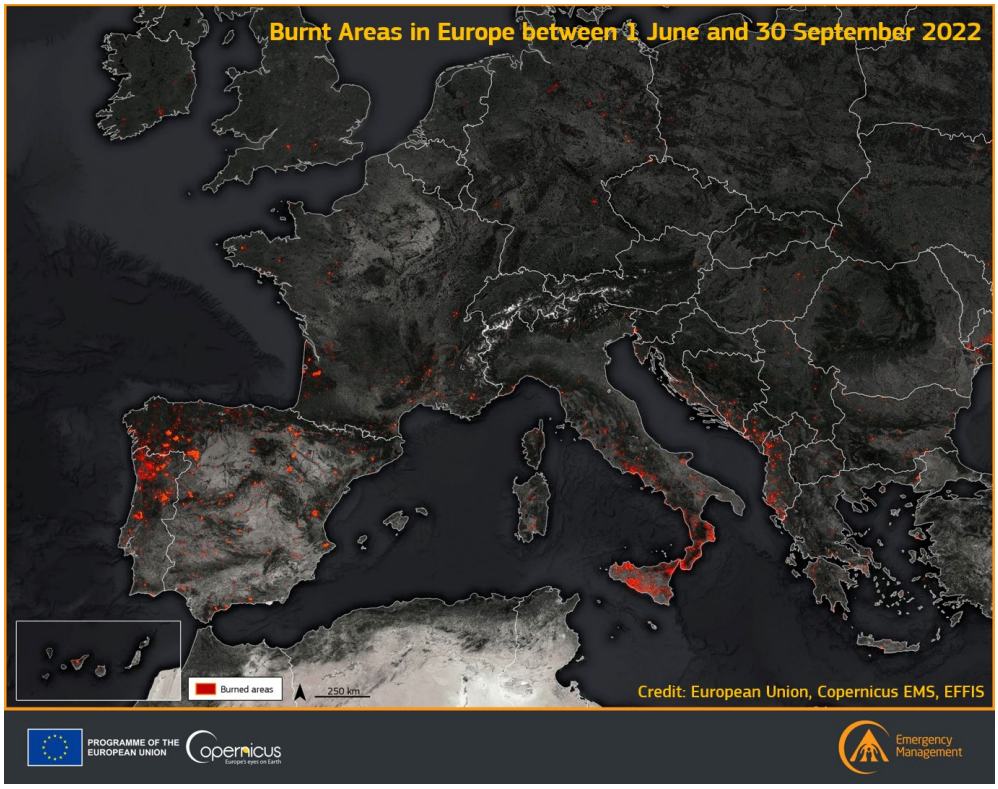

Figure 2. CEMS Burnt Area.

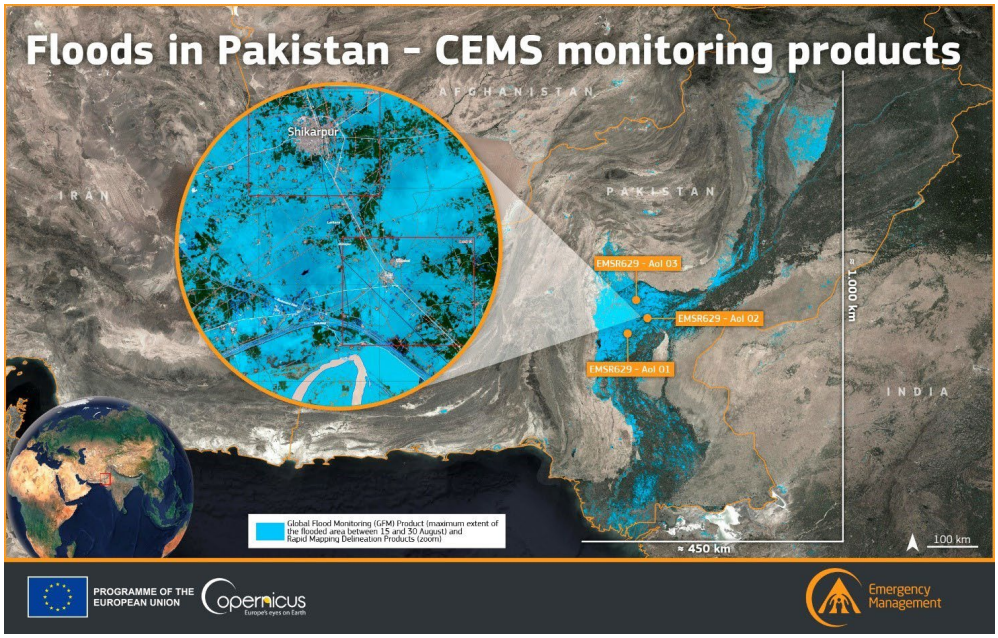

Figure 3. CEMS Flood Map.

Meanwhile, the other central theme of the event focused on the innovations and valuable new capabilities being brought into CEMS to enable a more effective and timely response to emergencies, and even more persistent global monitoring.

2.1 CEMS components

2.1.1 Mapping

As announced at this year's CEMS General Assembly, the Mapping component will be making a significant step forward in 2023 after experiencing a steady growth in the use of its products and services in recent years, caused in part by a series of very challenging years in terms of number and magnitude of wildfires. The three main innovations Mapping will be deploy in the coming months are:

In March 2023, the new Situational Reports for Rapid Mapping activations will be introduced. It will allow to concentrating one (web) place all relevant information concerning an activation, thus ensuring a more user and media-friendly experience. Each report will be updated throughout the duration of the activation with interactive maps, graphics, pre/post event satellite images and will be accessible on a new webpage to be launched in early 2023. In addition, information and data produced by third-party sources that provide more context on the activation will also be included, such as images extracted from social media, information produced by early warning and monitoring services and activation-related news published by the press.

Last August, CEMS inaugurated a new contractual framework for image acquisition by unmanned aerial platforms with the German company FairFleet to make available

information complementary with satellite imagery in specific cases in which higher spatial resolution or more frequent data acquisitions are required. New information was shared on what is now being designated as the new Aerial Component. It will create a network of certified drone operators: the goal is to have at least one pilot in each Member State by the end of 2022. In addition, coordination protocols are being implemented with the regulatory authorities of individual countries to facilitate the activation of this component regarding flight permits.

The third and last major innovation is the activation process of the Mapping component where CEMS aims to make the service more user-centric. How? Soon a single Service Request Form will be used for both Rapid Mapping and Risk and Recovery Mapping activations. This is expected to facilitate the process for authorised users. Moreover, it has also been announced that it will be possible to activate the Rapid Mapping team using information from national early warning systems by specifying it in the appropriate section of the service request form. This will allow pre-tasking of relevant imagery sources and faster availability of maps.

2.1.2 Floods

2022 is also proving to be a year of significant renewal for the Early Warning and Monitoring Component, particularly for flood-related product and services. As announced at last year's CEMS Week in November 2021, the new Global Flood Monitoring (GFM) product has been introduced successfully and represents a game-changing development in CEMS' capacity to monitor and support response to floods worldwide. Using data from the synthetic aperture radar onboard the Copernicus Sentinel-1 satellites, which is available regardless of cloud cover or time of the day, the GFM is providing automatic detection of flooded areas as a wealth of open, but also big, data.

Worthy of note is the rapid speed at which the GFM can accurately map flood affected areas: in less than 8 hours after image acquisition. The GFM tool has already been integrated with the Global Flood Awareness System (GloFAS) and it will soon be integrated into the European Flood Awareness System (EFAS), offering emergency response teams, as well as local and civil authorities, a more complete picture of flood-related emergencies.

Furthermore, EFAS-Next and GloFAS-Next will be released in the first half of 2023. They will bring an increased spatial resolution (e.g., from 5km to 1.5km for Europe and from 10km to 5km for the global set up) and the integration of new datasets that allow a more accurate representation of river networks and better modelling and forecasts. Meanwhile, new complementary information layers based on the integration of Social Media data (mostly Twitter) have been recently introduced.

2.1.3 Droughts

2022 has seen a number of innovations in the European and global drought Observatory. A new version of the Combined Drought Indicator (CDI v.2.0) was introduced to provide more accurate estimates and a better representation of drought risks and impacts. Further improvements of the Combined Drought Indicator focusing on a dynamic use of satellite data for drought impacts on vegetation and crops are planned for the coming months, with a new version (3.0) expected to be released in the first months of 2023.

A new responsive web-mapping, that will be soon released, was also shown and discussed. Among the ongoing development and improvements, it is worth to cite: the new tracking method, the climate attribution component, the enhanced seasonal forecasting system, the integration of tailored AI methods and tools. Together with the severe drought crisis that has hit Europe, the European and Global Drought Observatory products and reports received plenty of media attention.

2.1.4 Wildfires

Likewise, the European Forest Fire Information System (EFFIS) Wildfire Risk Viewer has been added to the EFFIS portal. The pan-European Wildfire Risk Assessment (WRA) approach takes stock of a series of EU regulations that require the European Commission to develop a better overview of the wildfire risk in the European region, to support the actions of its Member States and to ensure compliance in the implementation of EU regulations related to wildfires. Of no less importance, the 2022 CEMS General Assembly also discussed the future entry into operational service of the EFFIS global counterpart, GWIS.

2.1.5 Exposure Mapping: the Global Human Settlements Layer

2022 has also witnessed the introduction of the third component of CEMS, with the roll out of the Exposure Mapping products. The JRC, together with DG DEFIS and the Directorate-General for Regional and Urban Policy (DG REGIO), aims to develop further the scope of the Global Human Settlement Layer (GHSL) using Copernicus Sentinel data.

GHSL is a dataset detailing the breadth and extent of human settlements worldwide, in the form of built-up maps, population density maps and settlement maps. At this year's CEMS General Assembly, it was announced that the main objective is to increase the update frequency of the Global Human Settlement Layer (GHSL) to 2 years with a spatial resolution of 10 metres for built-ups and 100 metres for population data. In addition, the first data produced within the new GHSL service contract are expected in 2024.

2.2 Session on CEMS components and their Support to European Policy

2.2.1 Presentation by Ionut Homeag, DG ECHO, Team Leader of ERCC operations

During this presentation, Ionut explained the role of the Emergency Response Coordination Centre (ERCC). It coordinates the delivery of assistance to disaster-stricken countries, such as relief items, expertise, civil protection teams and specialized equipment. The center ensures the rapid deployment of emergency support and acts as a coordination hub between all EU Member States, the 7 additional participating states, the affected country, and civil protection and humanitarian experts.

The role of CEMS mapping was clearly shown and proves to be an important asset to the ERCC.

2.2.2 Presentation by Lewis Dijkstra, DG REGIO, How Copernicus has promoted a global definition of urbanization

The different concepts of urbanization where discussed. Valuable input through the population grid as statistical instrument, the remote sensing and geospatial data as new data source and the 2 new definitions of the degree of urbanization and FUA. A unique coalition of six international organizations with the aim of creating the first globally recommended definition of cities and rural areas in order to facilitate international comparisons.

How Copernicus has promoted a global definition of urbanisation

Presented by Lewis Dijkstra,
Lewis.Dijkstra@ec.europa.eu
Head of the Economic Analysis Sector
Directorate-General for Regional and Urban Policy,
European Commission

2.2.3 Presentation by D. Behrendt Kaljarikova, DG Environment, European Drought Observatory for Resilience and Adaptation (EDORA) project – supporting EU water resilience agenda

The EDORA project was explained and discussed. It aims at strengthening the European Drought Observatory (EDO by improving drought risk assessments, collect and analyse data on impacts and foster cooperation in the EU. Within the Framework of EDORA the following outcomes are expected:

- A drought impact database covering key socio-economic sectors as well as ecosystems
- A system specific and combined integrated drought risk assessment methodology
- A drought risk atlas
- Ad-hoc support to Member States that want to improve/build drought observatories.

EDORA objectives cover also in-dept. assessment of drought management plans/ policies in EU MS and climate adaptation actions against drought in different sectors.

European Drought Observatory for Resilience and Adaptation

EDORA

3 THE FUTURE OF CEMS

As Europe and the world must contend with an ever-growing number of damaging natural phenomena, many of them exacerbated by climate change, so grows the role of CEMS in helping to cope with these challenges. During the peak of the European wildfire season, between 5 June and 19 September, CEMS received 50 Rapid Mapping (RM) and 6 Risk and Recovery Mapping (RRM) activations to assess the damage wildfires caused in Europe. In the face of this growing demand, it is vital that CEMS continues to evolve as a Service, bringing on board the latest innovations. On this topic, the CEMS General Assembly hosted a session on Research Projects related to disaster and risk management.

Some of the most promising technological innovations discussed in the session stem from the EU's Horizon 2020 and Horizon Europe projects. These were:

→ The DAKI-FWS project (Data and AI supported early warning system), financed by the German Federal Ministry for Economic Affairs and Climate Action, was presented by Elena Xoplaki from Justus Liebig University of Giessen. The system is devised as a management tool for business, politics and society in all phases of a crisis. It addresses epidemics and extreme weather events. The system adapts the CEMS models like LISFLOOD to the German conditions and provides flood and drought prediction still implementing heatwaves, and windstorm forest fire risk models.

→ The second project presented a proof-of-concept for the implementation of a European Copernicus Coastal Flood Awareness System (ECFAS). Clara Armarolifrom the Istituto Universitario di Studi Superiori di Pavia (IUSS) presented the project tha aims to implement a European Coastal Flood Awareness System for the evolution of CEMS. It provides 5-day forecasts of total water level for the EU and models the flood extent and potential impact. The proof-of-concept should be presented in mid-November 2022.

→ Enrico Scoccimarro from Fondazione CMCC presented the Climate Intelligence project, CLINT. The project will use AI/machine learning together with large climatological data sets to advance detection, causation and attribution of extreme climate events. This includes tropical cyclones, extreme drought, heatwaves as well as compound events and concurrent extremes.

→ The Deep Cube project presented by Ioannis Papoutis, National Observatory of Athens, uses AI approaches in combination with Copernicus data to address extreme drought, climate induced migration, volcanic alerting, land subsidence and

sustainable tourism. The presentation focussed on fire danger forecasting taking stock of the EFFIS products. It provides Mediterranean fire danger forecasts for the following day.

→ The last two projects were only recently accepted and hence could present only their project vision. Steven Clandillon, SERTIT, presented the CENTAUR (Copernicus Enhanced Tools for Anticipative Response to Climate Change in the Emergency and Security Domain) project that aims to improve situational awareness and preparedness around climate change and its impact on complex emergencies.

→ Finally, the OVERWATCH project, presented by Vanina Fissore from Ithaca, aims to implement a crisis management system for wildfires, and floods by combining EO data with drone and other digital cartography data in an augmented reality user interface to provide a holographic crisis scenario map that should shorten the observation and decision making loop.

These cutting-edge projects have excellent potential future applications within the area of disaster risk management. Two clear examples are the ECFAS and CENTAUR projects. The European Coastal Flood Awareness System, for example, aims to "capitalise on the existing framework of CEMS and EFAS to implement a coastal flood awareness system." On the other hand, the CENTAUR project focuses on the flood-related threats to population, assets and infrastructures in urban areas.

The 2022 CEMS General Assembly presented participants with a comprehensive view on the first 10 years of operations, the current status, and the future of the Copernicus Emergency Management Service, tracing its evolution from the precursor research projects to future innovations. Whilst the consequences of climate change will make CEMS' tasks increasingly complex, the array of initiatives, hard work, and community commitment at this year's General Assembly shows that the Service is ready to evolve and adapt.

Access the complete recordings of the event at:
→ Day 1: *https://webcast.ec.europa.eu/cems-assembly-2022-10-years-of-service-2022-10-13*
→ Day 2: *https://webcast.ec.europa.eu/cems-assembly-2022-10-years-of-service-2022-10-14*

LIST OF ABBREVIATIONS

CDI	Combined Drought Indicator
CEMS	Copernicus Emergency Management Services
DG DEFIS	Directorate-General Defence Industry and Space
DG REGIO	Directorate-General for Regional and Urban Policy
JRC	Joint Research Centre
EDO	European Drought Observatory
EFAS	European Flood Awareness System
EFFIS	European Forest Fire Information System
GDO	Global Drought Observatory
GFM	Global Flood Monitoring
GHSL	Global Human Settlement Layer
GloFAS	Global Flood Awareness System
GWIS	Global Wildfire Information System
RM	Rapid Mapping
RRM	Risk and Recovery Mapping

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