Contribution ID: **169** Type: **Presentation**

# Adapting to Climate change with Open Science : Experiences from the CLIMATE-ADAPT4EOSC project

*Tuesday 14 October 2025 16:00 (11 minutes)*

Core objectives of the EU Mission on Climate Adaptation include ensuring that all Europeans have access to information on climate risks by 2030, supporting local authorities in developing risk management plans, and designing transformative strategies for 150 communities and regions to lead healthier and more prosperous lives. A central point of this work is addressing the challenges of cross-domain research by integrating data, knowledge, and solutions from various scientific disciplines. It therefore calls for collaboration among civil society organisations, authorities, researchers, and other stakeholders to develop comprehensive and innovative strategies for climate resilience.

The integration of data spaces such as COPERNICUS, GEOSS, DRMKC, and CLIMATE-ADAPT into the European Open Science Cloud (EOSC) represents a strategic initiative to coordinate climate adaptation efforts across Europe. These climate data spaces are essential for capturing diverse, large-scale observational data and enabling interdisciplinary research critical to understanding and mitigating climate change impacts. While compliance with European Directives supports data harmonization across Europe, it remains limited to specific domains. By aligning with the EOSC vision, this integration fosters a holistic approach to enhance resilience, ensuring that insights and methodologies developed in the EU member states can be effectively applied and adapted to diverse contexts.

A significant challenge in climate change adaptation research is gaining access to high-quality datasets that comply with the FAIR (Findable, Accessible, Interoperable, and Reusable) principles. By prioritising FAIR and open data practices, the mission aims to overcome legal and technical barriers to data sharing, improving data availability, quality, and interoperability. Implementing these principles is essential to unlocking the full potential of existing datasets, enabling easier discovery, access, use and re-use of data crucial for advancing climate adaptation research both in the EU and globally.

CLIMATE-ADAPT4EOSC aims to eliminate existing barriers to climate data access and interaction with operational climate data spaces, fostering a collaborative research environment where data can flow seamlessly between researchers and other stakeholders contributing to the climate adaptation mission. To achieve this, we will establish seamless interaction between the EOSC e-infrastructure and various EU and national climate data spaces by aligning precisely with EOSC's e-infrastructure plan.

CLIMATE-ADAPT4EOSC project places strong emphasis on ensuring that data management practices are compliant with legal standards, semantically aligned for cross-disciplinary research, technically robust for integration, and organisationally structured to support the diverse needs of the research community. Broadly, we aim to deploy the following two major services in EOSC-core (i) CLIMATE-ADAPTdata4EOSC: a service for EOSC to generate and share FAIR data, metadata, and digital research objects, and (ii) CLIMATE-ADAPTservice4EOSC: a suite of services for EOSC to analysing, processing, and modelling data to generate new insights.

We will embed a novel Ontology-Based EOSC Climate-Adapt Knowledge Graph within this service to enhance the FAIRness of data in climate change adaptation research. As part of this effort, we will recommend five interoperability frameworks to the EOSC community: (1) Technical Interoperability Framework, (2) Semantic Interoperability Framework, (3) Cross-domain Interoperability Framework, building on the work of the WorldFAIR project, (4) Organisational Interoperability Framework and (5) Legal Interoperability Framework. Taken together, these frameworks will provide a comprehensive and standards-based approach to enable data repeatable (and reproducible) data combination, integration and reuse for climate adaptation. We will use and

further develop the SIMPL1, an open source middleware, to enable data FAIRness across EU data spaces and to ensure that EOSC stakeholders can efficiently and securely collaborate and promoting data interoperability.

To demonstrate the effectiveness of our CLIMATE-ADAPTdata4EOSC value of sharing and reusing research data, our CLIMATE-ADAPTservice4EOSC will include four novel services: (a) OPENHIDRA –a service designed to empower users and stakeholders to adapt to climate change in coastal regions (b) Shrink-Swell from Space2Earth Service (3SES)- a service for static and dynamic mapping of shrink-swell risks affecting both old and new infrastructures prone to climate change (c) Digital Twins for Just Climate Urban Resilience Service (Just-CURS) –a solution tailored for enhancing climate resilience in socially vulnerable communities (d) Big Data Analytics (BDAnalytics) –a framework-as-a-service for comprehensive climate risk assessment.

To showcase the robustness, effectiveness and impact of our innovations –and the value of data sharing – we will implement all CLIMATE-ADAPT4EOSC novel methods, tools, and services in eleven real-world case scenarios: three use cases (UCs) and eight replication use cases (R-UCs). These will be demonstrated in three rounds across five EU member states: France, Greece, Portugal, Cyprus, and Poland.

**Primary authors:** Dr AZEVEDO, Alberto (Laboratório Nacional de Engenharia Civil (LNEC), Lisbon, Portugal); Dr SFETSOS, Athanasios (National Centre for Scientific Research "Demokritos" Institute of Nuclear & Radiological Sciences & Technology, Energy & Safety Environmental Research Laboratory); Dr FREISSINET, Catherine (Artelia); PANOU, Dimitra (National Centre for Scientific Research "Demokritos" Institute of Nuclear & Radiological Sciences & Technology, Energy & Safety Environmental Research Laboratory); Dr FARAZI, Feroz (University of Cambridge); Dr PATTINSON, Marc (GAC Group Sophia Antipolis); HEIKKURINEN, Matti (CODATA); Dr RAHMAN, Mohammad Azizur (Technovative Solutions LTD); HODSON, Simon (CODATA); Dr SOILAND-REYES, Stian (University of Manchester)

**Presenters:** Dr SFETSOS, Athanasios (National Centre for Scientific Research "Demokritos" Institute of Nuclear & Radiological Sciences & Technology, Energy & Safety Environmental Research Laboratory); PANOU, Dimitra (National Centre for Scientific Research "Demokritos" Institute of Nuclear & Radiological Sciences & Technology, Energy & Safety Environmental Research Laboratory)

**Session Classification:** Presentations Session 6: The Transformative Role of Data in SDGs and Disaster Resilience

**Track Classification:** SciDataCon2025 Specific Themes: The Transformative Role of Data in Sustainable Development Goals and Disaster Resilience