

Charter of Working Group Environmental Sciences

Version 1.0 of 11. 1. 2024, by the group leader in collaboration with the Secretary and the members of the group.

1 Introduction

Modern human society is becoming increasingly vulnerable to natural risks such as extreme weather, earthquakes, floods, famines, and pandemics. These risks have enormous societal impacts, including the loss of lives. Besides, society faces human-associated changes, such as intensification of land use and urbanization, emission of pollutants, biological invasions, and loss of biodiversity. To ensure society's resilience, we need to focus on the sustainable use of key natural resources, protection of water and soil, biodiversity conservation, prevention of environmental pollution, adaptation of crops to climate change, ensuring food security, and air quality. All of these aspects are crucial for protecting human health and sustainable development. However, to carry out these activities, we need to have a thorough understanding of the issues at hand and access to interconnected data. **Environmental sciences provide crucial data that is essential for addressing current environmental problems and societal challenges.**

Available metadata and data include meteorological data, substance, and energy flow data, collections of environmental samples, various biological materials, and human tissues preserved in biobanks, preserved organisms permanently stored in scientific collections (e.g., herbaria), data on the distribution of free-living organisms and their communities, data from remote sensing of the Earth and ground monitoring networks, data from controlled experiments, results of laboratory measurements focused on the content of harmful substances or nanoparticles in environmental matrices, foods, products, and biological material, as well as biological and health data characterizing the health of individuals and populations.

A vast array of data is available, including meteorological data, substance and energy flow data, or data from remote sensing of the Earth and ground monitoring networks. Scientific collections contain environmental samples, various biological materials, human tissues preserved in biobanks, or whole preserved organisms (e.g., herbaria). Valuable insights also provide data from controlled experiments and laboratory measurements focusing on substances in the environment, food, and biological material. Health and biological data can provide an understanding of how the environment affects human health and quality of life. Linking these data with economic, social, and public health information is necessary to systematically understand the relationships between different components of the environment. The human exposome is a theoretical concept that considers all factors that determine the health status of individuals and populations. Federated databases and information sources are crucial for interdisciplinary research, responsible decision-making, and relevant legislation to protect nature, the environment, and human health.

For the data interpretation and providing answers to questions about how humans affect the natural environment and how this environment affects human health and quality of life, **it is necessary to link existing environmental data with economic, social, and public health data.** These data are crucial for systematically understanding the relationships between different components of the environment, including the impact of the environment on the health of the human population within natural and human-altered ecosystems. Interconnected data contribute to the development of the theoretical concept of the human exposome as a set of



all (environmental, socio-economic, and behavioral) factors that, together with genetic predispositions, determine the health status of individuals and populations.

A federated approach to available databases and other information sources is essential not only for such comprehensive interdisciplinary research but also for providing the basis for responsible decision-making and the preparation of relevant legislation for the protection of nature, the environment, and human health.

2 Objectives

The EOSC ENVI working group aims **to create an interdisciplinary community of experts** (representing Earth sciences, life sciences, materials sciences, ecology, climatology and meteorology, biodiversity research, environmental and analytical chemistry, toxicology, microbiology, environmental risk analysis, biostatistics, bioinformatics, modelling, epidemiology, as well as medical, social, and economic sciences) that, **by ensuring better accessibility and connectivity of environmental data, will contribute to (i) a deeper understanding of natural processes and relationships between the environment and society, (ii) more effective protection of natural resources, including biodiversity and human health, and (iii) a more flexible ability to respond and adapt to current crises and global changes.**

To ensure data support for both scientific and decision-making processes, it will be **necessary to identify the needs of the scientific and user community, define data services, and create domain-specific standards for the controlled storage of newly generated data and tools to increase the visibility, availability, and usability of all data.**

The following activities will serve this purpose:

- **Inventory of data types** produced in this domain (initially in large research infrastructures), their locations, and methods of storage. Attention will be paid to their connection to international databases and standards, new types of data and metadata, and related needs.
- **Overview of standards for existing repositories** and assessment of their traceability, availability, interoperability, and conditions for further use to improve their parameters and strengthen their utilization.
- **Overview of current research questions** concerning European long-term priorities and missions, ongoing and planned partnerships, European and national research infrastructures, projects, and other initiatives. Access and interconnection of interdisciplinary data needs will be considered.
- **Domain-specific needs for data storage**, the possibility of using existing solutions, and the definition of solutions for new ones.
- **Prioritization of needs** and implementation plan of their solutions within EOSC CZ, especially in connection with OP JAK projects (especially Open Science II).
- **Communication with stakeholders** and the broader professional community regarding their needs, expectations in data work, and their further use, as well as obtaining feedback from relevant entities.
- **Support for cross-sectoral collaboration** through increased interoperability and quality of published data.
- **Educational and training activities** within the professional community and the general public.



3 Outputs and Their Applications

- Inventory of metadata and data sources (see also the PARC¹ Partnership - Horizon Europe).
- Identification and evaluation of existing databases and solutions that can - after possible modifications - serve the wider community, including their possible connection to existing international database platforms.
- Prioritization of needs for storing new types of data (e.g., non-selective data acquisition).
- Preparation of the OS II project following the outputs and capacities built (NRP) in the OS I project and in accordance with identified priorities.
- Implementation of the OS II project, modification of existing data repositories, or construction of new ones as mentioned above.

4 Membership and Expected Members

The EOSC ENVI group is an open working group consisting of representatives of large research infrastructures and research institutions operating in the field of environmental sciences and other relevant fields.

- ENVI VVI: RECETOX RI (EIRENE), CzeCos, ACTRIS CZ, CENAKVA, NanoEnviCz
- Participating institutions: Institute of Global Change Research CAS (CzechGlobe); Czech University of Life Sciences; Czech Hydrometeorological Institute (ČHMÚ); Faculty of Fisheries and Protection of Waters, University of South Bohemia; University of South Bohemia; Masaryk University; Mendel University in Brno; Technical University of Liberec; Faculty of Science, Charles University; Institute of Experimental Medicine CAS; J. Heyrovsky Institute of Physical Chemistry CAS; Institute of Chemical Process Fundamentals CAS
- Expected collaborations: e.g., infrastructures operating in the field of biological (e.g., collections of biological material, biobanks, museums, Czech Nature Conservation Agency, institutes of the Czech Academy of Sciences), medical, and social sciences.

¹ [Partnership for the Assessment of Risks from Chemicals](#)

