



# Colouring book

Release the stress with  
**ENVRIplus coloring book**  
and learn more about the  
**Environmental Research Infrastructures**

# ENVRIplus

Supporting environmental research  
with integrated solutions

**- *The Earth is our lab***



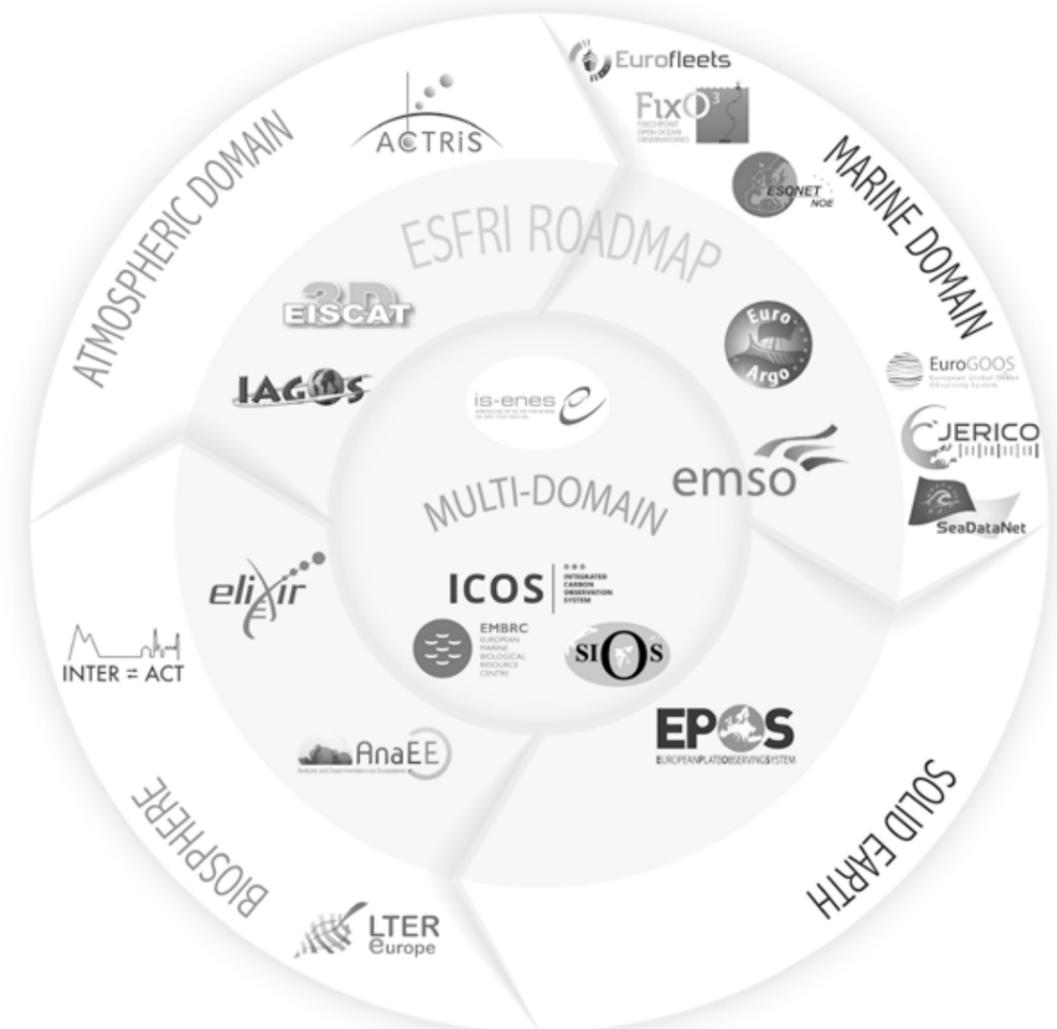
## What is ENVRIplus?

ENVRIplus is a Horizon 2020 project bringing together Environmental and Earth System Research Infrastructures, projects and networks together with technical specialist partners to create a more coherent, interdisciplinary and interoperable cluster of Environmental Research Infrastructures across Europe.

ENVRIplus has six main objectives, called Themes: 1) Technical solutions, 2) Data for Science, 3) Access to Research Infrastructures, 4) Societal Relevance & Understanding, 5) Knowledge Transfer, 6) Communication & Dissemination.

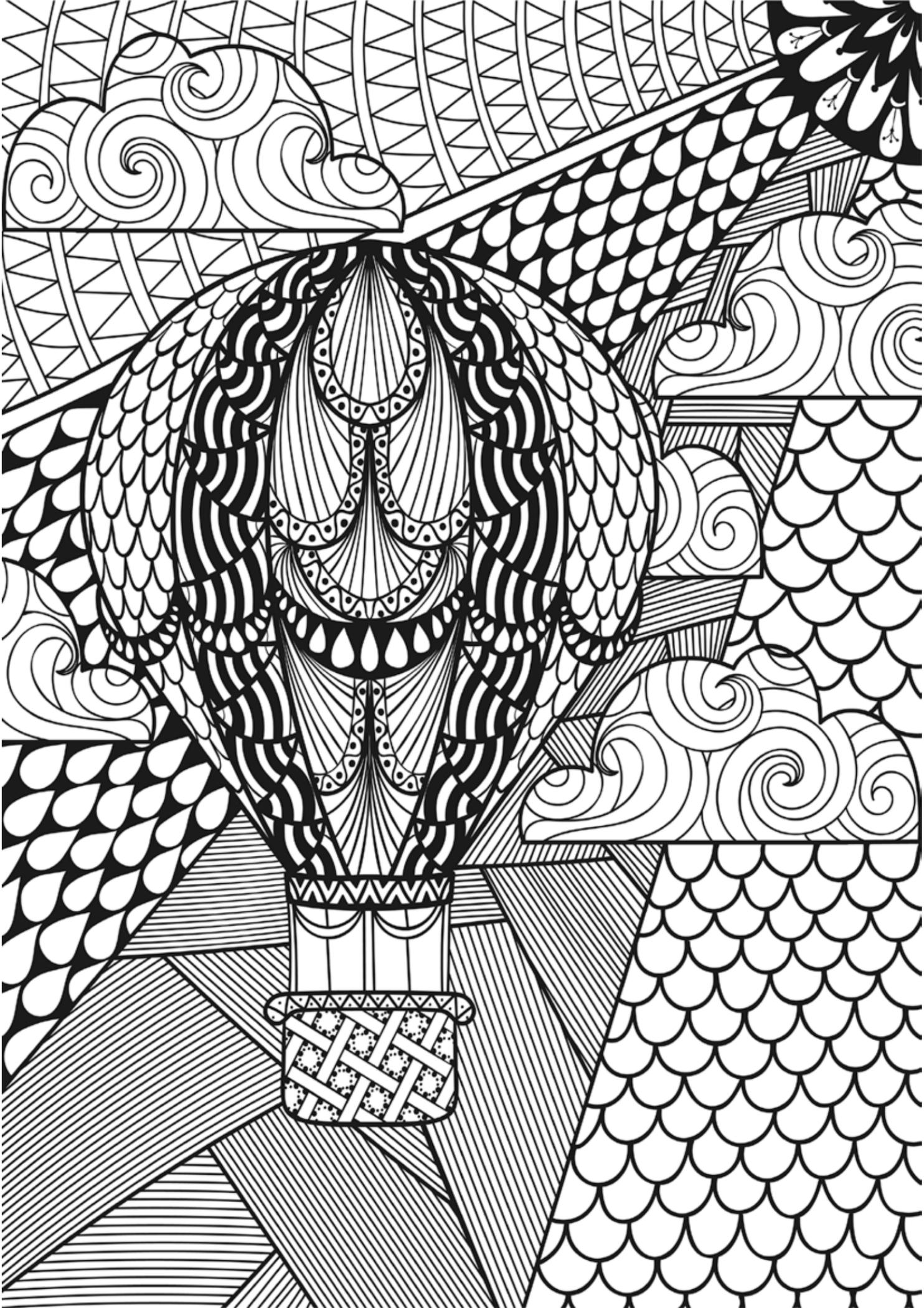
## What are the research infrastructures?

Research infrastructures are facilities, resources or services of a unique nature that have been identified by research communities to conduct top level activities in their fields. They differ from other research facilities by their long-term sustainability, focus on providing the services, and ability to gather the critical mass of people, knowledge and funds.



This coloring book introduces research infrastructures and projects collaborating in ENVRIplus - they are all part of the ENVRI community. They operate within the different domains of Earth system (Atmospheric, Marine, Biodiversity/Ecosystem and Solid Earth) with some of them having multi-domain approach.

*Grab a pencil - Color - Learn*



## ATMOSPHERIC DOMAIN



Key words - Atmospheric aerosols, clouds, trace gases, air quality, climate change  
Type of Research Infrastructure - Distributed  
Website - [www.actris.eu](http://www.actris.eu)

Detecting changes and trends in atmospheric composition and understanding their impact on the stratosphere and upper troposphere is necessary for establishing the scientific links and feedbacks between climate change and atmospheric composition.

ACTRIS is a European Research Infrastructure project integrating European ground-based stations equipped with advanced atmospheric probing instrumentation for coordinated long-term observations of aerosols, clouds, and short-lived gas-phase species. ACTRIS is composed of observing stations, exploratory platforms, instrument calibration centres, and a data centre; it provides 4-D integrated high-quality data from near-surface to high altitude for use in modelling, particularly towards implementation of atmospheric and climate services.

ACTRIS has the essential role to support building of new knowledge as well as policy issues on climate change, air quality, and long-range transport of pollutants.



Key words - Radar observations, incoherent scatter technique, atmosphere, near-Earth space  
Type of Research Infrastructure - single RI with multiple sites  
Website - [www.eiscat3d.se](http://www.eiscat3d.se)

EISCAT\_3D - is a multi-static phased array radar system dedicated to observations of the Earth's polar atmosphere above the northern Scandinavian Peninsula, as well as for support of the solar system and radio astronomy sciences. The radar system is designed to investigate how the Earth's atmosphere is coupled to space but it will also be suitable for a wide range of other scientific targets. The project is run by EISCAT Scientific Association an existing international research infrastructure that is currently funded and operated by research councils and funding organizations in Norway, Sweden, Finland, Japan, China and the United Kingdom and has its headquarters in Kiruna, Sweden. The ESFRI selected EISCAT\_3D for inclusion in the Roadmap 2008 for Large-Scale European Research Infrastructures.



Key words - Atmospheric composition, commercial aircraft, aerosols, clouds  
Type of Research Infrastructure - Distributed  
Website - [www.iagos.org](http://www.iagos.org)

IAGOS is a European research infrastructure which implements and operates a global observation system for atmospheric composition by deploying autonomous instruments aboard a fleet of commercial passenger aircraft. The European consortium behind IAGOS includes research centres, universities, national weather services, airline operators and aviation industry. IAGOS provides freely accessible data for users in science and policy including air quality forecasting, verification of CO<sub>2</sub> emissions and Kyoto monitoring, numerical weather prediction, and validation of satellite products.

It is considered a major contributor to the in-situ component of Copernicus Atmosphere Monitoring Services (CAMS). In combination with its predecessor programs MOZAIC and CARIBIC, which it has now incorporated, IAGOS has provided long-term observational data of atmospheric chemical composition in the troposphere and lower stratosphere since 1994, which it has expanded with new IAGOS-CORE aircraft the first of which was equipped in 2011, and the 7th one now in 2015



## MARINE DOMAIN



Key words - Ocean observing system, float deployment, global array  
Type of Research Infrastructure - Distributed, ERIC  
Website - <http://www.euro-argo.eu/>

The objectives of the **Euro-Argo** are to optimize, sustain and improve the European contributions to Argo and to provide a world-class service to the research (ocean and climate) and operational oceanography (Copernicus Marine Service) communities. Euro-Argo also aims at preparing the next phase of Argo with an extension to deeper depths, biogeochemical parameters and observations of the polar regions. The Euro-Argo research infrastructure comprises a central facility and distributed national facilities. On May 2014, the EC awarded European legal status (ERIC) to the central facility. Euro-Argo aims at developing a capacity to procure and deploy and monitor 250 floats per year and ensure that all the data can be processed and delivered to users (both in real-time and delayed-mode).



Key words - Oceanography, network, regional sea areas  
Type of Research Infrastructure - Distributed  
Website - [www.eurogoos.eu](http://www.eurogoos.eu)

**EuroGOOS**, the European Global Ocean Observing System, is an International Non-Profit Association of governmental agencies and research organisations, established in 1994 within the context of the IOC's Global Ocean Observing System. Today, EuroGOOS has 40 members from 19 European countries providing operational oceanographic services and carrying out marine research. EuroGOOS coordinates six regional operational systems: the Arctic ROOS, BOOS (the Baltic), NOOS (the North West Shelf), IBI-ROOS (the Ireland-Biscay-Iberian area) and MONGOOS (the Mediterranean). Strong regional cooperation enables the involvement of many more partners and countries. Through its ROOSes, working groups and networks of marine operational platforms, EuroGOOS delivers strategies, priorities and standards, towards an integrated European Ocean Observing System, to underpin sustainable blue growth.



Key words - Ocean observations, multidisciplinary, seafloor, air-sea interface  
Type of Research Infrastructure - Distributed  
Website - <http://www.fixo3.eu/>

**FIXO3** - Fixed Open Ocean Observatory network - seeks to integrate European open ocean fixed point observatories and to improve access to these key installations for the broader community. These will provide multidisciplinary observations in all parts of the oceans from the air-sea interface to the deep seafloor. Coordinated by the National Oceanography Centre, UK, FixO3 will build on the significant advances largely achieved through the FP7 programmes EuroSITES, ESONET and CARBOOCEAN. With a budget of 7 Million Euros over 4 years the project has 29 partners drawn from academia, research institutions and SME's. 23 observatories are involved in FIXO3, among them 15 offer Trans-National Access.



Key words - Ocean, data centers, data management, data access, harmonized data  
Type of Research Infrastructure - Virtual  
Website - [www.seadatanet.org](http://www.seadatanet.org)

**SeaDataNet** - Pan-European infrastructure for ocean & marine data management - is a standardized system for managing the large and diverse data sets collected by the oceanographic fleets and the automatic observation systems. The SeaDataNet infrastructure links already 90 national oceanographic data centres and marine data centres from 35 countries riparian to all European seas. The data centres manage large sets of marine and ocean data, originating from their own institutes and from other parties in their country, in a variety of data management systems and configurations. A major objective and challenge in SeaDataNet is to provide an integrated and harmonised overview and access to these data resources, using a distributed network approach. The networking of these professional data centres, in a unique virtual data management system provide integrated data sets of standardized quality on-line.



Key words - research vessels and equipment, transnational access, joint research activities, research fleets, training  
Type of Research Infrastructure - Distributed  
Website - [www.eurofleets.eu](http://www.eurofleets.eu)

**EUROFLEETS2** is the enhancement of EUROFLEETS(1), with the aim of developing a pan-European distributed research fleet infrastructure with common strategic vision and coordinated access to European marine Research Vessels and marine equipment.

EUROFLEETS2 provides fully funded days of ship-time on board 8 Global/Ocean class and 14 Regional class Research Vessels. EUROFLEETS2 also offers access to large equipment such as ROVs and submersibles to carry out ship-based research activities within various fields of marine sciences.

EUROFLEETS2 promotes information sharing, identification of new collaborative frameworks, development of common software tools and innovative integration schemes. The project contributes as well to the training of young marine scientists through dedicated ship-based training courses.



Key words - Coastal observations, pan-European framework, marine research  
Type of Research Infrastructure - Distributed  
Website - [www.jerico-fp7.eu](http://www.jerico-fp7.eu)

Coastal observations are an important part of the marine research. However significant heterogeneity still exists in Europe concerning technological design of observing systems, measured parameters, practices for maintenance and quality control, as well as quality standards for sensors and data exchange. The main challenge for the research community is to increase the coherence and the sustainability of these dispersed infrastructures by addressing their future within a, shared pan-European framework. In the continuity of JERICO(FP7), the objective of **JERICO-NEXT** consists in strengthening and enlarging a solid and transparent European network, integrating key observing platforms as well as developing further the collection of biological data, in particular exploiting synergies with marine biological observatories.

JERICO-Next intends to contribute to the international and global effort on climate change research (GEOSS), to provide coastal data inputs for operational ocean observing and forecasting, and also to answer to some of the needs of the environmental research and societal communities.



Key words - Seafloor, deep sea observations, integration, staff exchange, joint experiments  
Type of Research Infrastructure - Distributed  
Website - [visobservatories.webs.com](http://visobservatories.webs.com)

**ESONET-Vi** is a consortium focusing on deep-sea observatories built upon ESONET (European Seafloor Observatory NETWORK) activities, in complement to the EMSO observatories infrastructures.

The consortium aims at defining a perennial integration at European level of scientists from numerous laboratories using data collected by deep sea observatories.

ESONET-Vi organizes exchange of personal between its members, organizes joined experiments on EMSO observatories, promotes development of new scientific packages on the existing observatories, organizes workshops on data exploitation, management and dissemination, new sensor technologies, inter-comparison of results.

ESONET-Vi allows linking geographically scattered complementary research, industrial and governmental elements in Europe to rapidly transfer and implement research results into science and industrial applications.



## SOLID EARTH



Key words - Plate observations, solid Earth, earthquakes, volcanoes, tsunamis, tectonics, Earth surface

Type of Research Infrastructure - Distributed  
Website - [www.epos-ip.org](http://www.epos-ip.org)

**EPOS** - The European Plate Observing System - is a long-term plan to facilitate integrated use of data, models and facilities from distributed research infrastructures for solid Earth science in Europe. The goal of EPOS is to better understand the active Earth system processes controlling earthquakes, volcanic eruptions, unrest episodes and tsunamis, as well as those driving tectonics and Earth surface dynamics.

EPOS aims to build an efficient and comprehensive research platform for the Earth sciences in Europe relying on new e-science opportunities through the construction of a distributed e-infrastructure (EPOS Core Services). EPOS will allow the Earth Science community to make a significant step forward by developing new concepts and tools for accurate, durable, and sustainable answers to societal questions concerning geo-hazards and those geodynamic phenomena (including geo-resources) relevant to the environment and human welfare.



## ECOSYSTEM / BIODIVERSITY



Key words - Ecosystem, experimental platforms, food security, environmental sustainability

Type of Research Infrastructure - Distributed

Website - [www.anaee.com](http://www.anaee.com)

**AnaEE** - Infrastructure for Analysis and Experimentation on Ecosystems - is a Research Infrastructure for experimental manipulation of managed and unmanaged terrestrial and aquatic ecosystems. It will support scientists in their analysis, assessment and forecasting of the impact of climate and other global changes on the services that ecosystems provide to society. AnaEE supports European scientists and policymakers to develop solutions to food security, climate mitigation, and environmental sustainability, while stimulating the growth of a vibrant bioeconomy. AnaEE's building blocks are in natura and in vitro experimental platforms equipped with the latest technology and sophisticated analytical and modeling platforms coupled to observation sites that will provide the indispensable calibration and validation of datasets throughout Europe.



Key words - Long-term ecosystem research, socio-ecology, in-situ

Type of Research Infrastructure - Distributed in-situ infrastructure

Website - [www.lter-europe.net](http://www.lter-europe.net)

**LTER-Europe** - European Long-term Ecosystem Research network of 25 national LTER networks - is an essential component of world-wide efforts (ILTER) to better understand ecosystems. This comprises their structure, functions and long-term response to environmental, societal and economic drivers. LTER contributes to the knowledge base informing policy and to the development of management options in response to the Grand Challenges under Global Change. Since around 2003 the design of LTER-Europe has focussed on the integration of natural scientific ecosystem research and the human dimension. Besides around 400 LTER Sites (terrestrial, fresh- and transitional waters), LTER-Europe features LTSER Platforms as case study areas for socio-ecological research across European environmental and socio-economic gradients. 25 European national LTER networks form the backbone for the current eLTER H2020 project (2015-2019) and eLTER ESFRI initiative.



Key words - Life science, biological information, living systems

Type of Research Infrastructure - Distributed

Website - [www.elixir-europe.org](http://www.elixir-europe.org)

ELIXIR - European infrastructure for biological information - unites Europe's leading life science organisations in managing and safeguarding the massive amounts of data being generated every day by publicly funded research. It is a pan-European research infrastructure for biological information.

ELIXIR will provide the facilities necessary for life science researchers - from bench biologists to cheminformaticians - to make the most of our rapidly growing store of information about living systems, which is the foundation on which our understanding of life is built.

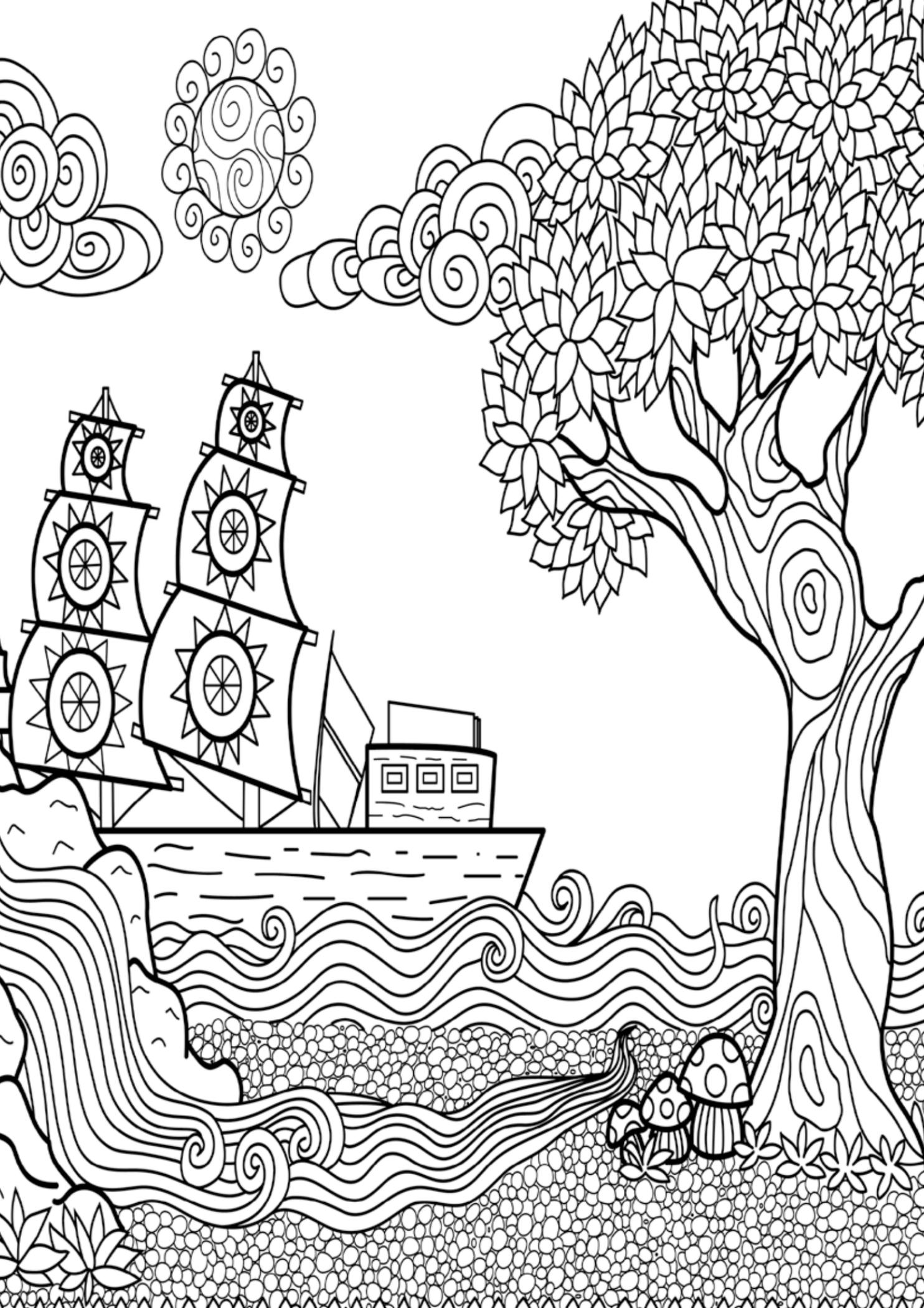


Key words - Arctic, network, terrestrial research, monitoring

Type of Research Infrastructure - Distributed

Website - [www.eu-interact.org](http://www.eu-interact.org)

INTERACT is an infrastructure project under the auspices of SCANNET, a circumarctic network of currently 71 terrestrial field bases in northern Europe, Russia, US, Canada, Greenland, Iceland, the Faroe Islands and Scotland as well as stations in northern alpine areas. INTERACT specifically seeks to build capacity for research and monitoring in the European Arctic and beyond, and is offering access to numerous research stations through the TNA program. The network provides an efficient platform for coordinated research, monitoring and logistics by sharing experiences and coordinating activities and by making the network infrastructures available to specialized scientific networks and organizations as well as to research and monitoring programmes and projects.



## MULTI - DOMAIN



Key words - Greenhouse gas observations, carbon cycle, standardized measurements, data integration, ERIC

Type of Research Infrastructure - Distributed

Website - [www.icos-ri.eu](http://www.icos-ri.eu)

**ICOS RI** provides the long-term observations required to understand the present state and predict future behaviour of the global carbon cycle and greenhouse gas emissions and concentrations. The objectives of ICOS RI are to provide effective access to a single and coherent data set to facilitate research into multi-scale analysis of greenhouse gas emissions, sinks and the processes that determine them, and to provide information, which is profound for research and understanding of regional budgets of greenhouse gas sources and sinks, their human and natural drivers, and the controlling mechanisms.

ICOS RI tracks carbon fluxes in Europe and adjacent regions by observing the ecosystems, the atmosphere and the oceans through integrated national station networks, European central facilities and distributes the GHG data to the users via ICOS Carbon Portal.



Key words - Modelling, climate change, climate variability, Earth system, HPC

Type of Research Infrastructure - Virtual (e-infrastructure)

Website - <https://is.enes.org/>

**IS-ENES2** is the second phase of the I3 infrastructure project for the European Network for Earth System Modelling (ENES). ENES gathers the community working on climate modeling. It contributes to the WCRP international coordinated experiments, used in support of the IPCC assessments.

IS-ENES encompasses climate models and their environment tools, model data and the interface of the climate modeling community with high-performance computing, in particular the European RI PRACE. IS-ENES provides services on models and software tools. It contributes to the international WCRP modelling database (ESGF), to the development of international standards on data and metadata (ES-DOC), and grants access to model data and metadata for the international global (CMIP) and regional (CORDEX) climate modelling experiments.

IS-ENES aims to further integrate the community, foster the development of Earth system models, facilitate high-end experiments and ensure the dissemination of model results for a large user community, including impact studies and climate service providers.



Key words - Svalbard, Arctic, observational network, polar research

Type of Research Infrastructure - Regional/Distributed

Website - [www.sios-svalbard.org](http://www.sios-svalbard.org)

The Svalbard Integrated Earth Observing System (**SIOS**) will be a regional observing system for long-term measurements in and around Svalbard. It will coordinate and develop existing and new research infrastructure in Svalbard, and will set an example for how to systematically construct observational networks in the Arctic.

The joint services offered by SIOS will generate added value for all partners beyond what their individual research can provide. The services will benefit the international polar research community as a whole and will make SIOS the leading polar research infrastructure in the Arctic.



Key words - Seafloor, water column, multidisciplinary across domains, long-term monitoring, ERIC

Type of Research Infrastructure - single RI with multiple sites

Website - <http://www.emso-eu.org/>

**EMSO**-The European Multidisciplinary Seafloor and Water-Column Observatory is a large-scale European Research Infrastructure Consortium (ERIC) of fixed point, deep sea and water-column observatories. The power of EMSO ERIC is in its distributed nature, presently composed of eleven deep ocean observatories and four shallow water test sites connecting research facilities across the oceans of Europe, from the Arctic through the North Atlantic to the Mediterranean and the Black Sea.

EMSO provides pan-European power, communications, sensors, and data infrastructure for continuous, high resolution, near real-time, coordinated interactive ocean observations across a truly multi- and interdisciplinary range of research areas including biology, geology, chemistry, physics, engineering, and computer science; from polar to tropical environments, down to the abyss.

## ENVRIplus serves the entire Environmental Research Infrastructure (ENVRI community)



Studying the environment today  
to solve the challenges of tomorrow  
- the Earth is our lab

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