e-shape solutions: Earth Observation for biodiversity and water management

14 - 15 February 2023
9.30 – 17.00 CET
The Hague - NSO Headquarter
Centre Court

e-shape mySITE – Mobilizing data from long-term in-situ observation facilities

Johannes Peterseil (Umweltbundesamt

e-shape

An event co-organised by

eurisy
ACTING COLLECTIVELY TO BRIDGE SPACE AND SOCIETY

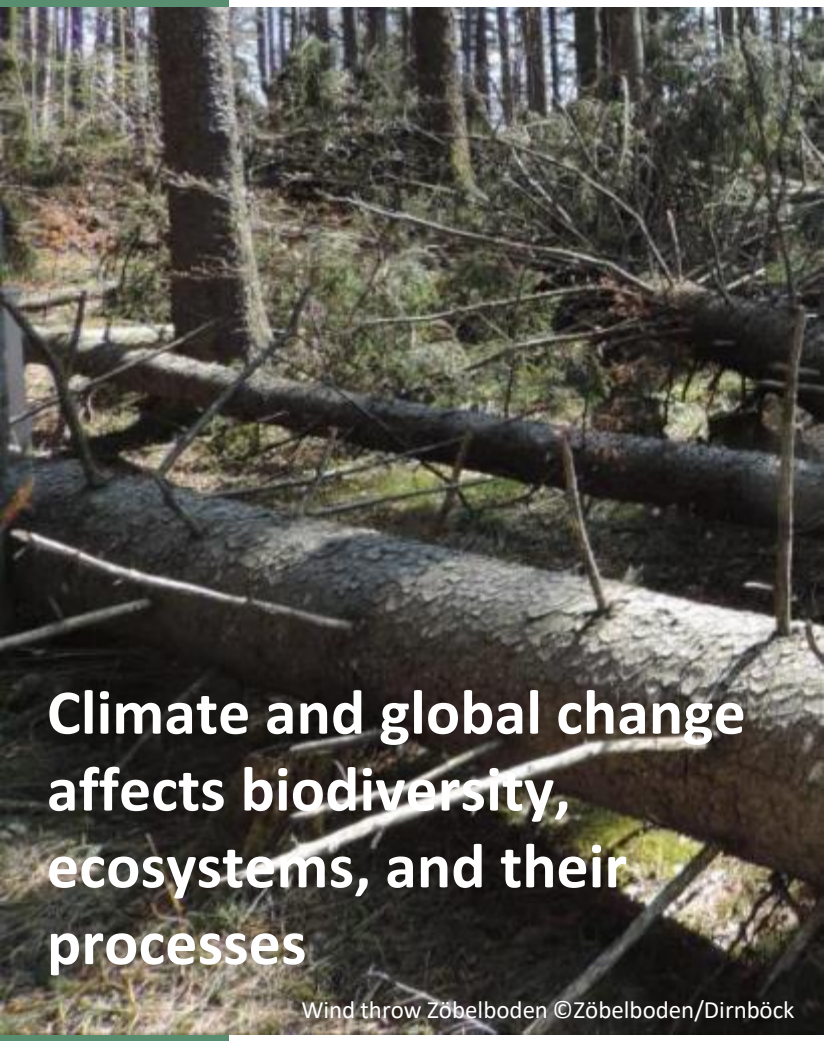
Netherlands Space Office

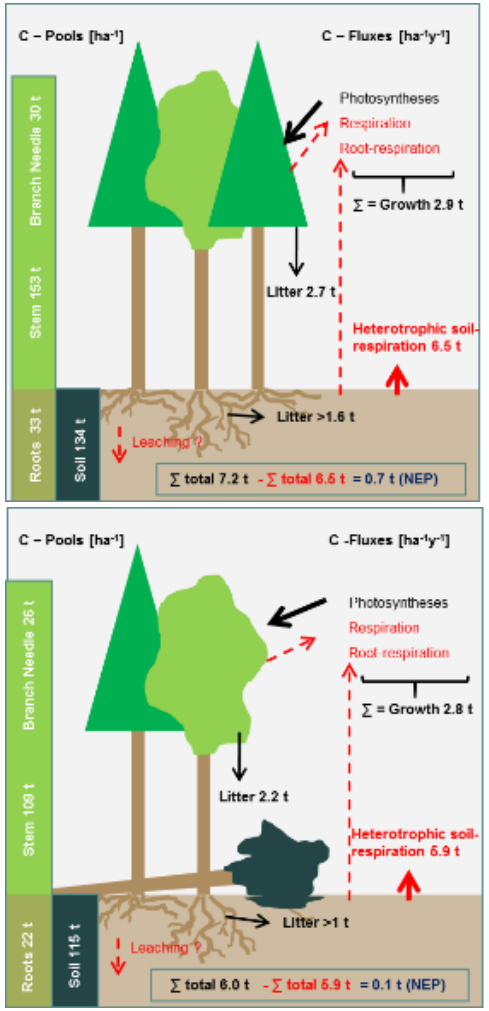
Outline

- Background
- Scope of e-shape pilot mySITE
- Implementation
- Sustainability and Outlook

The e-shape project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 820852

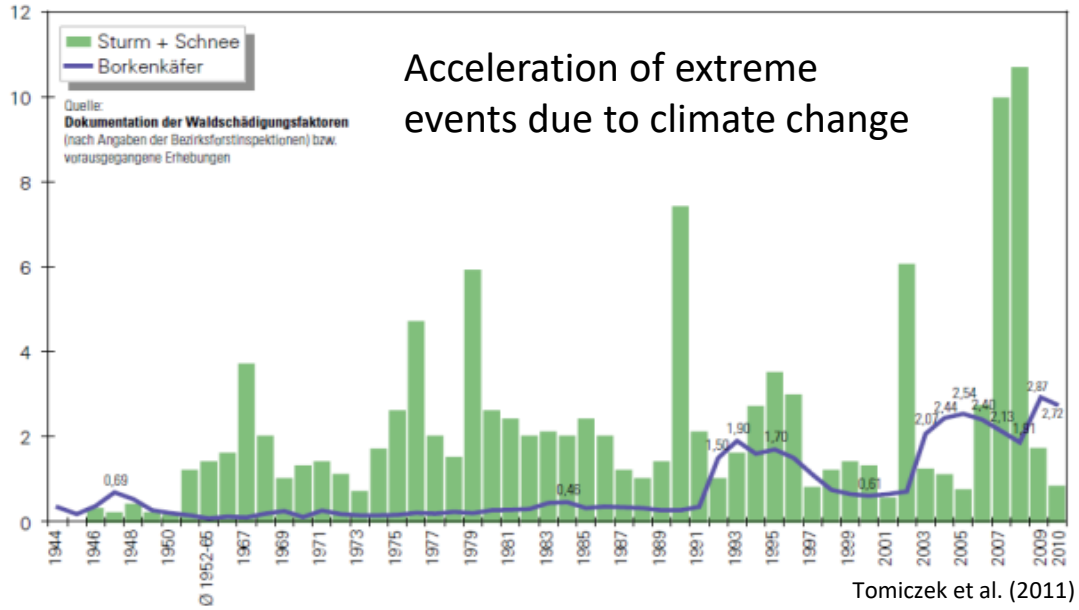
Background





Carbon sink → Carbon source

Kobler et al. (2015, European Journal of Forest Research)

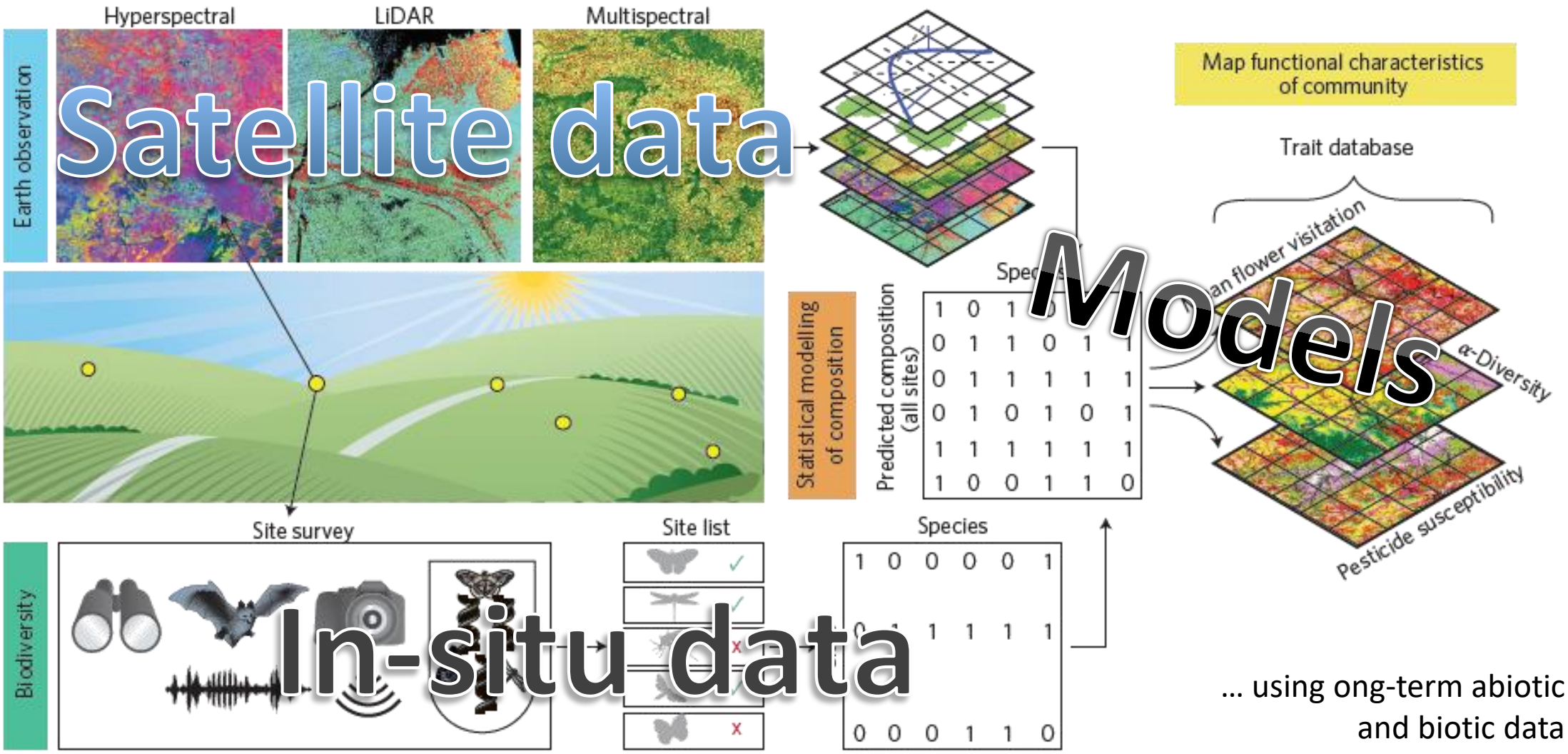


Tomiczek et al. (2011)

Long-term studies and high-quality in-situ data are necessary to understand the dynamics and magnitude of the changes and the possible effects and must be available in a timely manner

Background

… connecting Earth observation to biodiversity and ecosystems



… using ong-term abiotic and biotic data

Bush et al. 2017, Nature Ecology & Evolution

Starting point

In-situ data is available (varying amount of variables and with time series data 10y+)

Occasionally even **spatially continuous data** (phenology, LAI,…)

Gap:

- Site managers have no access/possibility to use EO data or EO enabled biodiversity data (spatially overview / early warning / gap filling)
- In-situ data have different interval, units, monitoring strategy, processing, quality
- Sometimes stored locally and not directly available

DEIMS.org (© TERENO Harz - central german lowland - Hohes Holz)

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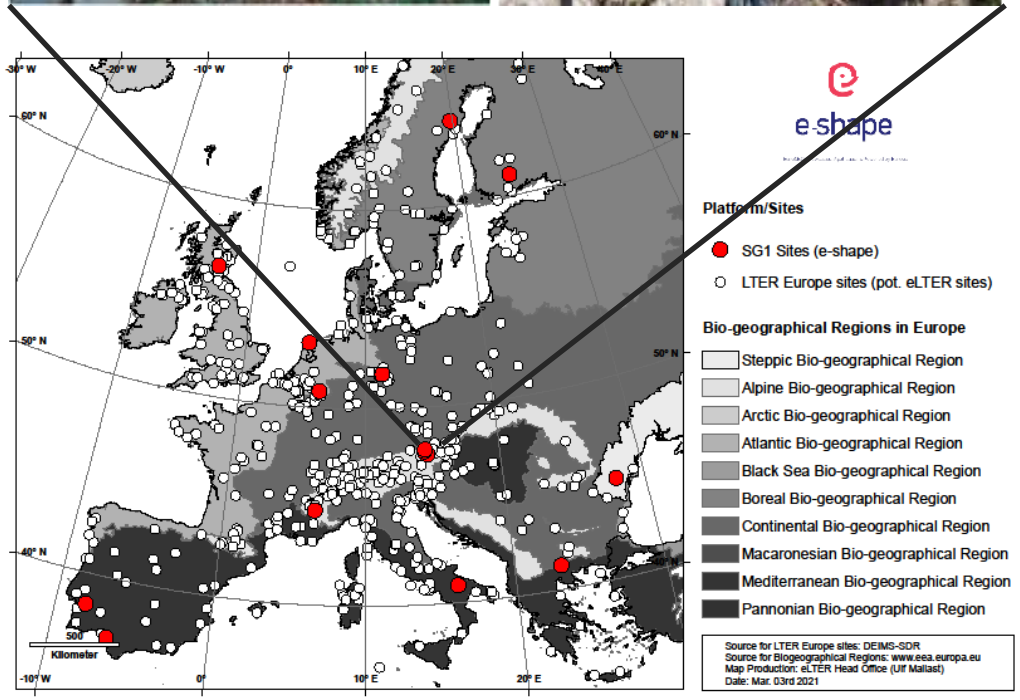
Objectives - mySite

Providing information on targeted areas (e.g. eLTER sites) in order to enable large scale research and assessment

- build and extend **common registry of observations and experimentation** facilities as the basis for the integration of available information and as contribution to the GEO Data Infrastructure
- **visualise in-situ and EO data** providing end user services linking to data provided from in-situ and remotely sensed observations
- **provide information on linked ecosystem indicators** aligned with the EBV framework and streamline targeted observations linking these indicators to the conceptual framework defined and implemented in the myVARIABLE pilot



mySITE Pilot

Building on a software stack enabling to document, publish and visualize in-situ data from long term observations

- Documentation
  - **DEIMS-SDR** https://deims.org
- Data storage
  - EUDAT B2SHARE (https://b2share.eudat.eu)
  - Geoserver
  - eLTER Central Data Node (OGC SOS)
- Visualization and access
  - **EcoSense** https://ecosense.biosense.rs
  - **crocoTile** https://elter-crocotile.datalabs.ceh.ac.uk/

Environmental Assessment Agencies/ European and national conservation agencies

Research Community

Protected Area / Site and Platform Coordinators

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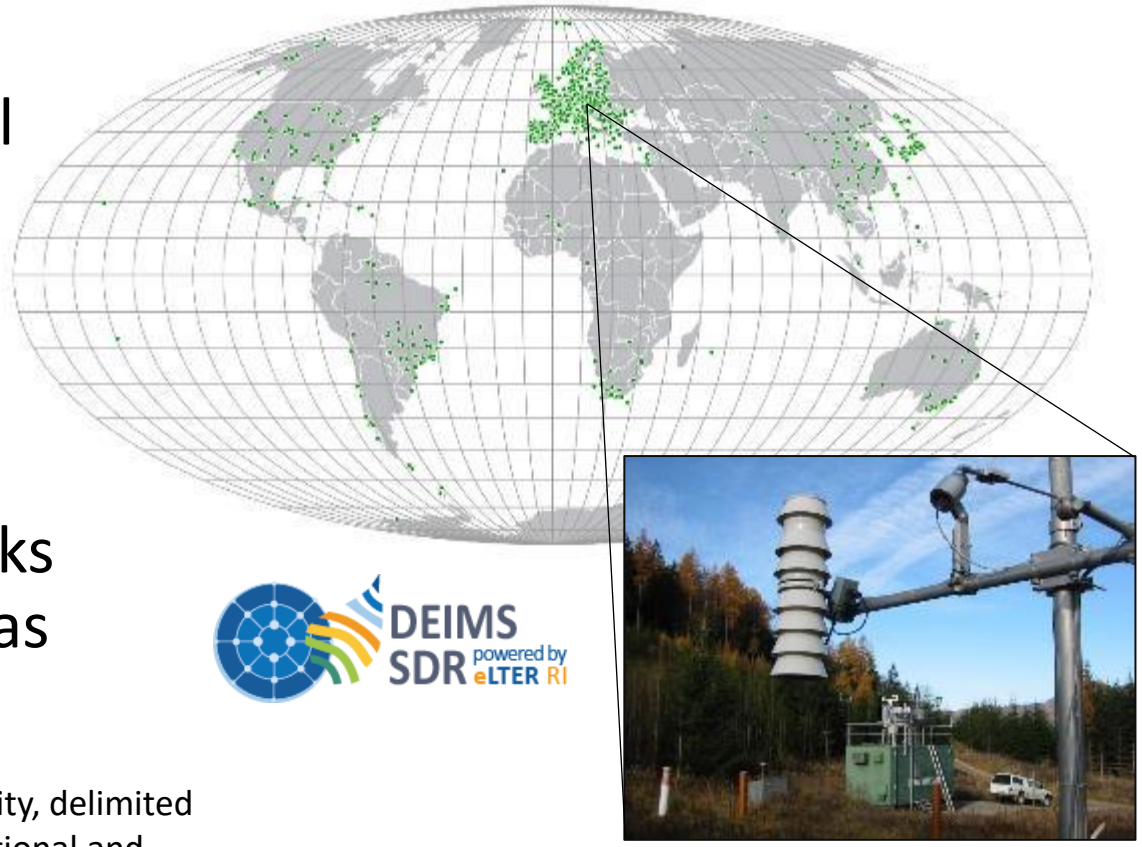
DEIMS-SDR (deims.org)

- A site and dataset registry
- Allows to document environmental monitoring and research sites
- Ca. 1200 sites* registered as of November 2022
- Used in the research networks eLTER, ILTER, national LTER networks and a number of EU projects such as e-shape



LTER Zöbelboden, Austria
https://deims.org/8eda49e9-1f4e-4f3e-b58e-e0bb25dc32a6

* A site is defined as an in-situ observation or experimentation facility, delimited in space, but varying in size and complexity of the internal organisational and observational design, for the collection of data covering e.g. biogeophysical, biotic or socio-ecological characteristics and processes (Wohner et al., 2019)

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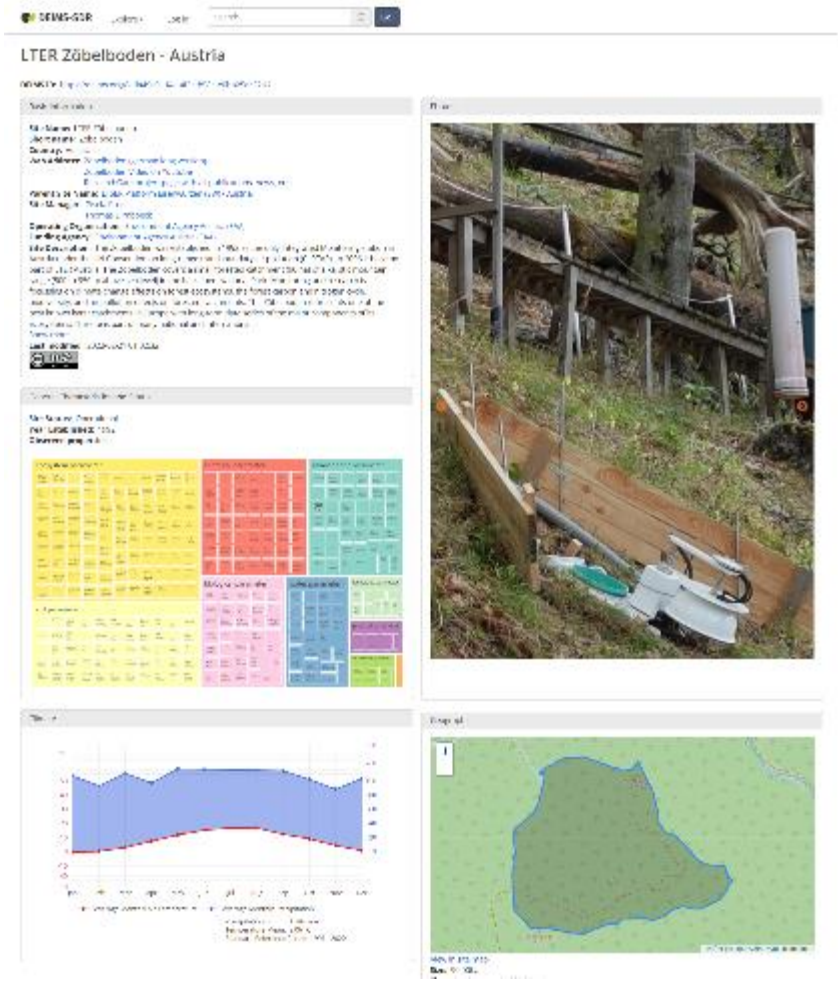
DEIMS-SDR (deims.org)

- Provides **information** about observed properties, geographic information, contact details and environmental characteristics
- Issues **persistent identifiers** for sites (DEIMS.ID)
  - Suitable for references in reports, papers, datasets, etc.
  - DEIMS.ID stays active even after a site is closed
- All of that information is available through machine-readable endpoints
- **APIs (WMS/WFS/REST-API)** in different formats (**GeoJSON, Shapefile, KML, …**) and used for cookie-cutting of remote sensing data



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DEIMS-SDR (deims.org) - locations

- Adding “locations” to DEIMS-SDR and linking them to sites – reference areas for observation and analysis
- Link is displayed both in human-readable form and in the REST-API
- (Current) Types of Locations:
  - Equipment Location
  - Hydrological Catchment
  - Sampling Area
  - Socio-ecological reference area
  - Air Shed
  - Model Area
  - **Remote Sensing Analysis Area (e-shape)**
- Building extraction workflows, e.g. crocoTile (https://elter-crocotile.datalabs.ceh.ac.uk/)

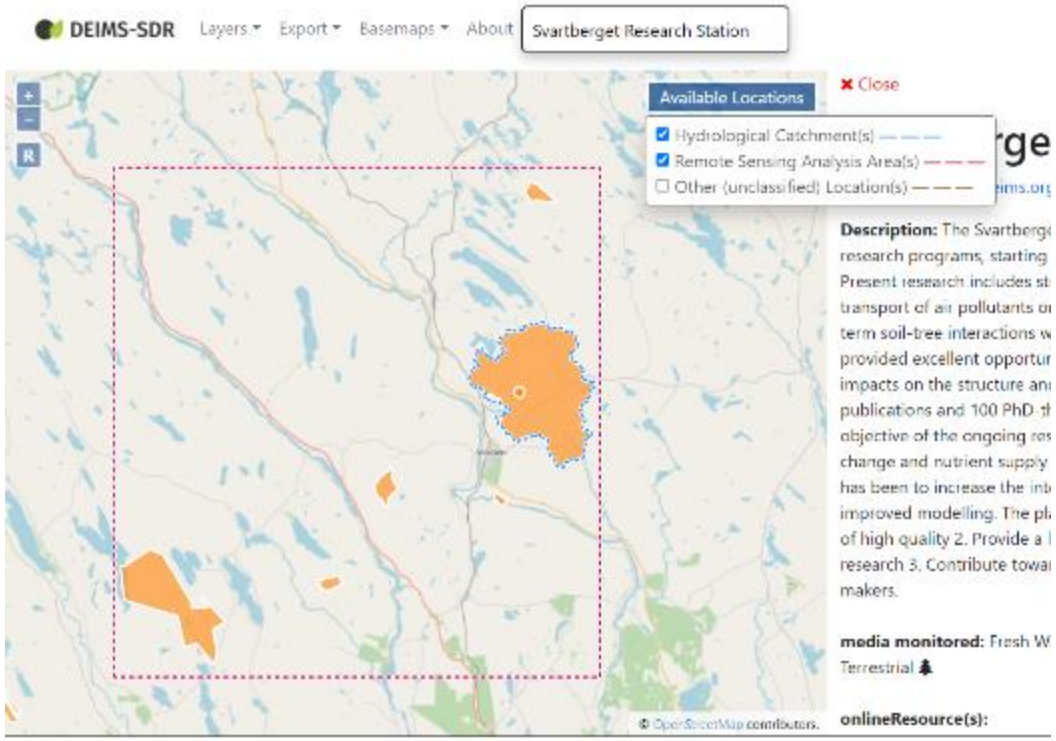

Fig. Boundaries and locations of Svartberget as displayed on the DEIMS-SDR site map (deims.org/map)

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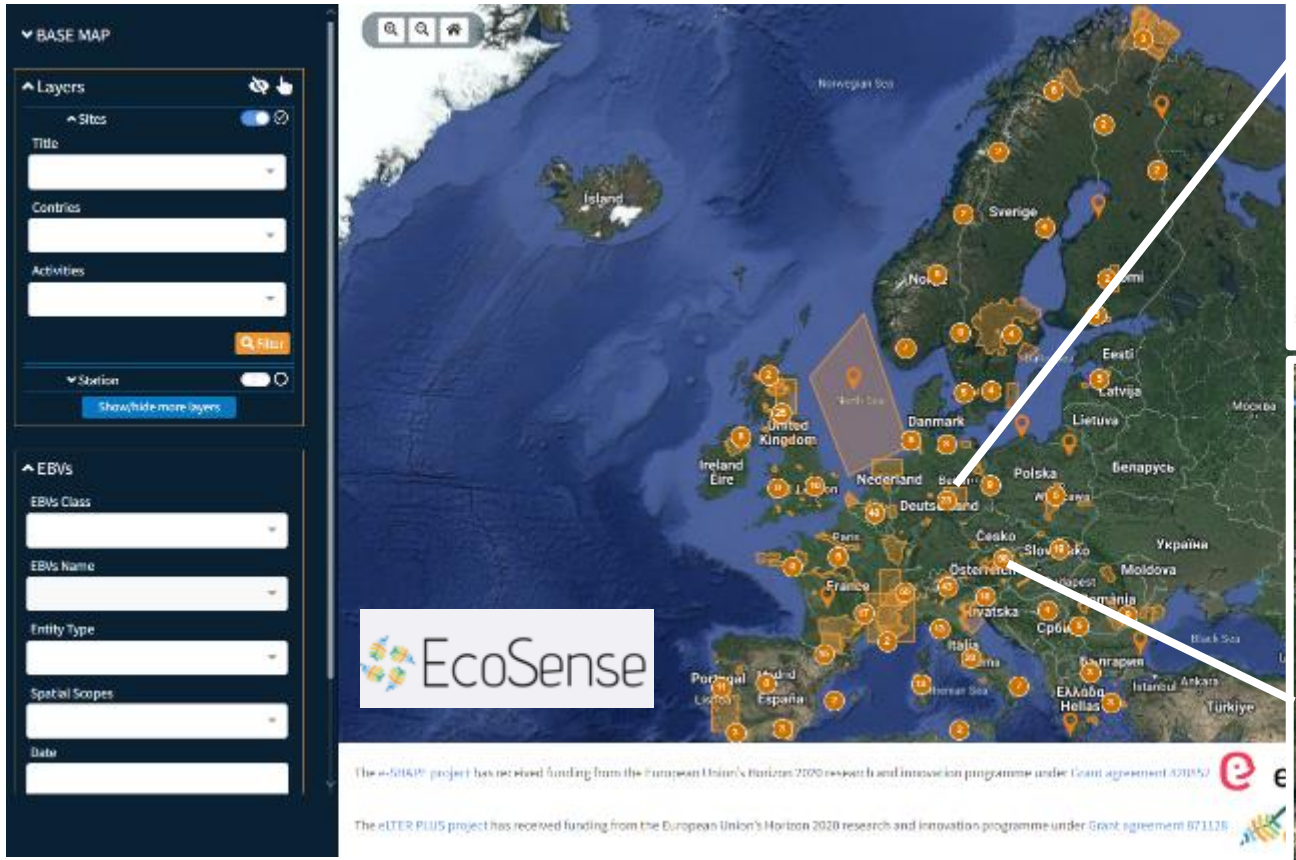
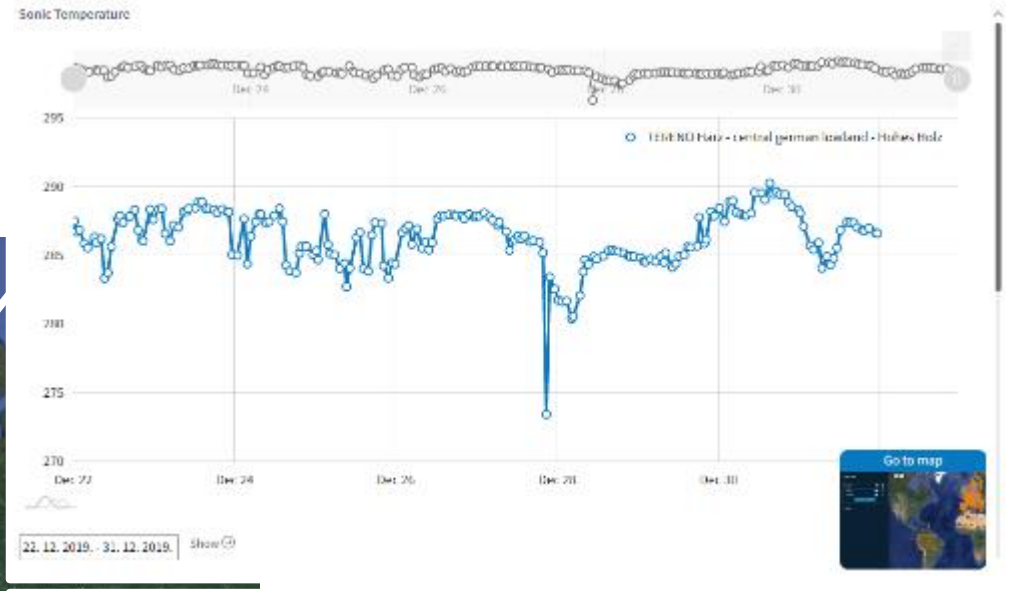
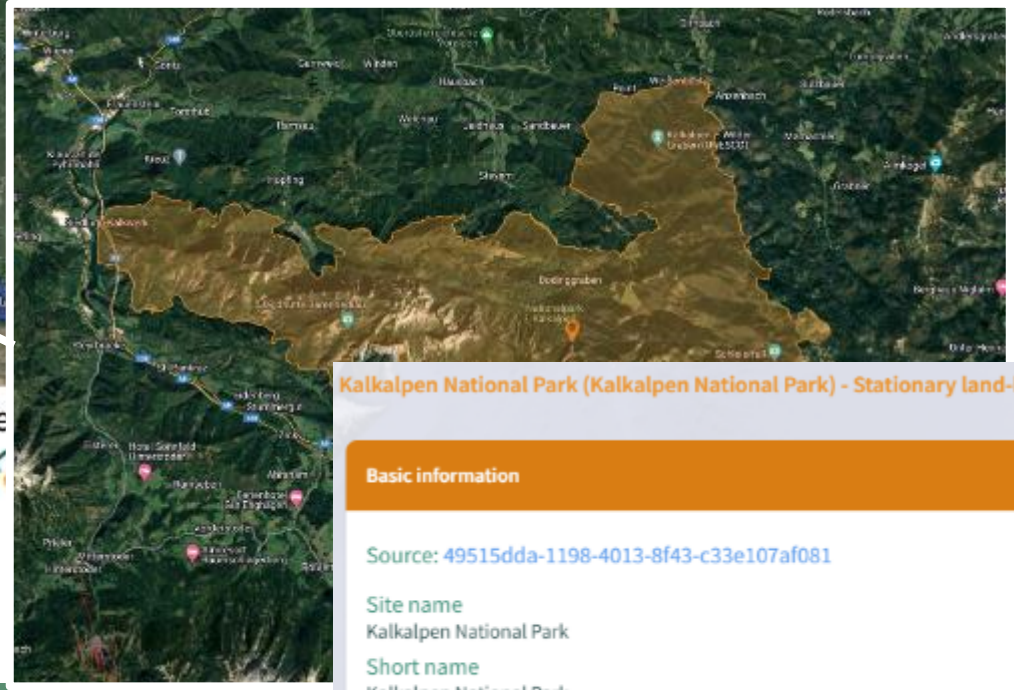
EcoSense - visualisation





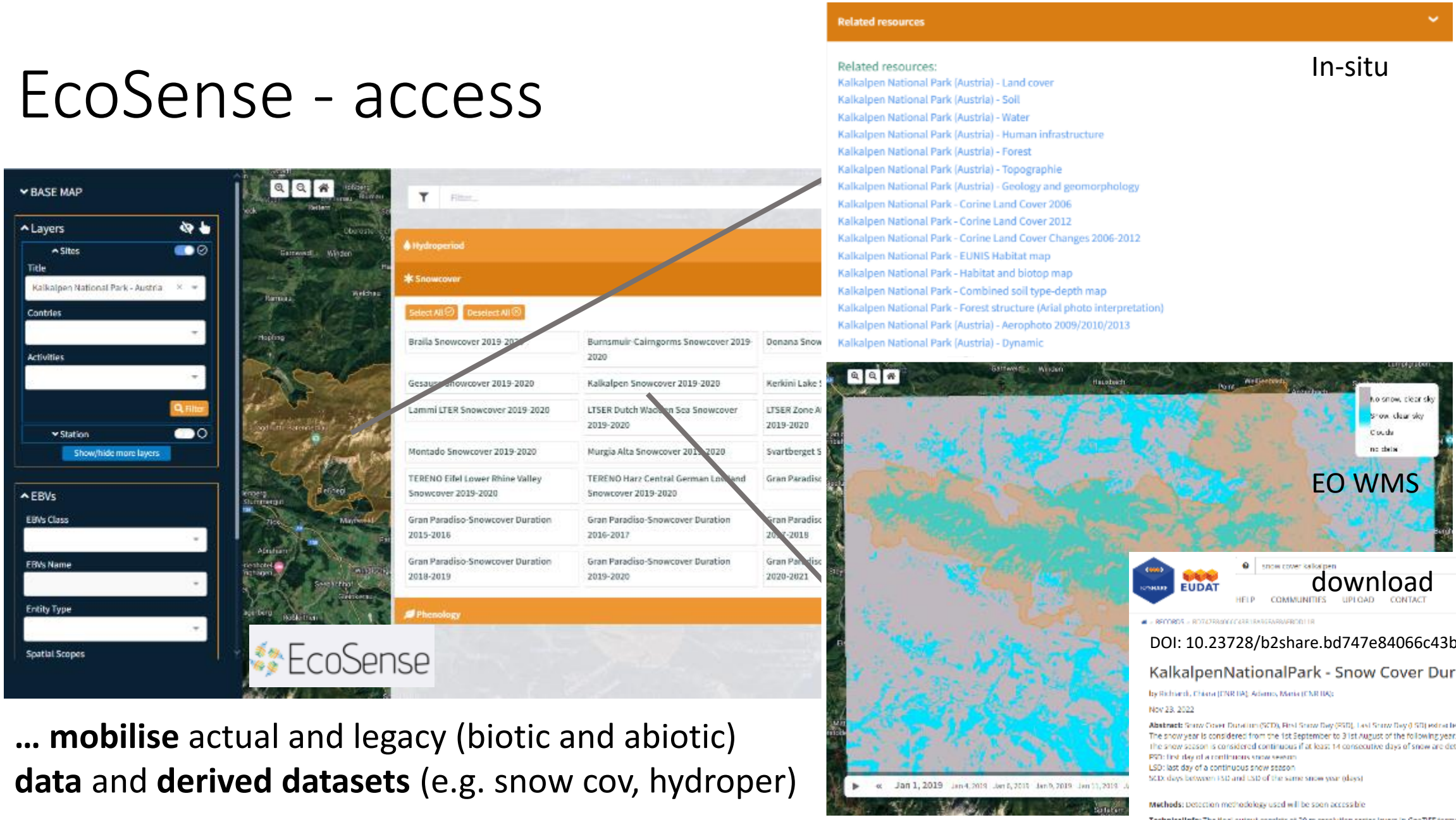


Combine **key components** to provide value to stakeholders and users through a services workflow

mySITE

EcoSense - access

In-situ



… mobilise actual and legacy (biotic and abiotic) **data** and **derived datasets** (e.g. snow cov, hydroper)

mySITE

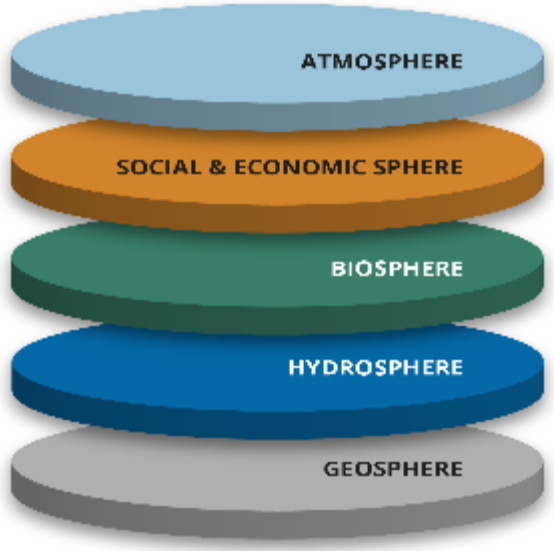
Sustainability

- **eLTER RI** is a **site based, long term observation** and **research**, focusing on a **whole system approach**, and covering a broad bio-geographic range
- … addressing the **key drivers of change** for the major European ecosystems and socio-ecological systems and how does these changes affect **ecosystem functions, biodiversity and ecosystem services**
- … adopted
  - **DEIMS-SDR** as main catalogue of eLTER facilities
  - **EcoSense** as component for visualisation
- … fostering
  - further **mobilisation** of biotic and abiotic data and enhancing the **FAIRness**

To enable cross-disciplinary whole system research

eLTER RI provides

- Basic site infrastructure
- Data nodes integrating
  - Baseline Standard Observations (“EEVs”)
  - Multiple other data sources (RS, modelling)
- Access to data & sites
- Central service portfolio



eLTER Site categories differ in their focus, but cover all system layers

Continuous long-term operation of ~200 innovative hubs

Summary and lessons learned

Data mobilisation from long-term observation sites is tedious, including legacy data

Foster the communication between EO sector and ground observational networks (eLTER, ICOS, GEO-BON, etc.)

Harmonisation and standardisation, as well as **rich documentation** of data needs to be further addressed – needs a tight communication with data providers

Actively **engage the ground observational networks sector** in larger activities (e.g. Copernicus Land Monitoring, ESA Carbon Science Cluster, ESA FutureEO programme etc.

Capacity building is needed – i.e. help/support to those who want to open their data but don't have the resources, knowledge, time

Actively support the communication with **dedicated calls that target the co-design, boost the sustainability, and data mobilisation**

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Thank you!

www.e-shape.eu