# **Developing eLTER as pan-European research infrastructure to support EO cal/val requirements**

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## eLTER Mission...extract

[...] The pan-European, in-situ research infrastructure will serve multiple scientific communities with high-level central facilities and distributed, wellinstrumented eLTER Sites and socio-

ecological eLTSER Platforms [...]

# 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 DESIGN PREPARATION LEGAL ENTITY Implementation (Construction) Central Services NRI Phase II NRI Phase II Operation

#### eLTER construction timeline



## Stakeholder support

**Political Level** 20 countries (EoS)

Institutional Level

26 national Networks165 research organisations



## **Geographical distribution of eLTER sites**

- Well distributed across Europe covering various biogeographical regions, and various gradients etc.
- Various land uses/land covers
- **Different** terrestrial, freshwater and transitional water **site foci**
- Level of observed variables is not identical for all sites





# eLTER Standard Observations framework



#### **Guiding principles**

- 1. High sensitivity to system changes
- 2. Supporting site comparisons and clustering
- 3. Critical relevance for modelling
- 4. Simplicity (Parsimony)

"A design too complex increases the risk of premature demise." (Henry Janzen, 2014)



## **eLTER Standard Observations**



# **Developing eLTER to support the Earth Observation data validation**

The in-situ measurements should \*

- follow an un-broken processing chain that utilize generally adopted standards
- Where measurement accuracy and uncertainty is routinely determined and documented.
- be long term and with known lifecycle, described with rich metadata
- managed and shared following the FAIR-principles.



EO validation suitability evaluation for in-situ measurements



# Linking SO to EO validation requirements

- In-Situ data requirements of the Copernicus Global, Pan European and Local components
  - Discussion European Environmental Agency (EEA), coordinating the Copernicus In-situ component
  - GBOV (Ground-Based Observation for Validation): A
     Copernicus service for Validation of Vegetation Land Products
- Validation protocols and tools by the Committee on Earth Observation Satellites (http://calvalportal.ceos.org/ and https://lpvs.gsfc.nasa.gov/ )
- Group on Earth Observation (GEO) and H2020/HEU Projects (e.g. CCVS; COINS; EOMORES)





### Identified SO variables with relevance for EO product validation

ATMOSPHERE SOCIO-ECONOSPHERE BIOSPHERE HYDROSPHERE GEOSPHERE WILL SERVE eLTE MANY NE SARCH COMMUNITIES

Standard Observation	SO variables
Soil inventory – geological characterization	soil texture, soil hydraulic conductivity, bulk density, organic matter, soil type classification, geological site characterization - on-time measurement
Soil temperature	Soil temperature
Soil chemical and physical characteristics	organic C concentration, CEC Total nitrogen, total phosphorus, plant available N and P, pH, soil base saturation, bulk density (per horizon)
lce cover	Ice cover stagnant waters
Snow cover and depths	Snow cover, depth
Soil water content	Soil water content



## **Summary**

- 250+ sites with harmonized and standardized observations (Method, Workflow, Metadata, Data Access)
- Wide spatial distribution and coverage of various biogeographical regions and habitats
- Long-Term (several decades), guaranteed sustainability of in-situ data
- Possibility to co-design protocols accounting for needs/requirements of the RS community





Integrated European Long-term Ecosystem, critical zone and socio-ecological Research

**K**eLTER

Thank you!

eLTER folks in the EuroGEO workshop Michael Mirtl, Ulf Mallast, Saku Anttila (at least)

Interested to hear your ideas, requirements, comments !

Filling a critical gap for top-class science at the continental scale

# **Category-2 SO variables with relevance for EO product validation**

Land surface temperature [K, °C] Land surface emissivity Direct/diffuse thermal radiation [W m<sup>-2</sup>]\* Surface reflectance or Top of canopy reflectance [] \* Fire/ burned area Surface albedo Soil BRF Vegetation structure \*\* Gross and net primary productivity  $[q C m^{-2} yr^{-1}]$ 

Canopy Chlorophyll content Habitats and biotopes / vegetation ground measurements Atmospheric properties Direct/diffuse thermal radiation [W m-2] Plankton pigments (chlorophyll a, phycocyanin) Water secchi depth / water transparency Algae blooms Total suspended matter Water colour/reflectances

