

Standard Observations protocols PLUS WP03, T3.3

eLTER PLUS Consortia meeting


Theresa Lumpi

Task 3.3 co-ordinator
SLU, Sweden

June 6th, 2024

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

SO protocol session

Duration	Agenda topic	Presenter
5	Introduction and welcome	James/Theresa
20	Overview of the SO definition process, and the current status of development work + questions	James/Theresa
10	Metadata and SO protocols presentation + questions	Alessandro
10	SO costs app presentation + questions	Jaana
5	Short break	
30	Break into groups by sphere for discussion <ul style="list-style-type: none">- “Problem SOs” and finding solutions- Metadata key elements- Role of central services	Sphere leads if present
10	Round up, next steps	James/Theresa

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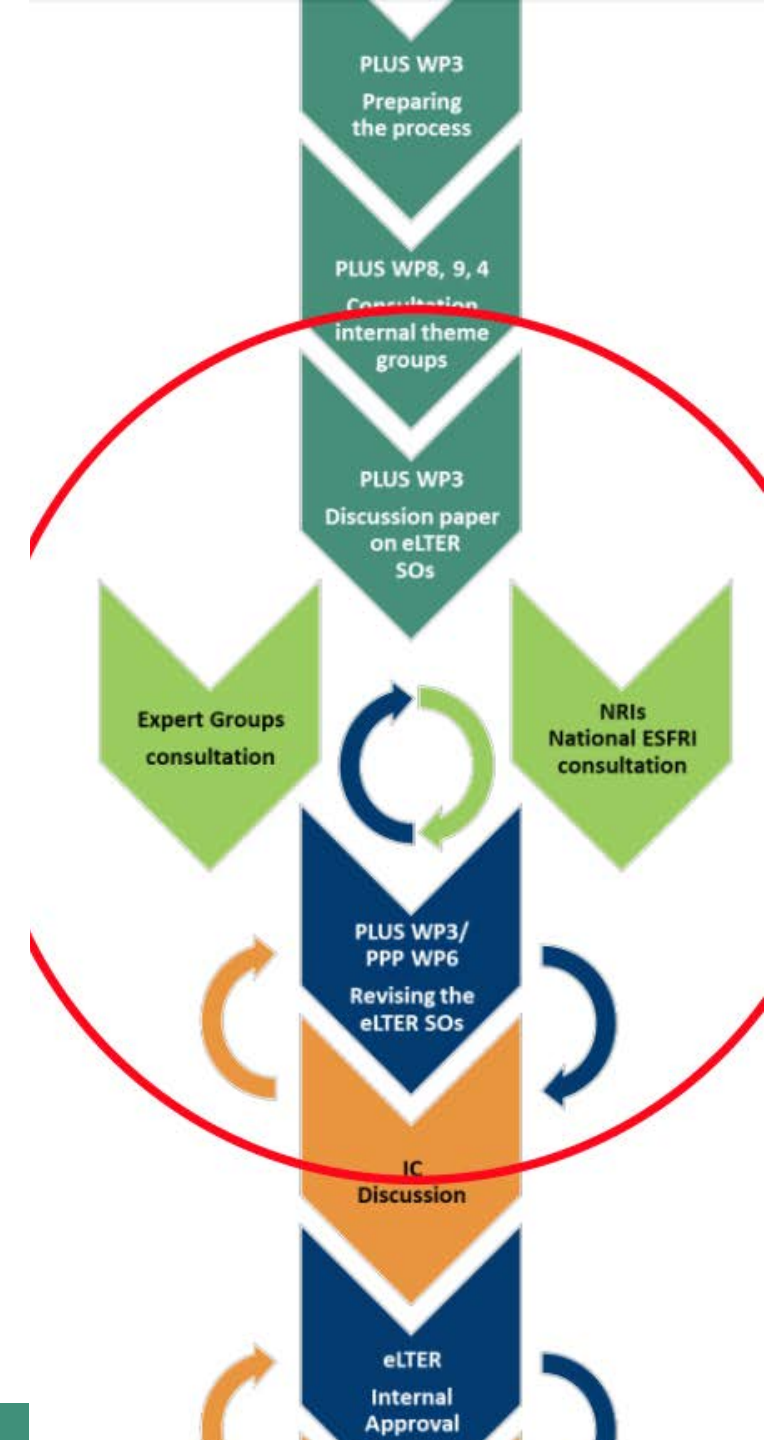
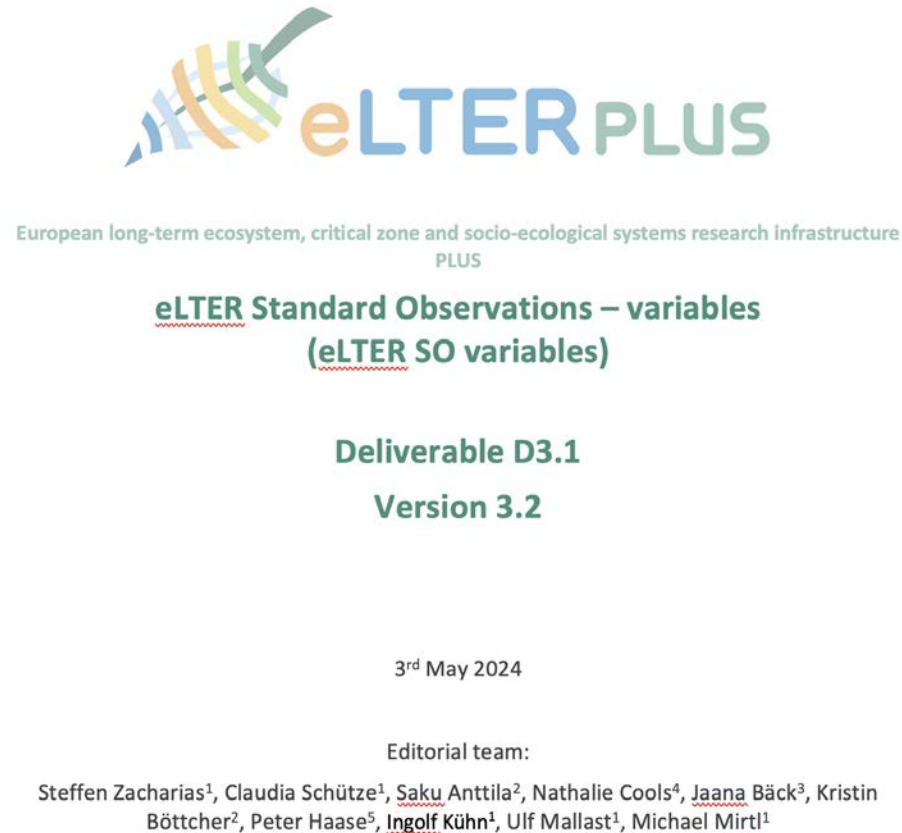


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SO development so far

Long process already to select the SOs:

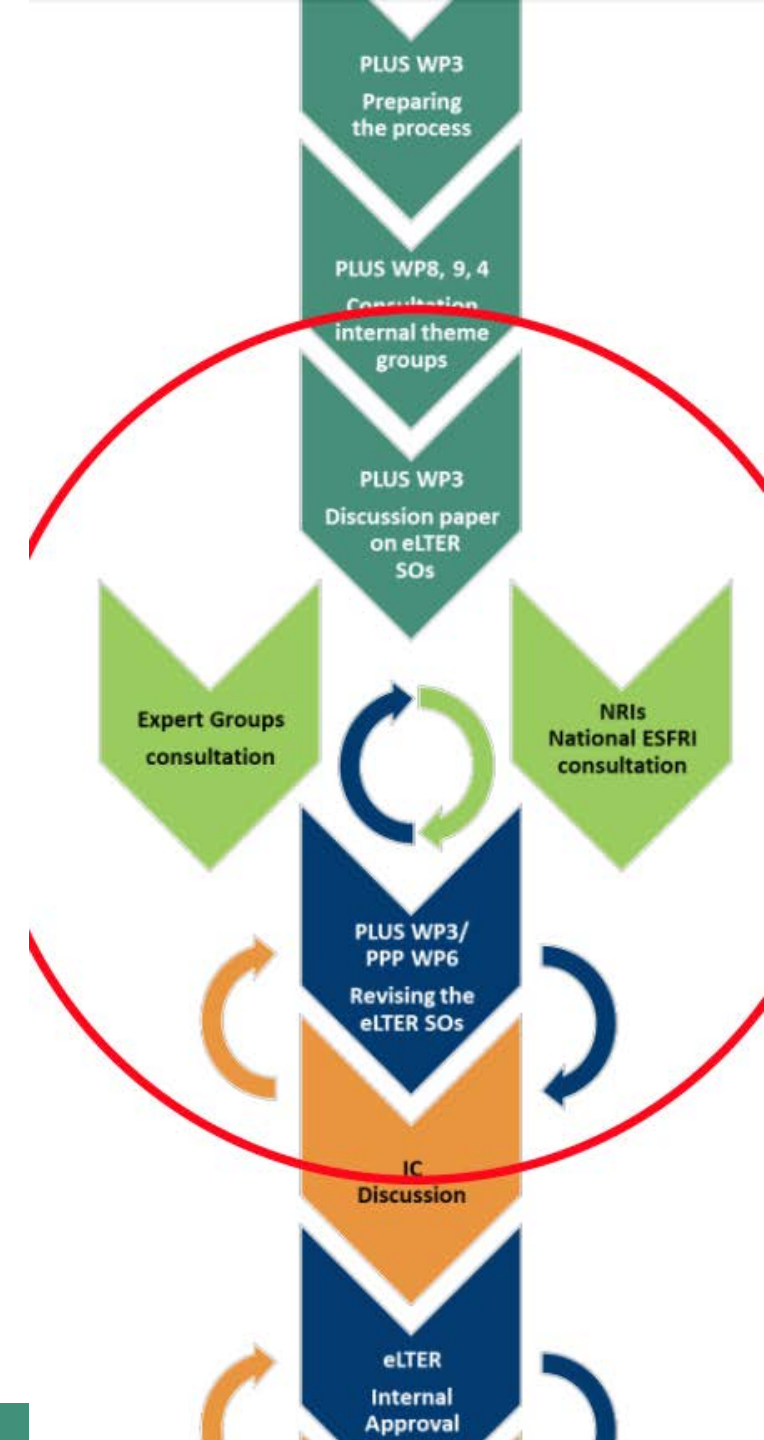
- > consulting with various stakeholders and user groups was started in 2020
- > Rome meeting 2023: final list of SOs
- > ongoing revisions



SO development so far

Selection criteria for SOs

- Representation of key elements of the ecosystem
- Critical relevance for understanding the coupled human-nature system
- High sensitivity to environmental changes
- Critical relevance for environmental modelling
- Cost efficiency
- Operative feasibility



Sphere leads

Atmosphere	Risto Taipale (University of Helsinki)
Biosphere	Peter Haase (Senckenberg Research Institute)
Geosphere	Jérôme Gaillardet (Institut de Physique du Globe de Paris)
Hydrosphere	Marie-Noëlle Pons (University of Lorraine)
Sociosphere	Veronika Gaube, Bastian Bertsch-Hörmann (BOKU - University of Natural Resources and Life Sciences, Vienna)

- > Support with identifying the main protocol author
- > Coordinating the writing process with support from SLU
- > First-level review/ quality check for protocols

SO recruitment process

Nov-Dec 2023:

SLU coordination reached out to experts who have previously been involved in the SO development (discussion paper, Rome workshop...)

Jan-May 2024:

Further calls for participation across the eLTER network (email lists)

**More volunteers are still welcome, particularly for unfilled SOs!
More info will follow in the next slides...**

SO protocols – adopted from sister RIs

General idea >> protocol should be adopted from existing RIs as much as possible

Sister RI	Number of co-located eLTER sites
ICOS	38
SITES	10
ICP Forests	114
ICP Waters	15
ICP Integrated Monitoring	14
ACTRIS	3
Lifeplan	5
Global Cryosphere Watch (GCW)	12



SO protocols – status

Atmosphere

53% in progress

Help needed for

- > vegetation phenology
- > Leaf area index
- > belowground biomass



Sphere	SO ID	Standard Observation	No Activity	Draft started	1st Draft ready
Atmosphere	SOATM_027	Meteorological data			
Atmosphere	SOATM_028	Radiation			
Atmosphere	SOATM_098	Ground heat flux			
Atmosphere	SOATM_103	Atmospheric deposition in precipitation			
Atmosphere	SOATM_108	Dry deposition of N-components			
Atmosphere	SOATM_176	CO2 flux and concentration, Latent heat flux, Sensible heat flux - Eddy Covariance			
Atmosphere	SOBIO_015	Vegetation phenology and Leaf Area Index – European scale			
Atmosphere	SOBIO_016	Vegetation phenology – site scale			
Atmosphere	SOBIO_023	Vegetation aboveground biomass - forest (site scale)			
Atmosphere	SOBIO_024	Vegetation aboveground biomass – non-forested sites			
Atmosphere	SOBIO_025	Leaf area index - forests (site scale)			
Atmosphere	SOBIO_026	Leaf area index – non-forested sites			
Atmosphere	SOBIO_090	Gross primary production			
Atmosphere	SOBIO_091	Transpiration (plants)			
Atmosphere	SOBIO_092	Aboveground litterfall - forests			
Atmosphere	SOBIO_093	Belowground biomass - terrestrial			
Atmosphere	SOBIO_095	Leaf C, N, K, P, Ca, Mg, Mn content - terrestrial			
Atmosphere	SOBIO_140	Vegetation structure - site scale			
Atmosphere	SOBIO_177	Tree growth			

SO protocols – status

Atmosphere

53% in progress

Help needed for

- > vegetation phenology
- > Leaf area index
- > belowground biomass

Note:

For all spheres we know there is work going on that hasn't made it into the Google Drive yet, so the situation is better than it looks (but still some real gaps!)

Sphere	SO ID	Standard Observation	No Activity	Draft started	1st Draft ready
Atmosphere	SOATM_027	Meteorological data			
Atmosphere	SOATM_028	Radiation			
Atmosphere	SOATM_098	Ground heat flux			
Atmosphere	SOATM_103	Atmospheric deposition in precipitation			
Atmosphere	SOATM_108	Dry deposition of N-components			
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Atmosphere	SOBIO_026	Leaf area index – non-forested sites			
Atmosphere	SOBIO_090	Gross primary production			
Atmosphere	SOBIO_091	Transpiration (plants)			
Atmosphere	SOBIO_092	Aboveground litterfall - forests			
Atmosphere	SOBIO_093	Belowground biomass - terrestrial			
Atmosphere	SOBIO_095	Leaf C, N, K, P, Ca, Mg, Mn content - terrestrial			
Atmosphere	SOBIO_140	Vegetation structure - site scale			
Atmosphere	SOBIO_177	Tree growth			

SO protocols – status

Biosphere

71% in progress

Help needed for

> Pollen and Spores

Sphere	SO ID	Standard Observation	No Activity	Draft started	1st Draft ready
Biosphere	SOBIO_014	Flying insects		Yellow	
Biosphere	SOBIO_017	Vegetation composition (mainly species level+abundance)			Green
Biosphere	SOBIO_018	Birds, bats, frogs, insects using acoustic recording		Yellow	
Biosphere	SOBIO_019	Pollen and spores	Red		
Biosphere	SOBIO_021	eDNA Water		Yellow	
Biosphere	SOBIO_022	eDNA soil	Red		
Biosphere	SOBIO_096	Chlorophyll a (benthic, pelagic) - standing, running waters			Green

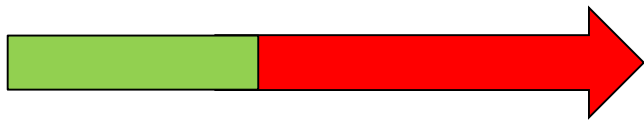


SO protocols – status

Geosphere

40% in progress

Sphere	SO ID	Standard Observation	No Activity	Draft started	1st Draft ready
Geosphere	SOGEO_001	Soil inventory – pedological/geological characterization			
Geosphere	SOGEO_003	Soil chemical and physical characteristics			
Geosphere	SOGEO_048	percolation/infiltration - soil			
Geosphere	SOGEO_155	Sediment (aquatic and marine) inventory			
Geosphere	SOGEO_167	Soil water chemical characteristics			



SO protocols – status

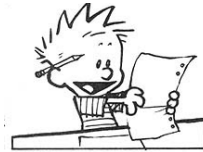
Hydrosphere
100% in progress



Sphere	SO ID	Standard Observation	No Activity	Draft started	1st Draft ready
Hydrosphere	SOHYD_004	Profiles of physical and chemical waters characteristics - surface water (standing)			
Hydrosphere	SOHYD_005	Physical and chemical water characteristics - surface water (running waters)			
Hydrosphere	SOHYD_006	Physical and chemical water characteristics - groundwater			
Hydrosphere	SOHYD_010	water level - surface water (running water)			
Hydrosphere	SOHYD_011	Ice cover/thickness (standing and transitional water)			
Hydrosphere	SOHYD_012	Snow cover and depths			
Hydrosphere	SOHYD_058	Stable isotopes (18O, 2H) - standing, running waters			
Hydrosphere	SOHYD_059	Stable Isotopes (18O, 2H) - groundwater			
Hydrosphere	SOHYD_062	Major ion concentrations: Cl, SO4, Br, Na, K, Mg, Ca, B - groundwater			
Hydrosphere	SOHYD_064	Nutrient concentration: TP, SRP, TDN, NO3, NO2, NH4, DOC, DIC - groundwater			
Hydrosphere	SOHYD_067	Micropollutants: non-target screening [~1000 substances] - running waters			
Hydrosphere	SOHYD_164	glacier front variation			
Hydrosphere	SOHYD_165	glacier mass balance			
Hydrosphere	SOHYD_166	glacier area			
Hydrosphere	SOHYD_168	Soil water content/soil temperature			
Hydrosphere	SOHYD_169	Nutrient concentration: NO2, NH4, DOC, DIC - running waters			
Hydrosphere	SOHYD_170	Profiles of nutrient concentration: NO2, NH4, DOC, DIC - standing waters			
Hydrosphere	SOHYD_171	Major ion concentrations: Cl, SO4, Br, Na, K, Mg, Ca, B, Silica - running/standing waters			
Hydrosphere	SOHYD_172	Nutrient concentration: TP, SRP, TDN, NO3 - running waters			
Hydrosphere	SOHYD_173	Profiles of nutrient concentration: TP, SRP, TDN, NO3, - standing waters			
Hydrosphere	SOHYD_174	Secchi-Depth; standing waters and transitional waters			

SO protocols – status

Sociosphere
33% in progress



Sphere	SO ID	Standard Observation	No Activity	Draft started	1st Draft ready
Sociosphere	SOSOC_029	Area under tillage	Red		
Sociosphere	SOSOC_030	Land-based income	Red		
Sociosphere	SOSOC_031	Yield (cropland, grassland, forest, fishery)	Red		
Sociosphere	SOSOC_032	Governance structure and character	Red		
Sociosphere	SOSOC_036	Land cover, land use, land cover change, land use change (CORINE)	Red		
Sociosphere	SOSOC_037	Land cover, land use, land cover change, land use change (Statistics)			Green
Sociosphere	SOSOC_040	Ecosystem services profile			Green
Sociosphere	SOSOC_042	Economics (GDP per capita; Per capita income)			Green
Sociosphere	SOSOC_043	Demography			Green
Sociosphere	SOSOC_044	Status of employment			Green
Sociosphere	SOSOC_045	Population consumption statistics	Red		
Sociosphere	SOSOC_114	Livestock	Red		
Sociosphere	SOSOC_183	Resource use	Red		
Sociosphere	SOSOC_184	Subsidies programs / schemes	Red		
Sociosphere	SOSOC_185	Agricultural products (cropland)	Red		





















Review of SO protocols

Review process of SOs is underway

New folder in the T3.3 Google Drive (SO_review) where you can look at and comment on available first drafts

Please read instructions ("Read this first" file) before starting!

Realistically, some protocols will be ready later than others, so the timeline is flexible

Name	↑	Owner
 Atmosphere		 jameskurenwe
 Biosphere		 jameskurenwe
 eLTER_SOs_Method-Costs		 steffen.zachar
 Geosphere		 jameskurenwe
 Hydrosphere		 jameskurenwe
 Meetings		 jameskurenwe
 Metadata_WG		 geoclaudsch@
 Reference_documents		 jameskurenwe
 SO_review		 me
 Sociosphere		 jameskurenwe

Review of SO protocols

Review process of SOs is underway

New folder in the T3.3 Google Drive (SO_review) where you can look at and comment on available first drafts

Please read instructions ("Read this first" file) before starting!

Review input asked (especially) from:

- > eLTER Site and Platforms Forum (SPF)
- > eLTER expert groups (EG)
- > Other relevant experts



Ongoing revision of SOs - aquatic BIOSOs

Postponed SOs

Open questions of feasibility

> central criteria for eLTER SOs = comparable data

> lack of common protocols, no immediate agreement could be reached

> long time series data - shift in methods would mean disruption of valuable time series data

SO no	SO ID	Habitat
SOBIO_079 SOBIO_080 SOBIO_179	Algal community	standing waters running waters transitional waters
SOBIO_081 SOBIO_180 SOBIO_157	Zooplankton (quantitative)	standing waters running waters transitional waters
SOBIO_082 SOBIO_083 SOBIO_158	Fish community (quantitative)	standing waters running waters transitional waters
SOBIO_086	Macrophyte community (quantitative)	freshwater transitional waters
SOBIO_084 SOBIO_181 SOBIO_182	Macroinvertebrate community (quantitative)	standing waters running waters transitional waters

Ongoing revision of SOs - aquatic BIOSOs

New agreement from 05/06/2024

Aquatic BIOSOs NOT included in final list of SOs, BUT:

> include postponed SOs in report as strategically highly important methods

→ highly recommended to be continued by sites which already use them (continuation of long time series)

→ highly relevant for cross-comparison to eDNA methods

> further work on developing common protocol for new aquatic sites

> include new pigment measurements (phycoerythrin/phyococyanin) as a proxy for cyanobacteria blooms

Standard data products and semantics

SLU coordination have been in regular contact with WP 10 to align protocols to planned standard data products, and with the semantics group working on vocabularies.

This is obviously something of a chicken and egg situation where both depend on each other and are developed simultaneously...
(see Metadata folder in T3.3 folder QR ->)

SO protocols need a standardised vocabulary within and across spheres, and standardised core metadata.



Timeline for SO development 2024

	SO core writing groups	SLU co-ordination
June	Finish writing first drafts + Give feedback on standard vocabulary	Support review process + Standard vocabulary work Present progress
July- September	Revise protocols	
October	Finish protocols	
November- December		Present progress + deliverables D3.3 and D3.4