

EuAsiaN-ROOT - Eurasian Network for Collaborative Research on Tree Root-Mycorrhizal-Pathogen Interactions in Forest Soils



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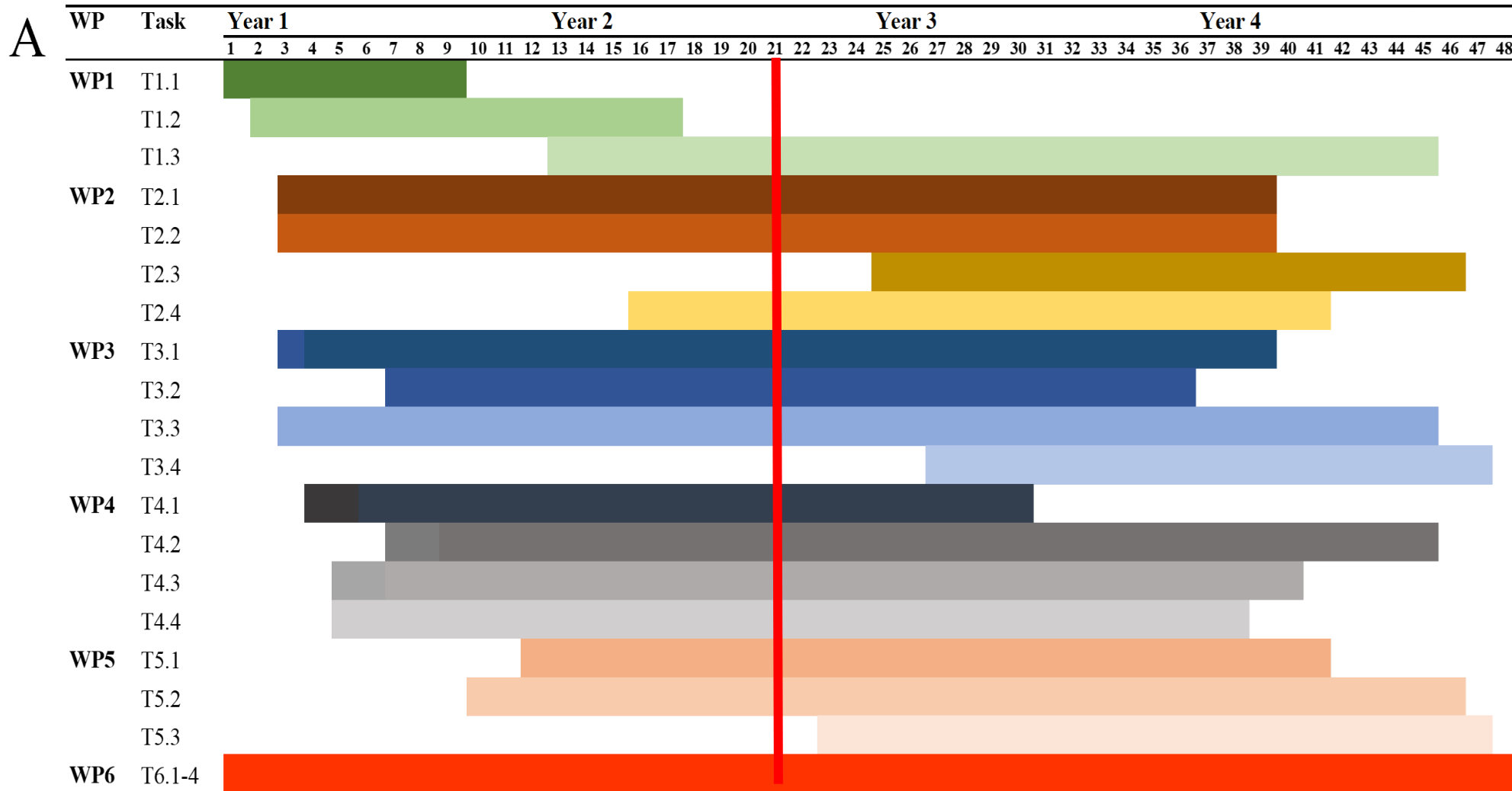
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Scientific objective

To gain a functional understanding of the **role of tree fine roots and mycorrhizal fungi** in the **ecosystem services** of **nutrient acquisition** and **carbon sequestration** in forest ecosystems of **different Eurasian forests biomes**, and to **identify abiotic and biotic pressures**, particular by **soil pathogens**, that **influence ecosystem service provision** by tree fine roots and different types of mycorrhizal fungi.



Time line



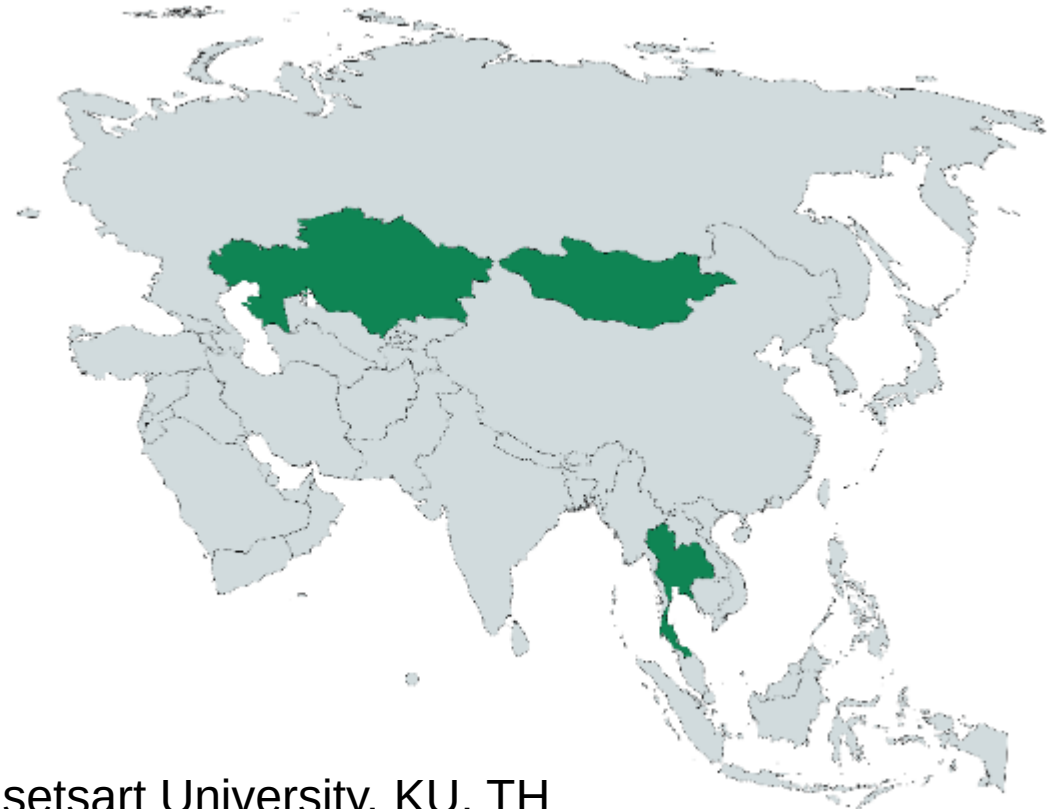
Main objectives

1. Develop a **research platform** using a tropical-continental-temperate forest gradient, allowing direct comparisons between Eurasian forest biomes using common methods.
2. Compare functional **microbial communities** in forest soils and **fine root traits** of forest trees - distinguishing global gradients and regional patterns of AM/EM fungi-dominated stands.
3. Determine the contribution of belowground **biomass inputs to soil C sequestration** across forest biomes
4. The role of **mineral weathering** by soil fungi in mineral nutrient acquisition.
5. Develop an understanding the importance of **mycorrhizal-soil pathogen**





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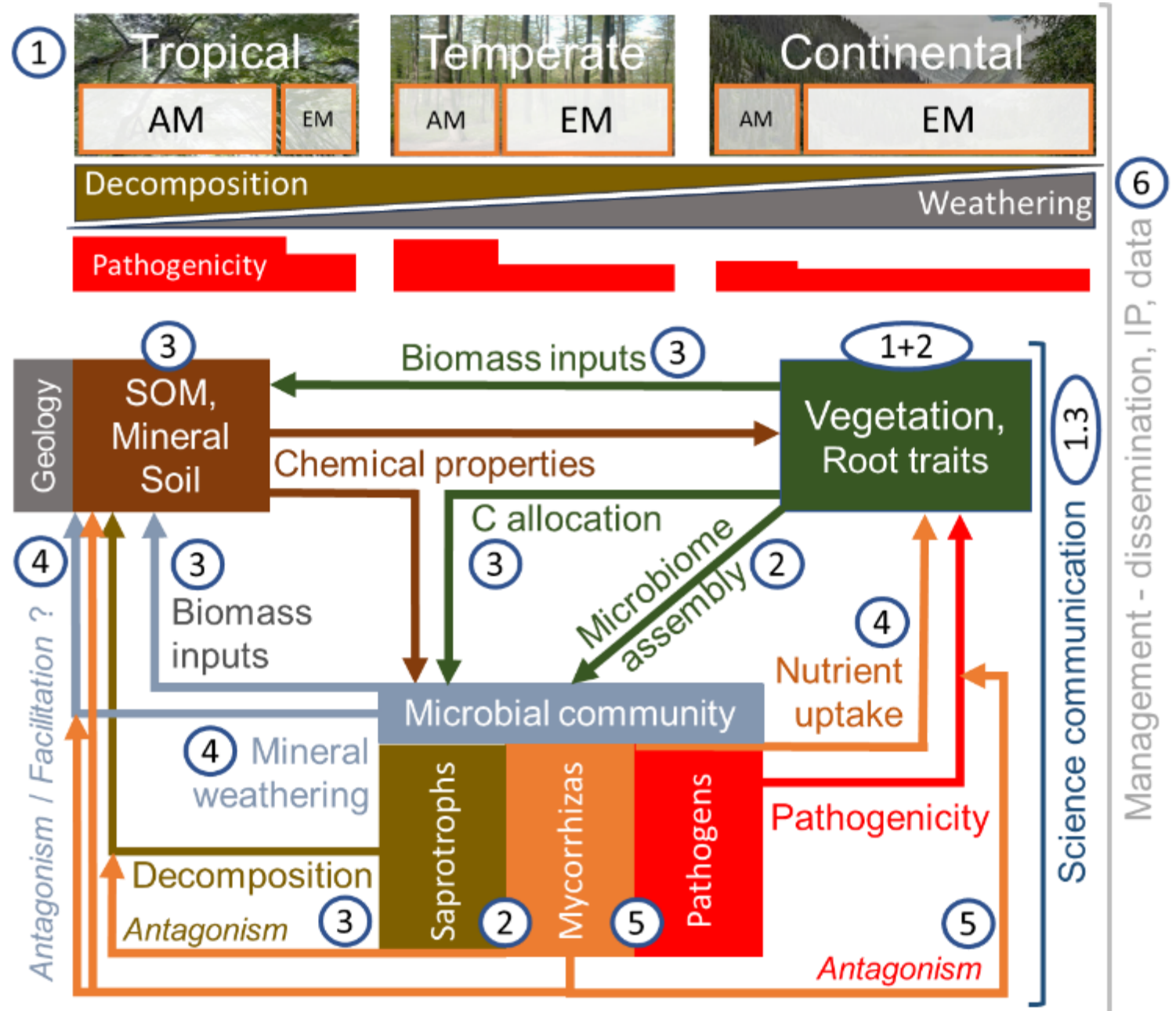


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Approach

Development of a tropical-Temperate- Continental forest gradient

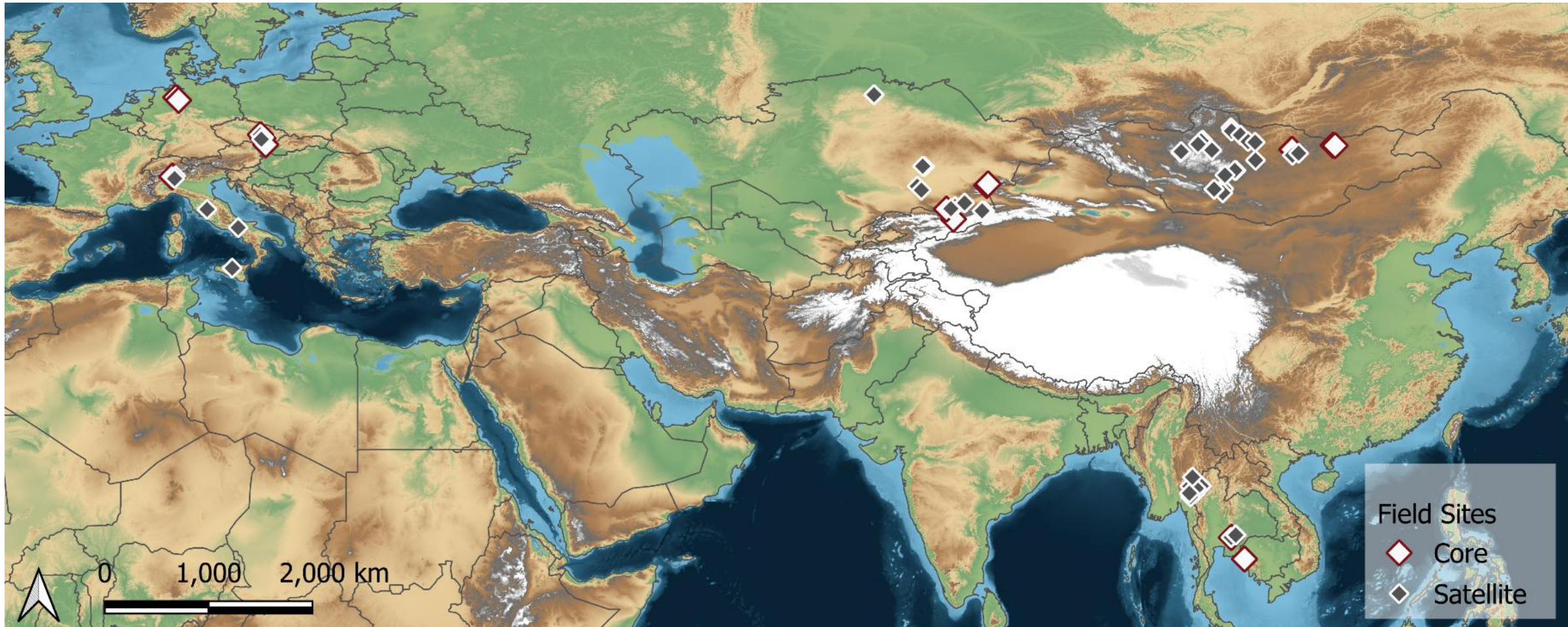


Workpackages

WP No.	Work Package title
1	Establishment of a Eurasian forest gradient
2	Functional microbiomes and root traits
3	Carbon transfer and stabilisation
4	Mineral weathering and nutrient acquisition
5	Pathogen-host-ecosystem relationships
6	Management and impact
7	Ethics requirements



• Core sites and satellite plots across Eurasia



Core sites across Eurasia

Sites dominated by ectomycorrhizal (EM) or arbuscular mycorrhizal (AM) fungi

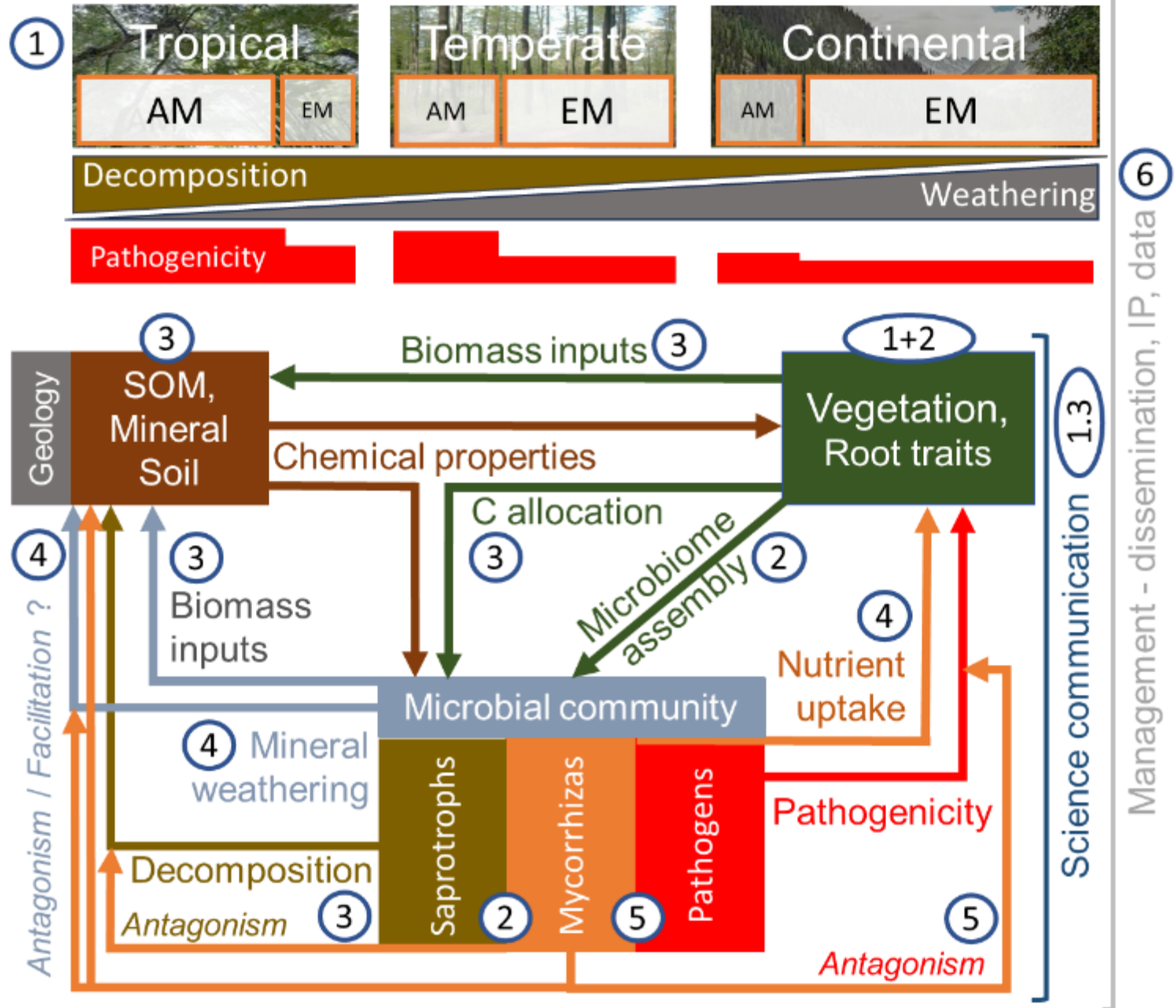
The core sites are high intensity investigation areas

Supplemented by satellite sites to increase the geographical cover

Country	Site Name	Mycorrhiza type
Czechia	Hády	AM
	Hády	EM
	Křetín I	EM
	Křetín I	AM
	Křetín I	EM
	Soutok*	EM
	Soutok*	AM
Germany	Grinderwald 1*	EM
	Grinderwald 2	EM
	Hoyerhagen*	AM + EM
Italy	CdF 1	AM
	CdF 2	EM
	CdF 3	EM
	CdF 4*	AM
Kazakhstan	Ile-Alatau	AM
	Ile-Alatau	EM
	Zhungar Alatau	EM
	Zhungar Alatau	EM
	Zhungar Alatau	AM
Mongolia	Binder	EM
	Binder	EM
	Binder	AM
	Udleg	EM
	Udleg	EM
Thailand	Sakaerat	EM
	Sakaerat	AM
	Trat*	EM
	Trat*	AM

Approach

Investigation of microbial community interactions



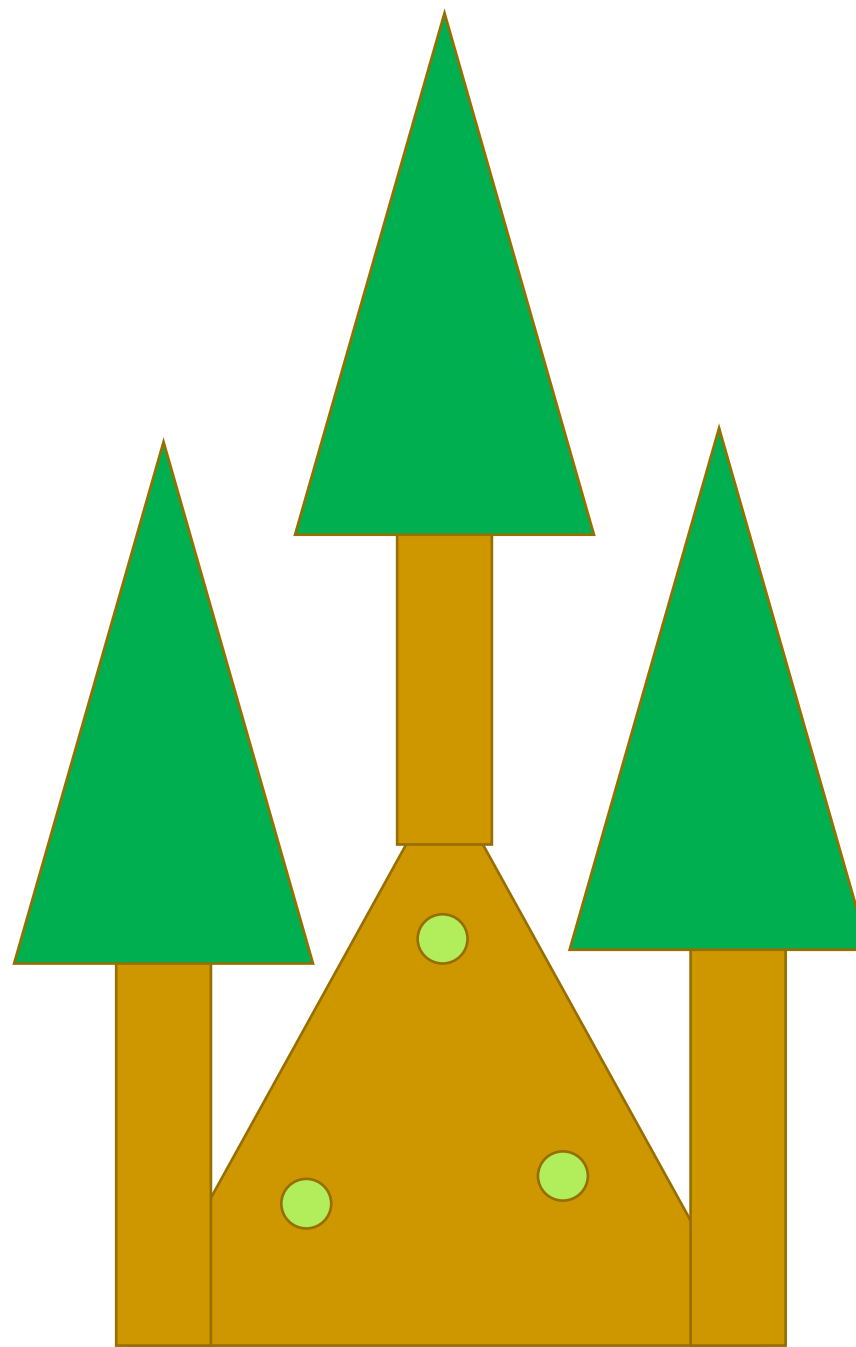
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Site design

Seven replicate plots
per site and tree
species

Area of at least 3 trees

Three replicate
samples per plot

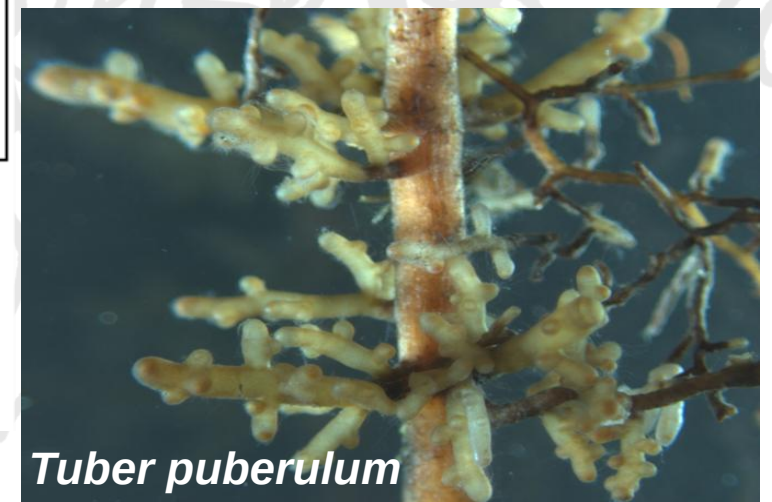
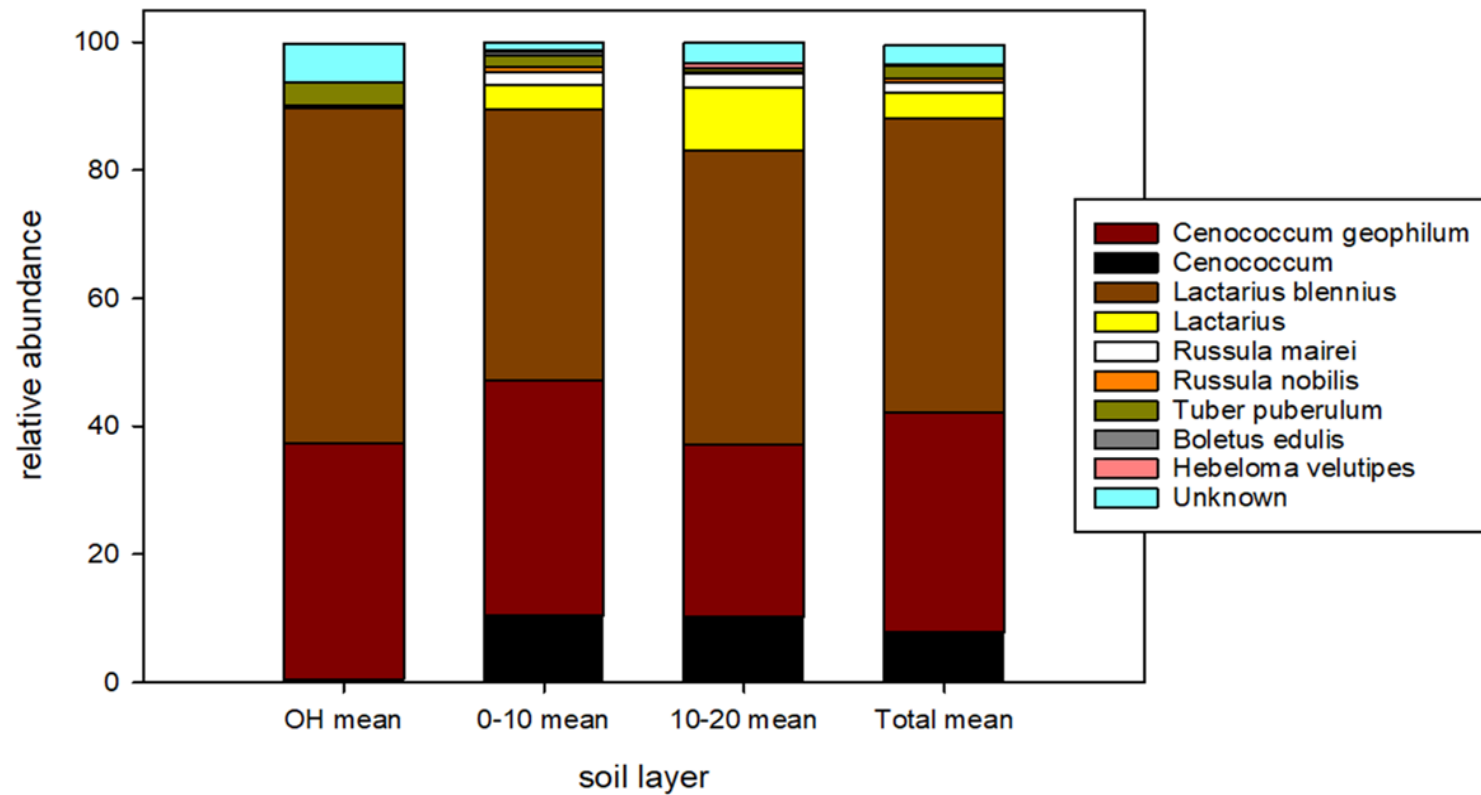


Root biomass
Root production
EM diversity on roots
Fungal diversity of soils
Hyphal biomass production
Mineral weathering
Decomposition

Soil chemical properties
Soil temperature
N availability

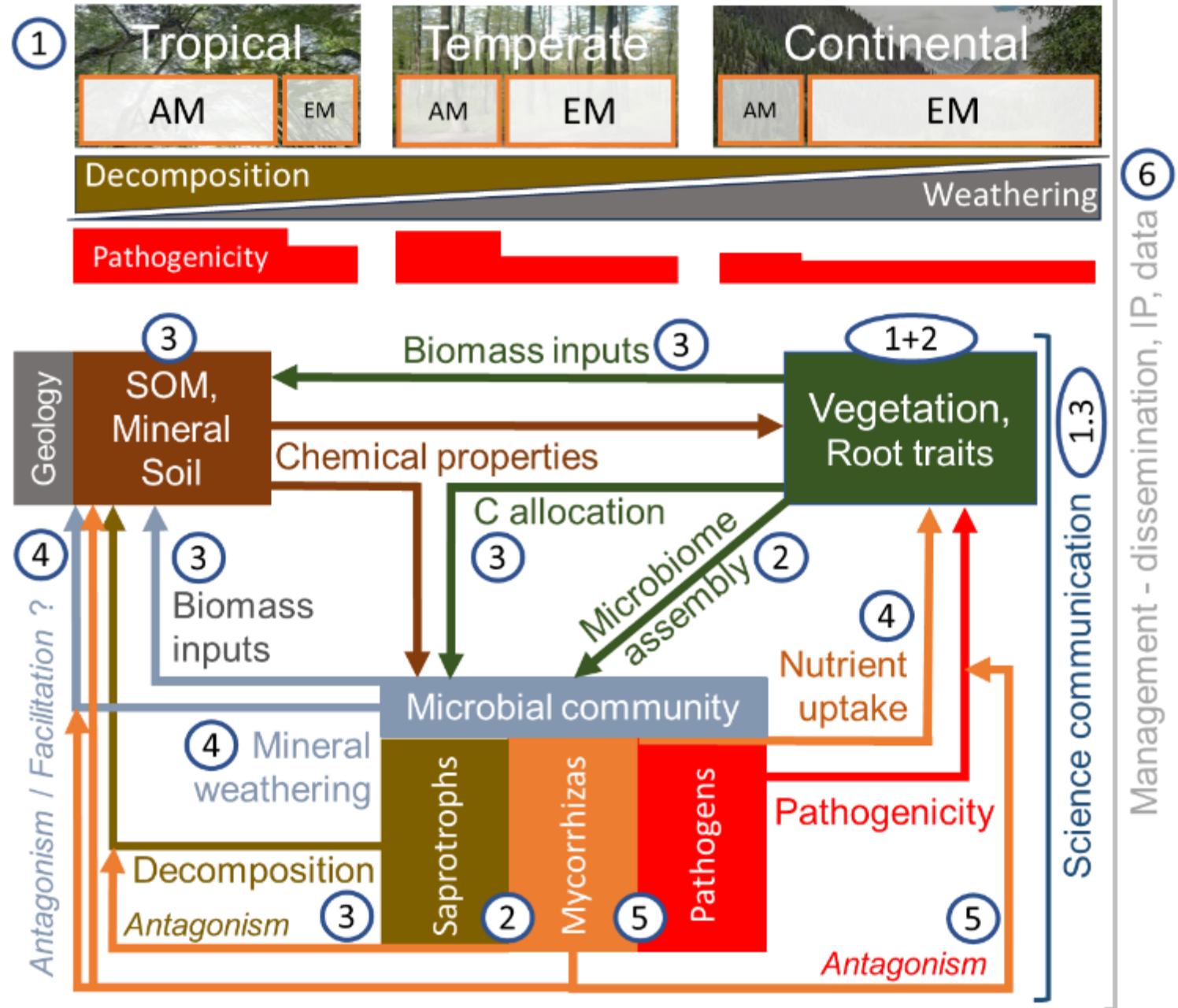
Tree biomass

Ectomycorrhizal Communities (Czech *Fagus* site)



Approach

Investigation of microbial community interactions
Manipulation by lowering mycorrhizal activity



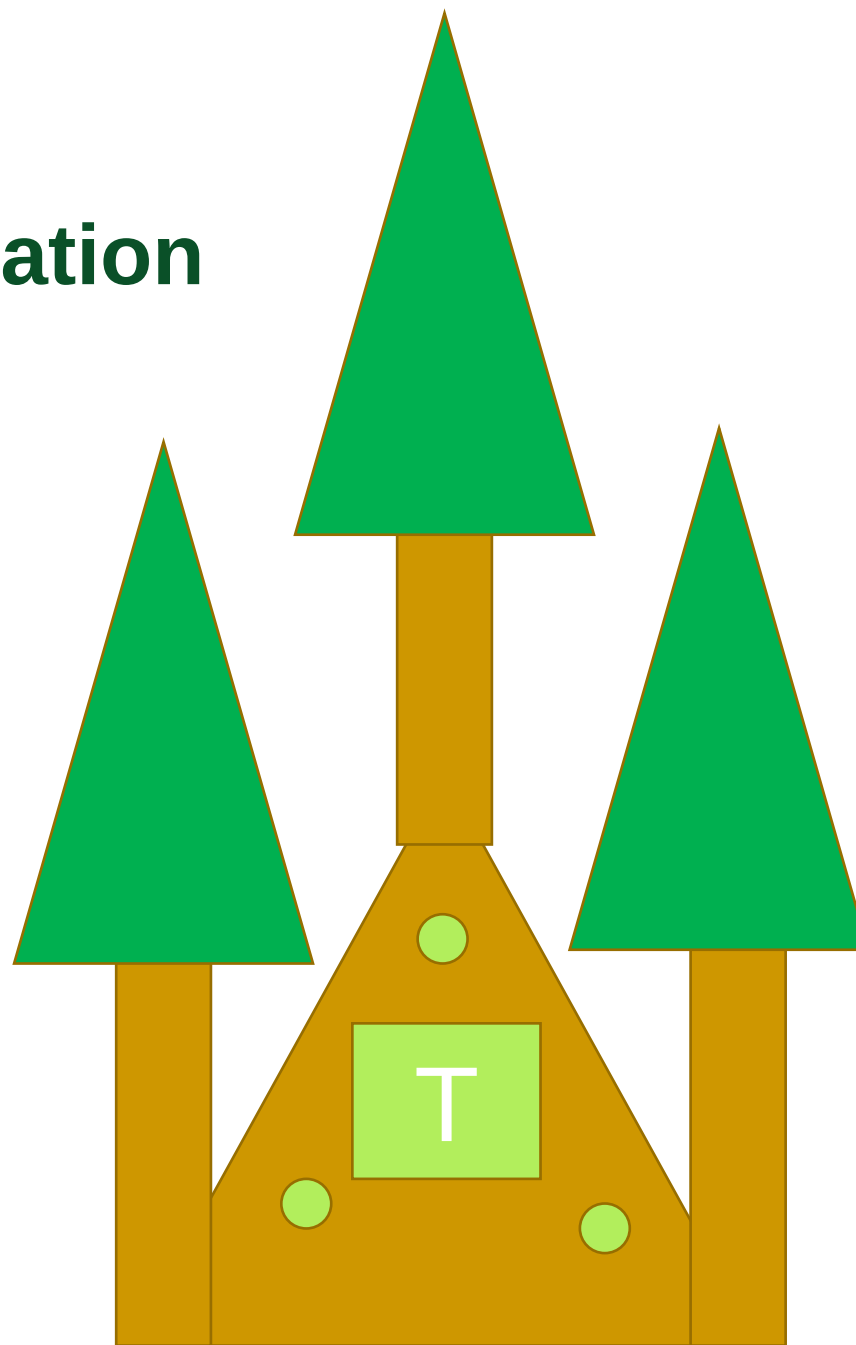
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Site design

Trench manipulation

1 x 1 m soil block
isolated to 50 cm soil
depth

Removes C supply
from roots and
mycorrhizal fungi



Measures changes in

Root biomass
EM diversity on roots
Fungal diversity of soils
Hyphal biomass production
Mineral weathering
Decomposition

Soil temperature
N availability

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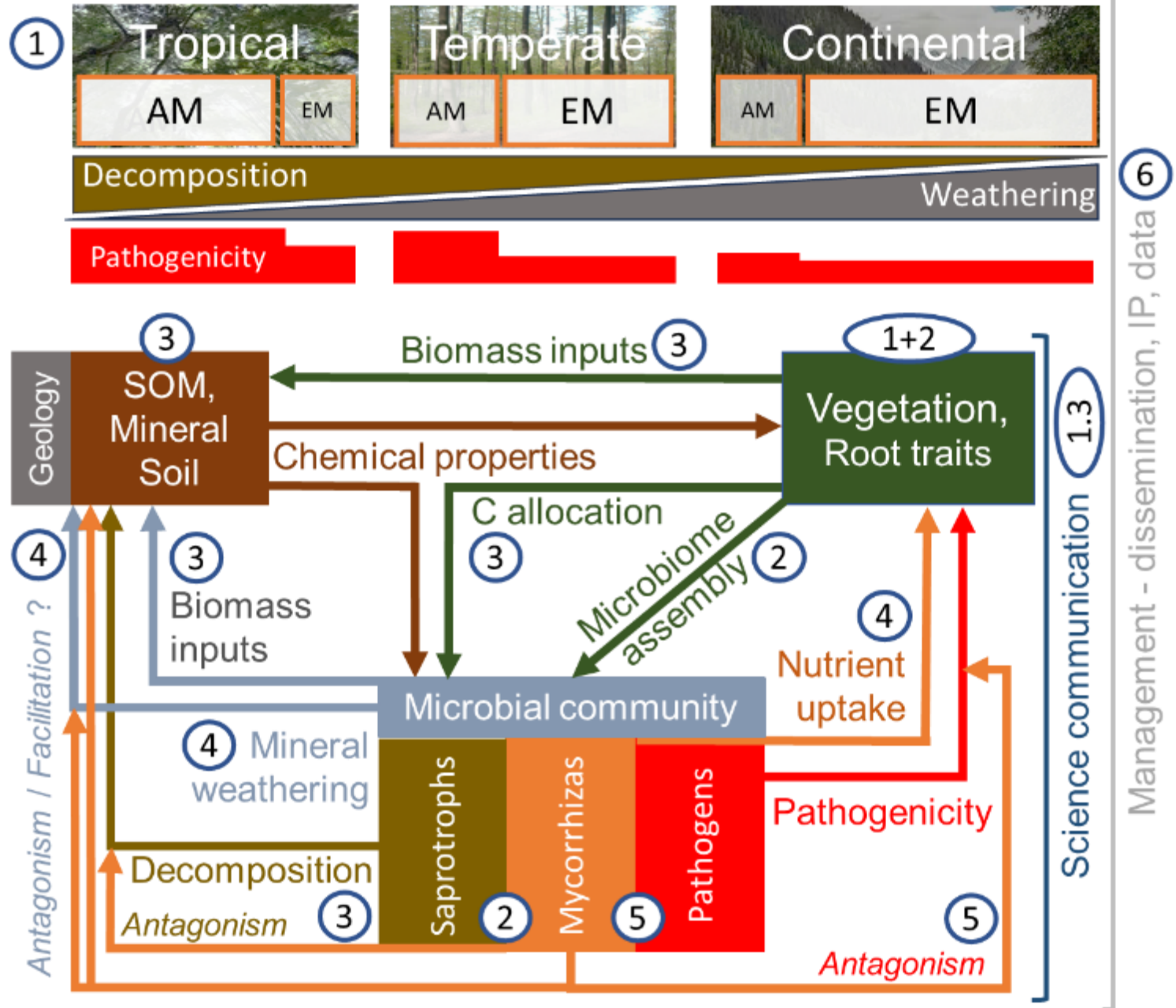
Measures changes in

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Soil temperature
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Approach

Linking of microbial communities to decomposition and mineral weathering



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T3.1 – Quantifying belowground C input (Mycorrhizal hyphal production – ingrowth bags)

Hyphal growth represents a
direct pathway of plant-derived C to soil

Approach

- Root-exclusion ingrowth bags → **mycorrhizal hyphal production**
- Standardised field incubation across forest stands
- Retrieval and analysis of **hyphal biomass and carbon**



Thank you for your attention

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