EGU General Assembly 2022 ——SSS4.4

Land use effects on earthworm diversity, functional traits and functional guilds

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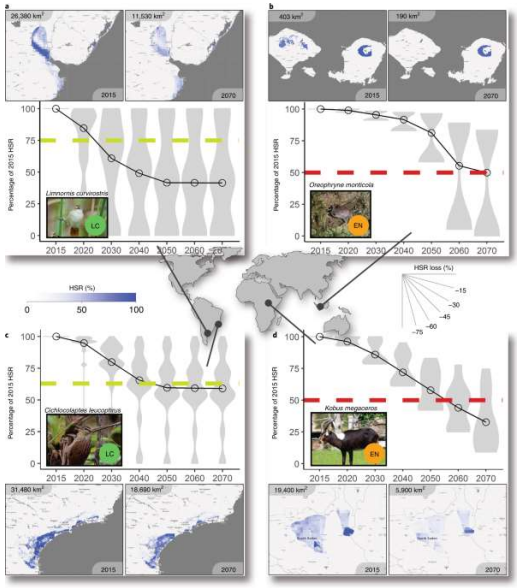
Abstract

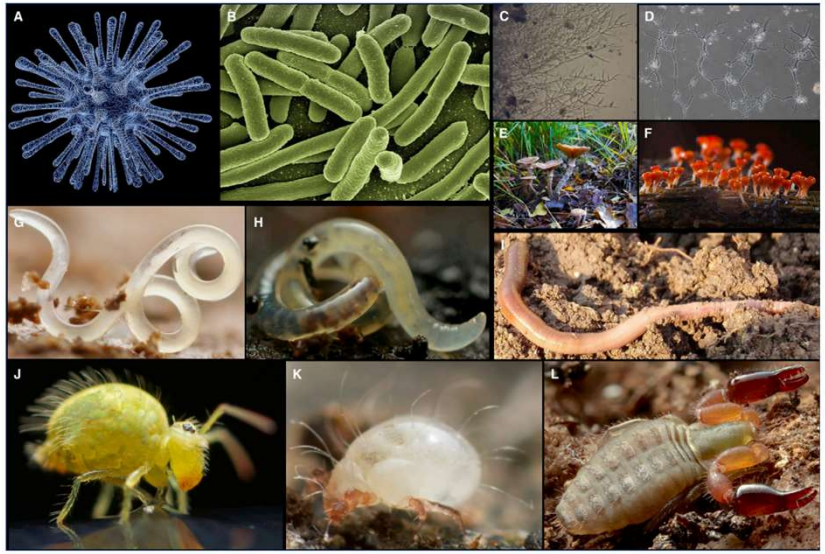
Background

- **Intensive land use and climate change decrease biodiversity**
- **Soil biodiversity has been researched widely but still limited**

From Stanford; WWF.



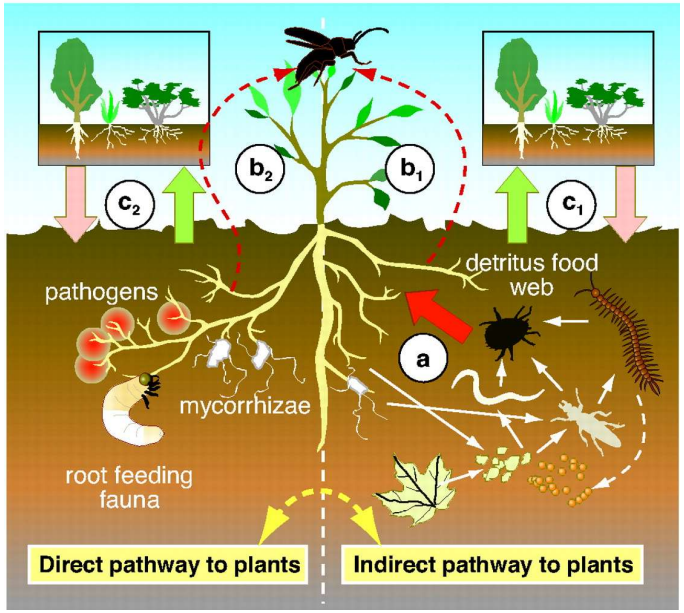
Powers & Jetz, 2019. Nat. Clim. Chang.



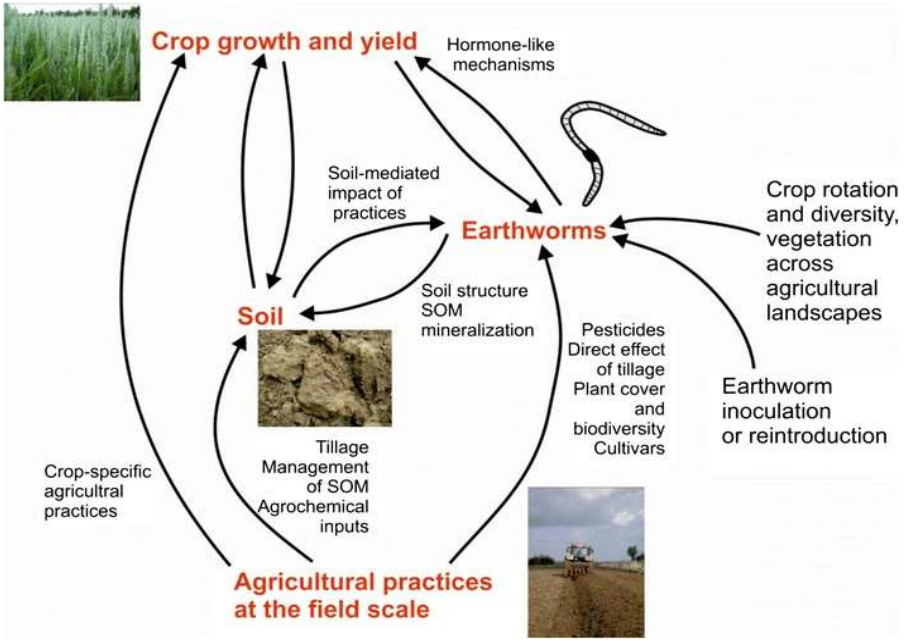
Geisen et al., 2019. Current Biology

Background

- **Soil organisms play a role in ecosystem function such as biogeochemical cycling and energy flow**



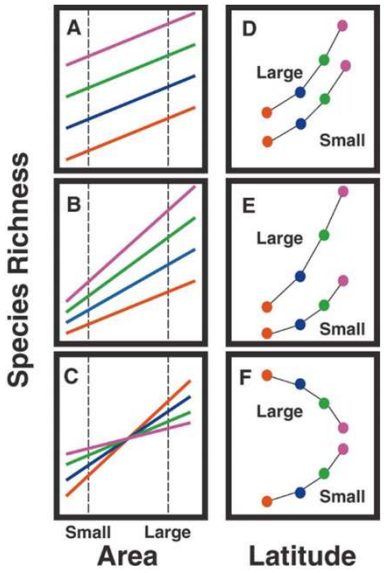
Wardle et al., 2004. Science



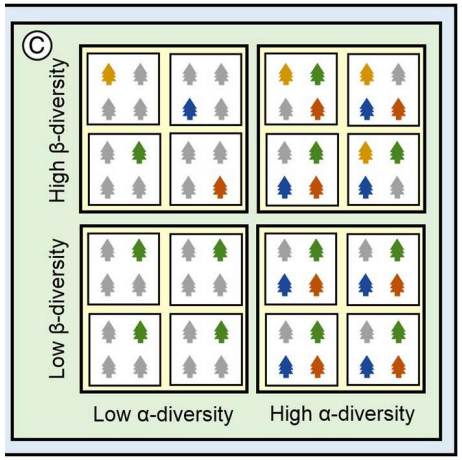
Bertrand, M., et al., 2015. Agron. Sustain. Dev.

Background

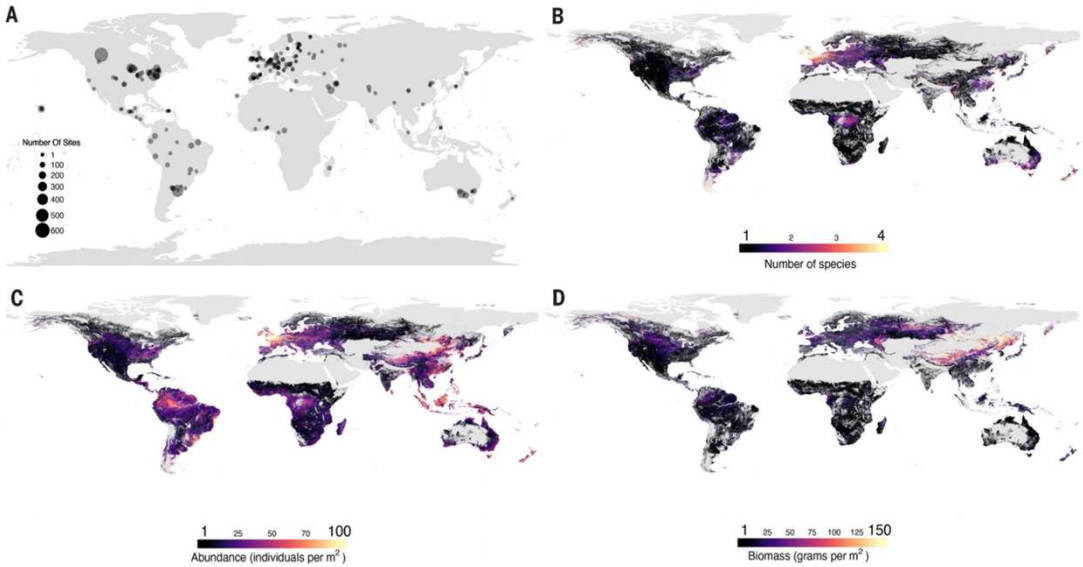
- **Biodiversity pattern is scale-dependent**
- **Drivers for earthworm diversity at global scale**



Willig et al., 2003. Annu. Rev. Ecol. Evol. Syst.



van der Plas et al., 2016. PNAS



Phillips et al., 2019. Science

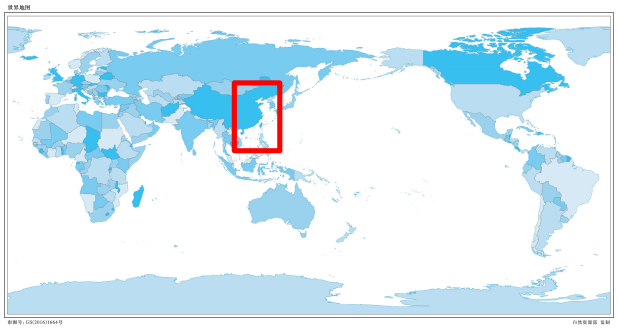
Questions

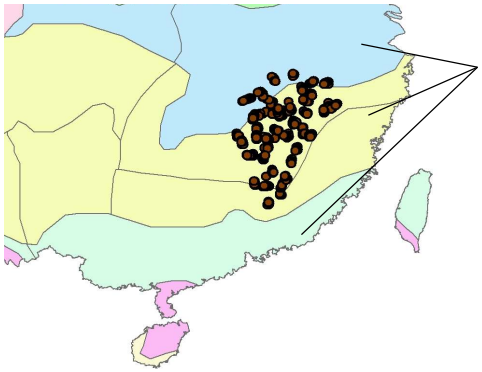
What about

① earthworm diversity at different scales under different land use tensity ?

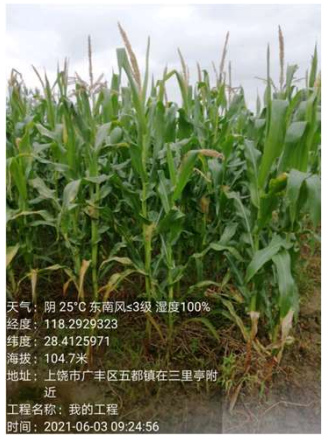
② the change of functional traits and guilds under different tensity ?

Materials & Methods study area and sample sites





subtropical



Farmland

Orchard

Forest

41 sites were sampled

Mean Annual Temperature (MAT) : 16.2 - 19.2 ℃; Annual Precipitation (AP) : 1341 - 1939 mm

Materials & Methods sampling and identification

3 types

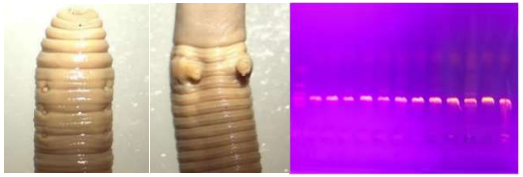
5 plots

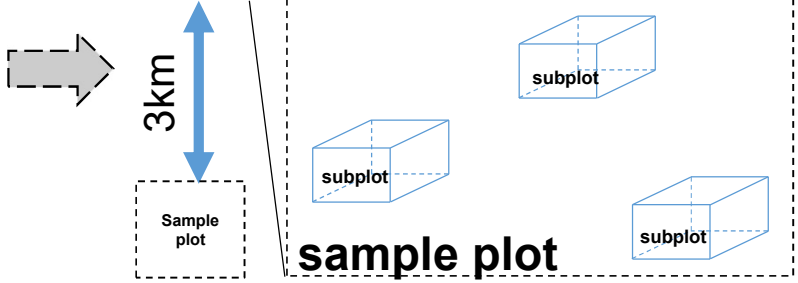
Earthworm sampling

Weight, Measure

Earthworm specimens

Earthworm identification





Soil sampling and analysis

41 sites × 3 types × 5 plots = 615

Materials & Methods data analyses

- Local scale diversity: average diversity in study area (α diversity)
- Regional scale diversity: total diversity in study area (γ diversity)
- Richness, abundance, body size, biomass were analyzed
- 5 % was used to separate the common and dominant species
- Earthworm functional guilds were divided into epigeic, endogeic and anecic

Results earthworm diversity

Amynthas corticis

Amynthas hupeiensis

Amynthas carnosus

Amynthas robustus

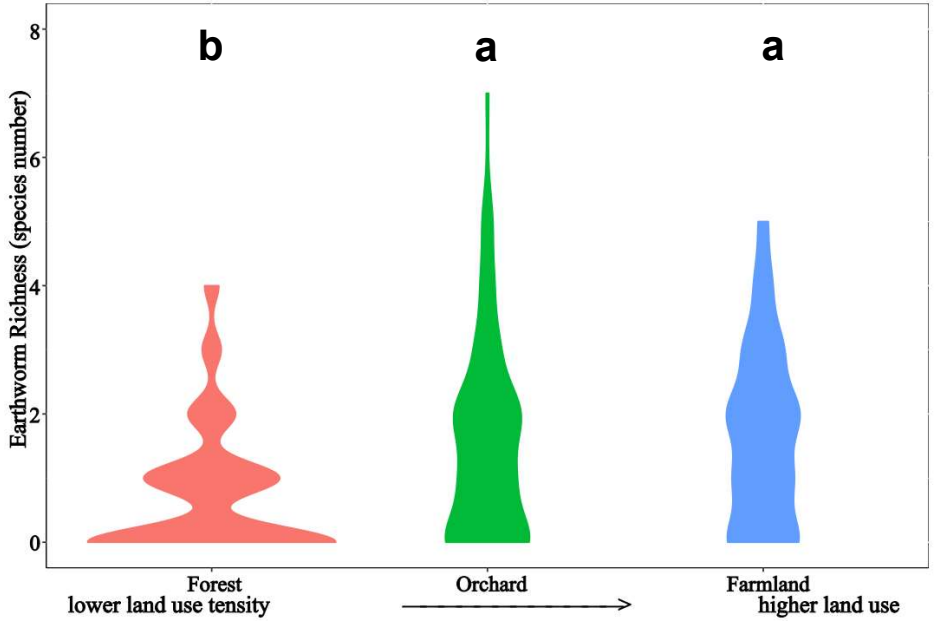
Amynthas huizhouensis amoutus subsp.nov.

individuals	family	genus	species
2126	4	5	84

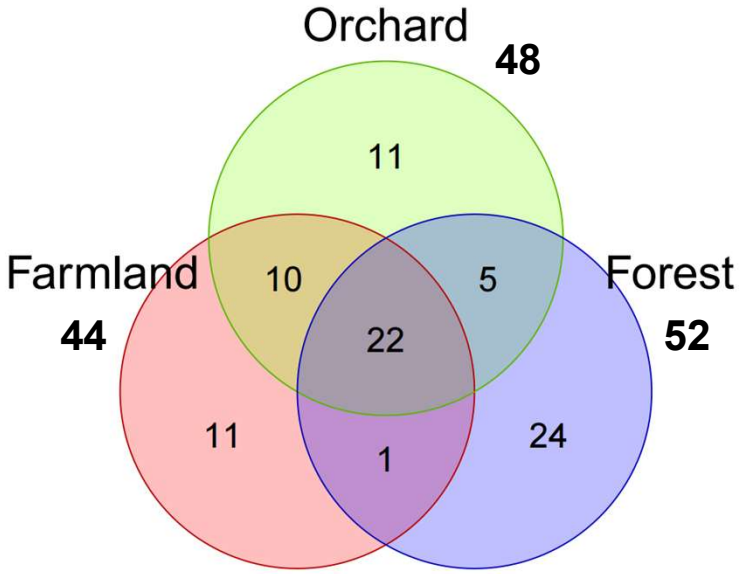
near 30 new species/distribution

Results earthworm diversity

- Local diversity(α): Orchard > Farmland > Forest
- Regional diversity(γ): Forest > Orchard > Farmland



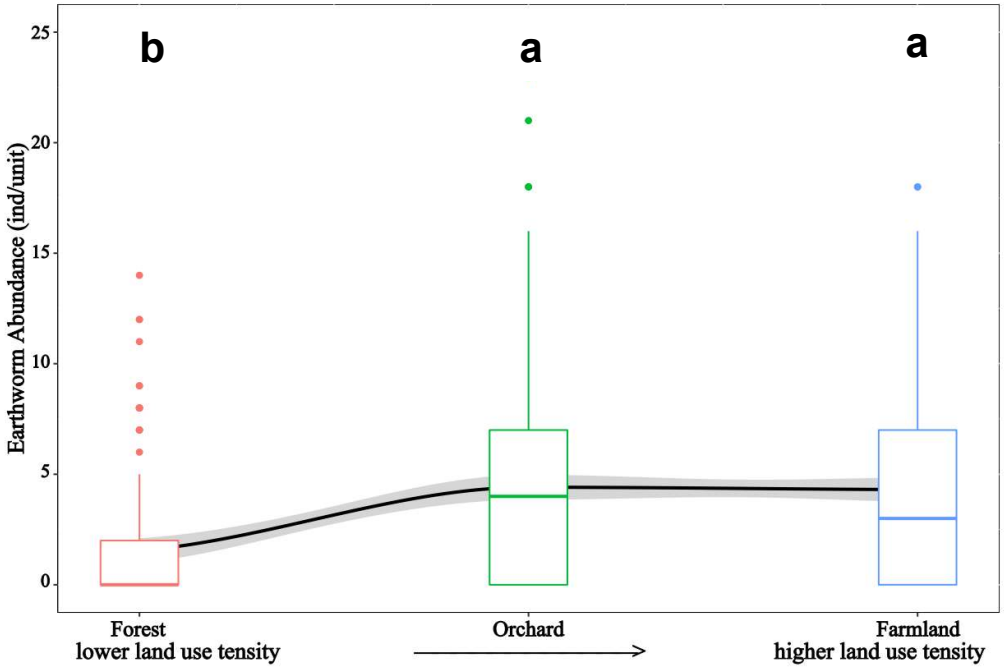
Local diversity

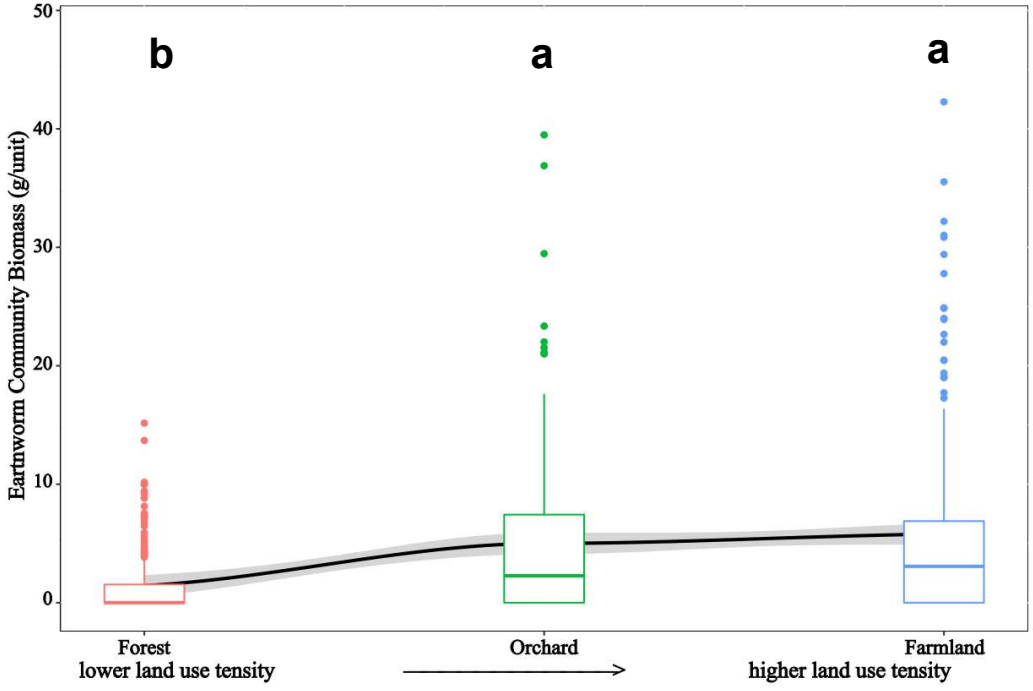


Regional diversity

Results earthworm abundance & biomass

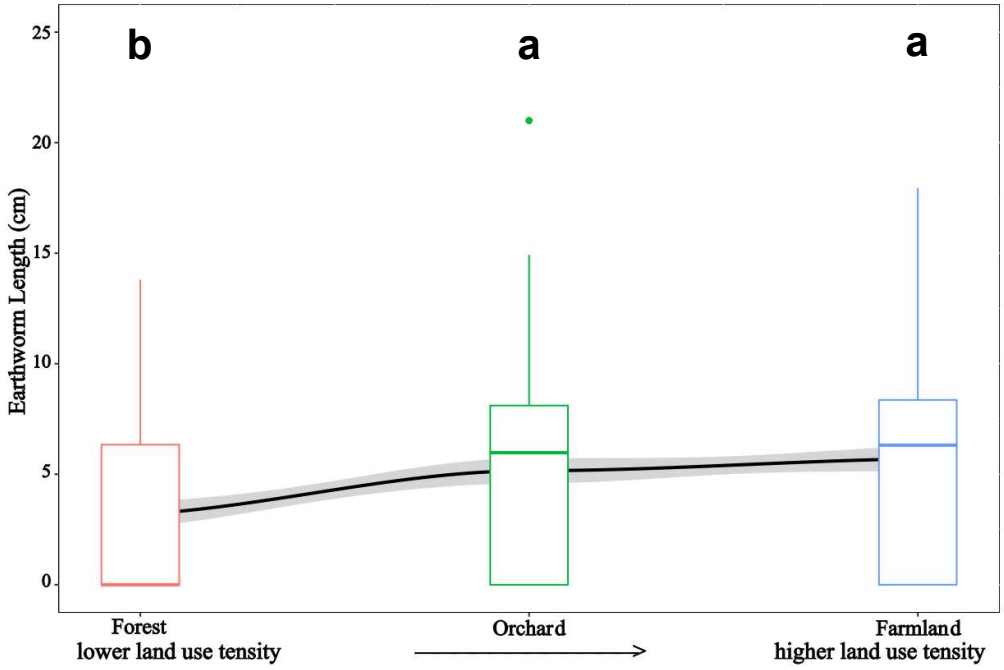
- Higher tensity increased abundance and biomass

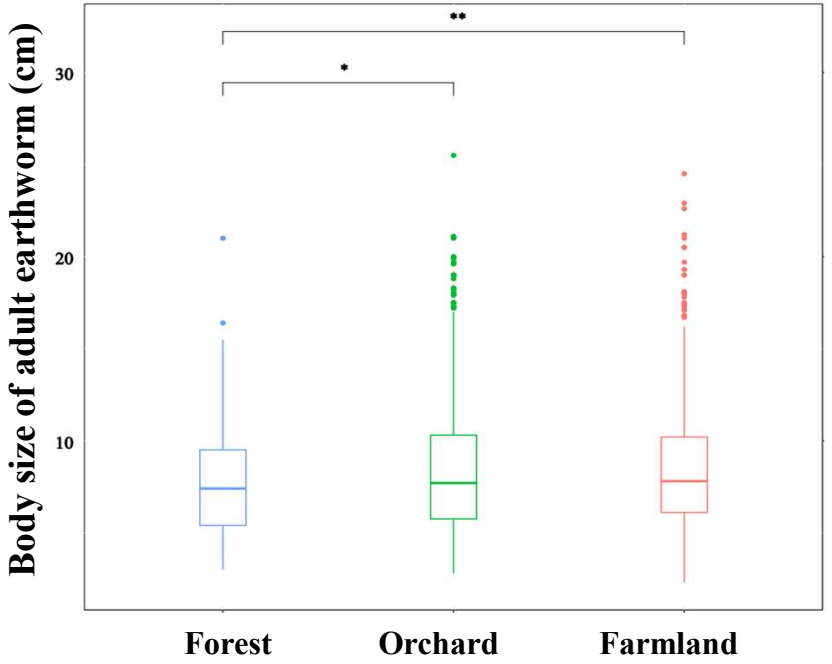




Results earthworm body size (length)

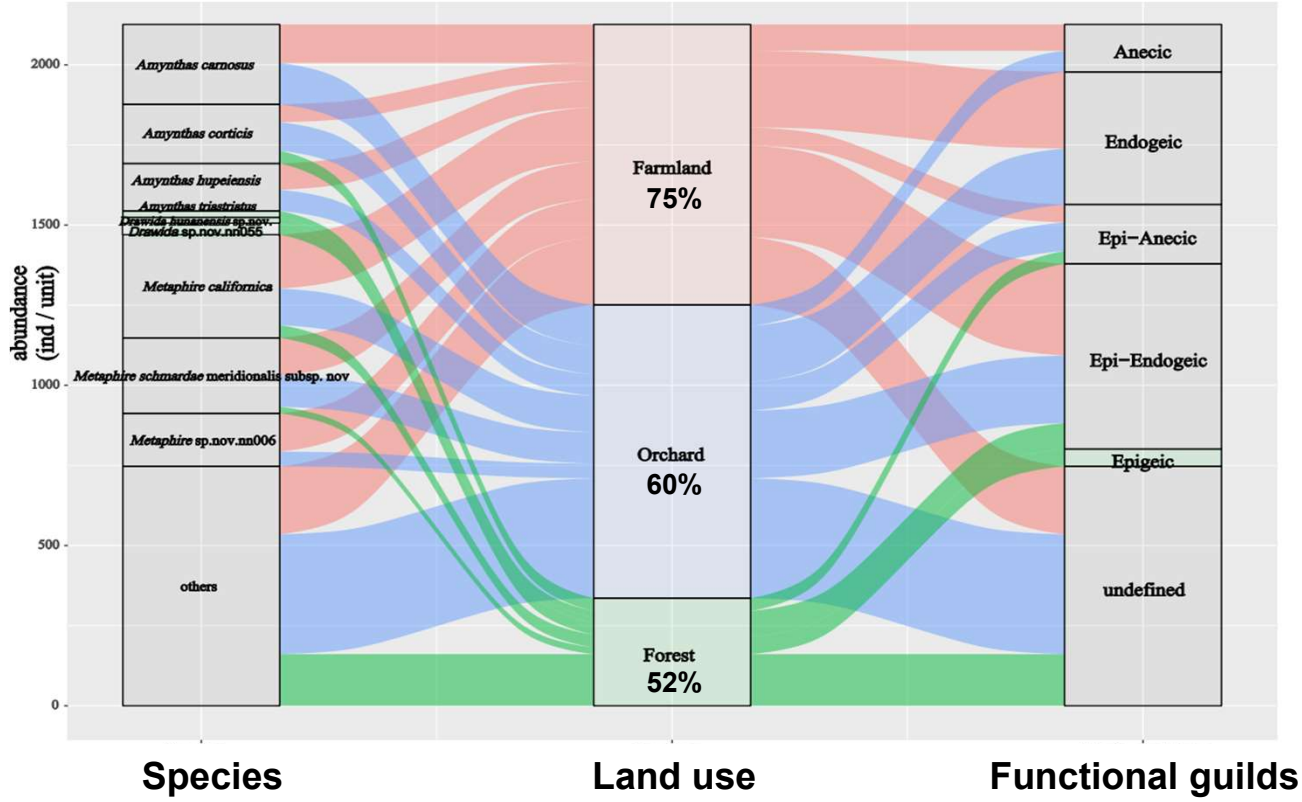
- Higher tensity promoted the growth of earthworm (p<0.01)





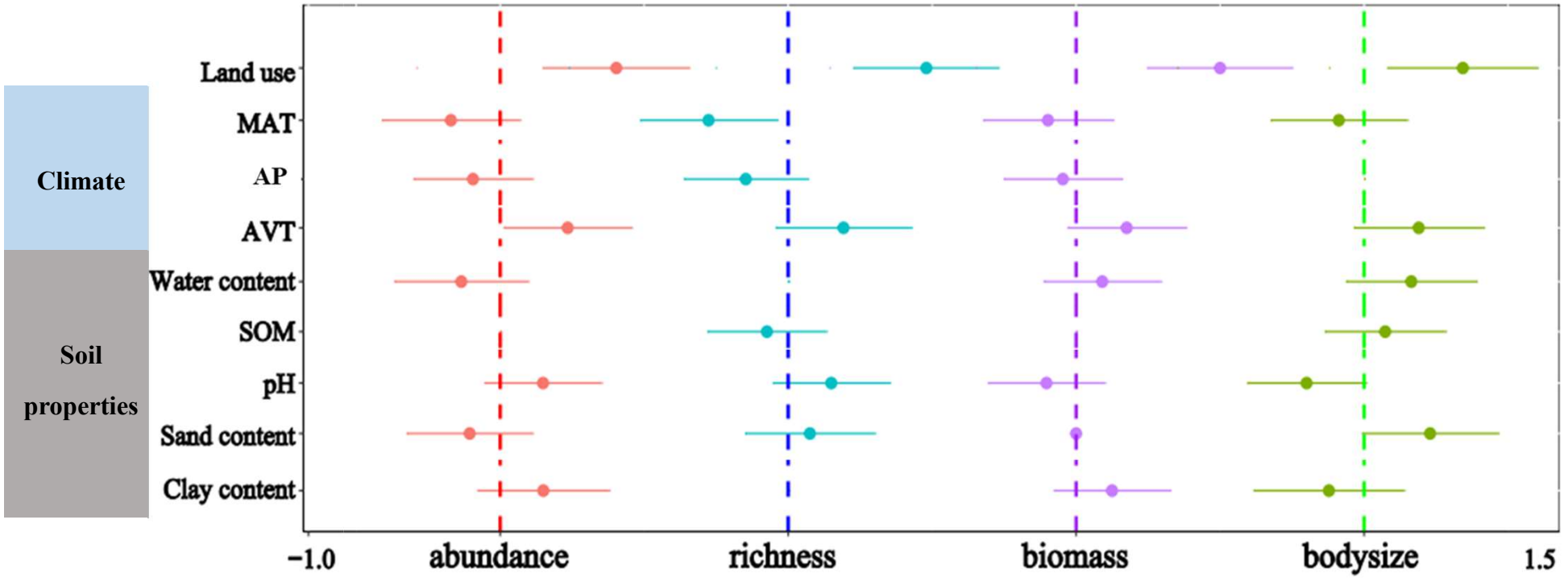
Results dominant species and functional guilds

- Higher tensity simplified earthworm community and changed the epigeic to endogeic, anecic species



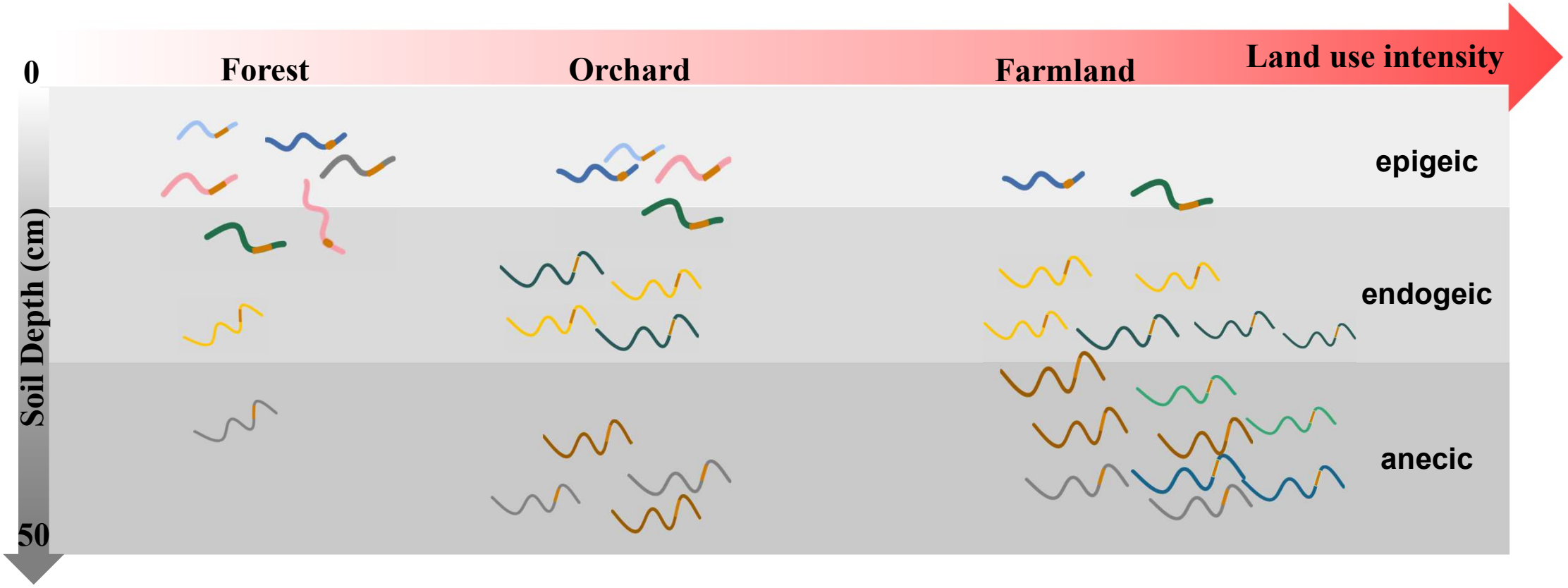
Results drivers for earthworm diversity and traits

- Higher tensity had a positive effect and soil properties counteracted the effect of climate



Conclusion

- Higher tensity increased earthworm diversity, developed functional traits, and changed earthworm community structure



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Thanks to people who help us during sampling and experiment

Thanks for your attention

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