



# Understanding and managing ecosystem services provided by earthworms

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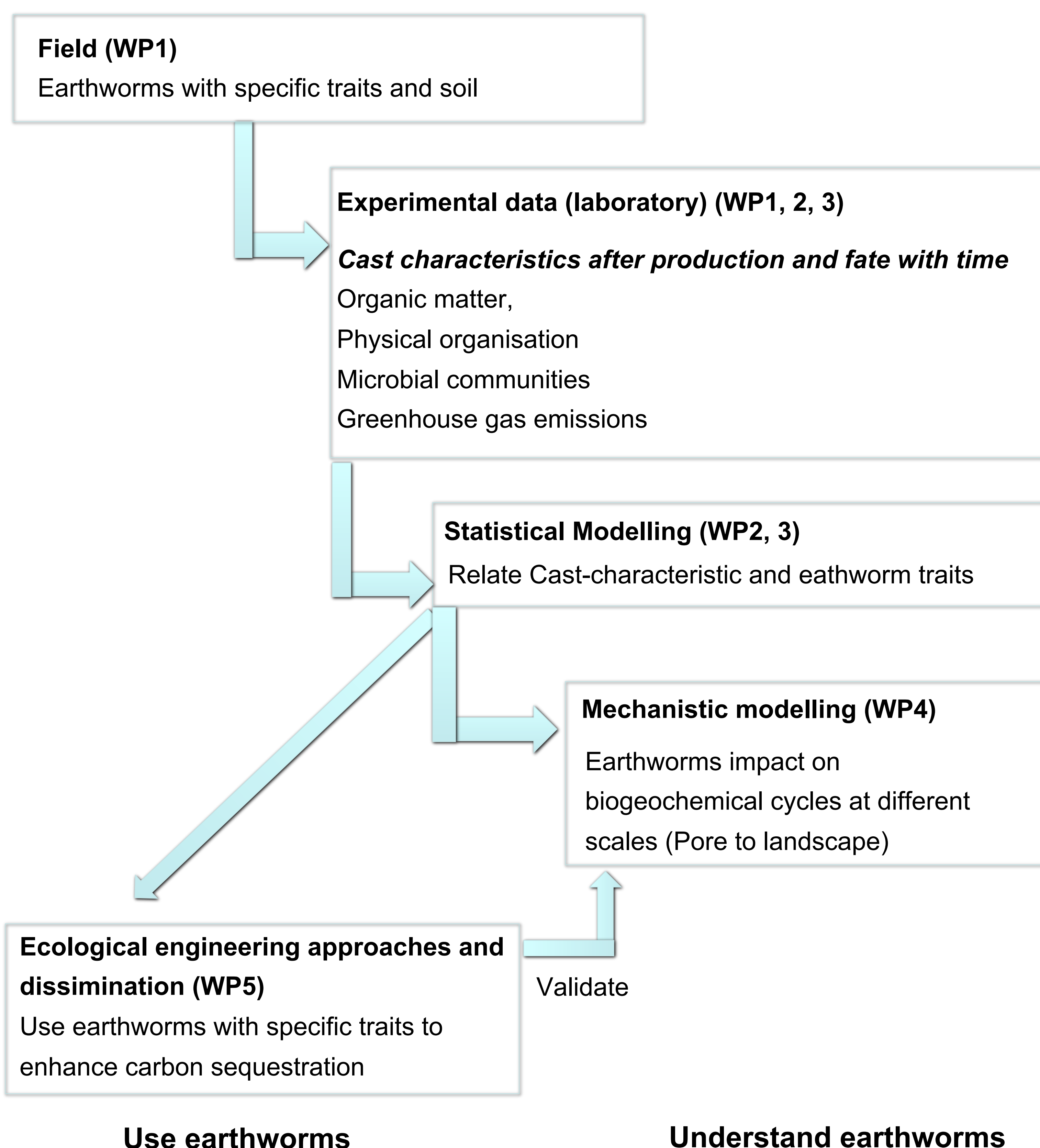
## Summary

Carbon storage and biogeochemical cycling in soil is influenced by physical, chemical and biological processes, which are most often studied separately. Our project aims to overcome this limitation as it elucidates the impact of soil fauna, in particular earthworms, on the formation of organo-mineral interactions in biogenic aggregates. We will study these processes through a combination of field and laboratory experiments in temperate as well as tropical environments. Our research goes beyond the current state of knowledge because it is based on specific earthworm traits instead of using the traditional functional group classification. **The project results concern fundamental knowledge of relationships between traits and their function in terms of soil carbon sequestration. These processes will be addressed using modern state of art techniques and concepts. The results will be implemented by developing new model parameters and agroecological (field) applications.**

## Objectives

The general objective of the project is **to understand and predict the effect of earthworms (and species-specific traits) on biogeochemical cycling and soil organic carbon (SOC) dynamics and evaluate their potential for ecological engineering in agricultural and horticultural applications.**

## Project organisation



## Consortium

### France



Institute of Ecology and Environmental Sciences Paris  
Marie-France Dignac, Pascal Jouquet, PhD student Yacouba Zi

Functional ecology and biogeochemistry of soils and agroecosystems  
Laetitia Bernard, Eric Blanchart

Unit of mathematical modelling and informatics of complex systems  
Nicolas Marilleau



Functional ecology and ecotoxicology of agroecosystems  
Patricia Garnier, postdoc Nicolas Puche

Laboratory of microbial ecology  
Alessandro Florio



Chemistry of the Environment and of Materials  
Laurent Caner, Arnaud Mazurier



Environment, Transfer and Interactions in hydrosystems and soils  
Katell Quénéa

### Madagascar



Radioactivity laboratory  
Tantely Razafimbelo,

### Vietnam



Soil and Fertilizer Institute  
Nicolas Bottinelli, Tran Minh Tien,  
PhD student Hoang Dang

Scientific advisor: Y. Czapowicz (INRA)

## Experimental part

### Deliverables

- List of 18 earthworm species with quantitative information on their morpho-ecological traits
- 90 earthworm casts samples and 15 control soil samples in sufficient quantity to be distributed amongst all project partners for further analyses
- Ageing protocol and aged samples

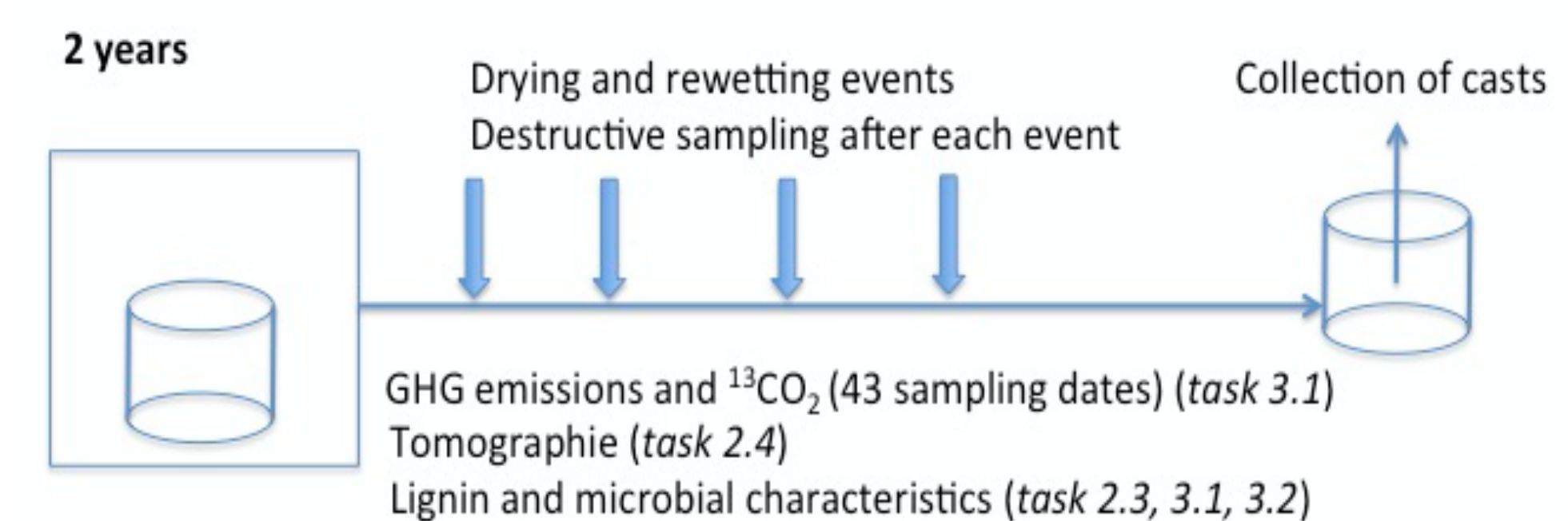


Fig. 1: Cast ageing experiment

## Modelling part

### Deliverables

- The CAMMI<sub>sworm</sub> model
- A simulation model description (ODD)
- Data, experiment plan, result analysis script used for model validation
- The SOM-Cast model
- Earthworm factor representing the impact of earthworm activity on OM decomposition, which can be implemented in other (SOM) models

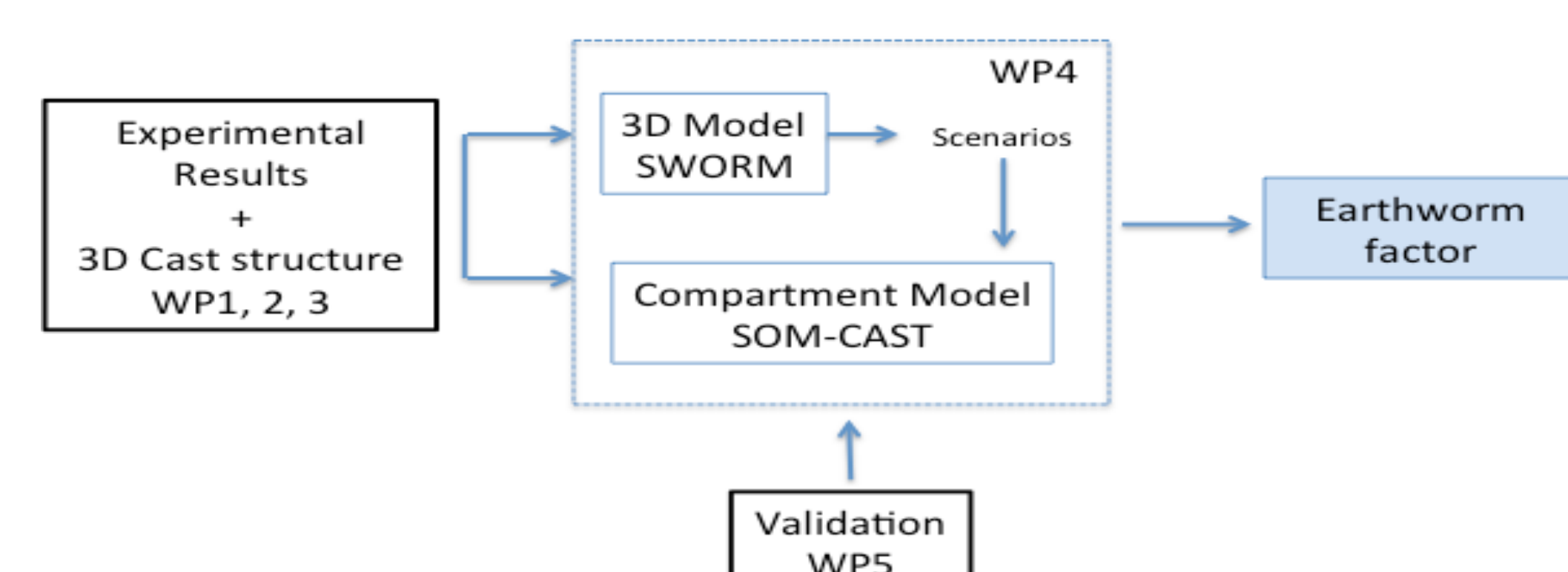


Fig. 2: Modelling approach