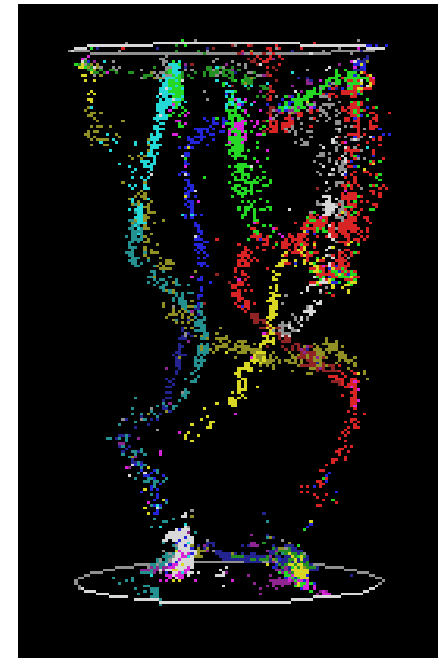


Yvan CAPOWIEZ  
(INRA Avignon)  
and colleagues:

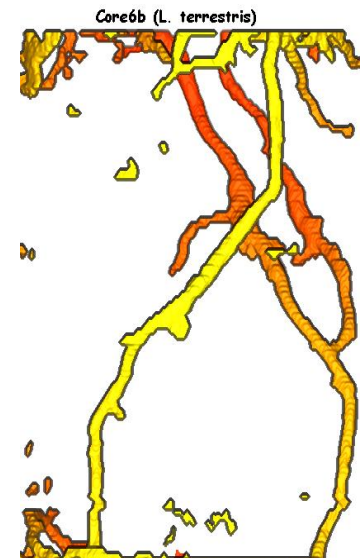
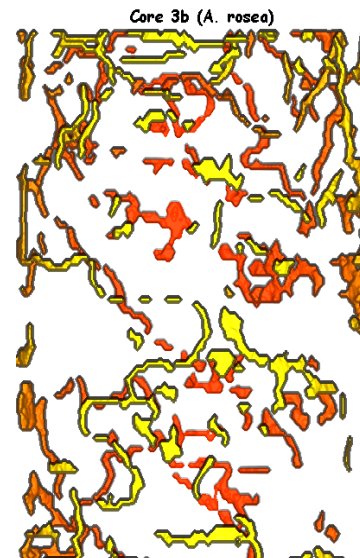
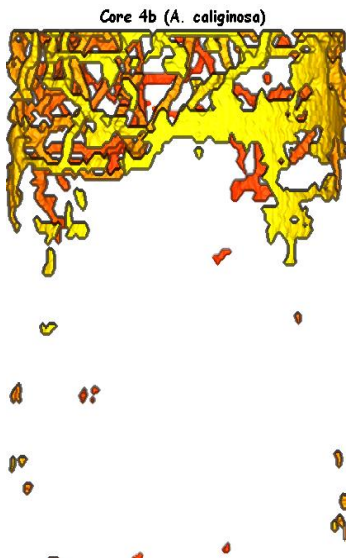
- Chris Moran (univ. Canberra)
- Alain Pierret (IRD, Laos)
- S. Sammartino and E. Michel (INRA Soil Science Avignon)



*radiotracking*

- H. Boizard (INRA Agronomy Mons)

*3D reconstructions*



Main topic :

Physical effects of earthworms behaviour (burrowing and casting) on the soil functioning

*... the most accepted and known effects but rarely quantified due to the lack of adapted tools.*

Scientific areas :

- soil ecology (interactions between earthworms)
- agronomy (soil regeneration, water infiltration)
- ecotoxicology (a link between effects at the individual level and soil functions)

## METHODS

### \* Burrowing

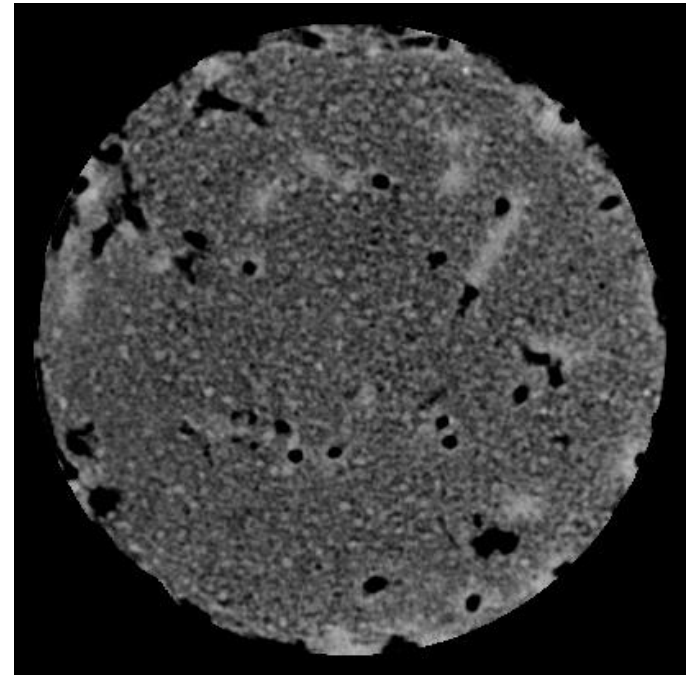
- X-ray tomography (snapshots)
- radiotracking (dynamical)
- 2D terraria (easy and cheap)



Simulation  
model

### \* Cast Production

- X-ray tomography (underground casts)
- sieving -> a new  
biomarker (ecotox.)



*Not all these tools are relevant at the field scale...*

## SCALE : Example 1 (field study)

Can earthworm regenerate compacted soil under natural (crop) conditions (if yes, at which rate ?)



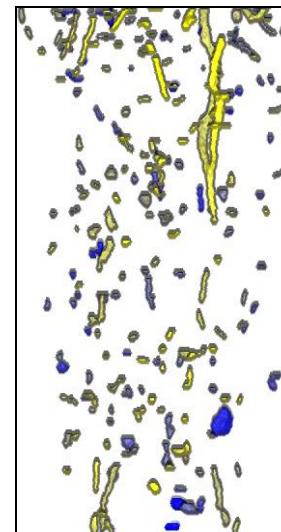
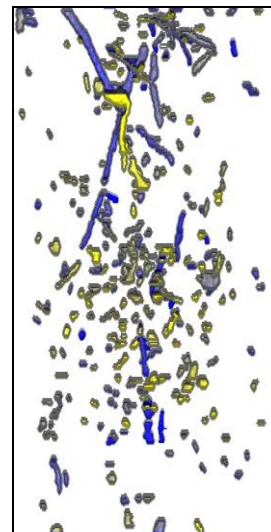
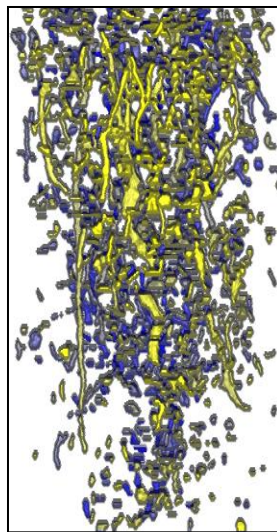
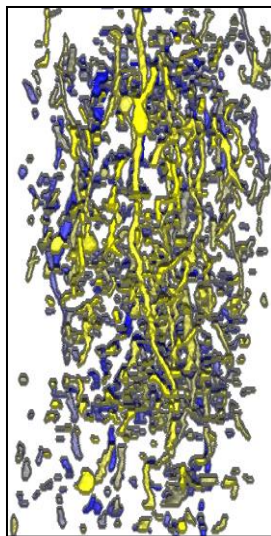


# CONTROL

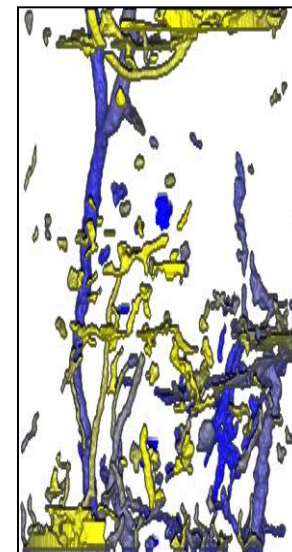
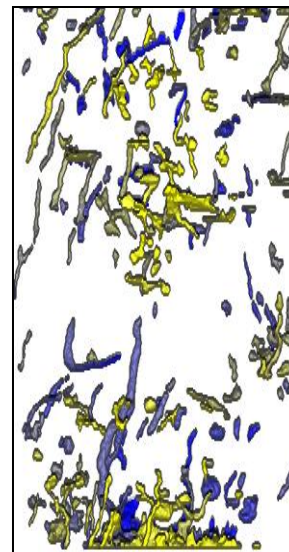
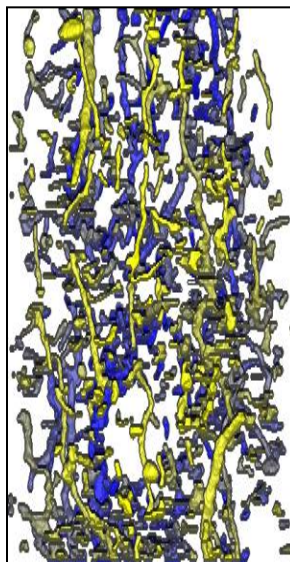
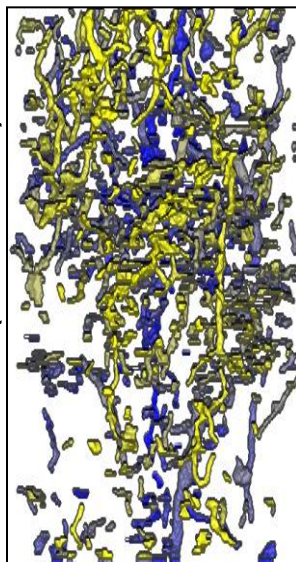
# COMPACTED

Soil core  
(Diameter  
= 16 cm  
Height  
= 35 cm)

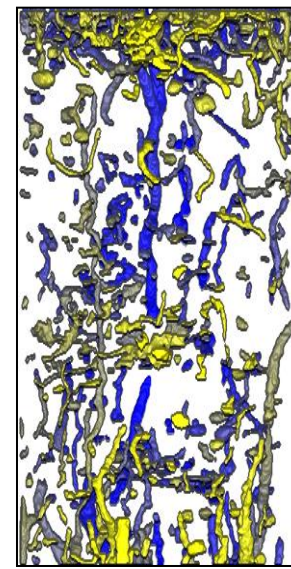
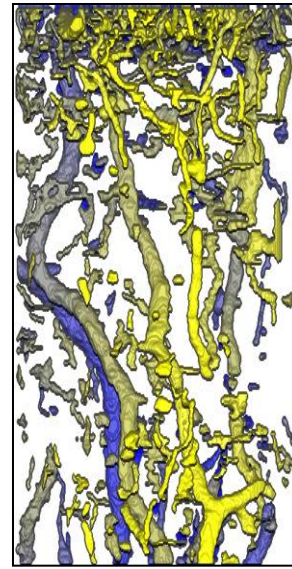
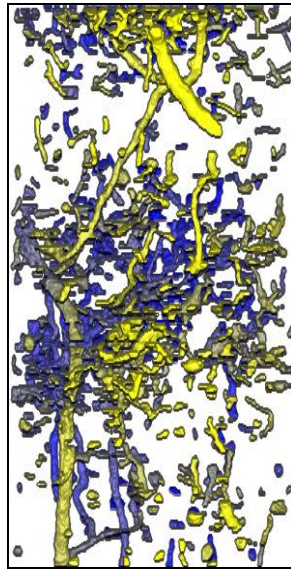
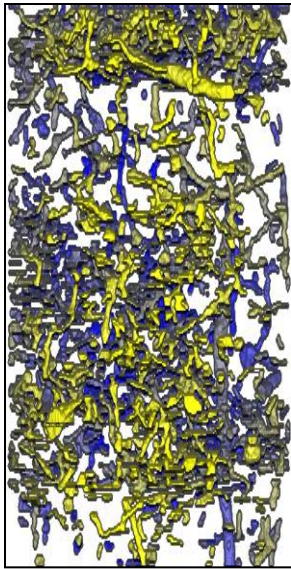
M+1 (03/2005)



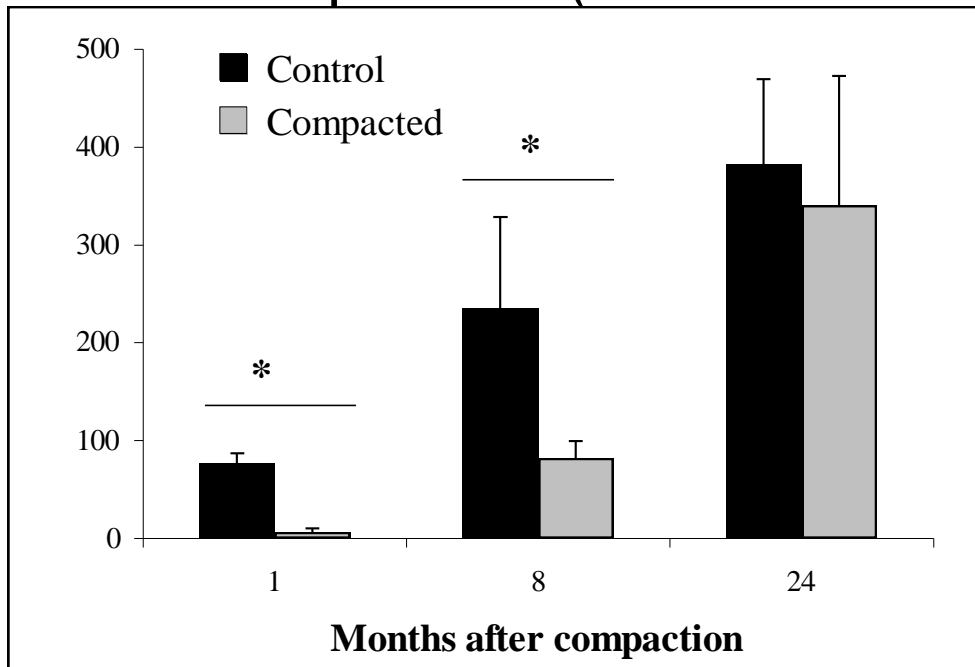
M+8 (11/2005)



M+24 (03/2007)



## Functional consequences (water infiltration - Beer Kan method)





## SCALE : Example 2 (laboratory conditions)

Do burrows of endogeic species influence water infiltration ? (if yes, what are the most effective burrows?)



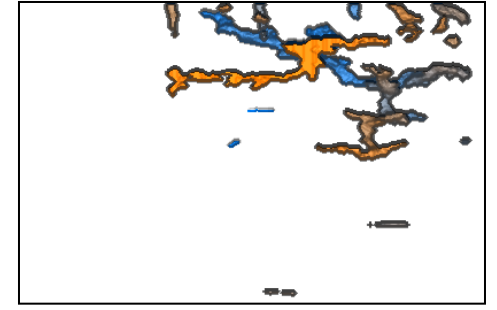
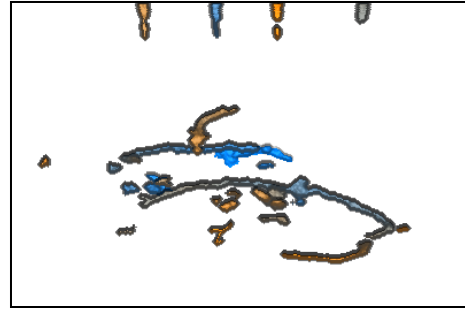
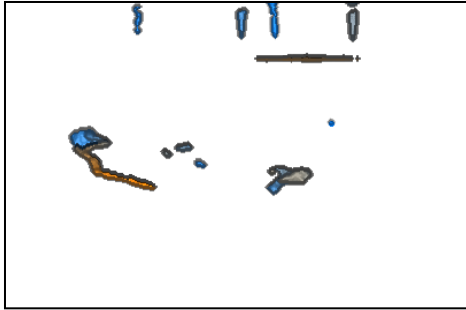
1 week

(2 weeks)

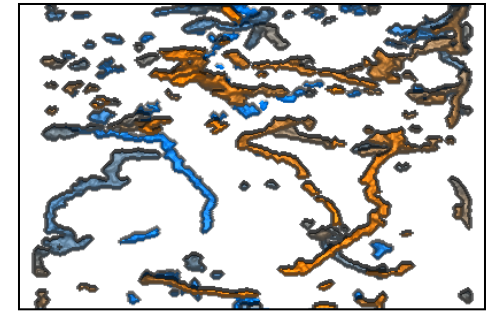
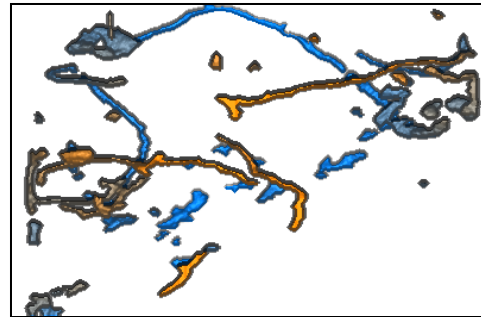
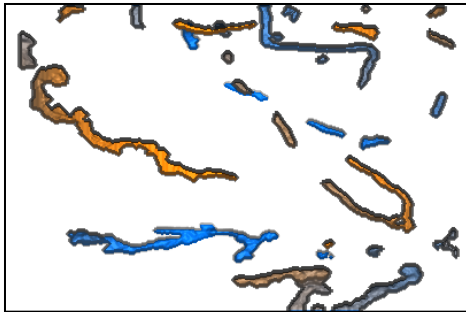
3 weeks

4 weeks

1ew

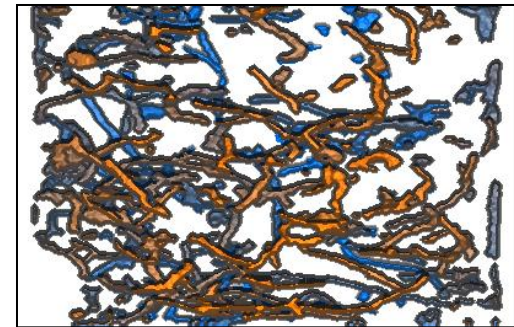
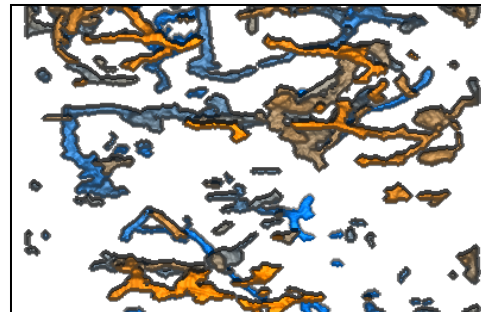
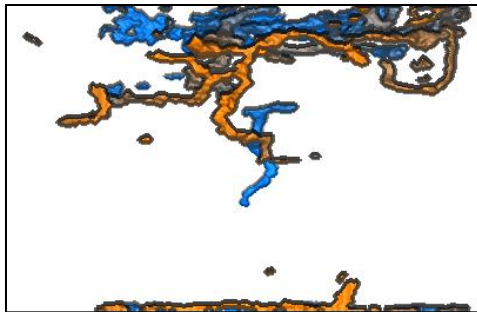


(3ew)



5ew

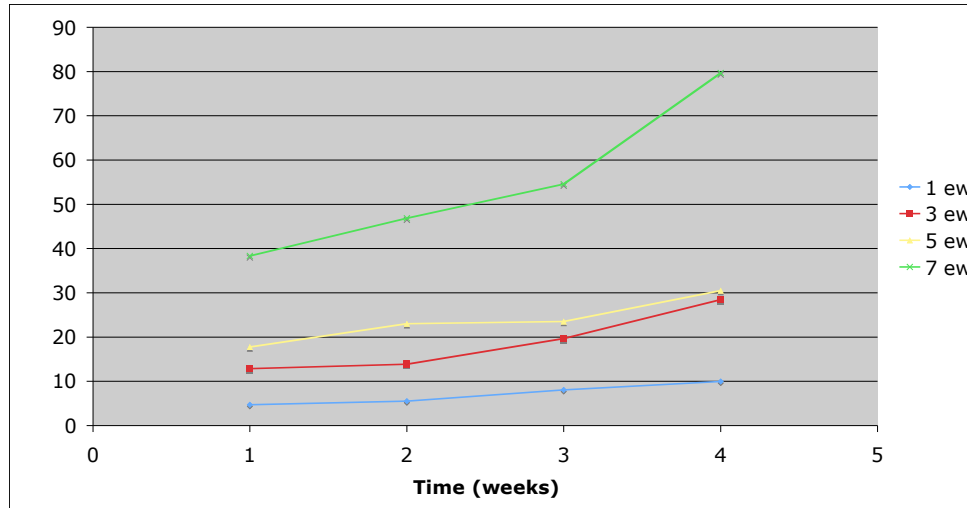
7ew



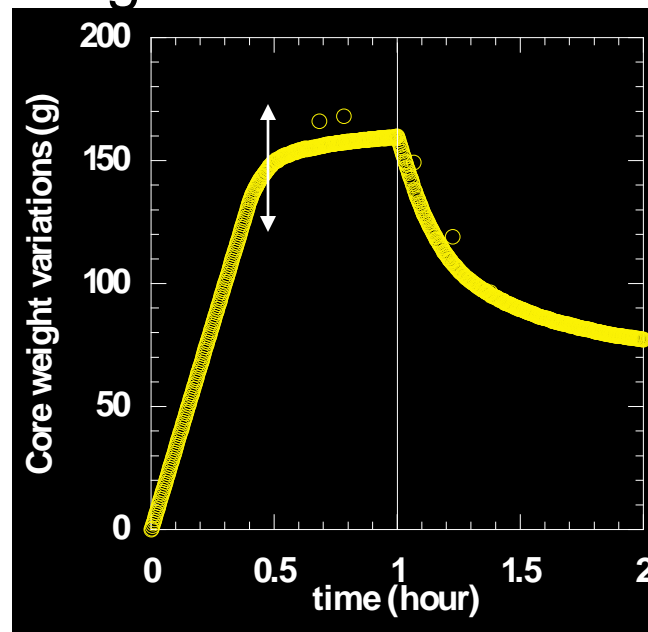
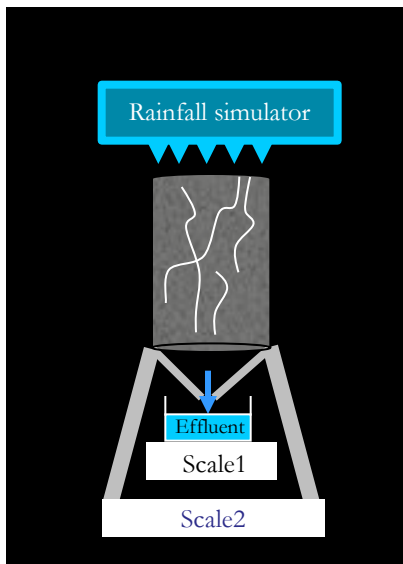
NB : 2 replicates => 32 soil cores



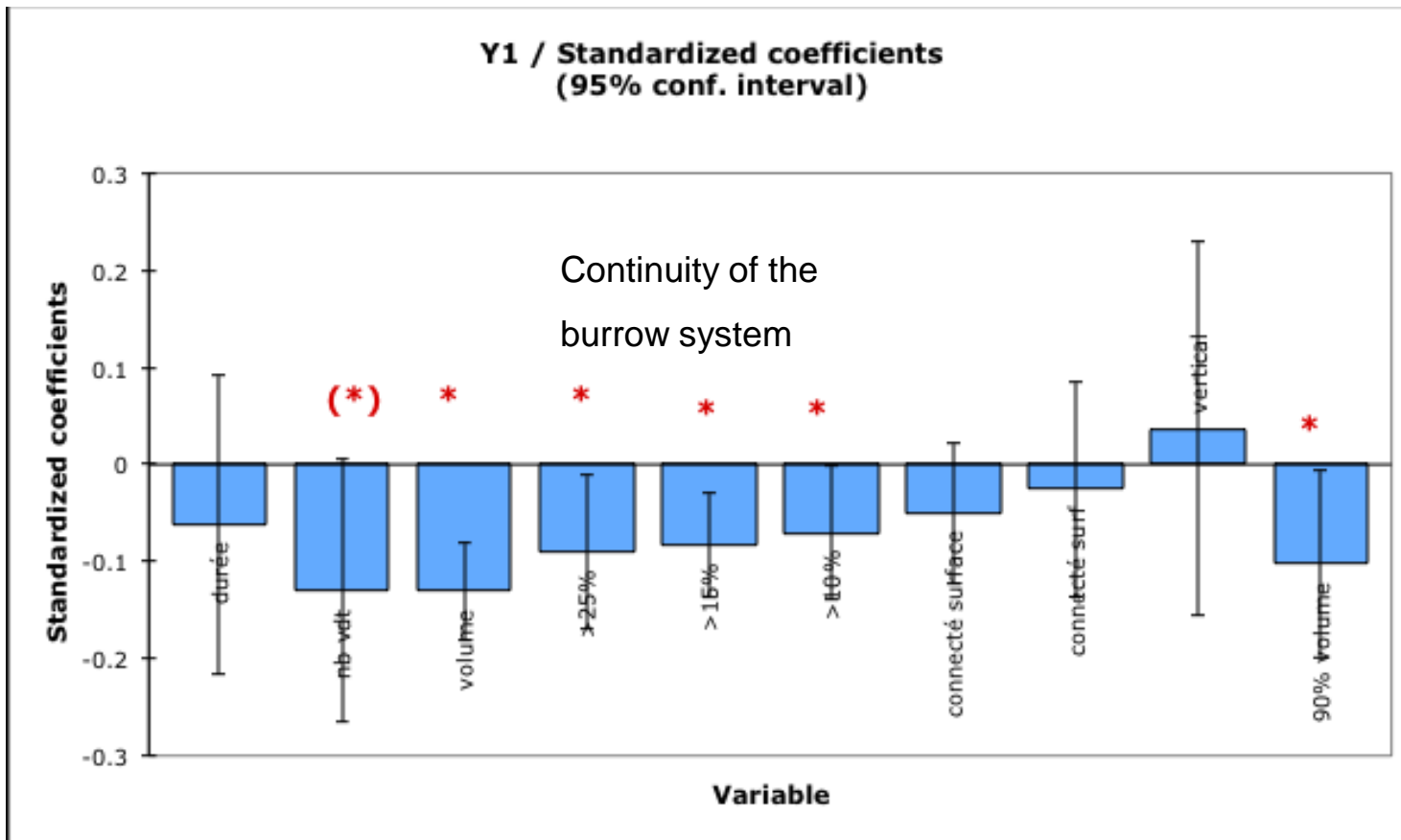
# Step1 :Burrow volume in function of time and ew number



# Step 2: Burrow system characterisation and rain simulation -> time for breakthrough of water



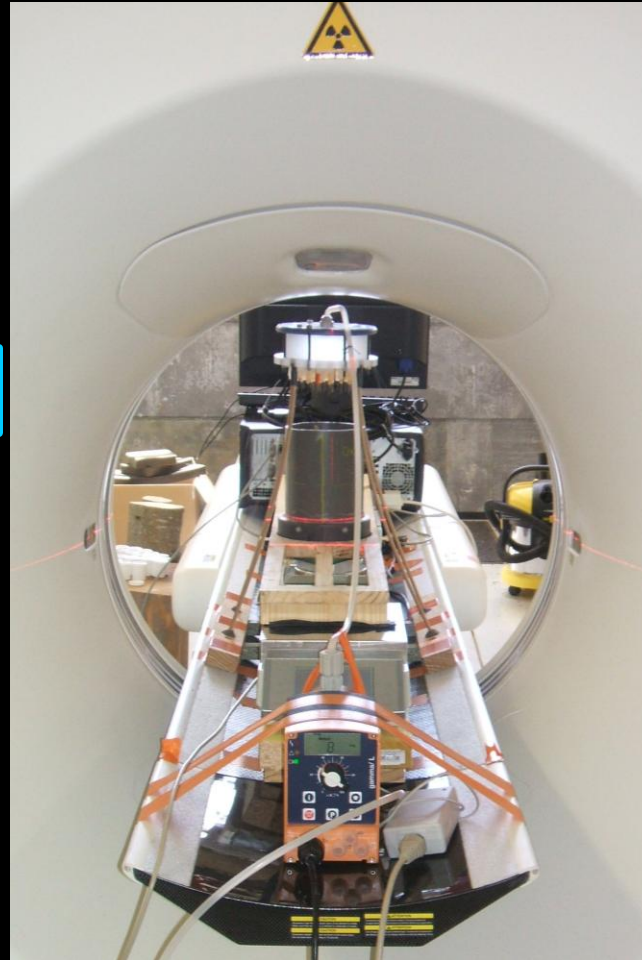
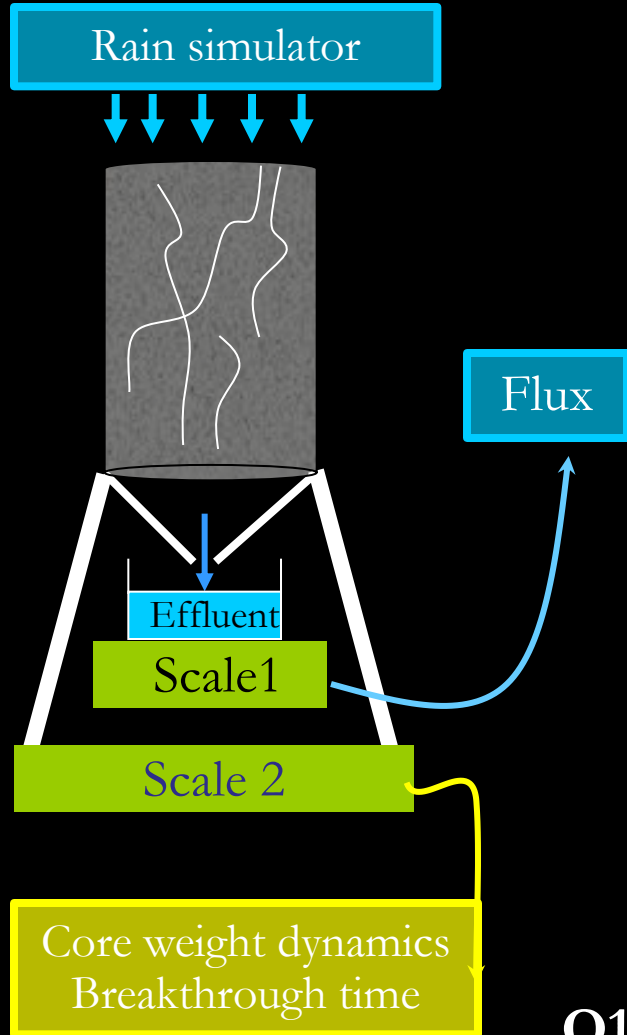
Step 3: regression between breakthrough time and the characteristics of the burrow systems in each core



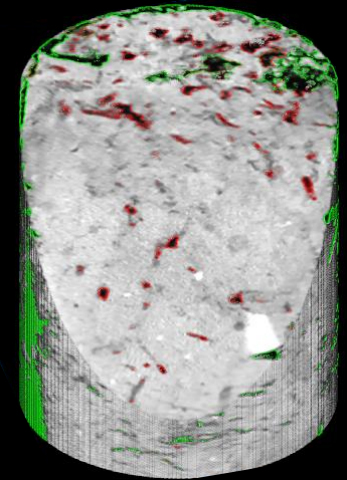
But this is only a correlative approach ....

To go deeper into processes ...

The core is scanned 20 times during a one-hour rain simulation



Water (50-70%) in macropores



Q1: which macropore are active ?

Q2: what kind of flux (laminar, droplets, ...) ?