



HAL
open science

Three-D simulations of burrow systems made by earthworm communities and study of some physical consequences

François Bastardie, Yvan Capowiez, Stéphane Ruy

► To cite this version:

François Bastardie, Yvan Capowiez, Stéphane Ruy. Three-D simulations of burrow systems made by earthworm communities and study of some physical consequences. 8. International Symposium on Earthworm Ecology, Sep 2006, Cracovie, Poland. 1 p. hal-02821210

HAL Id: hal-02821210

<https://hal.inrae.fr/hal-02821210>

Submitted on 6 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

THE 8th INTERNATIONAL SYMPOSIUM ON EARTHWORM ECOLOGY

The Symposium will be held in Poland in [Kraków](#), at the [Jagiellonian University](#) at the [Institute of Environmental Sciences](#).

From 4th to 9th of September 2006

Title: Three-D simulations of burrow systems made by earthworm communities and study of some physical consequences

Authors: BASTARDIE Francois(1), CAPOWIEZ Yvan(1), RUY Stéphane(2)

Address: (1) INRA / UAPV - UMR Ecologie des Invertébrés – 84914 AVIGNON cedex 09- France

(2) INRA- Climat-Sol-Environnement – 84914 AVIGNON cedex 09- France

Abstract:

In the past decade, X-ray tomography was successfully adopted as a mean to study earthworm burrow systems under natural or artificial conditions. However this method has some limitations such the size of the soil core, the existence of a border effect, and cost. Recently a new apparatus, called the “Colonne Gamma”, was developed that enabled to study the trajectory of radio-labelled earthworm belonging to different species in soil cores. The accurate knowledge of (i) the burrowing behaviour of earthworm and (ii) the 3D characteristics of the burrow systems gave the necessary information to develop a simulator. The input parameters are: (i) the earthworm community (and principally the ratio anecic/endogeic), (ii) the interaction between earthworms (avoidance or not) and (iii) the rate of burrow refilling. Hundred simulations were made for each parameter set and several output parameters were computed such as (i) volume and area of burrows connected to the surface and (ii) the verticality of the burrow systems. The first set of parameters was used in another model to simulate water flow through the burrow systems. Interestingly, we observed that increasing interactions between earthworms increased the verticality of the burrow systems. Regarding water flow, we observed that the key parameters were unsurprisingly the proportion of anecic earthworm and the intensity of the burrow refilling. These examples illustrate the potential use of our simulator to study the effect of behavioural parameters on the resulting burrow systems.

(poster)
