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Current Research on Earthworm Dynamics in Braunschweig

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Johann Heinrich von Thünen-Institute

- Federal Research Institute for Rural Areas, Forestry and Fisheries -

**15 institutes covering
ecology, economy and technology**

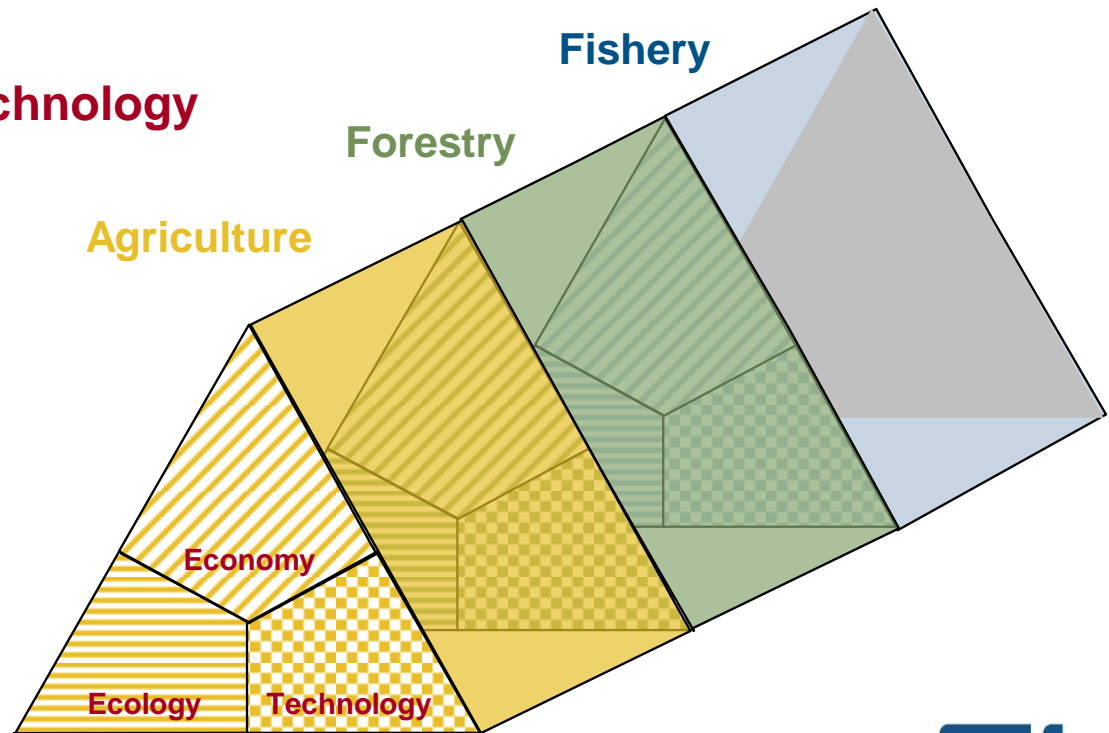
- Applied scientific research
- Scientific advice for the German government



Johann Heinrich von Thünen

(1783-1850)

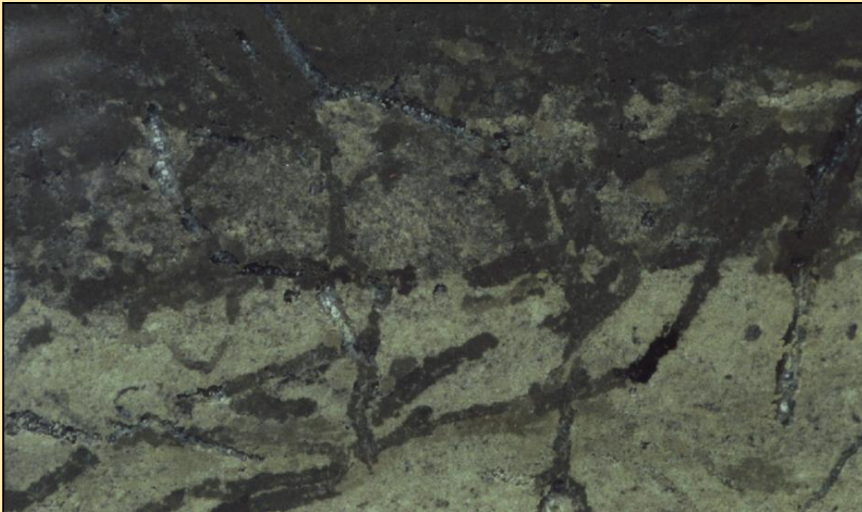
German scientist in agriculture,
economy and social sciences



Functions of earthworm burrow systems

Primary functions

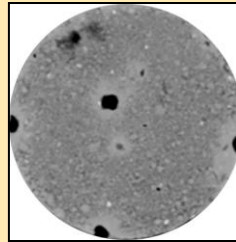
- Habitat for earthworms
- Protection from predation
- Protection from UV-radiation
- Space for reproduction, development
- Relatively constant conditions



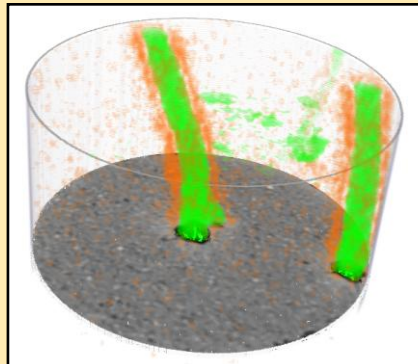
Secondary functions

- Improvement of soil structure
- Gas transport, ventilation
- Water transport, infiltration
- Transport of soluble compounds
- Reduction of erosion
- Location of degradation
- Improvement of nutrient availability
- Improvement of root growth
- Habitat for other soil organisms

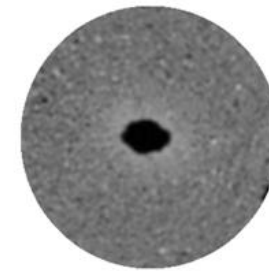
Formation and structural characterization of the drilosphere on the micro-scale



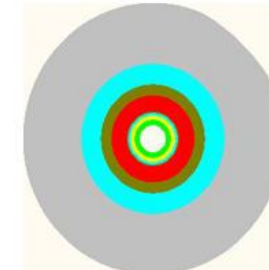
Earthworms in soil columns
 X-ray computertomography
 Biopore geometry
 Drilosphere characterization
 Quantif. of density heterogeneity
 Outlook for lateral transport



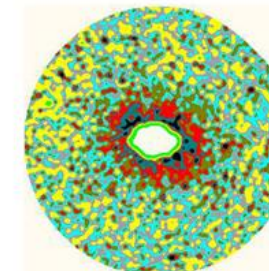
 Biopore
 Drilosphere



Horizontal soil scan slice



ROI cylinder coat



Basic voxel approach

Bulk density
 g cm^{-3}

-  0-0.15
-  0.15-0.90
-  0.90-1.30
-  1.30-1.38
-  1.38-1.45
-  1.45-1.55
-  1.55-1.65
-  1.65-1.75
-  1.75

LoessRW4ima53



Collaboration with
 Helmut Rogasik, Horst Gerke, Joachim Kiesel
 Leibniz Centre for Agricultural Landscape Research (ZALF)
 Müncheberg, Germany



Earthworm dynamics for hydraulic conductivity in relation to soil tillage

Alexandra Boll
Doreen Klofat
Graduate projects



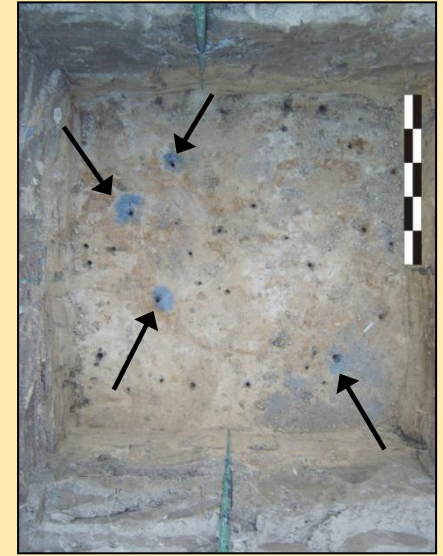
Earthworm sampling



Ring infiltration



Tension infiltration



Coloured and non-coloured
macropores (> 1.5 mm)

Soil depth: 10; 30; 50 cm

10 l of 0.2% brilliant blue

Conventional tillage / Conservation tillage / Direct drill

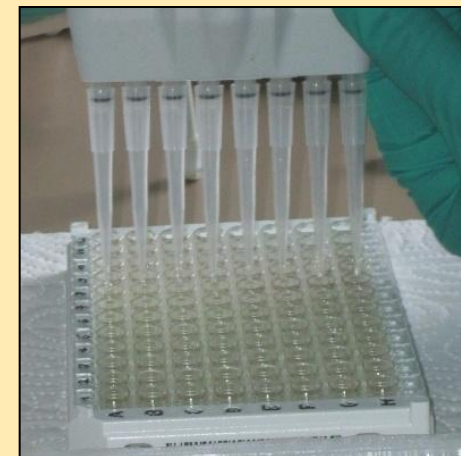
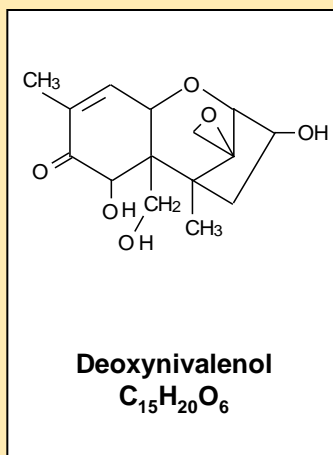


Collaboration with
Wolfgang Durner, TU Braunschweig
Joachim Brunotte, vTI Braunschweig



Regulation of plant pathogens and their toxins under conservation tillage

Friederike Wolfarth
PhD project
Financial support by DBU



Under cons. tillage high infection risk for cereals and maize with *Fusarium*

Deoxynivalenol (DON): main mycotoxin produced by *F. culmorum*

Nylon mesocosms (mesh 20 μ m)

Soil, earthworms, wheat straw

Fusarium culmorum:
infected vs. non-infected

ELISA test systems for concentrations of DON and FPE in soil, casts and remaining straw



Collaboration with
Elisabeth Oldenburg, JKI Braunschweig
Joachim Brunotte, vTI Braunschweig
Joachim Weinert, Chamber of Agriculture Lower Saxony



Current research on earthworm dynamics for ecosystem services in Braunschweig



Formation and structural characterization of the drilosphere on the micro-scale



Earthworm dynamic for hydraulic conductivity in relation to soil tillage



Regulation of plant pathogens and their toxins under conservation tillage