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Visualization of enzyme activities inside earthworm pores

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In extremely dynamic microhabitats as bio-pores made by earthworm, the in situ enzyme activities are assumed as a footprint of complex biotic interactions. Our study focused on the effect of earthworm on the enzyme activities inside bio-pores and visualizing the differences between bio-pores and earthworm-free soil by zymography technique (Spohn and Kuzyakov, 2013). For the first time, we aimed at quantitative imaging of enzyme activities in bio-pores.
Lumbricus terrestris L. was placed into transparent box (15×20×15cm). After two weeks when bio-pore systems were formed by earthworms, we visualized in situ enzyme activities of five hydrolytic enzymes (β-glucosidase, cellobiohydrolase, chitinase, xylanase, leucine-aminopeptidase, and phosphatase.
Zymography showed higher activity of β-glucosidase, chitinase, xylanase and phosphatase in biopores comparing to bulk soil. However, the differences in activity of cellobiohydrolase and leucine aminopeptidase between bio-pore and bulk soil were less pronounced. This demonstrated an applicability of zymography approach to monitor and to distinguish the in situ activity of hydrolytic enzymes in soil biopores.