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Effects of ageing under field conditions on soil organic matter in earthworm casts produced by the anecic earthworm *Amyntas adexilis* in northern Vietnam

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Carbon sequestration in soils became a major issue that governments have to face under their sustainable development objectives and the international 4p1000 program. Although, earthworms are recognized to play a key role in the structure and dynamics of organic matter (OM) in soils, their contribution to soil OM cycling is not taken into account in biogeochemical models nor well understood. In particular, the fate of OM protected in earthworm casts is unknown. In this study, we investigated the effects of ageing under field conditions on the OM dynamics contained in casts produced by the anecic earthworm *Amyntas adexilis* in North Vietnam. To this end we investigated (1) the microscale organisation of particulate organic matter and pores during the exposure of casts and control aggregates during 12 months and (2) compared it to the potential OM mineralisation during a laboratory incubation.

Our results indicated that fresh casts contained significantly more particulate organic matter (POM) than control soil aggregates and field aged earthworm casts. Conversely, the porosity was higher in soil control aggregates than in casts and the porosity of casts tended to increase with their ageing. The analyses of micro-CT images also revealed that POM and Pores contents between casts samples presented strong variabilities even in the youngest casts category. We found, on average, higher mineralisation rates for casts than for controls and a reduction of the OM mineralisation with the ageing of casts. Our results also highlighted a strong positive correlation ($r^2 = 0.89$) between POM contents determined by the segmentation of micro CT images and CO₂ emissions from the incubation experiment. We conclude that earthworms impact the microscale organisation of POM and pores in their casts and thereby influence soil OM dynamics.