

# Soil Organic Matter

## IN A STRESSED WORLD

# **SYMPOSIUM ORAL ABSTRACTS**

Sorted alphabetically  
by Family Name

## Stabilization – destabilization of soil organic matter in the long term: insights from long term bare fallows

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A fraction of soil organic matter has long residence times, from decades to millenia. Investigating the processes responsible for its persistence is however hampered by the presence of organic matter pools having shorter residence times and by the multiplicity of interacting processes. We proposed to use bare fallows plots, kept free of plants for decades, in which almost all C inputs have been stopped to investigate soil organic matter stabilization processes. Long term bare fallows provide an unexpected and unique opportunity to monitor the decay of soil organic C (SOC) by mineralization under natural conditions and to quantify and isolate stable soil C.

We discuss the advantages and limits of these long-term experiments to study soil organic matter dynamics and address two processes: physical protection and priming effect. By comparing SOC dynamics over 80 years in plots which had contrasted structures, thanks to repeated mineral amendments, we quantified the contribution of physical protection to SOC persistence. To investigate the long-term impact of priming effect on SOC stocks, we used two approaches (i) we compared SOC stocks after repeated additions over 50 years of organic matter that was more or less susceptible to induce priming effects and (ii) we compared the decay of SOC in a long term bare fallow and in an adjacent field in which <sup>13</sup>C natural abundance. Both analyses suggest that priming has limited impact on SOC stocks over decades.