

From microbial habitats to sustainable and climate smart soils

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Soils are at the nexus of global challenges: food security, water security, climate change adaptation and mitigation, biodiversity preservation and human health. Despite a growing recognition of the importance of soils in the last few years, it is still urgent to advance solutions to preserve soils while addressing our societal challenges. This requires a better understanding and better ability to predict how do soils function, and hence an in-depth, mechanistic and integrated knowledge on soils.

Studying soil organic matter gives a privileged entry into sustainable and climate smart soil management, because of its major role in elements cycles and soil properties. One of the main characteristics of soils is that they are the habitat of a huge diversity of living organisms, whose activity depends on the local environmental conditions and who in turn affect soil composition and structure: bio-organo-mineral interactions and feedbacks determine soil functioning. Another salient characteristic of soils is their complexity and heterogeneity at different spatial scales. Soil microbial communities live in a complex 3-D physical framework which causes a variety of microenvironments to develop that are more or less suitable for their growth and activity. Deciphering and describing what takes place at the microscale is necessary to understand and predict what happens at the microscale

In this lecture, I will share examples of research achievements in these fields. I will also reflect on how I think research on soils can be performed, in particular that targeted research is necessary, possible and fun, that research on soils should not be reserved to soil scientists and that mechanistic research can be linked and hopefully contribute to global awareness and political initiatives.