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13<sup>th</sup> conference on  
**Fast Field Cycling  
NMR Relaxometry**



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## Impact of Simulated Fire on Soil Properties: A FFC-NMR Investigation

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Wildfires profoundly impact soil properties, influencing a lot of ecological processes. This study investigates the effects of simulated fire on two distinct soil types (Orleans, Sparacia) using Fast Field-Cycling Nuclear Magnetic Resonance relaxometry, which has been proven a powerful tool for investigating molecular dynamics in complex systems. We aim to elucidate how fire-induced alterations, simulated by controlled heating in muffle furnaces, impact the chemical and physical properties of soils. FFC-NMR measurements have been exploited to analyze changes in soil organic matter mobility and composition, as well as water dynamics, across varying degrees of simulated fire severity [1,2]. The technique sensitivity to pore size distribution and water dynamics enables the assessment of soil hydrological connectivity, a crucial aspect of soil functioning impacted by fire. To complement the FFC-NMR analysis, Scanning Electron Microscopy has been used to visualize changes in soil structure and morphology after simulated fire. Additionally, X-ray Diffraction will identify any changes in the mineralogical composition of the soil samples due to heating. This approach, combining FFC-NMR, SEM, and XRD, provides with a comprehensive understanding of the impact of fire on soil organic matter dynamics, overall soil quality, and mineralogical composition. Our findings may likely contribute to a better understanding of fire-affected ecosystems and inform post-fire management strategies.



## References:

- [1] Conte, P., Ferro, V. *Eur. J. Soil Sci.* **2023**, *71*, 602-614.
- [2] Conte, P., Nicosia, A., Ferro, V. *Water*, **2023**, *16*, 843.