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Current knowledge and future perspectives on soil drying and rewetting, by the scientific community

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Drying and rewetting events induce enormous dynamics in soil biogeochemistry, known as the "Birch effect". A series of laboratory studies have shown that during this phenomenon, respiration and microbial growth are uncoupled. In addition, it has been found that soil microorganisms exhibit one of two different response-patterns, the dynamics of which are strongly regulated by the harshness of the moisture disturbance experienced by soil microbes. Despite the potential significance of these responses for the global carbon cycle, the characteristics and mechanisms underlying them are still unclear.

In order to shed some light on the current status of research in this field, we will present the outcomes of an international workshop organized in Lund in November 2019. During it, we integrated researchers from different environments in order to identify knowledge-gaps and tackle outstanding and new challenges in this field. We will review the characteristics of the growth and respiration responses to moisture fluctuations and the putative mechanisms and factors governing them. We will also discuss the advantages of combining empirical and modelling approaches by using our own group experience as a case example.