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# Labile and recalcitrant organic matter dynamics in a Sphagnum-dominated peatland (Le Forbonnet, Jura Mountains, France). Impact of moisture conditions.

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In a context of climate change, peatlands may switch from a carbon (C) sink to a C source function under the effect of temperature and moisture changes. The climate-induced positive feedbacks are closely linked to C dynamics, and thus to the fate of organic matter (OM) in the underlying peat. Our aim is then to determine how moisture conditions in a Sphagnum-dominated peatland affect the dynamics of OM.

Peat cores (50 cm long) were collected in June 2008 from a French peatland in two moisture conditions: a "DRY" site characterised by hummock plants and a "WET" site exhibiting hollow and/or lawn species. To assess decay processes, we analysed the composition of both the bulk peat OM and the water extractable OM (WEOM). The bulk peat OM was investigated through optical microscopy, total organic carbon, Rock-Eval pyrolysis, sugar and phospholipid fatty acids (PLFAs) and the WEOM through the analyses of water extractable organic carbon (WEOC), aromatic compounds (SUVA280) and carbohydrates (neutral monosaccharides, neutral disaccharides and polyols). The piezometric water collected at 15, 25 and 40 cm depth was also analysed to characterise DRY and WET environmental conditions.

Results from bulk peat showed that most bioindicators confirmed our hypothesis that OM decay increased with depth and was higher in the DRY condition. This was shown by a loss of a diagenetic sensitive oxygen-rich OM. At the peat surface, decay intensity was also shown by higher contents of microbial-derived sugars such as ribose and lyxose at the DRY condition where microscopic observations also revealed relatively large quantities of fungal hyphae. The results also showed that the WEOM dynamics was mainly controlled by labile OM release. At the surface (2.5 to 5 cm) a higher release of labile OM resulting from plant senescence, was recorded in the WET condition. It may be due to the close proximity of the water table combined with an initially less decomposed OM. In the DRY condition, an important release of both labile and recalcitrant OM, and high microbial biomass, were observed in the 12.5 to 15 cm depth. It could be interpreted as a possible priming effect occurring in upper part of the water table.

Using indicators for the bulk peat OM and the WEOM, this study shows the impact of moisture conditions on the early decay processes affecting labile and recalcitrant OM in peatlands. In a climate change perspective where drought events may increase, our work suggests that seasonal changes of groundwater level can enhance the decomposition of labile and recalcitrant organic pools contained in peatlands, thereby increasing mineralization and/or humification processes.