Microclimate of mire wetlands: testing the thermal buffer of groundwater in waterlogged and dry soils

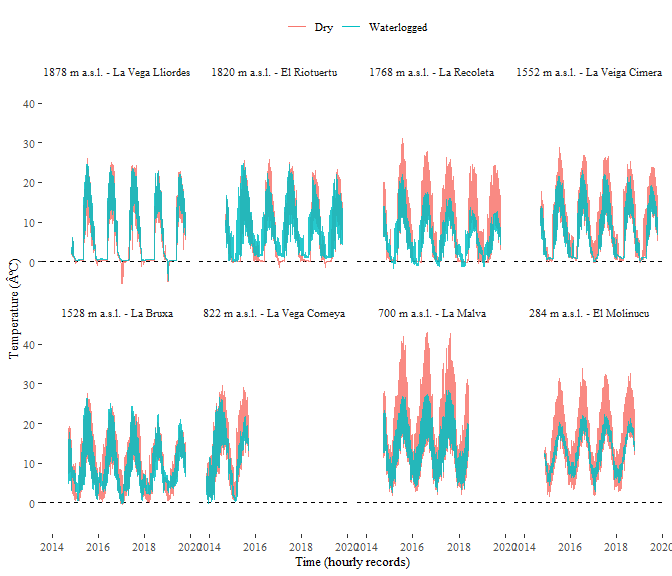
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12/05/2020

# Introduction

Mires are however azonal habitats whose existence depends on local soil properties (Breckle [2002](#ref-RN3328)): by definition, they are areas with waterlogged soils. Grounwater can produce a buffer effect on soil temperature, keeping soils warmer than the air during cold periods, and vice versa (Ellenberg [1988](#ref-RN3344); Geiger, Aron, and Todhunter [2009](#ref-RN3201)). Root-zone temperature is a major determinant of plant ecophysiology (Körner and Paulsen [2004](#ref-RN3024)), so the groundwater buffer effect is expected to allow mire plants to live along a wider range of air temperatures than they could otherwise. Indeed, mires have a relatively homogeneous flora despite being distributed from Mediterranean to Boreal biomes, and from low valleys to the alpine belt (Peterka et al. [2017](#ref-RN4678)). Recently, soil temperature measurements have become available for mires of North America (Raney, Fridley, and Leopold [2014](#ref-RN3204)), Western Europe (Fernandez-Pascual et al. [2015](#ref-RN2356)) and Central Europe (Horsák et al. [2018](#ref-RN4675)). Their comparison with air temperatures derived from models has shown that mire soils are indeed warmer in winter and cooler in summer, thus giving support to the existence of the groundwater thermal buffer (Fernandez-Pascual et al. [2015](#ref-RN2356); Horsák et al. [2018](#ref-RN4675)). Furthermore, the effect has been linked to the composition of mire flora and fauna (Horsák et al. [2018](#ref-RN4675); Schenková et al., [n.d.](#ref-RN4679)), the growth rings of mire trees (Raney et al. [2016](#ref-RN3060)) and the role of mires as glacial refugia (Jiménez-Alfaro et al. [2016](#ref-RN2513); Dítě et al. [2017](#ref-RN4680)).

# Figures



Hourly soil temperature records at the mire sites. The blue series was recorded within the mire, in a waterloged area. The red series was recorded in a neighbouring dry area. Dataloggers were buried at 5 cm depth.

# References

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