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Seasonality of Sphagnum LAI in a mountainous peatland (Pyrenees, France)

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Peatlands store more than a third of the global soil organic carbon stock. Bryophytes, and more specifically sphagnum mosses, play a major role in the carbon and water cycles of these ecosystems. There is a crucial need to include sphagnum mosses into Earth system models to better simulate the functional dynamics of peatlands in a changing environment.

Leaf Area Index (LAI) is a key integrated whole plant trait that characterizes the capacity of plants to photosynthesize. Moreover, LAI is also a variable calculated by land surface models used in climate models allowing control of the exchange of matter and energy between vegetation and environment. LAI is often validated by satellite observations in the land surface modelling community.

However, to date, too few studies are focused on the seasonal evolution of LAI of sphagnum mosses, which remains a difficult exercise. Therefore, we propose a seasonal monitoring of the LAI of sphagnum mosses in a mountainous peatland site (alt. 1343m) of the Pyrenees. Two techniques for determining the LAI are confronted. First, monthly *in situ* moss sampling at the stand scale (25 cm²) followed by laboratory measurement of wet and dry biomass, and the LAI with a 2D scanner. Secondly, calculation of LAI using ESA's SNAP toolbox (10m resolution).

We found that both Sphagnum LAI derived from field campaigns and the remote sensing approach show a strong seasonality from June to December 2021. Both techniques give the same range of LAI values during this period (1 to 6 m².m²). However, the peak of the growing season does not occur at the same time, with a peak in August for field experiments and July for remote sensing approaches.