

Hydrological controls on dissolved organic carbon exports from a - French Pyrenean - mountainous peatland

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At the catchment scale, peatlands disproportionately contribute to dissolved organic carbon (DOC) exports to surface waters. Rare attempts have been made to quantify and characterize these exports from mountainous peatlands where topography induce intense climatic events. The specific DOC contribution from the peatland has been tracked using fDOM (fluorescence of dissolved organic matter) sensors deployed both upstream and downstream of a mountainous (1340m) peatland in the Pyrenees. These high frequency (30 min) measurements have been coupled with water level, discharge and meteorological survey in order to identify controlling factors on DOC concentrations and fluxes.

This study highlights strong hydrological controls on DOC concentrations and fluxes at the outlet of the peatland, especially during short and intense events of flood. Mass flux ranges are highly variable, averaged at 52g.h^{-1} for low flows periods and reaching 3.5kg.h^{-1} during extreme hydrological events. From September 2014 to March 2015, 75% of the DOC mass flux transited during 39 different flood events which represent 40% of the timescale.

Water table levels fluctuates in the $[0, -45]$ cm range. During the high flow events, the highest DOC concentrations are associated with a narrow range of water table levels $[-9, -15]$ cm. The relations between runoff and concentration during flood events showed two hysteretic behaviours: counter clockwise for floods with a maximum runoff inferior to 30L.s^{-1} clockwise for events with a superior runoff, (DOC maximum concentration seems to be diluted by overflow from the upstream watershed). When considering the topographical watershed, a specific flux of $0.76\text{g C .m}^{-2}.\text{yr}^{-1}$ can be estimated. When reported to the peatland area, it reaches $32.3\text{g C .m}^{-2}.\text{yr}^{-1}$. During hot moments of short and intense floods, peatlands constitute hot spots of DOC exports to the surface waters in this mountainous watershed.