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Long-term DOC-leaching from a temperate Scots pine forest (Brasschaat, Belgium).

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The carbon and water balance of terrestrial ecosystems are tightly coupled. Part of the assimilated carbon is leached from the ecosystem as dissolved organic carbon (DOC). These DOC-fluxes from the ecosystem are highly uncertain and are not incorporated in most process-based models. Therefore the focus of this study is to determine the drivers of the interannual and seasonal variability of the DOC-leaching.
The study site is located 20km NE of Antwerp, near Brasschaat (Belgium) and consists of an 80-year-old even aged Scots pine (Pinus sylvestris L.) stand, which belongs to a larger mixed coniferous/deciduous forest and it is part of the ICP-II and Fluxnet/CarboEurope-IP networks since 1997. We simulated the different components of the water balance (transpiration, soil evaporation canopy evaporation, soil water content, runoff and leaching) with a combination of field measurements (sap flow, eddy covariance, TDR's) and the ORCHIDEE model. DOC concentrations were measured monthly in the trough fall and at four depths in the soil from the year 2000 onwards. Here we report estimates of DOC-leaching for a six year period (2000-2006) and assess its importance in the total carbon balance of the ecosystem. Results indicate that on average 10% of yearly NEE (as measured with eddy covariance measurements) is lost as DOC in the soil. We further looked at the drivers responsible for seasonal and interannual variation of the DOC-leaching. Logically, water leaching is the main driver of the DOC-leaching, for both the seasonal and the interannual variability. The remaining variation in the DOC leaching is affected by soil temperature and pH. DOC concentrations are highest in the upper soil layer and gradually decrease with depth. This could be explained by part of the DOC being respired as CO2 and part being retained in the soil matrix by Al and Fe-oxides adsorption. Future climate scenarios predict drier summer periods and more precipitation during the winter for the north Belgian region. To study the effect of future trends in water leaching and thus the DOC-leaching, future climate scenarios will be used as model inputs to simulate the water balance. These data will be presented in this paper.