

PROJECT INFORMATION

Project title: Temporal trends of dissolved organic carbon (DOC) in soil solution in European forests

Project ID: 56

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PROJECT DESCRIPTION

Objective(s) of the project:

The main objective of this project is the analysis of monotonic temporal trend of DOC concentrations in soil solution across European forests. Some linked questions that will be addressed are:

- Which drivers explain the differences in trends between the ICP Forests Level II plots? Are differences in vegetation type, soil type, deposition or climate driving differences in DOC trends across European forests?
- Is there an underlying driver of change operating in a uniform manner across European forest sites?

Scientific background of the project:

Dissolved organic carbon (DOC) concentrations in surface waters have increased over the past decades across Europe and North-eastern United States [Evans et al., 2012]. Drivers like climate, CO₂ increase, acid deposition, land use change and management [Evans et al., 2012; Freeman et al., 2004; Worrall and Burt, 2004] are the main hypothesis to explain this increasing DOC concentration trend. On the contrary, there is less agreement in the global trends of DOC concentrations in soil solution. Decreases, increases and no trends of soil solution DOC from forested soils have been reported [e.g. Löfgren and Zetterberg, 2011; Verstraeten et al., 2014; Ukonmaanaho et al. 2014], but even when a tendency is detected, the drivers of soil solution DOC temporal trends are not clear yet. While recovering from pollution is suggested as the cause of soil solution DOC increases in the UK [Vanguelova et al., 2010], the hypothesis that explains an increase of DOC in surface waters due to an acidification recovery could not be proven in soil solution DOC concentrations measured in Belgian and Swedish forests, suggesting that the drivers of DOC substantially differ between surface waters and soils [Löfgren et al., 2010]. Moreover, most of the studies of soil solution DOC temporal trends focus on local or national level and it is difficult to extrapolate these results to European scale, since the effect of the drivers vary over temporal and spatial scales [Clark et al., 2010]. In this context, the ICP Forests database constitutes a very valuable source of data to explore soil solution trends at European scale and investigate the effects of vegetation, soil, climate and atmospheric chemistry on soil solution DOC trends.