Studying the effects of droughts and heavy rain events on DOC in Scot pine in Belgium

Cristina Ariza Carricondo
University of Antwerp, University of Antwerp, Biology, Belgium (cristina.arizacarricondo@uantwerpen.be)

Studying the effects of droughts and heavy rain events on DOC in Scot pine in Belgium
Cristina Ariza-Carricondo(1,2), Marilyn Roland(1), Bert Gielen(1), Eric Struyf(1), Caroline Vincke(2) and Ivan Janssens(1).

(1) PLECO, University of Antwerp, Belgium. (2) Faculty of Bioscience Engineering & Earth and Life Institute, University of Louvain-la-Neuve, Louvain-la-Neuve, Belgium.

Climate extremes, including extreme rain events, are becoming more frequent and more extreme, and affect the carbon cycle of ecosystems. Very little is known about how Dissolved Organic Carbon (DOC) production and leaching are affected by such precipitation extremes while the relation between dissolved and gaseous exports of carbon under different precipitation regimes remains unexplored.

Hydrological conditions are the main driver of DOC leaching and alterations in precipitation patterns may cause large changes in the carbon balance of forests. To test the effects of precipitation extremes on DOC, we designed a manipulation experiment in a Scots pine forest in Belgium.

One of the challenges to estimate DOC export is the quantification of water drainage flow. In this study we used self-designed Zero Tension Lysimeters (ZTL) to capture leaching water and analyze its DOC-concentrations as well as other elements along profiles in the soil (up to 75cm depth), to study how DOC moves under different precipitation regimes. Different manipulation experiments were performed where we modified the precipitation regime simulating heavy rain events after different droughts as well as experiments where we modified the precipitation intensity over time. Leached water was collected at different depths at monthly intervals after natural rain events as well as after irrigations.

Preliminary results showed that drainage water transported DOC differently through the soil when different amounts of water were added. Furthermore, more frequent small rain events appear to favor the production of DOC as compared to less frequent high intensity rain events, while DOC production ceases during droughts.