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A large scale girdling experiment in the TERENO Wüstebach catchment

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Forest ecosystems are in focus of various research projects analyzing soil-plant-atmosphere interactions. Understanding of the carbon budget and carbon fluxes in the different compartments (soil and plants) are of great importance to understand future climate change impact or the influence of management practice. For example, in forest stands soil respiration is the sum of heterotrophic and autotrophic respiration, whereby both fluxes can be only separated by root exclusion (trenching) or isotope techniques if the tree stand cannot not be disturbed. Another possibility to study soil respiration processes without altering the micro-meteorological conditions are girdling experiments. However, in practice girdling experiments are restricted to relatively small areas before clear-cutting. Additionally, most experiments were performed at plots, where the undisturbed processes are not well known.

The proposed girdling experiment will take place in a mature spruce stand of approximately 60 years of age located in the Wüstebach catchment in North Rhine Westphalia, Germany. The 27 ha Wüstebach catchment is located in the Eifel low mountain range and is one out of four German Terrestrial Environmental Observatories (TERENO see also ttp://www.tereno.net/index.php?index=2). The catchment is permanently equipped with a wide range of sensors monitoring hydrological, meteorological, and biological processes. To monitor the soil water status a wireless sensor network of 150 sensor stations is already installed and monitors soil water content and soil temperature at 5, 20, and 50 cm depth. Hereby approximately 40 percent of all sensors are located within the area of projected clear cutting. Micrometeorological stations are equipped with standard weather data sensors. Additionally, a 30 m tower is equipped with an eddy covariance station. Soil respiration is measured using closed chamber technique since 2007 at predefined transects and nested points.

A clear-cutting of about 40 percent (10-13 ha) of the entire area is planned for the year 2011 and 2012. Before this clear cutting the tree stand is open for various girdling experiments.

In general, all data from the TERENO infrastructure can be used by any group participating in the experiment. We hereby invite any interested scientist to propose a topic which is related to the girdling and clear cutting experiment.