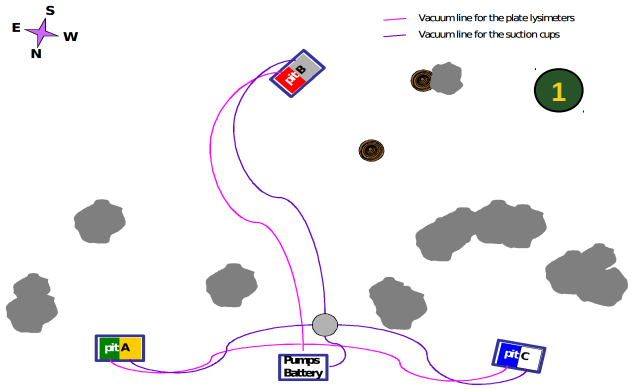
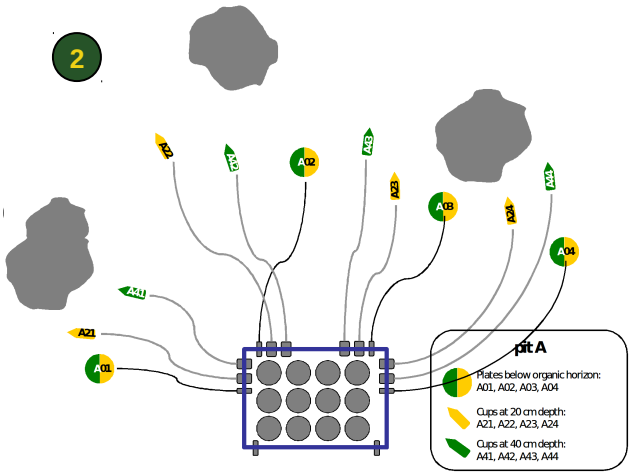
Studying the soil solution under Larch Stand

In forested ecosystems a significant portion of the organic matter may be fast turned over, involving a pool that is as dynamic as poorly known, i.e. the dissolved organic matter (DOM). Gaps in the knowledge include the amount and dynamics of dissolved organic carbon (DOC) that is produced in the soil and potentially leached, a phenomenon not only relevant to the understanding of biogeochemical processes, but also to C budget at the ecosystem scale.
In autumn 2010 we installed in the Tronchaney Larch forest **a suite of soil lysimeters** with the aim to periodically collect soil water.



The system is constituted by three replicated sites (A, B and C in 1). In each site we identified **three critical depths** where to sample the soil solution: (1) under the forest floor, (2) under the A horizon, around 20 cm depth, and (3) under the Bw horizon, at 40 cm depth. Each depth was equipped with 4 replicated suction devices 2 . The forest floor was equipped with suction plates, while at other depths suction cups were installed.

The system is continuously kept under a slight depression (-0.2 atm) by means of an electric pump (power-supplied by a battery). A vacuum barrel is also used as a vacuum reservoir. This allows to continuously sample the soil solution and makes it possible to calculate actual fluxes per surface unit from the measured concentrations of any element and the known volume of cumulate sample per time unit.
Samples are collected from weekly to biweekly during all seasons, including winter.
Water samples are analyzed to determine main cations and anions, DOC and dissolved organic nitrogen. Additional analyses include phospholipid fatty acids (PLFA) and phenolic compounds, which allow to elucidate the microbial dynamics and the organic matter decomposition processes.



The isotopic composition of collected waters (oxygen isotopes) will also be included as a further step, to understand how the incoming rain or snowmelt waters are partitioned into the soil and how cycled by the soil biota on a seasonal basis.

Samples have been collected throughout one year, and not yet analyzed. However, a first significant result is that also in midwinter, when the soil water content is low, free water is available and may be sampled, though in low amounts. Even under relatively harsh winter environmental conditions, the water sampling system has been operating with no interruption, which is encouraging for any further implementation of this soil solution sampling equipment in seasonally snow-covered soils.

PhenoALP is an Interreg project, co-funded by the European Regional Development Fund, under the operational program for territorial cooperation Italy–France (ALCOTRA) 2007-2013 (www.interreg-alcotra.org/)