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Controls of soil pore water carbon fluxes from a Histic Andosol, Iceland

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Soil pore water carbon from a Histic Andosol from Western Iceland was studied at three different scales; in the field, in undisturbed outdoor mesocosms and in laboratory repacked microcosms. Pore water was extracted using suction cup lysimeters and hollow-fibre tube sampler devices.

For the soils studied, nearly twenty percent of the organic carbon bound annually in the soil surface horizon under field conditions was lost by leaching of DOC and through decomposition forming DIC in disturbed non-vegetated microcosms. This percentage increased to 38 % in undisturbed vegetated mesocosms highlighting the importance of surface vegetation on the turnover of carbon in soils. Increased influx of nutrients and eaolian-andic deposition will increase growth and photosynthesis on the surface but decrease carbon sequestration in surface horizons. Decreased carbon sequestration is partly caused by increased pH values of the soil solution. Aluminium in soil solution will therefore rather be incorporated into inorganic minerals such as allophane and imogolite instead of being complexed with DOC before forming stable Al-humus complexes. Field studies considering long anthropogenic changes in pedogenesis require considerable experimental duration though more rapid experiments can be conducted with confidence in micro- and mesocosms as in this research.