



A long-term simulation of the effects of acidic deposition and climate change on surface water dissolved organic carbon concentrations in a boreal catchment

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Concentrations of dissolved organic carbon (DOC) are increasing in surface waters across Europe and North America. Two of the main mechanisms proposed to explain this increase are declines in sulphate (SO₄²⁻) deposition and changes in climate. Many of the reductions in SO₄²⁻ have already occurred. Climate change-related effects are occurring now and will continue in the future. Here we present the first application of a simple process-based model which simulates the effects of both climate and deposition on surface water [DOC]. The model was applied to Valkea-Kotinen, a small headwater catchment in Finland, where it was able to simulate present day (1990-2007) trends in [DOC] in the lake and catchment outflow as functions of observed climate and EMEP modelled SO₄²⁻ deposition. Using a parameter set derived from a present-day calibration, the model was run with two SRES climate scenarios and three deposition scenarios to simulate surface water [DOC] between 1960 and 2100. Preliminary modelling results show that much of the historical increase in [DOC] can be explained as a result of historical declines in modelled SO₄²⁻ deposition. It appears that [DOC] will continue to increase as climate changes. These findings should be corroborated by applying the model to other sites.