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An analysis of the long-term variation in stream water quality for three upland catchments at Loch Dee (Galloway, S.W. Scotland) under contrasting land management

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Abstract. A long term record of water chemistry, consisting of twenty years of weekly spot samples, from three sub-catchments draining into a loch and the loch outflow in Galloway, S.W. Scotland have been analysed. The analysis undertaken consisted of a three component statistical trend model. The technique allows the identification of long-term, seasonal and short-term trends, as well as differentiation between base flow and high flow responses. The land usage in the three sub-catchments is moorland, forest and forest plus lime. The results show that, since the mid-1980s, there has been a gradual decline in stream-water sulphate of the same order as reductions in the deposition of non-marine sulphate. Superimposed on this trend are somewhat random but considerable perturbations to this decline, caused by sea-salt deposition. There is no evidence of changes in surface water nitrate concentrations. The influence of different land management is evident in the sulphate, nitrate and pH data, whilst variations in calcium concentrations are also a product of differences in hydrological routing and the impact of sea-salt episodes.

Keywords: trend analysis, acid deposition, land management, water quality, sea-salts, Galloway, S.W. Scotland

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