



Long term (1987-2012) trends in water chemistry of acid sensitive Swedish lakes

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Acidification of surface waters is a serious concern in Sweden. During the 1970s and 1980s, many surface waters in Sweden were acidified by long-range pollution. Legislated emissions reductions have led to the recovery of many water bodies but today, there are concerns about the possibility of re-acidification. Sweden is committed to a goal of natural acidification only (i.e. no anthropogenic acidification). Here, we present long term (1987-2012) trends in strong acid anion, base cation, organic carbon and alkalinity measurements. Lakes are defined as acidified in Sweden if pH is more than 0.4 units less than a reference (1860) pH estimated using MAGIC, a widely used process-based model of acidification. Using this criteria, many acid sensitive Swedish lakes are still acidified. A changing climate and more intensive forest harvesting may further delay the recovery from acidification.

Average measured alkalinity in the 38 lakes presented here was ≤ 0.02 mekv/l between 2000-2012. Strong acid anion concentrations declined, primarily as a result of declines in sulfate. Chloride is now the dominant anion in many of these lakes. Base cations concentrations have declined less rapidly, leading to an increase in charge balance ANC. This increase in charge balance ANC has not been matched by an increase in measured alkalinity. Total organic carbon concentrations have increased significantly in many of these lakes, to the point where modeled organic acidity is now approximately equal to inorganic acidity.

While the results presented here conform to acidification theory, they illustrate the value of long-term monitoring for assessing the effects of pollutant reduction measures, identifying new threats to water quality and corroborating model results. Most importantly, the long-term monitoring results presented here can be an important tool for informing environmental policy.