

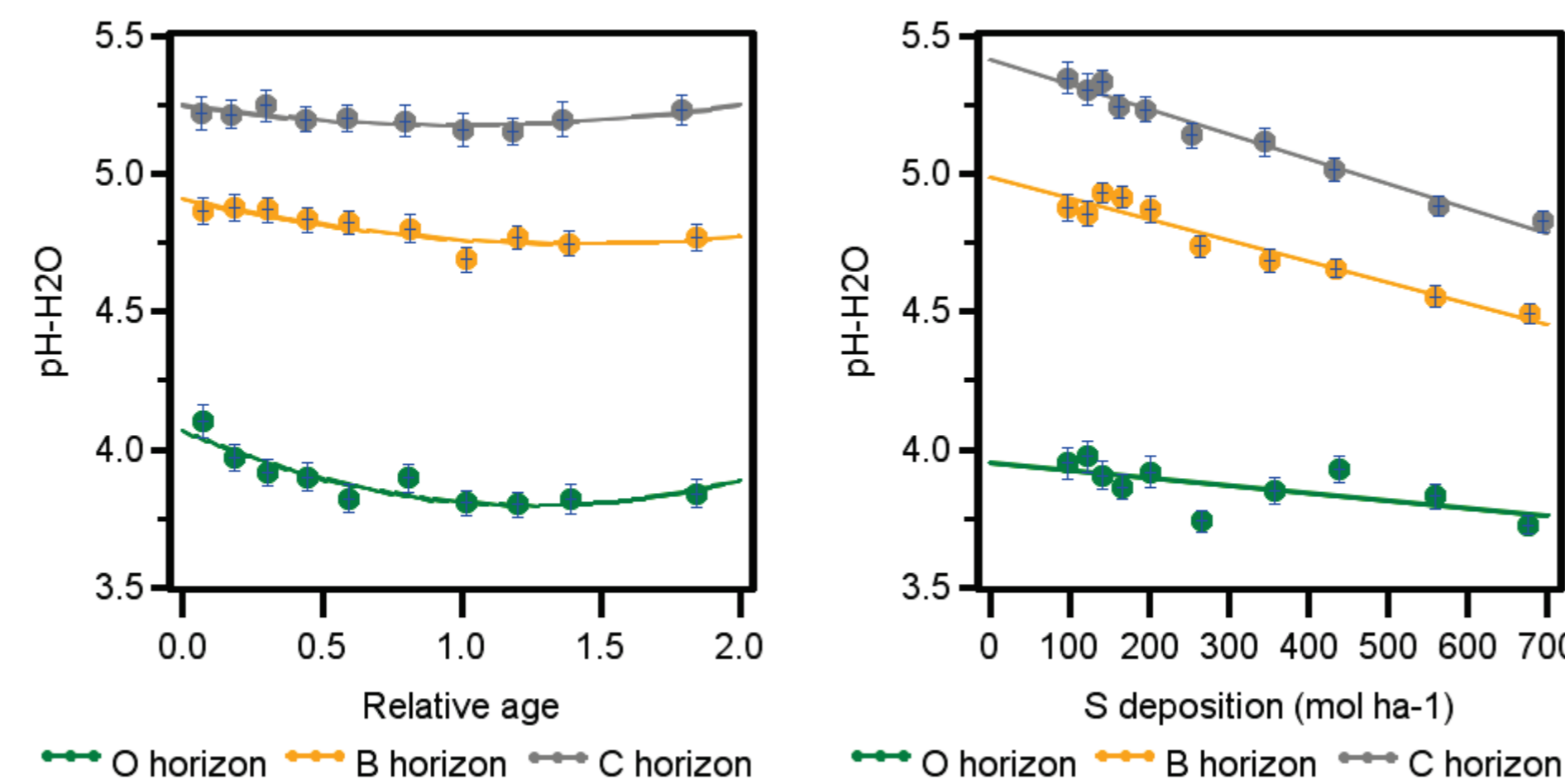
Spatial variations of acid-base properties in Swedish forest soils – the impact of deposition and biomass growth

Results and discussion

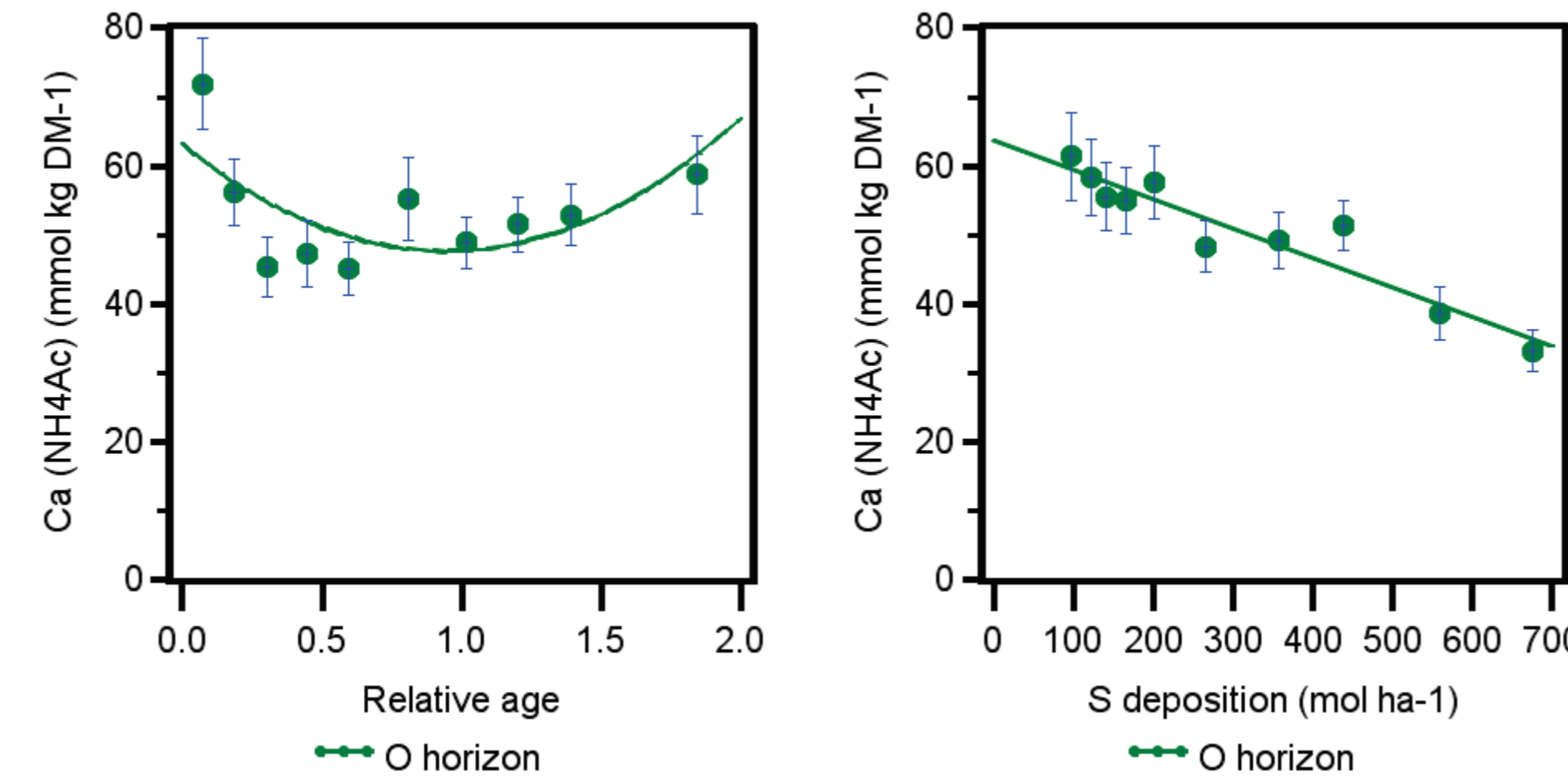
Results show that S deposition is significantly correlated to lower pH, lower BS, lower Ca and higher Al in all soil horizons. Relative age is significantly correlated to lower pH in the O and B horizons but not in the C horizon. Ca and BS in the O horizon show an initial drop, followed by a gradual increase, with increasing relative age.

Regression lines of pH, BS and Ca versus S deposition have steeper slopes for regions with lower temperature sum (northern Sweden). This indicates that these variables correspond more quickly to deposition in northern Sweden than in the south. Soils in the south have, however, been more acidified by deposition due to higher deposition levels there.

Overall, the analyses indicate that tree growth has an acidifying effect mainly in the upper soil layers while deposition has an acidifying effect throughout the soil profile.



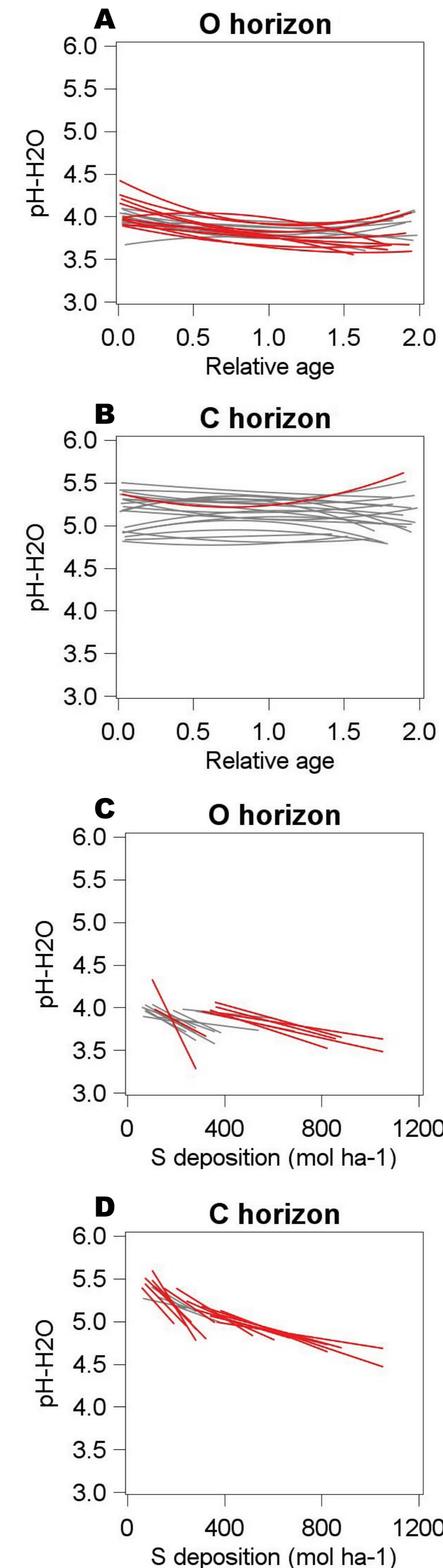
pH-H₂O versus relative age and S deposition
Average values and 95% confidence intervals



Ca-NH₄Ac in O horizon versus relative age and S deposition
Average values and 95% confidence intervals

A and B:
Regression lines of pH-H₂O versus relative age for 20 different regions in Sweden according to S deposition
C and D:
Regression lines of pH-H₂O versus S deposition for 20 different regions in Sweden according to temperature sum

Red lines (A-10, B-1, C-7 and D-15) mark a significant (p<0.05) relationship; grey lines are non-significant



Introduction

In this study, we compared the effects of tree stand age and acidifying atmospheric deposition on the acidity of forest soils in Sweden. Soil data, from the time period 1993-2002, for the O (n=1990), B (n=1902) and C (n=1477) horizons from the Swedish Forest Soil Inventory and sulfur deposition data from the European Monitoring and Evaluation Programme were used. To investigate acidification by stand age a relative age concept was used, taking into account that trees have different growth rates in different parts of Sweden.

Methods

We did regression analyses of pH-H₂O, base saturation (BS), Ca-NH₄Ac and Al-KCl versus relative age and S deposition, respectively. Analyses were done for the whole country as well as for data grouped either in S deposition or temperature sum gradient classes (the latter was done in order to minimize effects of co-variance due to similarity between geographic gradients for deposition and temperature in Sweden).