Semiparametric Regression Analysis of Free Air CO2 Enrichment

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Properties of a sandy soil, including carbon (C) and nitrogen (N) concentrations, were measured over a period of 10 years under ambient and elevated CO_2 in a FACE (Free Air CO_2 Enrichment) experiment on grazed pasture in the North Island of New Zealand. A mixed effects model was used to indentify the impact of CO_2 on soil properties, and a semiparametric model was built for revealing the trend in soil properties with time. We found that most soil properties changed significantly over time. Soil moisture was greater under elevated CO_2 but we found no evidence that this was the cause of changes in other properties, suggesting that increased inputs of C and N in the high CO_2 regime were driving treatment differences.

Key Words: Mixed effects, Repeated measurements, Hierarchical, Bayesian