

2.a. Using STATISTICAL FITTING to develop a model of soil carbon change

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The problem

How does soil carbon change under different agricultural (manure) management?

Data available

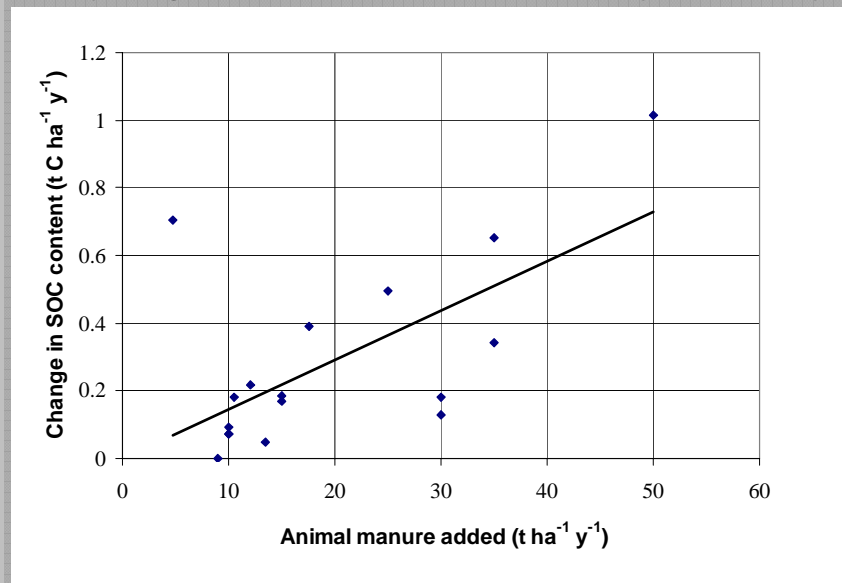
Measured changes in soil carbon in 18 long-term experiments manure added to the soil

Why use statistical fitting and not another method?

Data is limited (only 18 experiments in Europe). An approximate relationship was needed to provide preliminary estimates quickly for policy advice. Detailed process based modelling using spatial databases (GIS) followed but this took another 4 years. The statistical approach was adequate for these quick preliminary estimates.

Simple description of how it was done

Simple statistical (regression) model fitted to data by plotting yearly change in soil carbon ($\text{t C ha}^{-1} \text{ yr}^{-1}$) against amount of manure added ($\text{t dry matter ha}^{-1} \text{ yr}^{-1}$).



Each point on the graph is a different long-term experiment. From the regression line:

$$\text{Annual change in soil carbon content} = 0.0145 \times \text{amount of animal manure added}$$

$$(\text{t C ha}^{-1} \text{ yr}^{-1}) \qquad \qquad \qquad (\text{t DM ha}^{-1} \text{ yr}^{-1})$$

Software used and alternative generic packages that could be used

Microsoft Excel was used. Any spread sheet could be used.
 Alternative generic packages: Lotus 123

Reference

Smith, P., Powlson, D.S., Glendining, M.J. & Smith, J.U. 1997. Potential for carbon sequestration in European soils: preliminary estimates for five scenarios using results from long-term experiments. *Global Change Biology* 3: 67-79.

Further reading

Any textbook on Statistics, e.g. John Townend's "Practical Statistics for Biological and Environmental Sciences."