



On the information content of incubation studies

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The measurement of the production of CO₂ from soils in incubation studies has been used for many years to gain information about the influence of different soils types, changing temperatures and water contents, as well as the addition of amendments on the soil respiration. While in the early years the kinetic modelling (or fitting) was restricted to the single or one pool model due to the possibility of solving the problem by log-transforming the observed data and using a linear regression for the estimation of the rate constant (by doing so an analytical solution can be applied), more recent publications chose multi-pool models (2, 3, and even 4-pools), which can be fitted iteratively using appropriate computer software. In general, there are different methods used in literature to estimate the kinetic parameters resulting in different kinetic parameter values even for the same data set. Additionally, screening of existing literature revealed that the 2-pool model (or even higher pool models) were sometimes obviously wrong fitted or over fitted.

In our presentation, we will show how different constraints in the fitting process will influence the results of the kinetic parameter values, how obviously wrong fitting and overfitting can be easily detected, and how the information content of the incubation data can be easily judged prior any fitting. Finally, we will provide recommendations how to extract information from incubation experiments.