



Sensitivity analysis of a soil methane emission model.

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CH₄ emission from wetland soils depends on a large number of parameters, related to soil, vegetation and microbial population characteristics. Several of these parameters are difficult to determine by measurement, or the available amount of data is limited. For estimation of CH₄ emission using models, model confirmation, parameter estimation and parameter sensitivity should be assessed, in particular if these models are to be applied for modelling emissions over a range of wetland and soil types. We present the result of sensitivity analysis and parameter estimation of a model of wetland CH₄ emission (PEATLAND-VU). The validation data are derived from various wetland sites, ranging from temperate to arctic, and with different management conditions. For the analysis we used the GLUE (Generalized Likelihood Uncertainty Estimation) approach.

The performance of the model showed large differences between the validation sites. For one site, the model did not perform better than an emission estimate based on the mean of the data, in other cases the model fit to the data was satisfactory. The site for which the performance was poorest (model fit not better than weighed average of the data) was a site with a deviating management history, being converted from agricultural land to wetland recently; the other sites were more natural wetlands.

In general, the parameter sets of model simulations were highly non-unique; good model fits could be obtained with parameter sets that were widely different. The model parameters that proved to be highly identifiable in sensitivity analysis were vegetation-related parameters, while the model showed a comparatively low sensitivity to soil parameters. This suggests that for global scale modelling of CH₄ fluxes vegetation parameters are most important.