Geophysical Research Abstracts, Vol. 9, 02011, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02011


# Effects of parameter uncertainty in large scale modelling of Last Glacial methane emissions from Northern wetlands.

C. Berrittella, J. van Huissteden, A.M.R. Petrescu.

Vrije University, Faculty of Earth And Life Sciences, Department of Hydrology and Geo-Environmental Sciences, Amsterdam, The Netherlands (cberri@geo.falw.vu.nl)

Increased methane emissions from permafrost wetlands may provide a positive feedback to global warming. In the past, phases of rapid climate warming during glacials coincided with increased fluxes of methane to the atmosphere, with northern wetlands as their most likely source. Several attempts have been undertaken to model these fluxes using models of diverse levels of complexity.

We tested a soil methane flux process model (Walter-Heimann model) for use of large scale modeling, to simulate the effects of climate warming at Dansgaard-Oeschger cycles in Europe. The model simulates $CH_4$flux from soils based on interactions between water table, temperature, vegetation, microbial organic matter decomposition and soil characteristics, and has been coupled to climate model output and a simple topography-based wetland model. A selection of model parameters has been tested with different climate model scenarios, to evaluate the effect of uncertainty in these parameters. This reveals a high sensitivity of the model under both glacial and modern climatic conditions.

Model runs with different $Q_{10}$values (temperature sensitivity of microbial metabolism) show the largest ranges of $CH_4$ fluxes. Furthermore, the parameters affecting vegetation transport and methane oxidation show a clear influence on the model results. The application of different soil hydrological approaches to translate climate model data into soil water table fluctuation is also highly influential. A remarkable result is the importance of fluxes from wetlands on the exposed seafloor during low stands of the sea level. Exposed seafloor with subdued topography may have contained large wetland areas.