Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09838, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09838
EGU General Assembly 2008

Tracey, a Simulation Model of Trace Element Fluxes in the Soil-Plant System for long-term Assessment of Groundwater Contamination

A. Gärdenäs (1), H. Eckersten (1), A. Reinlert (2), D. Gustafsson (3), P-A Ekström (4), M. Greger (5) and P-E Jansson (3)

(1) Swedish Univ. of Agric. Scs, Uppsala, Sweden, (2) Lund University, Sweden, (3) Royal Institute of Technology, Stockholm, Sweden, (4) Facilia Co., Sweden, (5) Dep. of Botany, Stockholm Univ., Sweden (Annemieke.Gardenas@mv.slu.se, +46-18-672294)

We present a dynamic trace element model, called Tracey that describes the main processes determining the fate of a trace element in the soil-plant system. The model was developed to predict possible long-term effects (i.e 10.000 years) of a continuous groundwater contamination with radionuclides and to assess the importance of various ecosystem characteristics and radionuclide properties for the possible accumulation in an ecosystem. The model is designed as a general trace element model and written in Matlab-Simulink. Two model approaches describing the plant uptake of a radionuclide were included, (i) passive uptake driven by water uptake and (ii) active uptake driven by growth. Adsorption to soil particles and organic matter is described by a linear isotherm. Trace element storages are simulated for different plant parts (stem, leaves, fine and coarse roots, grain) and in soil layers as part of different soil organic matter fractions, solved in soil water solution and adsorbed to soil particles. The tracer element is added to the ecosystem by groundwater contamination and leaves the ecosystem by harvest, percolation and drainage. The trace element fluxes are assumed to be proportional to either water or carbon fluxes. The latter fluxes are simulated by CoupModel, a process-oriented ecosystem model (Jansson & Karlberg, 2004). A link between Tracey and the toolbox EIKOS (Ekström, 2005) was established to allow for sensitivity analysis of various ecosystem characteristics and radionuclide properties. In our second presentation (Gärdenäs et al. 2008b), we apply Tracey to two

ecosystems with contrasting hydrology.