Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06259, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06259
EGU General Assembly 2008

Different approaches to map soil water balance: comparison of two soil-plant-atmosphere-continuum models, STICS and DAISY

A. Heuer, M. Casper

Department of Physical Geography, University of Trier, Germany (heuer@uni-trier.de / Fax: ++49-651-201-3976)

The permanent and sufficient presence of water in the soil is vital to plant growth, not only because plants need water for both growth and transpiration but also because water contains nutrients in solution. The capacity of a soil to store water depends upon its depth, texture, structure and other physical properties.

This contribution describes and discusses two fundamentally different approaches of mapping soil water flux in the soil-plant-atmosphere-continuum. On the one hand there is the 'layer-approach', where the soil is subdivided into layers with an overflow function. This approach is implemented in the crop model STICS (developed by INRA, France). On the other hand attention is turned to the crop model DAISY (developed at the University of Copenhagen, Denmark), which uses the Richards equation to describe soil water fluxes. Both approaches are examined in detail. A parameter sensitivity study is conducted.

In order to compare the consequences of the particular approaches for the simulation of water and nutrient fluxes in the soil, both models, STICS and DAISY, had to be parameterized on the basis of one single dataset. The data were derived from a study site close to Trier (Rhineland-Palatinate, Germany) and include information concerning soil properties, plant type and cultivation techniques as well as climatic data on a daily time-step. The simulation period took four years; the first three years however, were used as initialisation runs. The simulation results concerning soil water balance and soil water fluxes were evaluated in detail. Considered were variables as for instance

soil moisture, drained water and evaporation. In the first parameterization scheme of the crop models macropores were left out of consideration. In a second run the particular macropore submodels got activated in order to investigate their influence on the crop model's behaviour. The model outputs are compared among each other and to the results of the field work.

It could be shown that the modelling concept influences very much the simulations results. Finally the strengths and the limits of each approach were summarized against the background of the soil-plant-atmosphere-continuum.