



Linking geophysics and soil function modelling – biomass production

J. Krüger (1), U. Franko (1), U. Werban (2), and J. Fank (3)

(1) Helmholtz-Centre for Environmental Research (UFZ), Halle, Germany (janine.krueger@ufz.de), (2) Helmholtz-Centre for Environmental Research (UFZ), Leipzig, Germany (ulrike.werban@ufz.de), (3) Joanneum Research, Graz, Austria (johann.fank@joanneum.at)

The iSOIL project aims at reliable mapping of soil properties and soil functions with various methods including geophysical, spectroscopic and monitoring techniques. The general procedure contains three steps (i) geophysical monitoring, (ii) generation of soil property maps and (iii) process modelling.

The objective of this work is to demonstrate the mentioned procedure with a focus on process modelling. It deals with the dynamics of soil water and the direct influence on crop biomass production. The new module PLUS extends CANDY to simulate crop biomass production based on environmental influences.

A soil function modelling with an adapted model parameterisation based on data of ground penetration radar (GPR) and conductivity (EM38) was realized. This study shows an approach to handle heterogeneity of soil properties with geophysical data used for biomass production modelling. The Austrian field site Wagna is characterised by highly heterogenic soil with fluvioglacial gravel sediments. The variation of thickness of topsoil above a sandy subsoil with gravels strongly influences the soil water balance. EM38, mounted on a mobile platform, enables to rapidly scan large areas whereas GPR requires a greater logistical effort. However, GPR can detect exact soil horizon depth between topsoil and subsoil, the combination of both results in a detailed large scale soil map. The combined plot-specific GPR and field site EM38 measurements extends the soil input data and improves the model performance of CANDY PLUS for plant biomass production (Krüger et al. 2011).

The example demonstrates how geophysics provides a surplus of data for agroecosystem modelling which identifies and contributes alternative options for agricultural management decisions.

iSOIL - “Interactions between soil related sciences – Linking geophysics, soil science and digital soil mapping” is a Collaborative Project (Grant Agreement number 211386) co-funded by the Research DG of the European Commission within the RTD activities of the FP7 Thematic Priority Environment.