Geophysical Research Abstracts
Vol. 15, EGU2013-11178, 2013
EGU General Assembly 2013

Determination of near-saturated hydraulic conductivity by automated minidisk infiltrometer

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Numerical models in surface and subsurface hydrology require knowledge of infiltration properties of soils for their routine use in the field of water management, environmental protection or agriculture. A new automated tension infiltration module has been designed at the Faculty of Civil Engineering, Czech Technical University in Prague to facilitate the measurements of near-saturated hydraulic conductivity. In the proposed infiltration module the amount of infiltrated water is registered via changes of buoyant force of stationary float attached to the load cell.
Presented setup consists of six mini-disk infiltrometer modules held in the light aluminum frame and two Mariotte's bottles. Three infiltrometer modules connected to each Mariotte's bottle allow performing six simultaneous measurements at two different pressure heads. Infiltration modules are connected to the automatic data logging system and consist of: plastic cover with the integrated load cell and the float, reservoir tube (external diameter of 50 mm), and sintered stainless steel plate (diameter of 44.5 mm).
The newly developed device was used for determination of near-saturated hydraulic conductivity of soils in experimental catchments Uhlirska (Jizera Mountains, Northern Bohemia) and Kopaninsky creek (Bohemian-Moravian Highlands). The acquired data show a good agreement with the data obtained from previous measurements.