Geophysical Research Abstracts
Vol. 19, EGU2017-12806, 2017
EGU General Assembly 2017

Hydrological balance and water transport processes of partially sealed soils

Anne Timm and Gerd Wessolek
Department of Ecology, Chair for Soil Conservation, Technical University Berlin, Germany

With increased urbanisation, soil sealing and its drastic effects on hydrological processes have received a lot of attention. Based on safety concerns, there has been a clear focus on urban drainage and prevention of urban floods caused by storm water events. For this reason, any kind of sealing is often seen as impermeable runoff generator that prevents infiltration and evaporation. While many hydrological models, especially storm water models, have been developed, there are only a handful of empirical studies actually measuring the hydrological balance of (partially) sealed surfaces. These challenge the general assumption of negligible infiltration and evaporation and show that these processes take place even for severe sealing such as asphalt. Depending on the material, infiltration from partially sealed surfaces can be equal to that of vegetated ones. Therefore, more detailed knowledge is needed to improve our understanding and models. In Berlin, two partially sealed weighable lysimeters were equipped with multiple temperature and soil moisture sensors in order to study their hydrological balance, as well as water and heat transport processes within the soil profile. This combination of methods affirms previous observations and offers new insights into altered hydrological processes of partially sealed surfaces at a small temporal scale. It could be verified that not all precipitation is transformed into runoff. Even for a relatively high sealing degree of concrete slabs with narrow seams, evaporation and infiltration may exceed runoff. Due to the lack of plant roots, the hydrological balance is mostly governed by precipitation events and evaporation generally occurs directly after rainfall. However, both surfaces allow for upward water transport from the upper underlying soil layers, sometimes resulting in relatively low evaporation rates on days without precipitation. The individual response of the surfaces differs considerably, which illustrates how important process orientated studies for different types of sealing material are.