



Investigating point zero: The artificial catchment ‘Chicken Creek’ as an observatory to study critical zone structures and processes of the critical zone in an initial ecosystem

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Recently, earth surface structures reaching from vegetation to the groundwater in the near underground have been termed “critical zone”. This zone is “critical” to supporting life on Earth and, thus, the understanding of processes within this zone is of great importance in environmental sciences. Investigating the critical zone requires interdisciplinary and integrative research approaches across the fields of geomorphology, ecology, biology, soil science, hydrology and environmental modeling. A central motivation of the critical zone concept is the need for moving beyond traditional disciplinary boundaries to a more holistic and integrated study of the Earth surface system. However, the critical zone is characterized by complex interactions between abiotic and biotic structures and processes which need to be analyzed for improving our understanding of ecosystem functioning as well as of ecosystem development.

To gain a better understanding of these fundamental questions it might be helpful to look at initial ecosystems, i.e. at ecosystems in the initial phase of development. It can be hypothesized that the complexity of a very young ecosystem is lower compared to mature systems and, therefore, structure-process interactions might become more obvious at early than at later stages of development.

In this context, an artificial watershed was constructed with well known boundary conditions to investigate the initial ecosystem phase. The catchment ‘Chicken Creek’ in Lusatia (Germany; 150 km SE from Berlin) has an area of 6 ha. It was set up with a layer of post-glacial sandy sediments overlying an aquiclude made of clay at the base. These hydrological starting conditions allowed for the formation of a groundwater body within the sandy layer of the experimental catchment. Further, after completion of the construction works in September 2005 the site was left to natural succession and no measures like planting or fertilization were carried out.

As the initial phase of ecosystem development is highly dynamic under the prevailing climate conditions and ecosystem structures are formed and altered very rapidly the careful observation of the ongoing processes is essential. Thus, a comprehensive ecological monitoring programme has been started immediately after completion of the watershed to investigate the development and differentiation of structures and processes and their interactions. This paper highlights the conceptual approach of the project and particularly of the artificial watershed. Findings of this comprehensive project over a period of 4 years will be presented.