

**Plant Life
in an Extreme and Changing
Environment**

**Pflanzenleben
in extremer und sich ändernder
Umwelt**

BOOK OF ABSTRACTS

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Structures and processes of the initial ecosystem development phase in an artificial water catchment

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Introduction

The complex interactions between structures and processes of an initial ecosystem system development are rarely possible to study under natural environments. The places where it is possible are e.g. landscapes that were completely destroyed, transformed or even newly created by volcanic activity like Mount St. Helens and Hawaii in USA or Surtsey Island in Iceland. Other examples of initial ecosystems are found in glacier retreat areas in arctic or alpine environments, tectonic uplift zones along coastlines and landslides. A large area where primary ecosystems development take place is the drying Aral Sea floor. In Central Europe today, natural initial ecosystem development can be observed very rarely and is mostly restricted to small-scale areas like coastal and inland dunes or stretches of wild rivers.

Objectives

The Transregional Collaborative Research Centre (SFB/TRR) 38 aims to investigate relevant structures and processes of the initial ecosystem development phase and their interactions and to differentiate them from those occurring in later stages of ecosystem development. The overall hypothesis is: The initial ecosystem development phase forms the later state of ecosystems. For this reason, the collaborative research centre investigates an artificial water catchment starting from point zero of its primary development (Fig. 1) in combination with experimental verifications of identified processes and structures including their interactions. The investigations focus on the analysis of initial development processes which are affected by existing and newly generated structures and the interpretation of their dependencies. The objective of the SFB/TRR 38 is to enhance integral models of structure genesis in ecosystems and of process dynamics as well as their interactions during the initial development phase based on a hydrologically clearly definable catchment. Considering especially the carbon and water cycles structural aspects and processes of the initial ecosystem development will be investigated and combined for the analysis of budgets of water and elements on the catchment scale and for implementation into models. The combination of structure and process data will be realised by means of a comprehensive “structure and process model” which will be developed within this collaborative project. This model will be the central tool for data aggregation and result integration. It will be used to elucidate and define characteristic conditions and phases of the development.

The joint research object of the SFB/TRR 38 is an artificial water catchment at South Welzow near Cottbus with an area of about 6 ha left to an undirected succession that allows the integrated analysis of all results on a landscape scale. Further, boundary conditions of this site are clearly defined including well documented inner structures as compared to natural catchments. These are important prerequisites for the validation and optimisation of established water and element budget models.

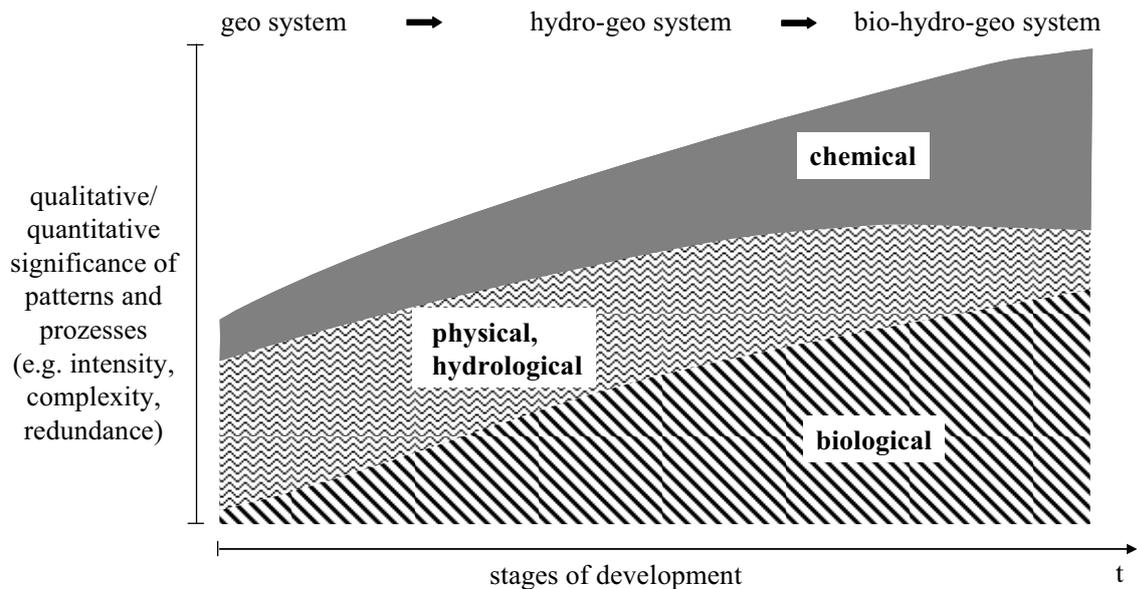


Fig. 1: Conceptual model of dominating patterns and processes during initial ecosystem development

In addition to this joint research object an experimental site close-by will be used to analyse the functioning of identified structure building processes by means of specific manipulations. For this reason, specific interventions into the natural succession as well as the use of stable isotopes as tracers are planned here. The experimental design of this site allows statistical replications. In addition, investigations will be conducted at comparison sites e.g. on inland dunes in North-eastern Germany as well as on a glacier forefield in the Swiss Alps. These additional sites allow to differentiate between site-specific influences, universally valid process as well as structure patterns of the initial ecosystem development phase that can be applied to similar ecosystems and different site conditions.

Regarding its integral and system oriented approach, the size and the well defined boundary and starting conditions of the central research object, this project is unique with respect to the investigation of the initial ecosystem genesis at a catchment scale. Results are expected to be of great importance for the management of landscapes that have been degraded to an initial state by natural or anthropogenic disturbances.

Further informations: http://www.tu-cottbus.de/sfb_trr/

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