

Sessions in the 2014 DDD conference organized by Dr. Golan Bel and Prof. Ehud Meron, Ben-Gurion University, Israel

Ecohydrology of dryland landscapes

The process of desertification, in which ecosystems undergo a significant reduction in bioproductivity, is often related to changes in the temporal and spatial distribution of precipitation and other water sources. Many theoretical and experimental works have been devoted to the improvement of our understanding of ecosystem dynamics. However, in many of these studies, the spatio-temporal dynamics of water and the feedbacks between hydrological processes and other ecological processes are not considered in detail. The goal of this session is to bring together scientists from various disciplines in order to present recent advancements in ecohydrology research and to encourage interdisciplinary interactions that may lead to better modeling and understanding of ecosystem responses to global and local changes in the water resources and, in particular, that may improve our quantitative understanding of the desertification process.

Place: Biology 2

Time: Monday, 17 November, 15:00 – 17:00

Schedule:

15:00 - 15:25: Dr. Tal Svorai, Ben-Gurion University, Israel, *“Relationships between primary productivity and rainfall in a semiarid ecosystem.”*

15:30 - 15:55: Prof. Jost von Hardenberg, Institute of Atmospheric Sciences and Climate – CNR Turin, Italy, *“Climate changes in precipitation variability and dryland vegetation.”*

16:00 - 16:25: Dr. Shmuel Assouline, Volcani Center, Israel, *“Rainfall-infiltration-runoff relationships in a semi-arid hillslope and their interactions with vegetation cover.”*

16:30 - 16:55: Prof. Ulrike Feudel, University of Oldenburg, Germany, *“Competition of species using a synthesizing unit approach.”*

Mathematical aspects of desertification and restoration

Desertification is commonly viewed as a dynamical transition from a productive stable state to an alternative less productive stable state. The transition can be induced by an environmental change or by a disturbance, and becomes feasible near an instability point of the productive state. The session will address mathematical aspects of such transitions, taking into account the possibility of the productive state being spatially patterned. Questions to be addressed include mechanisms of desertification, warning signals for imminent desertification and restoration of desertified areas. The session will also address field observations of vegetation patterns and pattern dynamics, and attempt confronting model predictions with empirical data.

Place: Biology 1

Time: Tuesday, 18 November, 10:30 – 12:30

Schedule:

10:30 - 10:55: Prof. Nadav Shnerb, Bar-Ilan University, Israel, "*Stochastic desertification.*"

11:00 - 11:25: Dr. Anna Maria Cherubini, University of Salento, Italy, "*Early-warning signals for desertification: a percolation framework.*"

11:30 - 11:55: Dr. Golan Bel, Ben-Gurion University, Israel, "*Critical and gradual transitions in pattern-forming systems.*"

12:00 – 12:25: Prof. Ehud Meron, Ben-Gurion University, Israel, "*Reversing desertification as a spatial resonance problem.*"

Dryland landscapes as pattern forming systems: modeling and analysis

There is an increasing evidence that self-organization induced by biomass-water feedbacks plays an important role in shaping dryland landscapes. Model studies have provided much insight into the mechanisms by which positive feedbacks can render uniform vegetation unstable and lead to the formation of vegetation patterns. Yet, the mechanisms at work in specific systems and the interplay between different mechanisms have remained largely unexplored. This session will bring together experts in modeling and in model analysis, as well as field and remote sensing experts, to present recent progress in understanding vegetation pattern formation and the implications it bears on ecosystem processes and function.

Place: Biology 1

Time: Tuesday, 18 November, 17:00 – 18:30

Schedule:

17:00 - 17:25: Prof. Jonathan Sherratt, Heriot-Watt University, UK, "*Wavelength Selection and Hysteresis in Mathematical Models of Banded Vegetation.*"

17:30 - 17:55: Dr. Stephan Getzin, Helmholtz Centre for Environmental Research-UFZ, Germany, "*Adopting a spatially explicit perspective to study the mysterious fairy circles of Namibia*"

18:00 - 18:25: Prof. Maxim Shoshany, Technion–Israel Institute of Technology, "*Modeling Power-Law Edge-Interior Area Decline in shrubs' and Soil Patch Patterns along Climatic Gradient.*"