Catchment Spatial Organization and Complex Behavior

Conference Program
AGU Chapman Conference on Catchment Spatial Organization and Complex Behavior

Luxembourg City, Luxembourg
23 September – 26 September 2014

Conveners
Laurent Pfister, Centre de Recherche Public – Gabriel Lippmann
Markus Weiler, University of Freiburg
Erwin Zehe, Karlsruhe Institute for Technology
Theresa Blume, GFZ German Research Centre for Geosciences
Efi Foufoula-Georgiou, St. Anthony Falls Laboratory
Jeffrey McDonnell, Global Institute for Water Security

Program Committee
Keith Beven, Lancaster University
Uwe Ehret, Karlsruhe Institute of Technology
Hannes Fühler, ETH Zurich
Bethanna Jackson, Victoria University of Wellington
Axel Kleidon, Max-Planck-Institute for Biogeochemistry
Hubert Savenije, TU Delft, The Netherlands
Loess van Schaik, University of Potsdam
Karsten Schulz, BOKU
Jens Tronicke, University of Potsdam
Volker Wulfmeyer, Hohenheim University
Hjalmar Laudon, Swedish University of Agricultural Sciences
Kamini Singha, Colorado School of Mines
Jan Seibert, University of Zurich
Christian Stamm, EAWAG

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Catchment Spatial Organization and Complex Behavior

Monday, 22 September
6:00 P.M. – 7:30 P.M.  Ice Breaker & Registration (Cloître et Jardin)

Tuesday, 23 September
7:30 A.M. – 8:30 A.M.  Registration (Foyer d’accueil 2eime étage (J. Ensch))
8:30 A.M. – 10:30 A.M.  1: Organizing principles, catchment structure and catchment functioning: is there a connection? - Part 1 (Salle José Ensch)
10:30 A.M. – 10:50 A.M.  Break (Foyer d’accueil 2eime étage (J. Ensch))
10:50 A.M. – 12:00 P.M.  1: Organizing principles, catchment structure and catchment functioning: is there a connection? – Poster (Foyer d’accueil 2eime étage (J. Ensch))
12:00 P.M. – 1:15 P.M.  Lunch (Foyer d’accueil 2eime étage (J. Ensch))
1:15 P.M. – 3:00 P.M.  1: Organizing principles, catchment structure and catchment functioning: is there a connection? – Part 2 (Salle José Ensch)
3:00 P.M. – 3:20 P.M.  Break (Foyer d’accueil 2eime étage (J. Ensch))
3:20 P.M. – 4:20 P.M.  1: Organizing principles, catchment structure and catchment functioning: is there a connection? - Part 3 (Salle José Ensch)

Wednesday, 24 September
8:30 A.M. – 6:30 P.M.  Field Trip

Thursday, 25 September
8:30 A.M. – 10:30 A.M.  2: New experimental concepts to search for functional landscape entities and to explore their controls on catchment functioning - Part 1 (Salle José Ensch)
10:00 A.M. – 10:50 A.M.  Break (Foyer d’accueil 2eime étage (J. Ensch))
10:50 A.M. – 12:00 P.M.  2: New experimental concepts to search for functional landscape entities and to explore their controls on catchment functioning – Poster (Foyer d’accueil 2eime étage (J. Ensch))
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3:00 P.M. – 3:20 P.M.  
Break  
(Foyer d’accueil 2eime étage (J. Ensch))

3:20 P.M. – 4:20 P.M.  
2: New experimental concepts to search for functional landscape entities and to explore their controls on catchment functioning – Part 3  
(Salle José Ensch)

8:00 P.M. – 10:00 P.M.  
Banquet  
(Nic Klecker 2)

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**Friday, 26 September**

8:30 A.M. – 10:30 A.M.  
3: Reducing physical and structural bias in catchment models: complexity versus falsifiability – Part 1  
(Salle José Ensch)

10:30 A.M. – 10:50 A.M.  
Break  
(Foyer d’accueil 2eime étage (J. Ensch))

10:50 A.M. – 12:00 P.M.  
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(Salle José Ensch)

3:00 P.M. – 3:20 P.M.  
Break  
(Foyer d’accueil 2eime étage (J. Ensch))

3:20 P.M. – 4:20 P.M.  
3: Reducing physical and structural bias in catchment models: complexity versus falsifiability – Part 3  
(Salle José Ensch)

4:30 P.M. – 6:30 P.M.  
Synthesis  
(Salle José Ensch)
Scientific Program
MONDAY, SEPTEMBER 22

6:00 P.M. – 7:30 P.M. **Ice Breaker & Registration**
(Cloître et Jardin)

TUESDAY, SEPTEMBER 23

7:30 A.M. – 8:30 A.M. **Registration**
(Foyer d’accueil 2eime étage (J. Ensch))

8:30 A.M. – 10:30 A.M. 1: Organizing principles, catchment structure and catchment functioning – is there a connection? – Part 1
(Salle José Ensch)
Conveners: Erwin Zehe and Hubert Savenije

8:30 A.M. – 9:30 A.M. **Keynote Lecture:**
Andreas Rinaldo | Catchment organization and its hydrologic response

9:30 A.M. – 9:50 A.M. Hubert Savenije | How people and ecosystems organize their storage requirements

9:50 A.M. – 10:10 A.M. Ryan Teuling | Concepts in catchment hydrology – an overview and lessons for model development

10:10 A.M. – 10:30 A.M. Keith Beven | Velocities and celerities without additional assumptions – a particle tracking approach.

10:30 A.M. – 10:50 P.M. **Break**
(Foyer d’accueil 2eime étage (J. Ensch))

10:50 A.M. – 12:00 P.M. 1: Organizing principles, catchment structure and catchment functioning – is there a connection? – Poster
(Foyer d’accueil 2eime étage (J. Ensch))
Conveners: Erwin Zehe and Hubert Savenije

T-1 Bakhram Nurtayev | Responses to climate variability in different catchments
T-2 Taro Uchida | The role of bedrock geology, historical rainfall pattern and topography on rainfall-runoff function in mountainous catchment

T-3 Hjalmar Laudon | Towards a unified model of stream water quality generation: Elucidating the role of hotspots, landscape heterogeneity and scale in a nested stream network

T-4 Yann Lucas | Modelling of vegetation-hydrology interaction in mountainous forest basin over the two past decades

T-5 Anna Scaini | From observation to modelling: An experimental framework for testing the MIPs model on a headwater catchment in Luxembourg.

T-6 Andrew Chiverton | A novel variogram-based approach for determining the influence of catchment characteristics on river flow dynamics

T-7 Anna Coles | Hierarchical and time-varying controls on snowmelt runoff generation: a coupled analysis of temporal trends and spatial patterns

T-8 Markus Neubauer | A physically-based numerical model of catchment water flow to evaluate dominant controls of residence time distribution

T-9 Julian Klaus | How does catchment geology control thresholds and non-linearities in rainfall-runoff transformation?

T-10 Taro Uchida | The role of bedrock geology, historical rainfall pattern and topography on rainfall-runoff function in mountainous catchment

T-11 Fuqiang Tian | Exploring Rainfall-Runoff Relationship at Hillslope Scale through Virtual Experiments

T-12 Lisa Angermann | Interflow in Periglacial Slope Deposits: Importance, Spatial Extent and Conceptual Representation

12:00 P.M. – 1:15 P.M. Lunch
(Foyer d’accueil 2eime étage (J. Ensch))

1:15 P.M.– 3:00 P.M. 1: Organizing principles, catchment structure and catchment functioning – is there a connection? – Part 2
(Salle José Ensch)
Conveners: Erwin Zehe and Hubert Savenije
1:15 P.M. –2:00 P.M. Patricia M Saco | Coevolving patterns of flowpaths, soils, landforms and vegetation in semiarid regions: links between spatial organization, hydrologic connectivity and function (Invited)

2:00 P.M. –2:20 P.M. Ingo Heidbuechel | How do catchment structure and event parameters influence the shape of transit time distributions?

2:20 P.M. –2:40 P.M. Roger Moussa | The aim is to use observations and simulations by a spatially distributed model for the role of spatial organization of terraces, ditches and arrangement of various tillage practices on the complex behavior of a small Mediterranean basin.

2:40 P.M. –3:00 P.M. Volker Guenter Wulfmeyer | Consistent hydro-meteorological large eddy simulation of water budgets in mesoscale catchments: Overkill or necessity?

3:00 P.M. – 3:20 P.M. Break (Foyer d’accueil 2eime étage (J. Ensch))

3:20 P.M.– 4:20 P.M. 1: Organizing principles, catchment structure and catchment functioning – is there a connection? – Part 3 (Salle José Ensch)

Conveners: Erwin Zehe and Hubert Savenije

3:20 P.M. –3:40 P.M. Axel Kleidon | Thermodynamics, Limits, and Optimality of Land Surface-Atmosphere Exchange and Evapotranspiration

3:40 P.M. –4:00 P.M. Erwin Zehe | Linking landscape structure and rainfall runoff behavior in a thermodynamic optimality context

WEDNESDAY, SEPTEMBER 24

8:30 A.M.– 6:30 P.M. Field Trip
THURSDAY, SEPTEMBER 25

8:30 A.M.– 10:30 A.M.  
2: New experimental concepts to search for functional landscape entities and to explore their controls on catchment functioning – Part 1  
*(Salle José Ensch)*

*Conveners: Theresa Blume and Laurent Pfister*

8:30 A.M. –9:30 A.M.  
Brian L McGlynn | Keynote Lecture: Moving from field observations of watershed structure, storage, and hydrologic connectivity to new modeling conceptualizations

9:30 A.M. –9:50 A.M.  
Inge Wiekenkamp | Spatial and Temporal Occurrence of Preferential Flow at the Catchment Scale

9:50 A.M. –10:10 A.M.  
Ingmar Schroeter | Field-scale prediction of soil moisture patterns by means of a fuzzy c-means clustering algorithm, ancillary data, and sparse TDR measurements

10:10 A.M. –10:30 A.M.  
Sibylle K Hassler | Landscape Controls on Hydrological Processes under Rainfall- and Radiation-driven Conditions

10:30 A.M. – 10:50 A.M  
*Break*

*(Foyer d’accueil 2eime étage (J. Ensch))*

10:50 A.M.– 12:00 P.M.  
2: New experimental concepts to search for functional landscape entities and to explore their controls on catchment functioning – Poster  
*(Foyer d’accueil 2eime étage (J. Ensch))*

*Conveners: Theresa Blume and Laurent Pfister*

TH-1 Tejshree Tiwari | Looking at catchments in a new way: The role of connectivity, scale, and location to understand the export of diverse biogeochemical elements

TH-2 Daniel Altdorff | Potential of soil water content mapping using electromagnetic induction in a low conductive coniferous forest ecosystem catchment

TH-3 Tatiana Feskova | Combination of electrical resistivity tomography and vertical electrical soundings for characterization of a representative hillslope as a functional unit in a catchment

TH-4 Michael Rinderer | Controls on groundwater response timing of a subalpine catchment
TH-5 Ambika Selvaraj | Do nano particles mediated in situ treatment change the spatial organization of catchment area? - An experimental study

TH-6 Bakhtier Nurtayev | Landslides triggered by distant earthquakes in Central Asia

TH-7 Ciaran J Harman | New models and measurements of unsteady lumped transport across scales

TH-8 Daniele Penna Sr. | What controls groundwater dynamics and hillslope-stream connectivity in an Alpine headwater catchment?

TH-9 Christopher Spence | Climate and landscape controls on the behaviour of catchment storage and streamflow

TH-10 Marius Floriancic | Can we relate flood and low flow behavior to spatial distribution of thick quaternary deposits? Case study of the 14 km² alpine Poschiavino catchment, Switzerland

TH-11 Andreas Krein | A multi-method analysis of bedload transport with seismometers and with hydrophones

TH-12 Christoph Hinz | Spatiotemporal evolution of the constructed Hühnerwasser catchment (“Chicken Creek”)

TH-13 Michael Paul Stockinger | Seasonal Soil Moisture Patterns Control Transit Time Distributions in a Forested Headwater Catchment

TH-14 Andrea Román Sanchez | QUANTITATIVE ASPECTS OF SOIL FORMATION IN MOUNTAINEOUS AREAS

TH-15 Maarten Smoorenburg | How does landscape organization determine complex flood runoff behavior? Lessons from geomorphology based mapping and modeling of dominant runoff processes in meso-scale alpine catchments

TH-16 Maik Renner | Inferring dominant controls on transpiration across a hillslope transect from ecohydrological measurements and thermodynamic limits

TH-17 Yuko Asano | Roles of hillslope and channel on spatial distribution of peak lag times during heavy storms at 4.5km² mountain watershed

TH-18 Niklas Allroggen | Time-lapse imaging of subsurface flow patterns by ground penetrating radar
TH-19 **Gunnar Lischeid** | A measure for transformation of the input signal in the soil-groundwater-stream continuum and implications for modelling

TH-20 **Theresa Blume** | Who is in Control? Competing Influences of Geology, Land use and Topography on Soil Water Storage and Soil Temperature Dynamics

TH-21 **Reinert Huseby Karlsen** | Spatiotemporal variability and landscape controls of specific discharge in a Boreal landscape

TH-22 **Martine Stoll** | Isotope fractionation in different types of soil water

TH-23 **Karsten Schulz** | Identification of catchment functional units by time series of thermal remote sensing images

TH-24 **Jérôme Juilleret** | How does dialogue between pedologists and hydrologist improve the knowledge on functional landscape entities? A case study in the Attert River basin, Luxembourg.

TH-25 **Ute Wollschlaeger** | Revealing principles of hydrological response – The Schaefertal approach

TH-26 **Simon P Seibert** | How to define hydrological functioning and how to connect it with structural catchment properties?

12:00 P.M. – 1:15 P.M. **Lunch**
*(Foyer d’accueil 2eime étage (J. Ensch))*

1:15 P.M. – 3:00 P.M. **2: New experimental concepts to search for functional landscape entities and to explore their controls on catchment functioning – Part 2**
*(Salle José Ensch)*

**Conveners: Theresa Blume and Laurent Pfister**

1:15 P.M. – 2:00 P.M. **Ilja H.J. van Meerveld** | Controls on hillslope-stream connectivity and threshold catchment response (Invited)

2:00 P.M. – 2:20 P.M. **Jay J Frentress** | Deconstructing the flow duration curve with stream geochemistry in a forested headwater catchment (Luxembourg)

2:20 P.M. – 2:40 P.M. **Jan H Fleckenstein** | Deciphering DOC export dynamics in small to meso-scale catchments using high frequency monitoring and numerical modeling
2:40 P.M. – 3:00 P.M.  Matthias Sprenger | Water transit times in the unsaturated zone: Spatio-temporal variation and its application in for the characterization of functional units

3:00 P.M. – 3:20 P.M.  Break
(Foyer d’accueil 2eime étage (J. Ensch))

3:20 P.M. – 4:20 P.M.  **2: New experimental concepts to search for functional landscape entities and to explore their controls on catchment functioning – Part 3**
(Salle José Ensch)
Conveners: Theresa Blume and Laurent Pfister

3:20 P.M. – 3:40 P.M.  **Kevin J McGuire** | A hydropedological approach to describing catchment spatial organization: linkages between soil development, groundwater regimes, and solute patterns in a headwater catchment

3:40 P.M. – 4:00 P.M.  **Loes van Schaik** | Synthesis of Earthworm Influence on Soil Hydrology across Scales

8:00 P.M. – 10:00 P.M.  **Banquet**
(Nic Klecker 2)

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**FRIDAY, SEPTEMBER 26**

8:30 A.M. – 10:30 A.M.  **3: Reducing physical and structural bias in catchment models: complexity versus falsifiability – Part 1**
(Salle José Ensch)
Conveners: Markus Weiler and Jeffrey McDonnell


9:30 A.M. – 9:50 A.M.  **Olivier Le Bourgeois** | Spatial variability of the hydrodynamic properties of soil at hillslope scale in Cevennes area

9:50 A.M. – 10:10 A.M.  **Astrid Denk** | Integration of Geophysical Data to improve Process Understanding of Hillslope Hydrology

10:10 A.M. – 10:30 A.M.  **Tanja Euser** | Drainage for agricultural purposes; how to distinguish and incorporate it in model structures?
10:30 A.M. – 10:50 P.M.  **Break**

*(Foyer d’accueil 2eime étage (J. Ensch))*

10:50 A.M.– 12:00 P.M. **3: Reducing physical and structural bias in catchment models: complexity versus falsifiability – Poster**

*(Foyer d’accueil 2eime étage (J. Ensch))*

*Conveners: Markus Weiler and Jeffrey McDonnell*

F-1 **Tatiana Trifonova** | Mountainous catchment area as a self-organizing geosystem

F-2 **Yangbo Chen** | Parameter optimization of physically based distributed hydrological model

F-3 **Jana von Freyberg** | Parsimonious modeling of mountainous catchment hydrology at various spatial scales – initial results and evaluation

F-4 **Elham Rouholahnejad** | How detail is enough? Large scale modeling limitations

F-5 **Jürgen Junk** | Projected changes in future reference evapotranspiration for Luxembourg derived from a very high resolution regional climate model

F-6 **Claudia Brauer** | Parameter identifiability, parameter estimation and parameter regionalisation for the Wageningen Lowland Runoff Simulator (WALRUS)

F-7 **Shervan Gharari** | Progressive evaluation of incorporating information into a model building process: from scratch to FELX-TOPO

F-8 **Shervan Gharari** | Progressive evaluation of incorporating information into a model building process: from scratch to FLEX-TOPO

F-9 **Anna Maria Åkesson** | Geomorphological controls on streamflow response

F-10 **Fabrizio Fenicia** | Investigating the correspondence between catchment properties, function, and model structure representation

F-11 **Stefan Seeger** | How far do buckets get us? A flux tracking, topography driven conceptual lumped convolution model to rival the CAOS model
F-12 **Lieke Anna Melsen** | Towards an effective calibration theory for a broadly applied land surface model (VIC)

F-13 **Conrad Jackisch** | A novel physical eco-hydrological model for preferential flow challenging observational and modeling concepts

F-14 **Martijn Westhoff** | Parameter transferability: Do structurally similar hydrological units also behave similar?

12:00 P.M. – 1:15 P.M. | Lunch

(\textit{Foyer d’accueil 2ème étage (J. Ensch)})

1:15 P.M. – 3:00 P.M. | **3: Reducing physical and structural bias in catchment models: complexity versus falsifiability - Part 2**

(\textit{Salle José Ensch})

\textit{Conveners: Markus Weiler and Jeffrey McDonnell}

1:15 P.M. – 2:00 P.M. | **Luisa Hopp** | Lessons learned from simulations of hillslope hydrologic response with a physics-based model (Invited)

2:00 P.M. – 2:20 P.M. | **Jean-Pierre Vandervaere** | Modelling the hydrology of small granitic catchments in the Sahel with parsimony

2:20 P.M. – 2:40 P.M. | **Markus Hrachowitz** | Process Consistency in Models: the Importance of System Signatures, Expert Knowledge and Process Complexity

2:40 P.M. – 3:00 P.M. | **Rita Ley** | Testing the SUPERFLEX Modelling Framework for basin classification purposes: an analysis of performance measures.

3:00 P.M. – 3:20 P.M. | Break

(\textit{Foyer d’accueil 2ème étage (J. Ensch)})

3:20 P.M. – 4:20 P.M. | **3: Reducing physical and structural bias in catchment models: complexity versus falsifiability - Part 3**

(\textit{Salle José Ensch})

\textit{Conveners: Markus Weiler and Jeffrey McDonnell}

3:20 P.M. – 3:40 P.M. | **Uwe Ehret** | Dynamical grouping and representative computation: a new approach to reduce computational efforts in distributed, physically based modeling on the lower mesoscale
3:40 P.M. – 4:00 P.M.  **Wuletawu Abera Worku** | The effect of spatial discretization in Semi-distributed Hydrological modelling, the case of JGrass-NewAGE Model

4:30 P.M. – 6:30 P.M.  **Synthesis**  
*(Salle José Ensch)*