

# WORKSHOP - 17-20 September 2024, DST, UniFi

In presence & online on Gmeet

## Non-Gaussian distributions, dissipative dynamics and spatial organization in hydrological Earth systems

Department of Earth Sciences (DST)

Via G. la Pira 4., Florence

Sala Strozzi (Paleontology Museum)



# PROGRAM

## DAY 1 - 17.09.2024

<https://meet.google.com/cco-radb-bzs>

### Short Course: Introduction to Dissipative Earth Systems

Introduction to the dissipative dynamics of environmental Earth systems (short course intro for students to provide background)

❖ 09:30 - 10:30 **Basics of dissipative systems** | Dr. Axel Kleidon

 Coffee break and informal discussions

❖ 11:00 - 12:00 **Hydroclimate and biogeochemistry** | Dr. Axel Kleidon

 Lunch break

❖ 15:00 - 16:00 **Soil hydrology** | Prof. Erwin Zehe

 Coffee break and informal discussions

❖ 16:30 - 17:30 **Runoff and catchments** | Prof. Erwin Zehe

## DAY 2 – 18.09.2024

<https://meet.google.com/vzs-dndc-rmt>

### Opening and Introduction

❖ 09:15 - 9:30 Greetings, Welcome and Introduction  
Antonella Buccianti – University of Florence and NBFC

### (A) Dissipative Dynamics in Hydrological Earth Systems

❖ 09:30 - 10:00 The Hydrological Cycle as a Dissipative System  
Axel Kleidon - MPI- BGC Jena, Germany

❖ 10:00 - 10:30 Dispersion, the ignored flip side of dissipation  
Gunnar Lischeid - ZALF and University of Potsdam

 Coffee break and informal discussions

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### (A) Dissipative Dynamics in Hydrological Earth Systems

- ❖ 11:00 - 11:30 Thermodynamic framework application to reactive flow in heterogeneous fields - Sources of entropy generation Yaniv Edery -Technion-Israel
- ❖ 11:30 - 12:00 Thermodynamic constraints on atmospheric dehumidification by rainfall Sarosh Alam Ghausi - Max Planck Institute for Biogeochemistry
- ❖ 12:00 -12.30 Application of non-equilibrium thermodynamic framework to characterize evolution of subsurface preferential pathways due to geochemical weathering-transport interaction Evgeny Shavelzon - Technion - Israel Institute of Technology

🍴 Lunch break

- ❖ 14:30 - 15:00 Spectral variability of seismo-acoustic energy released by complex hydrological processes G. Belli and E. Marchetti - University of Florence
- ❖ 15:00 -15:30 Effects of Storage on Distributions and Scaling laws generated under a disequilibrium Tejasvi Chauhan - Max Planck Institute for Biogeochemistry

☕ Coffee break and informal discussions

### (B) Non-Gaussian Distributions in Dissipative Systems

- ❖ 16:00 - 16:30 Probability Distributions in River Catchment Geochemistry Caterina Gozzi - University of Florence and NBFC
- ❖ 16:30 -17:00 Anomalous transport governed by power-law travel time distributions Brian Berkowitz - Weizmann Institute of Science
- ❖ 17:00- 17:30 Bifurcating paths: the relation between preferential pathways, channel 1 splitting, under sampled regions, and tortuosity on the Darcy scale Yaniv Edery -Technion-Israel

❖ 20:00-23:00 🍴 Workshop dinner

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**DAY 3 - 19.09.2024**

 <https://meet.google.com/swb-ocqy-vgk>

### **(C) Dissipative Systems and Structure**

- ❖ 09:00 - 09:30 **River networks, logistic growth and dissipative dynamics- where is the connection?**  
Erwin Zehe - KIT, Germany
- ❖ 9:30 - 10:00 **Vertical connectivity in the Critical Zone and water flow paths in a headwater catchment**  
Christophe Hissler - Luxembourg Institute of Science and Technology
- ❖ 10:00 - 10:30 **Modeling overland flow by splitting into sheet and rill components during simulated rainfall extremes**  
Doga Yahsi - Karlsruhe Institute of Technology
-  Coffee break and informal discussions
- ❖ 11:00-11:30 **Spatial organization and entropy of groundwater pathways**  
Massimiliano Schiavo - University of Padua
- ❖ 11:30-12:00 **Modeling dissipative structures in natural systems**  
Giordano Montegrossi - CNR-IGG
- ❖ 12:00-12:30 **Dynamic soil configuration to meet the system's dissipation demands**  
Conrad Jackisch -TU Bergakademie Freiberg
- ❖ 12:30-13:00 **Feedback mechanisms between precipitation and dissolution reactions across randomly heterogeneous conductivity fields**  
Yaniv Edery -Technion-Israel

### **Breakouts, Discussions and Conclusions**

- ❖ 15:00-16:30
  - Breakout groups on:
    - [A] Dissipative systems
    - [B] Non-Gaussian distributions
    - [C] Structure formation
- Coffee break and informal discussions
- ❖ 16:30-17:30
  - Report from breakout groups and discussion
  - Conclusions and next steps

 Optional dinner

## DAY 4 – (20.09.2024)

### Informal trip to Fiesole, casual discussions and lunch

- ❖ 10:30 Meeting point at the Department of Earth Sciences in front of the dinosaur
- ❖ 10:30-12:30 Visit to Fiesole's Etruscan-Roman Archaeological area and walk around
- ❖ 12:30-14:30 Lunch



## Additional information

- Please note that coffee breaks, lunches and dinners are not included. Participants are free to choose among the nearby coffee bars and restaurants.
- Recommended places for lunch:
  - Ristorante SimBIOsi:** [Via de' Ginori, 58r/60r, 50123 Firenze FI, Italy.](#)  
Several options for pasta, pizza and salads.
  - All'Antico Vinaio:** [Via Ricasoli, 121r, 50121 Firenze FI, Italy](#)  
Sandwiches with different fillings