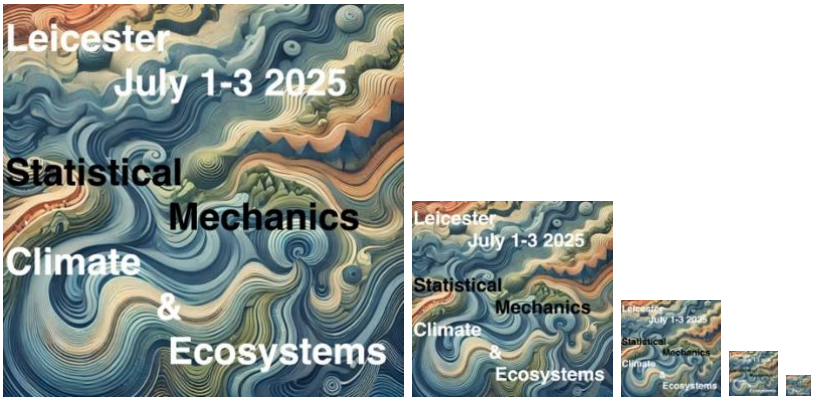
Statistical Mechanics of the Climate System and of Ecosystems

July 1st-3rd 2025
Leicester, UK

Website: https://vlucarini.github.io/conference.html
Contact: Valerio Lucarini (v.lucarini@leicester.ac.uk)



Programme

****
Tuesday July 1st
****

8.00-9.00 Registration - Lecture Theatre 2

Lecture Theatre 2
9.00-9.45 Susanne Ditlevsen: Estimating tipping points in climate and ecosystems
9.45-10.30 Jeffrey Weiss: Nonequilibrium Statistical Mechanics of Climate Oscillations

Room 0.03
10.30-11.00 Coffee break

11.00-12.20
Parallel Sessions

Lecture Theatre 2
Session a) (20 mins presentations)

- Bert Wuyts: Stability and bifurcation analysis for individual-based ecological models
- Davide Bernardi: A novel metric for species vulnerability and coexistence in spatially-extended ecosystems
- Samuel Johnson: Feedback, stability and trophic coherence in complex systems
- Perrin Davidson: Pathways Toward the Onset of Climate-Carbon Cycle Disruptions

Room 0.03
Session b) (20 mins presentations)

- Chris Chapman: The typicality and spatio-temporal structure of extreme climate regimes revealed through Archetype Analysis
- Ofer Shamir (remote): Earth's Infrared Background
- Larissa Serdukova: Influence of extreme events modeled by Lévy flight on Atlantic meridional overturning circulation stability
- Erik Chavez: The role of vegetation ecosystem quality in a bistable climate system

Lecture Theatre 2
14.00-14.45 Andrea Toreti: Climate Multi-Risks across Different Scales
14.45-15.30 Alan Hastings: Synchrony of spatial population dynamics using ideas from statistical physics

Room 0.03
15.30-16.00 Coffee break

16:00-17.00
Parallel Sessions (20 mins presentations)
Lecture Theatre 2

Session a) (20 mins presentations)

- Ulrike Feudel: Critical transitions in complex systems: The role of multiple time scales and unstable states
- Andrey Morozov: Rate-induced tipping in ecological systems: unifying theory and empirical evidence
- Michael Bonsall: Differential games, optimal control and climate change

Room 0.03
Session b) (20 mins presentations)

- Eric Hall: When simulations forget: An information-theoretic burn-in criterion for physical systems with memory
- Francisco de Melo Virissimo: From Chaos to Clarity: Exploring Uncertainty in the Design and Interpretation of Climate Ensembles
- Ruslan Davidchack: Minimal cover of high-dimensional chaotic attractors by embedded recurrent patterns

Special Session: Academic Publishers
Lecture Theatre 2
17.00-17.25 Kyle Welch: Climate and Earth Science in the Physical Review Journals
17.25-17.45 Zoe Budrikis: Climate and ecosystems at Nature Reviews Physics

19.00 - Social Dinner

****

Wednesday July 2nd

****

Lecture Theatre 1
9.00-9.45 Silvia De Monte: Fluctuations in complex ecological comunities
9.45-10.30 Sandro Azaele: Statistical Mechanics of Ecological Systems

Room 0.03
10.30-11.00 Coffee break

11.00-12.40
Parallel Session

Lecture Theatre 1
Session a) (20 mins presentations)

- Srikanth Toppaladoddi: Sea ice motion as a problem in kinetic theory
- Manuel Santos Gutierrez: Dynamical regimes of droplet activation in warm clouds
- John Moroney: Data-driven construction of linear response operators using a Koopman formalism
- Wyatt Petryshen: Application of Haar Fluctuation Analysis to Infer Drivers in Ecological Time Series

Room 0.03
Session b) (20 mins presentations)

- Ahash Deshmukh: Downscaled Climate Data to Represent Climate Extremes in Europe
- Abdelwaheb Ben Ahmed Hannachi: Weather & climate extremes: simplex, dynamical systems and hull clustering
- Samuel Ogunjo: Feedback, stability and trophic coherence in complex systems
- Viacheslav Kruglov: Numerical Study of Connectivity and Lagrangian Particle Transport in the Pacific Ocean
- Massimo Cavallaro: Spatio-temporal surveillance and early warning signals in infectious disease epidemiology

Lecture Theatre 1
14.00-14.45 Johannes Lohmann: Multistability of the Ocean Circulation
14.45-15.30 Jonathan Daemayer: Atmospheric regimes: definition, transitions and predictability

Room 0.03
15.30-16.00 Coffee break

Lecture Theatre 1
16:00-16.45 Matthew Colbrook: When Can We Trust Data-Driven Learning of Dynamics?
16.45-17.30 Nisha Chandramoorthy (remote): Physical Generative Modeling of Chaotic Systems

18:00 Wine and Cheese reception

****

Thursday July 3rd

****

Lecture Theatre 2
9.00-9.45 Juergen Kurths: Climate Meets Complex Systems Science and Statistical Physics: Exploring Teleconnections and Extreme Events in the Climate System
9.45-10.30 Ludovico Giorgini: Response Theory via Score Modeling

Room 0.03
10.30-11.00 Coffee break

11.00-12.40
Parallel Sessions
Lecture Theatre 2
Session a) (20 mins presentations)

- Pedram Hassanzadeh: Can AI emulators predict out-of-distribu6on gray swan weather extremes?
- Catherine Drysdale: DMD for Predicting First Episode Psychosis
- Ankan Banerjee: Early warning and prediction to critical transitions in a non-autonomous turbulent reactive flow system
- Francesco Ragone: Simulation of extreme events in numerical models with rare event algorithms
- Mickael Chekroun (remote): Equations Discovery of Organized Cloud Fields: Stochastic Generator and Dynamical Insights

Room 0.03
Session b) (20 mins presentations)

- Sergei Petrovskii: Interplay between climate forcing and evolutionary rescue may explain mass extinctions in the Earth history
- Daniel Bearup: Outcomes of long-range cyclic competition are determined by interaction mechanism
- Yu Meng: Dynamical impact of dispersal on biodiversity patterns for three species food web model
- Bukem Belen: Analysis of Present and Future Variability in the Physical Processes of the Black Sea (1950–2100)

- Euijoon Kwon: Universal Bounds on Fluctuation and Response in Stochastic Systems

Lecture Theatre 2
14.00-14.30 Liubov Tupikina (remote): On some challenges of embedding theory: from topology to the meaning and back
14.30-15.00 Concluding remarks

Room 0.03
15.00-16.00 Coffee break and goodbye