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Notes:

Author name in CAPITALS denotes the presenter where appropriate.

Monday (Law Faculty)

Symposium: Complexity Science and the Earth System

08:30 **REFRESHMENTS**

09:00 **Mervyn Freeman**

British Antarctic Survey, Cambridge, U.K.

Introduction

09:10 **Robert Culshaw**

British Antarctic Survey, Cambridge, U.K.

Welcome

09:20 **John Harte**

University of California, Berkeley, U.S.A.

Is a Grand Unified Earth System Science possible? And if so, what might it look like? My best GUESS

10:05 **Eric W. Wolff**

British Antarctic Survey, Cambridge, U.K.

Ice cores and climate: Patterns and causes of change

10:50 **COFFEE**

11:20 **Tim Lenton**

School of Environmental Sciences, University of East Anglia, Norwich, U.K.

Tipping Elements in the Earth System

12:05 **Jürgen P. Kropp**

Potsdam Institute for Climate Impact Research, Potsdam, Germany

Qualitative Physics: An alternative approach to assess coupled human-environment systems

12:50 **LUNCH**

14:00 **Leonard A. Smith**

London School of Economics, London, U.K.

Unnatural Complexity: Towards achievable aims for complicated simulation models in applications with data (weather-like) and those without (climate-like)

14:45 **Tom Mullin**

Dept. of Physics and Astronomy, University of Manchester, U.K.

Patterned segregation: Order out of complexity

15:30 **TEA**

16:00 **Theo Geisel (1,2,3)**

(1) Max-Planck-Institute for Dynamics and Self-Organization, Göttingen, Germany

(2) Faculty of Physics, University of Göttingen, Göttingen, Germany

(3) Bernstein Center for Computational Neuroscience, Göttingen, Germany

The Scaling Laws of Human Travel – New Approaches to the Forecast of Epidemics

16:45 **Geoff West (unconfirmed)**

Santa Fe Institute, New Mexico, U.S.A.

Title to be announced

17:30 **END**

18:00 **RECEPTION in Scholar's Garden, Clare College**

(for registered participants)

19:45 **DINNER in Great Hall, Clare College**

(for registered participants)

Tuesday (Clare College)

Nonlinearity and scaling in the complex solar and terrestrial systems

09:00 **David Broomhead**

University of Manchester, U.K.

TUTORIAL: Nonlinear time series concepts and methods with an emphasis on the time domain

10:00 **David Thomson**

Queens University, Kingston, Ontario, Canada

Multitaper Analysis of Normal Modes of the Sun

10:30 **COFFEE (JCR)**

11:00 **Jan W. Kantelhardt**

Institut für Physik, Martin-Luther Universität Halle-Wittenberg, Germany

TUTORIAL: Fractal and Multifractal Data Studied with Detrended Fluctuation Analysis

12:00 **Armin Bunde**

Institut für Theoretische Physik III, Universität Giessen, Germany

On the statistics of return intervals in monofractal and multifractal data sets

12:30 **Douglas Maraun**

Climate Research Unit, University of East Anglia, Norwich, U.K.

Power Laws in Nature – A Sceptical Enquiry

13:00 **LUNCH (Great Hall)**

14:00 **Victor VENEMA, Clemens Simmer**

Meteorologisches Institut, Universität Bonn, Germany

Beyond fractals: surrogate time series and fields

14:30 **Valerie N. LIVINA, Tim M. Lenton**

University of East Anglia, Norwich, U.K.

Monitoring climate variability using the modified degenerate fingerprinting

15:00 **Adrian F TUCK, Susan J Hovde**

NOAA Earth System Research Laboratory, Chemical Sciences Division, Boulder, Colorado, U.S.A.

Molecules to Meteorology: The Emergence of Vorticity and Temperature

15:30 **TEA (JCR)**

16:00 **POSTERS (JCR)**

17:00 **Bar opens (JCR)**

19:30 **DINNER (Great Hall)**

Wednesday (Clare College)

Networks, stability, and biodiversity

09:00 **Jose M Montoya**

Queen Mary University, London, U.K.

TUTORIAL: Complex Biological Networks: Structure, dynamics, functioning and their fragility

10:00 **Anje M Neutel**

University of York, U.K.

(now at British Antarctic Survey, Cambridge, U.K.)

Reconciling complexity with stability in naturally assembling food webs

10:30 **COFFEE (JCR)**

11:00 **Lloyd Demetrius (1, 2)**

(1) Harvard University, Cambridge, U.S.A.

(2) Max Planck Institute for Molecular Genetics, Berlin, Germany

Quantum Metabolism: A molecular explanation of allometric scaling

11:30 **S. C. CHAPMAN (1), G. Rowlands (1), N. W. Watkins (2)**

(1) CFSA, Physics, Univ. of Warwick, UK

(2) Natural Complexity Programme, British Antarctic Survey, UK

Reynolds number in turbulence, Self Organized Criticality and ecosystems

12:00 **Andrew Clarke**

British Antarctic Survey, Cambridge, U.K.

Metabolism: Is it simple, or is it complex?

12:30 **Rich Williams**

Microsoft Research, Cambridge, U.K.

Network structure and the functioning of large model food webs

13:00 **LUNCH (Great Hall)**

14:00 **EXCURSION (assemble outside Latimer Room)**

18:30 **Bar opens (JCR)**

19:30 **CONFERENCE DINNER (Great Hall)**

Thursday (Clare College)

Beyond Brownian motion: Random walks, fractals and self-organisation in Nature

09:00 **Raúl Sánchez**

Fusion Energy Division, Oak Ridge National Laboratory, Tennessee, U.S.A.

TUTORIAL: Continuous-Time Random walks: Applications to the modeling of non-diffusive transport in complex systems

10:00 **Andrew M. Edwards (1), Richard A. Phillips (1), Nicholas W. WATKINS (1), Mervyn P. Freeman (1), Eugene J. Murphy (1), Vsevolod Afanasyev (1), Sergey V. Buldyrev (2,3), Marcos G. E. da Luz (4), Ernesto P. Raposo (5), H. Eugene Stanley (2) and Gandhimohan M. Viswanathan (6)**

(1) British Antarctic Survey, Cambridge, UK

(2) Boston University, Boston, USA

(3) Yeshiva University, New York, USA

(4) Universidade Federal do Paraná, Curitiba-PR, Brazil

(5) Universidade Federal de Pernambuco, Recife-PE, Brazil

(6) Universidade Federal de Alagoas, Maceió-AL, Brazil

Revisiting Lévy flight search patterns of wandering albatrosses, bumblebees and deer

10:30 **COFFEE (JCR)**

11:00 **Aleksei Chechkin**

Institute for Theoretical Physics NSC KIPT, Kharkov, Ukraine

TUTORIAL: Lévy flights: Paradigm of non-Brownian random motion

12:00 **Martin Rypdal, Kristoffer RYPDAL**

University of Tromsø, Norway

A stochastic theory for temporal toppling fluctuations in self-organized critical systems

12:30 **F KWASNIOK (1), G Lohmann (2)**

(1) University of Exeter, Exeter, UK

(2) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

Dynamical modelling of ice-core records: Integrating theories and palaeoclimatic data

13:00 **LUNCH (Great Hall)**

14:00 **Ray Goldstein**

Department of Applied Mathematics and Theoretical Physics, University of Cambridge, U.K.

How the Stalactite Got Its Shape

14:30 **Peter Dieterich (1), RAINER KLAGES (2), Roland Preuss (3), Albrecht Schwab (4)**

(1) Institut für Physiologie, Medizinische Fakultät Carl Gustav Carus, Dresden, Germany

(2) School of Mathematical Sciences, Queen Mary, University of London, UK

(3) Max-Planck-Institut für Plasmaphysik, Garching, Germany

(4) Institut für Physiologie II, Münster, Germany

Anomalous dynamics of cell migration

15:00 **Daniel SCHERTZER (1,2), Shaun Lovejoy (3,4), Jose Macor (1,5), Ioulia Tchiguirinskaia (1,6)**

(1) CERERE, ENPC, Marne-la Vallée, France

(2) CNRM, Météo-France, Paris, France

(3) Physics dept., McGill U., Montreal, Canada

(4) GEOTOP UQAM/McGill, , Montreal, Canada

(5) FICH, UNL, Santa Fe, Argentina

(6) OHAX, CEMAGREF, Aix-en-Provence, France

Multifractal Predictability and Forecasts

15:30 **TEA (JCR)**

16:00 **POSTERS (JCR)**

17:00 **Bar opens (JCR)**

19:30 **DINNER (Great Hall)**

Friday (Clare College)

Model choice, universality, and natural hazards

09:00 **David J. C. MacKay**

Cavendish Laboratory, University of Cambridge, U.K.

TUTORIAL: Gaussian processes for nonlinear data modelling

10:00 **Jörn Davidsen**

Complexity Science Group, Department of Physics and Astronomy, University of Calgary, Canada

Advances in characterizing spatio-temporal clustering and emergent applications in seismicity

10:30 **COFFEE (JCR)**

11:00 **Cosma Shalizi**

Statistics Department, Carnegie Mellon University, Pittsburgh, Pennsylvania, U.S.A.

TUTORIAL: Beyond Scaling

12:00 **Sarah HALLERBERG, H Kantz**

Max Planck Institute for the Physics of Complex Systems, Dresden, Germany

When are extreme events the better predictable, the more extreme they are?

12:30 **Christian Franzke**

National Center for Atmospheric Research, Boulder, Colorado, U.S.A. (now at British Antarctic Survey, Cambridge, U.K.)

Extracting Macroscopic Dynamics from Complex Geophysical Systems

13:00 **LUNCH (Great Hall)**

14:00 Informal discussion

15:30 **TEA (JCR)**

16:00 **END**

Posters (Clare College)

(Alphabetical by first author.)

G. A. Abel, M. P. Freeman, G. Chisham, N.W. Watkins

British Antarctic Survey, Cambridge, UK

Investigating turbulent structure of ionospheric plasma velocity using the Halley SuperDARN radar

Marco BAIESI (1), Christian Maes (2)

(1) Physics Dept., University of Florence, Italy

(2) ITF, K.U.Leuven, Leuven, Belgium

Temporal correlations in sandpiles

Oleg Bakunin

Turbulence Theory Laboratory, Nuclear Fusion Institute, Moscow, Russia

Small cluster statistics and Lévy size distributions

S. C. Chapman (1), N. W. Watkins (2), G. Rowlands (1)

(1) Centre for Fusion, Space and Astrophysics, University of Warwick, U.K.

(2) Natural Complexity Project, British Antarctic Survey, Cambridge, U.K.

Order parameters and effective Reynolds Numbers in avalanching systems and in fluid turbulence

Huseyin Ciloglu

Eastern Mediterranean University, TRNC/Turkey

Complex Dynamics in Manufacturing Environment: A Case Study on Valeo Company

Richard W. CLARKE, Mervyn P. Freeman, and Nicholas W. Watkins
British Antarctic Survey, Cambridge, U.K.

Application of computational mechanics to the analysis of natural data: An example in geomagnetism

Jörn DAVIDSEN (1,2), James Griffin (2,3)

(1) Complexity Science Group, Department of Physics and Astronomy, University of Calgary, Canada

(2) British Antarctic Survey, Cambridge, UK

(3) University of Cambridge, UK

Estimating the volatility of unevenly sampled time series and its application to ice cores and climate proxies

Greg King (1,2), Robert Kerr (1)

(1) Fluid Dynamics Research Centre, School of Engineering, University of Warwick, Coventry CV4 7AL, UK

(2) Instituto de Oceanografia, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal

Second and third order structure functions for near-surface winds from QuikSCAT measurements over the Pacific Ocean

Khurom H KIYANI, Sandra C. Chapman, and Bogdan Hnat

CFSA, University of Warwick, U.K.

Outliers and their effects on the scaling of self-affine and multifractal stochastic processes

F KWASNIOK

University of Exeter, Exeter, UK

Nonlinear stochastic low-order models of atmospheric low-frequency variability using an empirical regime-weighted closure scheme

Laura Limer

University of Sheffield, UK

Using satellite data to validate integral processes within ecosystem models

Alexander V. MILOVANOV (1), Kristoffer Rypdal (1), Jens Juul Rasmussen (2)

(1) Department of Physics and Technology, University of Tromsø, N-9037 Tromsø, Norway.

(2) Optics and Plasma Research Department, Riso National Laboratory, Technical University of Denmark, DK-4000 Riso, Denmark.

E-pile model of self-organized criticality

Mark Naylor, Ian G Main

School of GeoSciences, University of Edinburgh, UK

Predictability and statistical stability of the inter-event record in the OFC model

Dmitry Nerukh

Unilever Centre for Molecular Informatics, Department of Chemistry, Cambridge University, Cambridge CB2 1EW, UK

Statistical complexity of classical molecular dynamics systems: a measure of phase space exploration and non-Markovian behaviour of molecular conformation

Martin E. W. O'LEARY, Mervyn P. Freeman, and Alison J. Cook

British Antarctic Survey, Cambridge, U.K.

How long is the coastline of Antarctica? A new method for understanding iceberg calving and a possible precursor of ice shelf collapse.

Ryan PAVLICK (1), Axel Kleidon (1), Sameer Patwardhan (2)

(1) Biospheric Theory and Modelling Group, Max-Planck-Institut für Biogeochemie, Jena, Germany

(2) Technische Universiteit Delft, Delft, The Netherlands

Does the empirical Ball-Berry law of stomatal conductance emerge from maximization of productivity ?

Panagiota PETKAKI (1) and Alexander L. MacKinnon (2)

(1) British Antarctic Survey, Cambridge, U.K.

(2) DACE/Physics and Astronomy, University of Glasgow, Glasgow, U.K.

Particle acceleration from fluctuating electric fields superposed on X-type magnetic fields

Craig R POWELL, Alan J McKane
University of Manchester, Manchester, UK

Food web assembly through evolution and immigration

GUNNAR PRUESSNER (1), Michael Gastner (2), Dániel Zimmerman (3)

(1) University of Warwick, Warwick, UK

(2) Santa Fe Institute, Santa Fe NM, USA

(3) Lorand Eötvös University Budapest, Budapest, Hungary

The gradient contact process

H.W. Rust (1), V. Venema (2), O. Mestre (3)

(1) Nonlinear Dynamics Group, Physics Institute, Potsdam University, Germany

(2) Meteorological Institute, University Bonn, Germany

(3) Meteo France, Toulouse, France

Data inhomogeneity creates artificial long-range dependence in historical temperature data

Aicko Y Schumann, Jan W Kantelhardt
Martin-Luther-University Halle-Wittenberg, Germany

Multivariate Phase Rectified Signal Averaging - For Study of Complex Inter-Related Time Series

P Szymczak (1), A J C Ladd (2)

(1) Faculty of Physics, Warsaw University, Hoza 69, Warsaw, 00-681 Poland

(2) University of Florida, Chemical Engineering Department PO Box 116005, Gainesville, FL 32611-6005 United States

Scaling properties of the dissolving channels in a fractured rock

Victor Venema (1), Annika Schomburg (1), Felix Ament (2), and Clemens Simmer (1)

(1) Meteorologisches Institut, Universität Bonn, Germany, Victor.Venema@uni-bonn.de

(2) MeteoSchweiz, Switzerland

Adaptive radiative transfer parameterisation schemes utilising spatial and temporal correlations

Nick WATKINS (1), Dan Credgington (1,2), Raul Sanchez (3), Sandra Chapman (4)

(1) British Antarctic Survey, Cambridge, U.K.

(2) University College London, London, U.K.

(3) Oak Ridge National Laboratory, Oak Ridge, U.S.A.

(4) University of Warwick, Coventry, U.K.

A diffusion equation for linear fractional stable motion, apparent multifractality, and applications to space physics

Robert T WICKS (1), S C Chapman (1), R O Dendy (1,2)

(1) Centre for Fusion, Space and Astrophysics, University of Warwick, Coventry, CV4 7AL, UK

(2) UKAEA Culham Division, Culham Science Centre, Abingdon, Oxfordshire, OX14 3DB, UK

Mutual Information as a Tool for Identifying Phase Transitions in Dynamical Complex Systems with Limited Data

Hywel T P WILLIAMS, Timothy M Lenton

University of East Anglia, UK

Environmental regulation in a simulated network of microbial ecosystems

Ryan Woodard (1), Mervyn P Freeman (1), Jesse V Johnson (2)

(1) British Antarctic Survey, Cambridge, UK

(2) University of Montana, USA

Dynamics of Antarctic ice sheet models