



## BRITISH GEOPHYSICAL ASSOCIATION

Annual British Discussion Meeting incorporating the BGA Bullerwell lecture

# SCALE-INVARIANCE AND SCALE-DEPENDENCE IN EARTH STRUCTURE AND DYNAMICS

9 and 10 March 2006

Geological Society of London, Burlington House, Piccadilly, London, W1J 0BG

Convenors: Ian Main, John McCloskey, Chris Bean and Bruce D. Malamud

**Day 1: Thursday 9<sup>th</sup> March 2006**

**Location: Lecture Theatre of the Geological Society, Burlington House**

*09:30–10:10*      **REGISTRATION + COFFEE**

*10:10–10:20*      **Start of Meeting and Introduction**

### SESSION 1: PRIMARY OBSERVATIONS

Chaired by Bruce D. Malamud (King's College London)

- 10:20–10:50      **Invited Speaker: Rachel Abercrombie** (Boston University, USA)  
Are earthquakes scale-invariant?
- 10:50–11:10      **Jörn Davidsen & Maya Paczuski** (BAS, Cambridge & Waterloo, Canada)  
Analysis of the spatial distribution between successive earthquakes
- 11:10–11:30      **James Millington** (King's College London) ••[J.D.A. Millington, B.D. Malamud, G.L.W. Perry]••  
The use of power-law statistics to characterise and compare wildfire regimes
- 11:30–11:50      **Richard Jones** (Durham University) ••[R. Jones, K. McCaffrey, S. Smith, R. Holdsworth, D. Healy, G. Jullin]••  
Quantification of spatial distribution and granularity of fold and fracture systems seen in outcrop
- 11:50–12:10      **Pierre Rampall** (LGGE, CNRS, France) ••[P. Rampall, D. Marsan, J. Weiss, R. Lindsay, H. Stern]••  
Solid turbulence in the fracture of the Arctic sea ice cover
- 12:10–12:40      **PANEL + AUDIENCE DISCUSSION**

*12:40–14:00*      **LUNCH ('Buy-your-own' sandwiches from nearby shops)**

### SESSION 2: PHYSICAL MODELS

Chaired by Ian Main (University of Edinburgh)

- 14:00–14:30      **Invited Speaker: Tim Lenton** (University of East Anglia)  
Tipping points in the climate system and their predictability
- 14:30–14:50      **Daniel Schertzer & Shaun Lovejoy** (CEREVE, ENPC, France)  
Multi fractal predictability
- 14:50–15:10      **Michael Zaiser & B. Fyffe** (University of Edinburgh)  
Scale-dependent and scale-free aspects of snow slab avalanches
- 15:10–15:30      **Stuart Crampin & Yuan Gao** (University of Edinburgh)  
Self-similarity due to distributions of stress-aligned, fluid microcracks
- 15:30–16:00      **Invited speaker: Patience Cowie & Alex Whittaker** (University of Edinburgh)  
Perturbing ideas: Characteristics of non-steady-state landscape dynamics
- 16:00–16:25      **PANEL + AUDIENCE DISCUSSION**

*16:25–17:00*      **TEA**

17:00–18:00      **BULLERWELL LECTURE: Andrew Jackson** (University of Leeds)  
Understanding the Earth's magnetic field through observation and theory

*18:00–19:00*      **BGA WINE RECEPTION** in the Lower Library of the Geological Society

**Day 2: Friday 10<sup>th</sup> March 2006**

**Location: Lecture Theatre of the Geological Society, Burlington House**

**08:30–09:00 REGISTRATION** (for those that did not register on day 1)

**SESSION 3: SPATIAL SCALING**

**Chaired by Chris Bean** (University College Dublin)

- 09:00–09:30 **Invited speaker: Brian Berkowitz** (Weizmann Institute, Israel)  
Scale-free and scale-dependent dispersion in porous media
- 09:30–09:50 **Olivier Jacquet** (Colenco, Switzerland) ••[O. Jacquet, G. Massonnat, P. Siegel, R. Namar, E. Pernarcic, E. Jacquemard, F. Martineau, F. Morandini]••  
A 4-D approach for stochastic modelling of hydraulic properties in aquifers affected by dissolution
- 09:50–10:10 **Amy Day–Lewis** (Stanford University, USA) ••[A. Day-Lewis, M. Zoback, S. Hickman]••  
The scaling of stress rotations, physical properties and the distribution of faults near the San Andreas Fault in Southern California
- 10:10–10:40 **Invited speaker: Michael Worthington** (University of Oxford)  
Wave propagation in fractured media and the up-scaling of fracture compliance
- 10:40–11:15 **PANEL + AUDIENCE DISCUSSION**

**11:15–11:45 COFFEE** (11:15–11:45) & **Posters** (11:30–12:30) in the apartments of the RAS at Burlington House

**SESSION 4: POSTERS**

- 11:30–12:30 ••**Arrigo Caserta** (INVG, Rome, Italy)  
Preliminary observations of the statistical features of the seismic noise-field and their dependence on the soil conditions
- Jörn Davidsen & Maya Paczusi** (BAS, Cambridge & Waterloo, Canada)  
Analysis of the spatial distribution between successive earthquakes
- Art Jonkers** (University of Liverpool)  
Characteristic Geomagnetic Timescales
- Lun Li & Ian Main** (University of Edinburgh)  
Characteristic size effects in different types of earthquake frequency–size data
- Ken McCaffrey** (University of Durham) ••[K.J.W. McCaffrey, G. Jiulin, R.R. Jones, R.E. Holdsworth, D. Healy]••  
Digital acquisition of spatial heterogeneity and scaling of faults in sandstone
- Mark Naylor & Ian Main** (University of Edinburgh)  
Maximum entropy production in earthquake dynamics: Analytic description and comparison with a modified OFC model
- Daniela Pandolfi** (University College Dublin & Vesuvius Observatory) ••[D. Pandolfi, C.J. Bean, G. Saccorotij]••  
Seismic wave scattering characteristics at Mt. Vesuvius
- Sandy Steacy & John McCloskey** (University of Ulster)  
Assessing the stability of the rate of background seismicity
- Raul Pérez–López** (Universidad San Pablo, Spain) ••[R. Pérez–López, C. Paredes, A. Cisternas, S. Arefiev, O. Polat, L. Rivera, R. Tatevossian, H. Haessler, J.L. Giner-Robles]••  
Rescaled range analysis of the aftershock sequence of the Racha earthquake, Mw 7.0 (1991)
- Annette Witt & Bruce D. Malamud** (King’s College London)  
Comparison of five methods for characterising long-range persistence

**12:30–13:30 LUNCH** (Sandwiches will be available for purchase from the RAS and nearby shops)

**SESSION 5. TEMPORAL SCALING**

**Chaired by John McCloskey** (University of Ulster)

- 13:30–14:00 **Invited speaker: Massimo Cocco** (Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy)  
Scale dependence in the dynamics of earthquake rupture propagation: evidence from geological and seismological observations
- 14:00–14:20 **Kim Christensen** (Imperial College) ••[K. Christensen, P. Bak, L. Danon, T. Scanlon, O. Peters, C. Hertlein]••  
Scaling laws for Earthquakes and rain
- 14:20–14:30 **Valerie Livina** (University of East Anglia) ••[V.N. Livina, S. Havlin, A. Bunde]••  
Memory in the occurrence of earthquakes
- 14:30–15:00 **Invited speaker: Donald Turcotte** (UC Davis, USA)  
Recurrence and inter-occurrence times in natural hazards and associated models
- 15:00–15:30 **PANEL + AUDIENCE DISCUSSION**

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