

Mark Naylor, MPhys, PhD, AInstP

CONTACT INFORMATION

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RESEARCH INTERESTS

Tectonically driven natural complexity: Earthquakes, rivers and mountains

EMPLOYMENT

Edinburgh University, Edinburgh, UK

EPSRC Postdoc on Complexity, School of GeoSciences, 2004-present

- NANIA consortium project to address complexity in the Earth sciences
- Principle Investigator: Prof Ian Main

EDUCATION

Edinburgh University, Edinburgh, UK

Ph.D. , Geology and Geophysics, 2000-04

- Thesis: A discrete element model of orogenesis
- Supervisors: Dr Hugh D. Sinclair & Dr Patience A. Cowie

Oxford University, Oxford, UK

MPhys, Department of Physics, 1996-00

- Pure Physics
- Atmospheric & Oceanographic Physics
- Condensed Matter Physics
- Project: Partial cloud cover using a statistical interrogation of Meteosat IR and VIS data

Hessle High School, Hessle, UK

A-Level: Mathematics A, Physics A, Chemistry B, Biology B
GCSE: 4A*, 5A

ACADEMIC EXPERIENCE

EPSRC Postdoc on Complexity

September 2004 - present

I have been funded as part of the NANIA consortium for the last three years. This is a multidisciplinary project with expertise ranging from population genetics to complex social networks. My contribution focuses on fault scale and seismological processes.

NERC PhD

2000 - 04

Continuous tectonic driving of mountain belts and accretionary wedges by plate tectonics produces a punctuated response on the scale of individual thrust sheets. I demonstrated that studies which seek to explain localised deformation in terms of climate must first discount internal tectonic variability.

ACADEMIC LEADERSHIP

PhD students I am co-supervising a PhD student, with I.G. Main, who is already contributing to one of my publications in preparation. I am also a co-supervisor on a new project being offered with H.D.Sinclair for the coming years Edinburgh NERC quota.

- Sarah Touati : Earthquake physics: 'Snap', 'crackle' (but no pop) and implications for seismic hazard and earthquake predictability in a complex system (Started 2007)
- Offering : Erosion and sedimentation on active thrust wedges: implications for deformation, seismicity and hazards

Board member for Knowledge Transfer Partnership

October 2006

A PDRA works with Andrew Curtis to further develop and transfer statistical survey and experimental design methods from the University of Edinburgh to Total Research. My primary role is to deputise for Andrew at the monthly meetings with Total Research in Aberdeen.

PROFESSIONAL
EXPERIENCE

Convenour of the NANIA Complexity Meeting, Barony Castle, Eddleston **27-29th August 2007**

This productive meeting was attended by 40 delegates and 3 invited, international speakers covering a range of disciplines in complexity science including the biological, physical, Earth and social sciences.

Extended visit to UW, Seattle

2002, 4 Months

This visit was funded by UW to facilitate collaboration with Associate Professor Sean Willett and directly contributed to Naylor et. al (2004).

Invited talks

- **Keynote:** Sinclair, H.D. & Naylor, M., Pro- versus retro-peripheral foreland basins as records of orogenesis, No. 161-1, GSA Annual Meeting (2007)
- Main, I.G. & Naylor, M., Maximum entropy production in earthquake dynamics: origin of spatial order and temporal unpredictability in a complex system, EGU06-A-01028, EGU Vienna (2006)
- Tectonic variability during orogenic evolution (2005) Physics of Geological Process, Oslo, Norway
- Discrete element modelling (2002) University of Washington State, Seattle, US

Journal reviews

I have reviewed for journals including Geology, Geophysical Journal International and Basin Research

TEACHING
EXPERIENCE

Co-supervising 4th year student projects:

- Epidemics, aftershocks and synthetic earthquake catalogues (2007)
- Crackling noise (2006)

I have contributed to undergraduate teaching through:

- Lecture cover for Waves and Fields (4th year Geophysics), Foreland Basins (4th year Geology), Structural Geology (3rd year Geology), Natural Hazards (2nd year GeoScience)
- Tutor for the 2nd year Natural Hazards course
- Demonstrator for the 2nd year undergraduate field trip to Arran (1 week residential trip)
- Demonstrator for various courses including Mathematical Methods, More HTML,...

TRAINING
COURSES

Summer School in Complexity Science: Emergent phenomena via separation of scales in time & space, Imperial College London **2007, 10 days**

The overall theme of the summer school is the dynamics of complex systems, with an emphasis on emergent phenomena such as spatiotemporal patterns, with specific emphasis on the mathematical quantitative techniques used in complexity science.

Nonlinear Computational Solid & Fluid Mechanics, Braunschweig, Germany

2006, 5 days

Advanced course on the theoretical formulation of FEM technology and computation applied to a range of engineering problems.

Tectonics, Climate and Landscape Evolution, Penrose Conference, Taiwan

2003, 7 days

As part of this Penrose conference I attended a 4 day field trip which focused on the geomorphologic imprint of the collisional evolution of Taiwan and a quantification of relevant processes.

Geophysical Fluid Dynamics Summer School, DAMPT, Cambridge **2002, 2 weeks**
 The Summer School exposes the key physical processes involved in the dynamics of the atmosphere, oceans and solid Earth using simple mathematical ideas illustrated by hands-on laboratory experiments and interactive computer demonstrations.

Earth Systems Processes Summer School, UEA **2001, 2 weeks**
 This course provides training in Earth system science through key topics addressing interactions of different environments, and the dynamic processes that link their physical, chemical, biological and social components.

CONTINUING
DEVELOPMENT

I have undertaken a range of courses to maintain a high level of personal skills and expertise:

- Making Funding Application, Edinburgh (2007, 1 day)
- Enhancing your writing skills, Edinburgh (2007, 1 day)
- Applied Numerical Algorithms, EPCC, Edinburgh (2006, 4 days)
- Scientific Visualisation using VTK, EPCC, Edinburgh (2005, 1 day)
- Practical Software Development, EPCC, Edinburgh (2005, 4 days)
- Java for High Performance Computing, EPCC, Edinburgh (2005, 2 days)
- Introduction to High Performance Computing, EPCC, Edinburgh (2005, 1 day)
- Presentation Skills, Edinburgh (2000, 1 day)

FIELD
ASSISTANT

My ability to produce relevant models is greatly enhanced by working closely with field scientists:

- Ladakh, India, 5 days preliminary investigation with D.Hobley and group (2006)
- Borgarfjordur, E.Iceland, 14 days tephra profile and sample collection for L.Sugden (2005)
- Pyrenees, Spain, 6 days (U-Th)/He sample collection for G.Lynn (2004)
- Ladakh, India, 14 days (U-Th)/He sample collection for L.Kirstein (2001)
- Pyrenees, Spain, 7 days preliminary trip and (U-Th)/He sample collection for M.Gibson (2000)

COMPUTER SKILLS

- Statistical Packages: R, S-Plus, Statistical Seismology Library (SSlib)
- Languages: Java, C++, Fortran, Perl
- Algorithms: Discrete element modelling, finite difference, cellular automata, non-linear regression
- Specific interests in: Efficient program design using object orientated design, native methods to run optimised routines and concurrent programming to utilise changing technology in the form of multi-core processors.
- Applications: Netbeans, Generic Mapping Tools (GMT), L^AT_EX, common Windows database, spreadsheet, and presentation software
- Operating Systems: Unix/Linux, Windows

AWARDS

- Small Projects Grant (2002)
- Sheila Hall Trust (2002)
- Wier Fund for Field Studies (2002)
- NERC Studentship (2000)

CONTRIBUTIONS
TO WORKPLACE

I provide practical contributions to improving the working environment:

- Member of the School's Press Gang (Media outreach) **2007 - present**
- Introduction and maintenance of reprint and media board **2006 - present**
- Technical advice on rebranding of School website **2006 - present**
- Web design for Subsurface Group **2006 - present**
- Geophysics Seminar Series coordinator **2004 - 2006**