

LONDON'S GLOBAL UNIVERSITY

UCL



RDR

UCL Institute for Risk and Disaster Reduction
Annual Report 2015



Edited by Peter Sammonds and Katerina Stavrianaki

www.ucl.ac.uk/rdr/

From the Director



Understanding global risks and reducing disasters presents a major challenge that requires coordinated and collaborative action. Responding to the UCL Grand Challenges, our vision for the UCL Institute for Risk and Disaster Reduction (IRDR) is

for an institute, working across UCL, that leads research, policy engagement, knowledge exchange with industry and humanitarian agencies, and advanced teaching, in the area of risk and disaster reduction.

In the 5 years since our launch as a Provost's initiative, the IRDR has grown to 4 core, 7 academic, 9 research and 12 visiting staff, 23 PhD and 25 masters students, and over 400 hundred members from across UCL and beyond. We work in diverse areas and regions, ranging from water risks in Africa to space weather risks. We have built international collaborations and joined the UNISDR World Conference on Disaster Risk Reduction in Sendai in 2015 to promote the importance of people's rights in disaster risk reduction.

We are building the collaborative networks that the challenge of global disaster risk re-

duction demands. This year we have focussed on the Network for Disaster Reduction and Resilience championed by David Alexander and coordinated by Zehra Zaidi.

We are delighted to welcome to UCL for the third year, over 100 colleagues from the UK, Europe and beyond to an Academic Summit, with an agenda of bridging the gap between academic research and practitioners. While two IRDR PhD students, Serena Tagliacozzo and Gianluca Pescaroli, are initiating a pan-European student network.

For the coming year we aim to strengthen our partnerships with social and commercial enterprise, promoting co-produced knowledge transfer with practitioners and business. Far-naz Arefian is presently leading on this for us. This will include CPD (continuing professional development), consultancy and MOOCs (massive open online courses) and where we can act as a lead for all UCL.

Peter Sammonds
Director

UCL Institute for Risk and Disaster Reduction



Contents

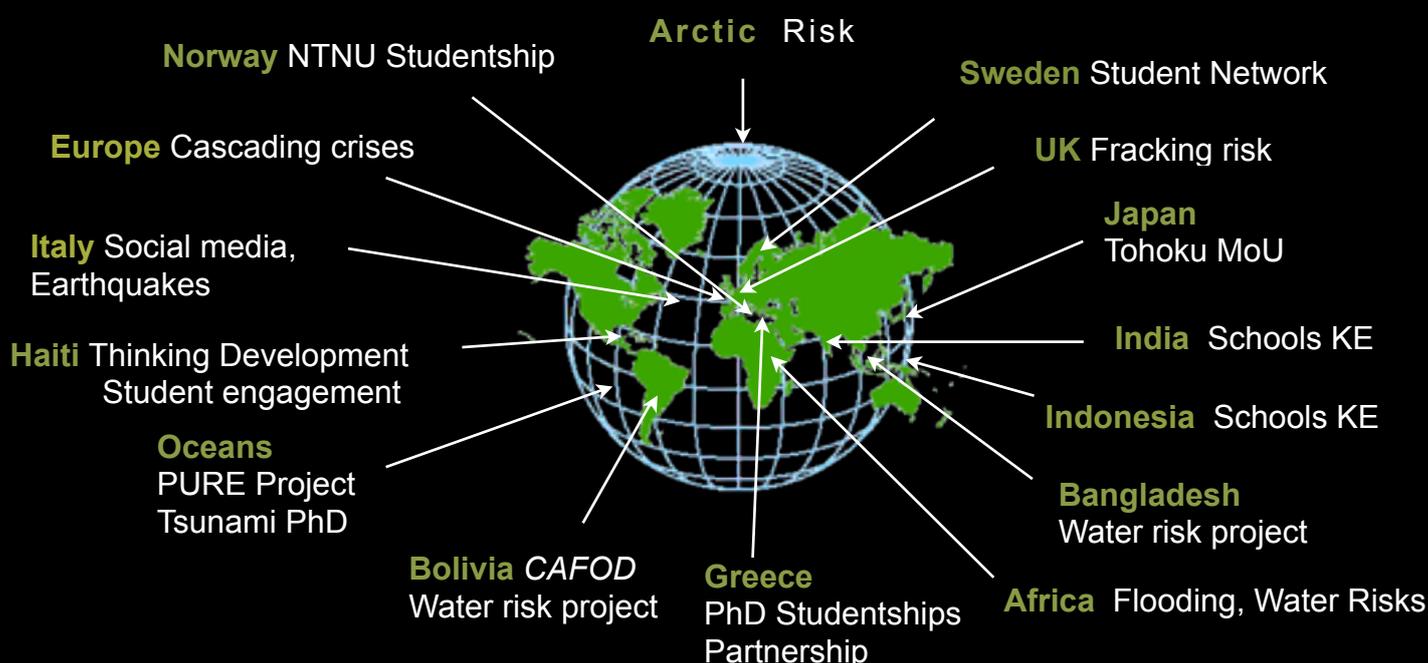
02	From the Director	08	Graduate Teaching
03	IRDR at a Glance in 2015		Doctoral Research Centre
	IRDR - Global Reach	09	Academic and Research Staff
04	Public Engagement	12	PhD Research Students
	Public Events in 2014-15	16	Publications 2014-15
05	Making Impact	18	IRDR People
	Media Engagement		Executive Board
06	Enterprise	19	Calendar 2015-16
	Network for Disaster Reduction and Resilience		If you wish to propose an IRDR event
07	Graduate Teaching		

IRDR at a Glance in 2015

Below we highlight the achievements and developments of the IRDR in 2014-15

- Welcomed the appointment of Carmine Galasso as Lecturer in Catastrophe Risk Engineering, made jointly with the Department of Civil, Environmental and Geomatic Engineering, and strengthening our links with EPICentre and earthquake engineering
- Welcomed the appointment of Robert Wicks as Lecturer in Space Weather Risks, made jointly with the Department of Space and Climate Physics and the UCL Mullard Space Science Laboratory in an exciting new development
- 10 IRDR staff were included in the research excellence 'REF' submissions by the Departments of Earth Sciences, Civil, Environmental and Geomatic Engineering and Statistical Sciences, and we contributed to 2 impact case studies
- Mumtaz Ghafoor was appointed as IRDR Administrator, Farnaz Arefian as Enterprise Manager, Zehra Zaidi as research associate, Steve Kirby as Honorary Professor, David Cope as visiting professor and Björn Erlingsson as honorary researcher
- Congratulated Andria Sarri and Alexis Cartwright-Taylor as the first PhD students to graduate from the IRDR while welcoming Andrew Goldsmith, Omar Velazquez, Justine Uyimleshi and Rhea Leung as new IRDR PhD students and Alexandra Tsioulou, Stelios Minas, Ivy Zhou, Michael Duong and Enrico Mariconte appointed jointly with other departments
- Our Doctoral Research Centre grew to 23 PhD students, funded from diverse sources and co-supervised across UCL
- Held the second IRDR Student Forum for our PhD students, second Spring Academy for all IRDR researchers, staff and students and third IRDR Careers and Opportunities Fair
- Our masters student numbers grew to 25
- 550 participants in IRDR events from UCL and beyond
- Undertook fieldwork in the Himalayas, the Arctic Ocean, Indonesia, Bangladesh, China, Japan, the USA, Italy and Greece
- Published over 60 papers and book chapters in 2014-15 including the most "liked" paper on social media ever published by the American Geological Association
- Joined the UNISDR World Conference on Disaster Risk Reduction in Sendai, Japan, hosting a session on disasters and rights

IRDR - Global Reach



Public Engagement

A key aim of the IRDR is to engage in public debate on issues in risk and disaster reduction, creating a space for academic discourse in the public-policy and political arenas, and raising the profile of UCL. To achieve this, we have organised discussion meetings, lectures, conferences and symposia, open to the UCL community and the general public, which have proved to be highly successful.

The principal theme we have addressed this year is *human rights* following on from last year's focus on Disabilities and Disasters and Women in Disaster Risk Reduction.

Fresh from the terrorist outrages in Paris and Copenhagen, the IRDR convened a panel on *Security, terrorism and human rights- making London resilient* to discuss the draconian legislation passed by Parliament that obliges universities, schools, hospitals etc. to monitor subversives and prevent terrorism, along with a raft of other measures to restrict the freedom of speech. Panel experts included Noemie Bouhana from the UCL Jill Dando Institute of Security and Crime Science and Robert Hall from London First. We had invited a government minister, but none was prepared to defend the legislation publicly at a university. So the question remains unanswered as to how this legislation increases London's resilience.

A strong contingent of seven members of the IRDR participated at the UN World Conference on Disaster Risk Reduction (WCDRR) in Sendai, Japan.



Continuing the theme on rights, we organised a public forum panel discussion on Human Rights and Disaster Risk Reduction at the WCDRR, joined by Richard Olson, Extreme Events Institute, Florida, Virginie Le Masson, ODI, UK, and Arif Rehman, Resilience Coordinator, LEAD Pakistan. The panel explored whether failure to mitigate disaster risk is a consequence of the failure to guarantee basic rights, if disaster situations can sometimes be used as an opportunity to deny rights and whether pre-existing human rights violations leave societies more vulnerable to disasters.

Following on from Sendai, Virginia Murray, IRDR Honorary Professor, represented us at the Global Summit of Research Institutes for Disaster Risk Reduction and the development of a research road map for the next decade.

Public Events in 2014-15

June 2014 IRDR Fourth Annual Conference attended by 140 participants, with a keynote speech by Assistant Director, Civil Contingencies Secretariat, Dr Rob MacFarlane, sessions on Cascading Crises and the Role of Women in Disaster Risk Reduction, and an in conversation interview with Dr Dougal Goodman on managing risk in business by BBC journalist Pallab Ghosh.

June 2014 Second Academic Conference on Disaster Risk Reduction and Resilience, attended by 90 academics and practitioners from the UK, Europe and the USA.

October 2014 Special Seminar on Probabilistic Catastrophe Loss Models by Dr Robert Muir-Wood, RMS.

March 2015 IRDR Careers and Opportunities Fair.

March 2015 IRDR Public Discussion Meeting on Security, terrorism and human rights, making London resilient.

March 2015 UNISDR World Conference on Disaster Risk Reduction, Sendai, Japan, public forum panel discussion on Human Rights and Disaster Risk Reduction.

April 2015 Special Seminar by UCL Honorary Professor Stephen Kirby, on plate tectonics and young serpentinite belts worldwide.

Making Impact

Understanding disaster preparation and disaster response is important to make impact from our research and teaching and is therefore a key part of the mission of the IRDR.



IRDR Arctic Report

The IRDR hosted a meeting on Arctic Risk Scenarios and considered two (hypothetical) case studies: a cruise ship sinking off Svalbard, and a wellhead blowout in the Kara Sea. 22 participants from the UK, France, the Netherlands, Norway, Russia and Canada, covering oil, shipping, humanitarian, environmental sectors and indigenous people participated. A report on the outcomes of the meeting was published as evidence to the House of Lords Arctic Subcommittee in October 2014. Issues highlighted included that cruise

ship traffic is increasing in the Arctic, and search and rescue infrastructure may not keep up, while the people who live in the Arctic would like prosperity without a loss of autonomy, and must have a strong voice in deciding appropriate levels of risk.

IRDR researchers participated in and organised post-earthquake and tsunami field surveys in the Tohoku region of Japan to better understand the needs of people living in temporary accommodation and the support they are given by local and national government. An enormous reconstruction effort is in hand, but many, especially the elderly, remain in temporary housing. Younger Japanese have moved to Sendai and Tokyo. This emphasises the importance of re-building the local economy and not just physical reconstruction. Comparison with the Philippines will form part of an assessment on post-disaster reconstruction.

Residents of temporary housing in Tohoku explain their experiences.



Media Engagement

The IRDR maintains a high-profile media strategy, providing both immediate comment during disasters and features for documentaries and magazines



- Ilan Kelman writes a regular column for 'The Foreigner', an English-language news service in Norway, and was quoted in The Guardian and Le Monde Diplomatique.
- Joanna Faure Walker was interviewed on Hostages and Earthquakes for BBC Radio2, in January 2015 and Nepal Earthquake aftershocks, Sky News, May 12th 2015
- Peter Sammonds was interviewed for the CNN Amanpour interview, commented for Sky News, and was interviewed on the Nepal earthquake aftershocks for ITN News at 10 and Sky News.

Enterprise

The Institute for Risk and Disaster Reduction brings together the wealth of knowledge and expertise across UCL, and through research, teaching, public engagement and knowledge exchange aims to improve the understanding of risk and overcome the barriers to increasing resilience to disasters. The multidisciplinary nature of risk to disasters overlaps with a range of industry sectors including, insurance and finance, the built and natural environment and space. This creates multidimensional opportunities that places the IRDR as a hub for UCL in providing research, consultancy, advice and training, to both commercial and social enterprise. We have partnered business and humanitarian agencies, undertaken consultancy for private and public sectors organisations in the UK and internationally, and participated in training and continuing professional development. We are now taking a more structured approach, and have appointed an Enterprise Manager, Farnaz Arefian (fatemah.arefian.10@ucl.ac.uk) to coordinate:

- Seeking out business needs for fundamental and applied risk analysis research and practice that maps onto the profiles of academics and researchers across UCL, covering mathematics, statistics, natural hazards, population health, environment, catastrophic engineering risks, financial risks and resilience.
- Acting as a broker for delivery of high quality consultancy across UCL to financial institutions, legal firms, brokerages and consultants and manage the development of the consultancy portfolio in collaboration with UCLc.



- Developing a programme of continuing professional development courses particularly for the international audience as part of UCL's commitment to Lifelong Learning.
- Aiming to build long-term commercial and social enterprise partnerships in collaboration with UCL Corporate Partnerships.
- Developing MOOCs (Massive Open Online Courses) in risk and disaster reduction as part of UCL's new commitment to MOOCs.



Network for Disaster Reduction and Resilience

The IRDR is taking the lead in establishing an international **Network for Disaster Reduction and Resilience**. The Network is a direct outcome of Academic Summits hosted by the IRDR in 2013/14, with participants from the UK, Europe and beyond working in disaster risk reduction and emergency management which identified the need for strengthening collaboration between academics and with practitioners. The Network's website will be an online portal for research, teaching, consultancy, and job and internships vacancies: www.ndrr.info.

It will link the business advocacy group to London First's, resilience hub website. PhD students from the IRDR are setting up a student European network in disasters, risk and resilience. They have organised the First IRDR / CNDS Doctoral Workshop on Disaster Research, 23 June 2015, attended by 20 students. The goal is to challenge students' expertise and produce a basis for future applied interdisciplinary research. Contact: serena.tagliacozzo.13@ucl.ac.uk or gianluca.pescaroli.14@ucl.ac.uk

Graduate Teaching

Teaching is a core part of our mission. We have established Risk and Disaster Reduction as a taught discipline and our masters student numbers have grown to 25 over the first 3 years. We launched an MRes (Master of Research) in Risk and Disaster Reduction in 2012; an MSc in Risk, Disaster and Resilience in 2013 and will launch an MSc in Risk and Disaster Science in 2016. There are associated Postgraduate Diploma and Postgraduate Certificates for students who wish to follow only part of these programmes. These fill identified needs from practitioners and trained researchers who wish to gain a sound underpinning in the subject. In 2014-5 we have enriched the masters programmes to include two UK field trips and a scenario event exercise taught by Rescue Global (practitioners in disaster response).



Students from MSc and MSci programmes across UCL attend our modules (notably Earth Sciences and Engineering). IRDR staff also teach extensively on the MSc Geophysical Hazards, MSc Earthquake Engineering and other programmes.

MSc Risk, Disaster and Resilience

Director: Dr Joanna Faure Walker

The MSc is a one-year full-time (or two-year part-time) taught masters programme in which students explore the characterisation, quantification, management and reduction of risk and disasters, and their associated impacts from a diverse range of perspectives. The IRDR teach four core modules:

Natural and Anthropogenic Hazards and Vulnerability



Integrating Science into Risk and Disaster Reduction

Emergency and Crisis Planning

Emergency and Crisis Management

We also provide two skills modules:

Risk and Disaster Reduction Research Tools

Research Proposal Appraisal.

Optional modules include Social Vulnerability and Disaster Risk Management; Anthropology of Risk; Post Disaster Recovery Policies and Practices; Climate Change Adaptation and Disaster Risk Reduction in Cities; Risk and Contingency Planning in Security and Crime Science; Terrorism, Conflict, Humanitarianism and Health.

Dissertation - All students undertake an independent research project, which cumulates in a research report and presentation.



MSc Risk and Disaster Science
(available from 2016)

Director: Prof Peter Sammonds

The MSc is a one-year full-time (or two-year part-time) taught masters programme. It is a complementary programme to the MSc Risk, Disaster and Resilience but with a stronger

Graduate Teaching

emphasis on the physical science of natural hazards and the opportunity to study in depth the statistics of risk and disasters.

Additional IRDR modules available:

Earthquake Hazard and Risk

Climate Risks to Hydro-ecological Systems

The Variable Sun: Space Weather Risks

Decision and Risk Statistics

In addition to modules listed under the MSc Risk, Disaster and Resilience, the following modules from other departments are available: Seismic Risk Assessment; Natural and Environmental Disasters; Statistical Computing; and Risk, Reliability, Resilience.

MRes Risk and Disaster Reduction

Director: Prof David Alexander

The Master of Research is a research intensive programme to meet the need for experts



trained to analyze and provide solutions to complex issues relating to risk and disasters. The programme consists of five core taught modules, three of the four IRDR core courses listed for the MSc Risk, Disaster and Resilience and the two skills modules, and a substantial independent research project.

Careers and Opportunities Fair

We held our third IRDR Careers and Opportunities Fair, targeted at risk and disaster reduction, and attended by over 100 students and graduates and a dozen specialist exhibitors/recruiters that included organisations from the NGO, local government, insurance, catastrophe modelling, financial risk and education sectors. Recruiters and delegates remarked how effective and focussed the event is and students attending these fairs have found work directly from them.



Please note the programme contents may change from time to time and students should consult the IRDR website for the latest information.

Doctoral Research Centre

UCL graduate students are regarded by the IRDR as our greatest asset. With PhD students numbers building rapidly, we are establishing an IRDR Doctoral Research Centre, which is cross-disciplinary, international in perspective and making real societal impact. With cross-disciplinary supervisory panels, an educational programme in DRR and participation in IRDR Student Forum, Spring Academy and Annual Conference, we aim to foster a new type of graduate student, comfortable working in a multi-disciplinary, international environment.

The Theobalds House, for the second IRDR Spring Academy in 2015.



Professor David Alexander is involved in a research and applications initiative with the Council of Europe (CoE) concerning assistance to people with disabilities in disasters. The work has produced a review, guidelines, a toolkit and a CoE official declaration to member states. He will be taking this research forward to a phase of collecting and evaluating evidence in order to improve emergency assistance to people with disabilities. In another project he has collaborated with the Universidad Autónoma Nacional del México (UNAM) on issues of measuring the performance of local and regional civil protection systems. David was also a member of the UCL-IRDR return mission to the area of Japan affected by the tsunami of 11 March 2011, in which the perceptions and opinions of inhabitants of temporary post-disaster accommodation were surveyed. Finally, he continues with his research on culture and disasters.

Dr Joanna Faure Walker's research focus is the mechanics of continental extension and how this relates to seismic hazard, specifically the importance of fault geometry and rates of motion in understanding fault interactions, fault growth and the dynamic forces controlling these. Understanding how faults interact and grow and what the governing forces are causing the deformation are crucial questions in understanding the timing, location and magnitudes of earthquakes. The Italian Apennines is a region of active extension where the deformation is distributed over a number of normal faults. To date, Faure Walker's main publications have been focused on calculating strain-rates in the Italian Apennines using field measurements of slip-vectors from striated faults and offsets of Late Pleistocene-Holocene landforms and sediments. Faure Walker has shown the importance of 3D fault geometry in controlling local deformation rates. By comparing her results with strain-rates calculated using geodesy and historical seismicity, uplift rates, and topography, she has provided new insights into regional mechanisms of continental extension, fault growth, seismic hazard, the seismic cycle, and how the spatial pattern of earthquake recurrence is controlled by fault evolution and sub-crustal processes.

Dr Ilan Kelman's research programme is combining disaster research and health research, including the integration of climate change challenges and opportunities into both topics. Two main areas of case studies are priorities: Small Island Developing States, and the poles, so the Arctic and the Antarctic. Much of the work relates to the Many Strong Voices programme <http://www.manystrongvoices.org> working with Arctic and island communities to address climate change in the context of wider development and sustainability challenges. Specific research questions relate to three main areas. First, disaster diplomacy and health diplomacy. Second, the intersection between health status and disaster risk reduction initiatives plus disaster survival. Third, how climate change will impact physical, mental, and environmental health. Most work learns from people's perspectives, people with disabilities, and decision-makers considering disaster aid to or from an enemy state.

Dr Robert Wicks is a Lecturer in Space Weather and Risk, appointed 50:50 to UCL IRDR and UCL Department of Space and Climate Physics in March 2015. His work focuses on dynamic processes in outer space that impact the Earth. The Sun is the source of the solar wind, a supersonic flow of plasma that buffets the Earth. The changing pressure and magnetic fields in the solar wind cause space weather, which includes increased radiation dose for satellites, astronauts and airline passengers, the brightening and enlarging of the aurora, surges in electrical current in the power grid, and interruption to radio communications and GPS signals. Dr Wicks' research focuses on understanding the fundamental plasma physics of how space plasmas are heated, accelerated, and interact when pushed together, helps to understand and predict the impacts of changing solar output on the Earth. In the two months since Dr Wicks joined IRDR he has studied the heating of the solar wind and the complexity of the turbulence in its magnetic field. He has also started working on the QB50 mission, an EU funded project at UCL to launch 50 CubeSats into low Earth orbit in 2016.

Dr Gordon Ross is a lecturer in Statistics and Risk Analysis, appointed 50:50 between UCL IRDR and the Department of Statistical Science. He is interested in the statistical modelling of risk in both physical and social environments, particularly with regards to how risk exposure may change over time. His work is cross-disciplinary and analyses risk in a variety of areas, such as seismic hazards, financial markets, and cybercrime. The typical goal is to build models that can quantify the current level of risk based on recent events, which requires the use of statistical algorithms to determine how far back in the past one must look before previous events start becoming irrelevant to understanding current risk levels. Examples include estimating the current probability of large earthquakes occurring given recent seismic activity, learning the probability of financial institutions suffering large losses based on the current stock market volatility, and constructing models to measure the current rates of crime occurring against computer networks.

Dr Carmine Galasso is a Lecturer in Catastrophe Risk Engineering with a joint appointment in UCL's Department of Civil, Environmental & Geomatic Engineering (CEGE) and UCL's Institute for Risk & Disaster Reduction (IRDR) since July 2014. He is also member of the EPICentre research group and Degree Programme Director for the MSc in Earthquake Engineering with Disaster Management. His research focuses on the development and use of probabilistic and statistical tools for modelling and managing risk caused by extreme loads on the built environment, with emphasis on developing new tools for hazard-consistent seismic input assessment, engineering applications of earthquake early warning systems, structural reliability and flood risk assessment. He is currently collaborating with regional, national, and international research entities and stakeholders to promote catastrophe risk engineering. He has authored over 60 journal and conference papers and he is an Editor and referee to international journals/books series/conferences proceedings, and he is involved with international research programs.

Megan French Rural agricultural-mining communities in the Lake Poopó Basin were assessed as highly vulnerable to water scarcity and contamination (natural and mining) of water resources; >70% of assessed surface and groundwater sites are of unsuitable chemical quality for potable use or irrigation without treatment. Most communities only have sufficient water to meet basic requirements, and human and animal health may be at risk from insufficient water and/or poor water quality. Levels of natural and mine contamination in many waters in the region are so severe that effective remediation would be very challenging and expensive unless substantial investment is made to solve the problem. Although waters of fair to good chemical quality exist, they may still require treatment depending on use, in particular for elements of health significance, and access issues remain problematic for many communities due both to lack of water supply infrastructure and insufficient water availability, particularly in the dry season. Findings demonstrate a need for further studies to source more good quality waters and investigate contaminate migration and uptake, in addition to emphasizing the need for various stakeholders to deliver on their responsibilities to the environment and for providing potable and irrigation water.

The Bolivian water project is a collaborative project between UCL, CENDA, CEEDI, Birkbeck and CAFOD, undertaken between 2012 – 2015 in the Poopó and Antequera-Urmiri sub-basins and Pazña floodplain area of the Lake Poopó Basin on the eastern margin of the Bolivian Altiplano. Two comprehensive pieces of research have formed the basis of this project; investigation and assessment of i) chemical water status and ii) community vulnerability to water availability and quality issues. The project has aimed to contribute to improving management strategies for the regions highly stressed water resources by improving understanding of both the current human vulnerability and the water access and quality situation. Findings act as a basis for advice given to Bolivia's Vice Ministry of Irrigation and Water Resources, and contribute to regional and local decision-making as well as submission for journal publication.

Dr Mohammad Shamsudduha ("Shams") research is primarily focused in three areas: (1) the impact of anthropogenic stresses and climate change on freshwater resources with a specific focus on groundwater storage in Asian Mega-Deltas, (2) the critical role of groundwater-fed water supply to reduce risks to public health and food security through irrigated agriculture, and (3) the risk of chronic exposure to chemical contaminants in shallow groundwater (e.g. reducing human exposure to naturally-occurring groundwater arsenic contamination in Bangladesh. Shams and his colleagues at the Bangladesh Water Development Board are currently installing two deep (~250 meters) water-supply points to provide "fresh" drinking water to several local communities living in a remote coastal island of southern Bangladesh. Shams and his colleague at UCL Earth Sciences have recently been awarded a catalyst grant (£10k) to work on food, water, policy and people in northwestern Bangladesh. Recently, Shams has started a new role as the Project Manager of a UCL-led consortium grant project called GroFutures (Groundwater Futures in Sub-Saharan Africa).

Dr Simon Day During and after the 2014-15 eruption of Fogo, Cape Verde Islands, Simon has been involved in the development of a multi-disciplinary understanding of the eruption combining petrological and volcanological studies with remote sensing and geophysical data. Simon collaborated with many researchers to apply results from his previous fieldwork in Cape Verde to the interpretation of data collected during the eruption. During the first five weeks of the eruption, a primary concern was whether lava flows would escape from Cha das Caldeiras and enter densely populated coastal regions of Fogo. Simon combined models of lava flow growth with estimates of magma effusion rates determined by F. Ferrucci and B. Hirn (Open University), to predict that this would not occur. This proved to be correct despite unusual fluctuations in the effusion rates during the eruption. Since the eruption, Simon carried out fieldwork on Fogo to collect lava and tephra samples from all phases of the 2014-15 eruption.

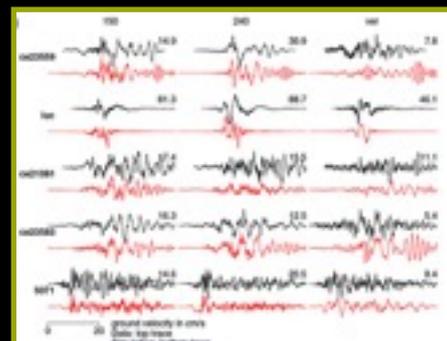
Dr Ben Lishman All modelled predictions of sea ice behaviour rely on an understanding of the physics of sea ice. Although the thermodynamics of ice are important – how quickly will it melt? – the mechanics and kinematics are perhaps more important, since we need to know where the ice will be, and how thick or strong it will be, before we can begin thermodynamics calculations. Ben works on questions related to the mechanics and kinematics of ice. In September, Ben visited Aalto University in Finland on a European Union small grant, to collaborate with Arttu Polojarvi on modelling how friction models affect the behaviour of ice fields, Elsewhere, Ben has investigated the thermal expansion in ice, focussed particularly on whether sea ice behaves like fresh ice, or whether the presence of salt is a complicating factor. He has continued to supervise work on ice friction for winter sports, on the friction of ice on aluminium, on acoustic wave velocities in ice, and on the mechanical properties of ice rubble. He has also continued work with colleagues at Bristol University on the design of sensors for subglacial environments: how do we measure the water conditions underneath the planet's ice sheets? This work recently attracted the attention of the UK Rivers Agency, who would like to use similar technologies to measure water conditions in UK rivers.

Dr Zehra Zaidi is a research associate in the IRDR. Her interests are in the role of institutions and social behaviour in mediating vulnerability and resilience to disasters in the context of climate change. Her work focuses on risk governance, and the development of risk management strategies and adaptive capacity to improve resilience to climate related hazards at both the institutional and community level. At UCL she is engaged in FORTRESS, an EU FP-7 funded project that examines the cascading impacts of crisis situations. She is also engaged in consultancy work with international development organisations and other not-for-profit institutions working in disaster risk management.

Alexandra Tsioulou: “*Simulated ground motions for risk engineering*” (Start: Sept 2014)

Funding: UCL CEGE

Synthetic ground motion signals (“GMs”) represent an attractive option for loss estimation purposes in the absence of suitable natural records. The general concern is that synthetic GMs may not be equivalent to real records in estimating the induced structural damage. The aim of the research is to develop testing/rating methodologies for synthetic GMs to be used in engineering applications.



Alexis Cartwright-Taylor: “*A non-extensive statistical physics approach in rock fracture and earthquake geophysics*” (Start: Aug 2010) Graduated in 2015.

Funding: UCL Impact Studentship with TEI, Crete

A laboratory-based investigation of electrical signals that accompany rock deformation. Alexis is examining the relationships between microscopic fracture in the laboratory and crustal seismicity and electrical current patterns, aiming ultimately to improve assessing seismic risk.



Amy Chadderton; “*High temperature pressurisation, fracturing & permeability in volcanic systems*” (Start: April 2013)

Funding: IRDR / Earth Sciences

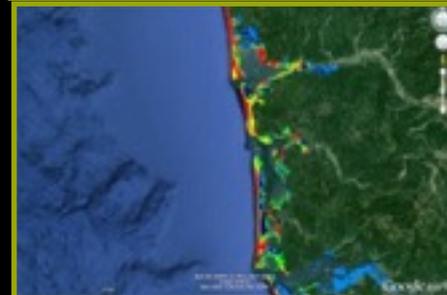
The permeability of magma exerts a major influence on volcanic processes and can control the extent to which eruptions are effusive/explosive. The permeability of lava dome material is therefore being investigated experimentally at magmatic temperatures/pressures to aid our understanding of volcanic degassing.



Andria Sarri: “*Investigation of tsunami wave propagation and inundation induced by earthquake or landslide using statistical emulation*” (Start: Oct 2010) Graduated in 2015.

Funding: IRDR / Statistical Science

Numerical modelling of tsunami comes at the expense of high computational resources. To overcome this, Andria’s research uses a statistical emulator which approximates the mathematical model with high accuracy.



Andrew Goldsmith: “*Risks to Arctic offshore operations: Consolidation and strength of thick sea ice features*” (Start: Feb 2015)

Funding: UCL Impact with SAMCOT

There has been a growing desire in recent years to access the Arctic through increased shipping activity and natural resource extraction, with this come risks. This PhD analyses these risks through modelling freeze bond development and strength



Bayes Ahmed: “*Understanding the Issues Involved in socio-economic and socio-cultural vulnerability among the people living with landslide risks in the Hilly Districts of Chittagong Division, Bangladesh*” (Start: Oct 2013)

Funding: Commonwealth Scholarship

The aim of this research is to understand how the urbanised floating and indigenous tribal people deal with landslide hazards in the south-eastern hilly districts of Bangladesh.



Danielle Charlton: “*The impact of volcanic activity to major urban centres*” (Start: April 2014)

Funding: UCL Impact PhD studentship

How can scientists help manage hazard and risk at one of the most dangerous volcanoes in Europe, Campi Flegrei? This project investigates what more scientists can do to help reduce the impact of volcanic activity to major urban populations.

Gianluca Pescaroli: “*Vulnerability of critical infrastructure in cascading disasters - contingency planning for a major disruption of air transportation in London*” (Start: Apr 2014)

Funding: EC FP7 FORTRESS

This project addresses the vulnerability path of cascading disasters in global networked systems. It analyses the possible effects of a disruption of air transportation and creates the information needed to manage the needs of stranded passengers in Greater London area.

Gillian Dacey: “*Self-protective behaviour during earthquake shaking: A comparative study of the effect of awareness programmes on human behaviour*” (Start: Nov 2013)

Funding: Self-funded (part-time)

This research seeks to determine whether earthquake self-protective behaviour is effective in improving survivability from damaging earthquakes, by conducting a comparative study with earthquakes from New Zealand and Japan.

Giorgos Michas: “*Generalized statistical mechanics description of fault and earthquake populations in Corinth Rift (Greece)*” (Start: Mar 2011)

Funding: Greek State Scholarship Foundation (IKY)

The PhD research project seeks to investigate the physics of fracturing processes and earthquakes in one of the most seismically active areas in Europe, the Corinth Rift (Greece) and contribute to the earthquake hazard assessment in the

Giorgos Papadakis: “*A non-extensive statistical physics analysis of seismic sequences: Application to the geodynamic system of the Hellenic subduction zone*” (Start: Mar 2011)

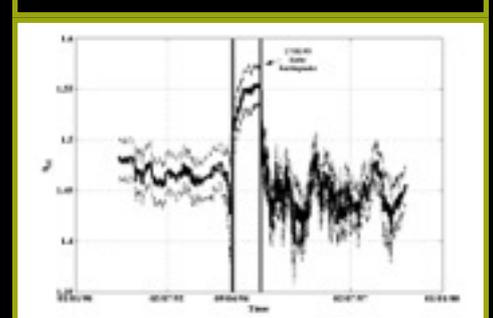
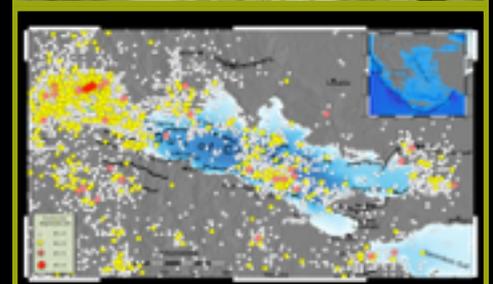
Funding: Greek State Scholarship Foundation (IKY)

George is studying the spatiotemporal distribution of seismicity and the earthquake frequency-magnitude distribution using the concept of Non-Extensive Statistical Physics (NESP). NESP is a generalization of Boltzmann-Gibbs statistical physics.

Jabraan Ahmed: “*Towards sustainable and risk free gas production from an unconventional source*” (Start: Sept 2012)

Funding: UCL Impact Studentship with the Institute for Sustainable Resources (UCL ISR)

This project addresses the shale gas production issue from a classical sedimentology perspective by examining a transect through the Bowland Basin which contains organic rich shales.



IRDR PhD Students

Justine Uyimleshi: “Strategies for emergency preparedness and response to man-made Disasters in Nigeria” (Start: April 2015)

Funding: Petroleum Technology development Fund, Nigeria
Examination of the major disasters incidence in Nigeria to evaluate the consequence and investigate the management practices adopted by the Nigeria Government and develop strategic frame work and preparedness plan for response to disaster risks.

Katerina Stavrianaki: “Complexity of seismicity in a statistical physics view: fracture to earth's scale” (Start: Sept 2013)

Funding: THALES Program of the Ministry of Education of Greece and the European Union and UCL IRDR

Understanding of earthquake physics, from rock fracture to earthquake fault scale, will enhance the quality of life of both European citizens and vulnerable populations worldwide. This research will develop new innovative techniques based on modern statistical methods and laboratory experiments.

Luke Wedmore: “Earthquake geology and seismic hazard in the central Apennines, Italy” (Start: Feb 2013)

Funding: UCL Impact Studentship with CASE support from Geospatial Research Limited

Luke uses physical models, driven by field observations of earthquake geology, to understand the behaviour of earthquake faults over a range of time periods. In particular, he has focused on understanding and modelling elastic interactions between active faults.

Melodie Vanderpuye: “Investigating spatio-temporal randomness of large earthquakes” (Start: Mar 2013)

Funding: Aon Benfield (part-time)

This project uses proxies such as sub-marine deposits as a method to extend earthquake records at subduction zones. The eventual aim will be to suggest alternative distributions to those currently used that better reflect the behaviour of these extreme events.

Nurmalahayati Nurdin: “Integrating the disaster risk reduction into senior high school chemistry curriculum In Indonesia” (Start: Jan 2014)

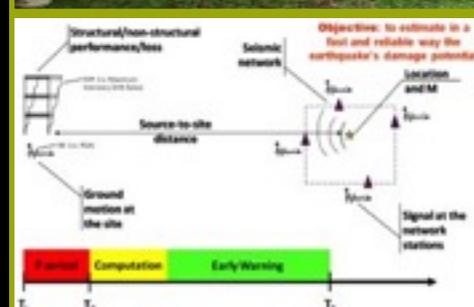
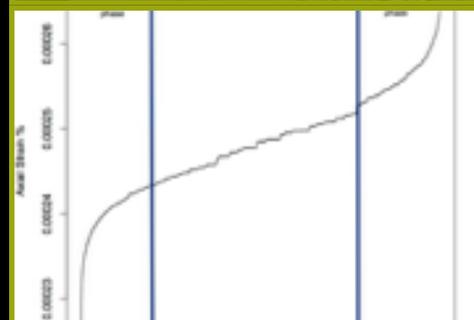
Funding: Indonesian Government, MORA.

This research aims to develop the effective teaching method for integrating disaster risk reduction concepts into the chemistry curriculum of Senior Secondary High Schools in Banda Aceh, Indonesia, by addressing climate change impacts on the ocean system and on water quality.

Omar Ortiz: “Engineering Earthquake Early Warning Systems” (Start: April 2015)

Funding: CONACYT (Mexico) & IRDR

This project investigates and addresses the issues faced in the design of engineering applications of EEW, particularly structural control, i.e., using the early information on ground shaking to better prepare structures to respond to the earthquake.



Rebecca Yore: *“The role of immediate disaster response in the transitional phase to recovery”* (Start: July 2015)

Funding: UCL Impact studentship with Rescue Global

This project will focus on how aid during the initial aftermath and transitional period affects the continuing vulnerability to disaster and the ability to recover and gain resilience of individuals, households and communities.

Rhea Leung Ching-yee: *“Mitigation and disaster preparedness measures enacted in remote mountainous areas affected by earthquake-triggered geohazards”* (Start: Oct 2014)

Funding: Self-funded

The 2008 Wenchuan earthquake has triggered numerous geohazard risks in Sichuan Province, China. The main objective of this research is to investigate the post-earthquake geohazard risk and to evaluate the effectiveness of subsequent mitigation and disaster preparedness measures.

Sally Scourfield: *“Consolidation and deformation of brash ice”* (Start: April 2014)

Funding: UCL Impact studentship with TOTAL

This project investigates the physical properties of brash ice (ice rubble generated when a ship passes through a region of sea ice cover), in particular the effect it has on ice-ice friction, through lab and field experiments and modelling.

Serena Tagliacozzo: *“Investigating requirements for a web 2.0 platform to support communication between authorities and citizens in disaster recovery”* (Start: Sept 2013)

Funding: UCL MAPS Scholarship

This research is focusing on the use of social media to support the communication between citizens and authorities in the reconstruction phase following natural and anthropogenic disasters.

Stelios Minas: *“Advancing vulnerability assessment Implementation of mid- and high-rise RC buildings”* (Start: Sept 2013)

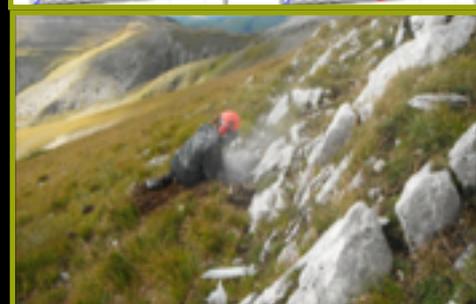
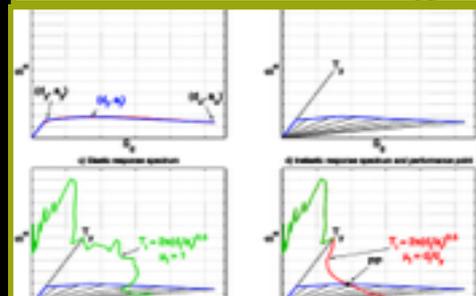
Funding: EPSRC with AIR Worldwide

Stelios's research is on the seismic vulnerability of mid- to high-rise RC buildings. The main aim is to develop a generic framework for the derivation of analytical fragility functions using simplified analysis methods.

Zoë Watson: *“The link between earthquake recurrence and structural geology in the Apennines of Italy”* (Start: Oct 2013)

Funding: Natural Environment Research Council

This research is focusing on the structural geology of the active fault scarps seen throughout the Apennines and whether this has any implication for the recurrence interval between earthquakes occurring on the same fault. This research aims to aid understanding the seismic hazard of the region.



Ahmed, B. (2014). Landslide Susceptibility Mapping Using Multi-Criteria Evaluation Techniques in Chittagong Metropolitan Area, Bangladesh. *Landslides*. Published Online, (In Press). doi: 10.1007/s10346-014-0521-x

Ahmed, B., Hasan, R., & Maniruzzaman, K. M. (2014). Urban Morphological Change Analysis of Dhaka City, Bangladesh, Using Space Syntax. *ISPRS International Journal of Geo-Information*, 3(4), 1412-1444.

Alexander, D.E. (2015). Evaluation of civil protection programmes, with a case study from Mexico. *Disaster Prevention and Management*, 24 (2), 263-283. doi:10.1108/DPM-12-2014-0268

Alexander, D.E. (2014). Communicating earthquake risk to the public: the trial of the "L'Aquila Seven". *Natural Hazards*, 1-15. doi: 10.1007/s11069-014-1062-2

Alexander, D.E. (2014). Disability and disaster: an overview.. In Kelman, I., Srough, L. (Eds.), *Disability and Disaster*. Sterling, Virginia: Kumarian Press.

Bagshaw, E. A., Lishman, B., Wadham, J. L., Bowden, J. A., Burrow, S. G., Clare, L. R., & Chandler, D. (2014). Novel wireless sensors for in situ measurement of sub-ice hydrologic systems. *Annals of Glaciology*, 55(65), 41-50.

Cartwright-Taylor, A., Vallianatos, F., & Sammonds, P. (2014). Superstatistical view of stress-induced electric current fluctuations in rocks. *Physica A: Statistical Mechanics and its Applications*, 414, 368-377.

Duží, B., Vikhrov, D., Stojanov, R., Jakubínský, J., Kelman, I., (2015), Household flood risk reduction in the Czech Republic, *Mit. Adapt. Strat. Global Change*, 20(4), 499-504.

Gehl, P., Douglas, J., Rossetto, T., Macabuag, J., Nassirpour, A., Minas, S., & Duffour, P. (2014). Investigating the Use of

Record-to-Record Variability in *Static Capacity Approaches. Vulnerability, Uncertainty, and Risk: Quantification, Mitigation, and Management*, 1675-1684. American Society of Civil Engineers.

doi:10.1061/9780784413609.168

Galasso, C., Stillmaker, K., Eltit, C., & Kanvinde, A. (2015). Probabilistic demand and fragility assessment of welded column splices in steel moment frames. *Earthquake Engineering & Structural Dynamics*.

Galasso, C., Maddaloni, G., Cosenza, E. (2014). Uncertainly Analysis of Flexural Overstrength for Capacity Design of RC Beams. *Journal of Structural Engineering*, 140 (7), 04014037. doi:10.1061/(ASCE)ST.1943-541X.0001024

Gaunt, H. E., Sammonds, P. R., Meredith, P. G., Smith, R., & Pallister, J. S. (2014). Pathways for degassing during the lava dome eruption of Mount St. Helens 2004–2008. *Geology*, 42(11), 947-950.

Goldstein, M. L., Wicks, R. T., Perri, S., & Sahraoui, F. (2015). Kinetic scale turbulence and dissipation in the solar wind: key observational results and future outlook. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 373(2041), 20140147.

Kelman, I., Gaillard, J.C., Mercer, J. (2015), Climate Change's Role in Disaster Risk Reduction's Future: Beyond Vulnerability and Resilience. *Int. J. Dis. Risk Sci.*, 6(1): 21-27.

Kelman, I., Lewis, J., Gaillard, J. C., Mercer, J., (2015) Island contributions to disaster research, *Global Environment*, 8, 16-37.

Kulesa, B., Jansen, D., Luckman, A. J., King, E. C., & Sammonds, P. (2014). Marine ice regulates the future stability of a large Antarctic ice shelf. *Nature communications*, 5.

Publications 2014 - 15 (Selected Journals and Books)

Michas, G., Sammonds, P., & Vallianatos, F. (2014). Dynamic Multifractality in Earthquake Time Series: Insights from the Corinth Rift, Greece. *Pure and Applied Geophysics*, 1-13.

Papa, F., Frappart, F., Malbeteau, Y., Shamsudduha, M., Vuruputur, V., Sekhar, M., ... & Calmant, S. (2015). Satellite-derived surface and sub-surface water storage in the Ganges–Brahmaputra River Basin. *Journal of Hydrology: Regional Studies*.

Papadakis, G., Vallianatos, F., & Sammonds, P. (2014) A Nonextensive Statistical Physics Analysis of the 1995 Kobe, Japan Earthquake. *Pure and Applied Geophysics*, 1-9.

Pescaroli, G., Alexander, D.E., (2015), A definition of cascading disasters and cascading effects: Going beyond the “toppling dominos” metaphor, *Planet@Risk*, Global Forum Davos, 3(1) 58-67.

Pescaroli, G., & Magni, M. (2015). Flood warnings in coastal areas: how do experience and information influence responses to alert services?. *Natural Hazards and Earth System Science*, 15(4), 703-714.

Ramos, O. E. R., Rötting, T. S., French, M., Sracek, O., Bundschuh, J., Quintanilla, J., & Bhattacharya, P. (2014). Geochemical processes controlling mobilization of arsenic and trace elements in shallow aquifers and surface waters in the Antequera and Poopó mining regions, Bolivian Altiplano. *Journal of Hydrology*, 518, 421-433.

Ross GJ (2015) - Time Dynamics of Heavy-Tailed Risk in Financial Markets (preprint)

Ross, GJ and Jones, T. (2015) Understanding Heavy Tailed Dynamics in Human Behavior, *Physical Review E* (in press)

Ross, G. J. (2014). Sequential Change Detection in the Presence of Unknown Parameters. *Statistics and Computing*, 24(6), 1017-1030.

Rossetto, T., Gehl, P., Minas, S., Nassirpour, A., Macabuag, J., Duffour, P., & Douglas, J. (2014). Sensitivity Analysis of Different Capacity Spectrum Approaches to Assumptions in the *Modeling, Capacity and Demand Representations. Vulnerability, Uncertainty, and Risk: Quantification, Mitigation, and Management*, 1665-1674. American Society of Civil Engineers.
doi:10.1061/9780784413609.167

Shamsudduha, M., Taylor, R. G., & Chandler, R. E. (2015). A generalized regression model of arsenic variations in the shallow groundwater of Bangladesh. *Water Resources Research*.

Tagliacozzo, S., & Arcidiacono, C. (2015). Do ICTs Help To Maintain Social Capital In The Disaster Recovery Phase? A Case Study Of The L'Aquila Earthquake. *Journal of Community Informatics*, 11(1).

Vallianatos, F., Michas, G., & Papadakis, G. (2014). Non-extensive and natural time analysis of seismicity before the Mw6. 4, October 12, 2013 earthquake in the South West segment of the Hellenic Arc. *Physica A: Statistical Mechanics and its Applications*, 414, 163-173.

Weck, P. J., Schaffner, D. A., Brown, M. R., & Wicks R. T., (2015) Permutation entropy and statistical complexity analysis of turbulence in laboratory plasmas and the solar wind, *Phys. Rev. E* 91, 023101, doi:10.1103/PhysRevE.91.023101

Wilkinson, M., Roberts, G.P., McCaffrey, Cowie, P.A., Faure Walker, J.P., Papanikolaou, I., Phillips, R. J., Michetti, A.M., Vittori, E., Gregory, L., Wedmore, L. and Watson, Z. (2015). Slip distributions on active normal faults measured from LiDAR and field mapping of geomorphic offsets: an example from L'Aquila, Italy, and implications for modelling seismic moment release. *Geomorphology* 237, 130-141.

IRDR People

IRDR Director

Peter Sammonds
Professor of Geophysics

IRDR Deputy Director

Dr Rosanna Smith

IRDR Administrator

Mumtaz Ghafoor

Professor, Risk & Disaster Reduction

David Alexander

Reader, Risk, Resilience & Global Health

Dr Ilan Kelman

Lecturers in Risk & Disaster Reduction

Dr Carmine Galasso

Dr Gordon Ross

Dr Joanna Faure Walker

Dr Robert Wicks

IRDR Research Fellows

Dr Ben Lishman

Dr Mohammad Shamsudduha

Senior Research Associates

Dr Simon Day (NERC)

Dr Stephen Edwards (ABUHC)

Research Associates

Dr Joachim Beck (NERC)

Dr Megan French (CAFOD)

Dr Rosa Sobradelo (ABUHC)

Dr Zehra Zaidi (EC FORTRESS)

Honorary Professors

Virginia Murray, Public Health England

Stephen Kirby, USGS

Visting Professors

Frank Furedi, University of Kent

Dougal Goodman, Found. Sci & Tech.

Knut Hoyland, NTNU, Trondheim

Robert Muir-Wood, RMS

Filippos Vallianatos, Tech Ed Inst Crete

Gordon Woo, RMS

PhD Research Students

Bayes Ahmed

Jabraan Ahmed

Amy Chadderton

Danielle Charlton (ABUHC)

Gillian Dacey

Andrew Goldsmith

Rhea Leung Ching-ye

Giorgos Michas

Stelios Minas

Nurmala Nurdin

Omar Ortiz

Giorgos Papadakis

Gianluca Pescaroli

Sally Scourfield

Katerina Stavrianaki

Serena Tagliacozzo

Alexandra Tsioulou

Justine Uyimleshi

Melodie Vanderpuye

Zoe Watson

Luke Wedmore

Rebecca Yore

IRDR Executive Board

Peter Sammonds

Rosanna Smith

David Alexander,

Richard Chandler

Dina D'Ayala

Graham Hart

Julian Hunt, FRS

Cassidy Johnson

Georgina Mace, FRS

Ian Scott

Alan Smith

Richard Taylor

Helena Titheridge

Claire Fox

Dougal Goodman

Linda O'Halloran

Director, IRDR

Deputy Director, IRDR

Professor of Risk and Disaster Reduction, IRDR

Professor of Statistics, Statistical Science

Professor and Head of Structures, Co-Director, EPICentre, CEGE

Dean, Faculty of Population Health Sciences

Professor of Climate Modelling, Earth Sciences

Lecturer, Development Planning Unit, Bartlett School

Professor, Biodiversity & Ecosystems, Genetics Evolution & Environment

Director, UCL Grand Challenges

Director, Mullard Space Science Laboratory

Professor of Hydrogeology, Geography

Director, Centre for Urban Sustainability & Resilience, CEGE

Director, Institute of Ideas

Director, Foundation for Science and Technology

Director, Thinking Development

Calendar 2015-16

12th October 2015

Book launch: Recovery from Disaster

Convenor: Prof. D. Alexander and Ian David
david.alexander@ucl.ac.uk

22nd October 2015

Disaster Science Workshop held jointly with Tohoku and Cambridge Universities at the Japanese Embassy

Convenor: Dr Rosanna Smith
rosanna.smith@ucl.ac.uk

24th November 2015

Alumni Roundtable Dinner

For our alumni, visiting staff and members. Roundtable discussion and awards
Convenor: IRDR Administrator
irdr-enquiries@ucl.ac.uk

20th January 2016

IRDR PhD Student Forum

Convenor: Dr Ilan Kelman
i.kelman@ucl.ac.uk

1st March 2016 (Provisional)

IRDR Careers & Opportunities Fair

To register as exhibitor / delegate, email:
irdr-enquiries@ucl.ac.uk

3 March 2016

IRDR Public Meeting on Disasters and Heritage

Convenor: Prof. Peter Sammonds
p.sammonds@ucl.ac.uk

25-26th April 2016

IRDR Spring Academy

For IRDR academic and research staff and research students.

Convenor: Dr Ilan Kelman
i.kelman@ucl.ac.uk

15th June 2016 (Provisional)

IRDR Sixth Annual Conference (UCL)

A day of thought-provoking lectures and discussions, open to the UCL community and the general public.

Convenor: Dr Rosanna Smith
rosanna.smith@ucl.ac.uk

16th June 2016 (Provisional)

IRDR Fourth Academic Summit (UCL)

For academic and practitioners in disaster risk reduction and resilience

Convenor: Prof. D. Alexander
david.alexander@ucl.ac.uk

Monthly IRDR Invited Seminar Series

Convenor: Dr Gordon Ross
gordon.ross@ucl.ac.uk

IRDR Discussion Forum Series

Informal - fortnightly

Convenor: Dr Mohammad Shamsudduha
m.shamsudduha@ucl.ac.uk



If you wish to produce an IRDR event

The IRDR supports the following events:

IRDR Forums which aim to bring together 16-20 people from the UCL community, informally, with potential partners and funders, to foster cross-disciplinary collaboration. The format is three lead presentations, then brief talks by researchers and open discussion, followed by a drinks reception.

Evening Discussion Meetings which are open to the UCL community, general public and media, are organised around a topical theme which promises a lively debate.

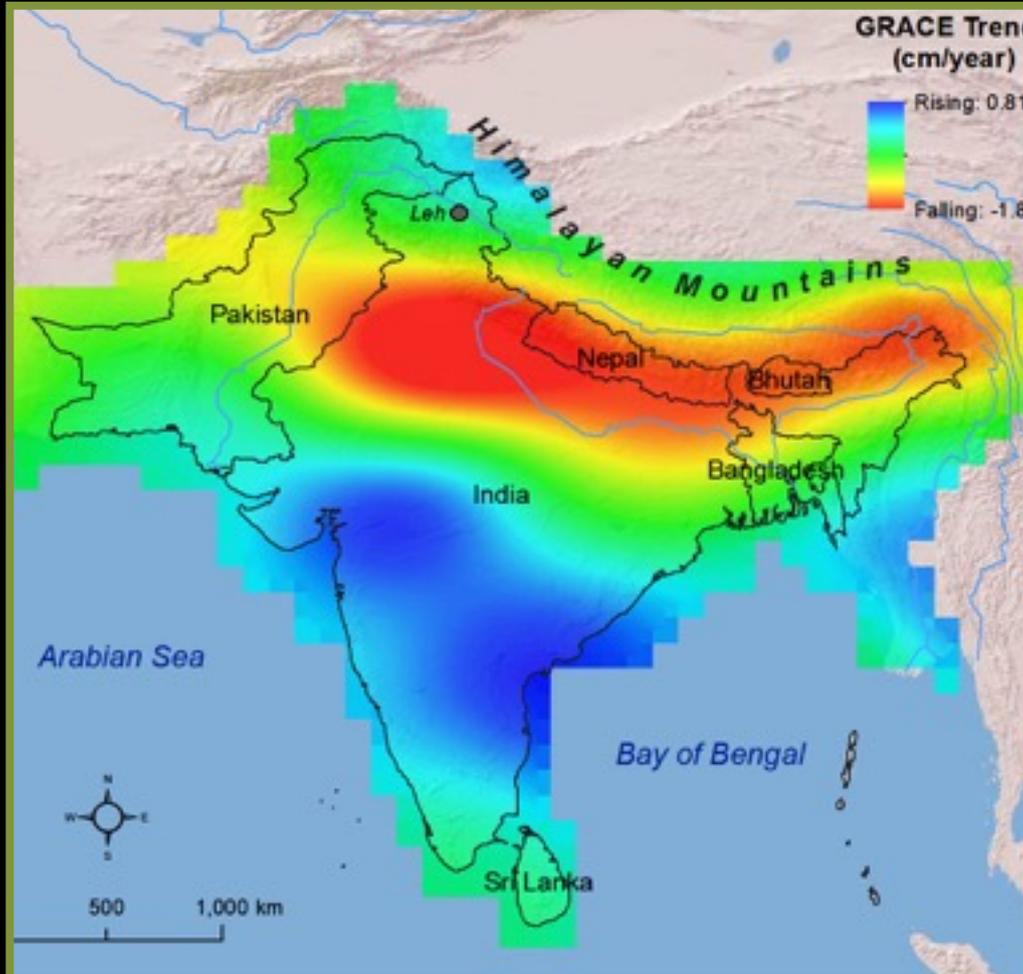
IRDR Annual Conference sessions on a research theme. The format may be presentations, panel discussion, keynote lecture or “*in conversation*” interview.

IRDR Sponsorship of launch events, conferences or workshops at UCL, where we can provide logistical support and pump-priming funding.

For further information, please contact the IRDR Deputy Director.

UCL Institute for Risk and Disaster Reduction
University College London
Gower Street, London WC1E 6BT
United Kingdom
Location: Main Campus, South Wing (2nd flr)

web: www.ucl.ac.uk/rdr
phone: +44 (0)20 3108 1101
email: irdr-enquiries@ucl.ac.uk
Follow@UCLIRDR



Long-term (2003-2012) trends in changes in total terrestrial water storage in South Asia as revealed through an analysis of time-series data from NASA's Gravity Recovery and Climate Experiment (GRACE) twin satellites that were launched in March, 2002. Areas in red and yellow show declining trends in water storage that are primarily associated with excessive use of groundwater for irrigation and mass loss of ice from glaciers in the Himalayas.

BECOME A MEMBER OF THE IRDR. Reducing global risks and disasters presents a colossal challenge that requires coordinated and collaborative action. UCL is uniquely well placed to respond to this challenge with at least 70 academics across 12 departments and 7 faculties involved in world-class research, teaching and practice in the field. The IRDR aims to bring together this wealth of knowledge and expertise, and through research, teaching and knowledge exchange aims to overcome the barriers to understanding risk and reducing the impact of disasters. To find out more - or to register your own activity - please visit ucl.ac.uk/rdr/join