



UCL Institute for Risk
and Disaster Reduction

Annual Report 2016

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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.

A unique opportunity is now presenting itself for UK researchers and practitioners in risk and disaster reduction. The government is making really substantial sums available as part of its Official Development Assistance (ODA). As Strategic Advisor to the UK Natural Environment Research Council and the Economic and Social Research Council, I wrote the Announcement of Opportunity for one of the first of these

programmes, *Increasing Resilience to Natural Hazards in China*, supported through the Newton Fund. In January, I helped run the launch event involving six UK-China university partnerships, including colleagues from UCL. ODA-funded activities focus on outcomes that promote long-term sustainable growth, with the promotion of the economic development and welfare of developing countries as its main objective, which includes understanding how knowledge of both physical and social processes in the hazard chain can improve risk mitigation, risk management and preparedness, and enhance resilience and recovery.

Now the government has launched the UK Global Challenges Research Fund (GCRF). The research investments are on such a scale that could transform research, knowledge exchange, policy engagement and capacity building to assist developing countries increase resilience to multiple hazards. In the IRDR, with our experience of ODA programmes and strong links in developing countries, we will be putting forward initiatives in the next few weeks and months to build networks to put UCL in a strong position to respond to the GCRF initiative. We look forward to working with you, whether you are a university researcher, a practitioner in an NGO, engineering consultancy, or industry, or a partner in a developing country, to put forward innovative ideas to understand global risks and reduce disasters. We invite you to join with us in this work.

Peter Sammonds
Director, UCL Institute for Risk and Disaster Reduction

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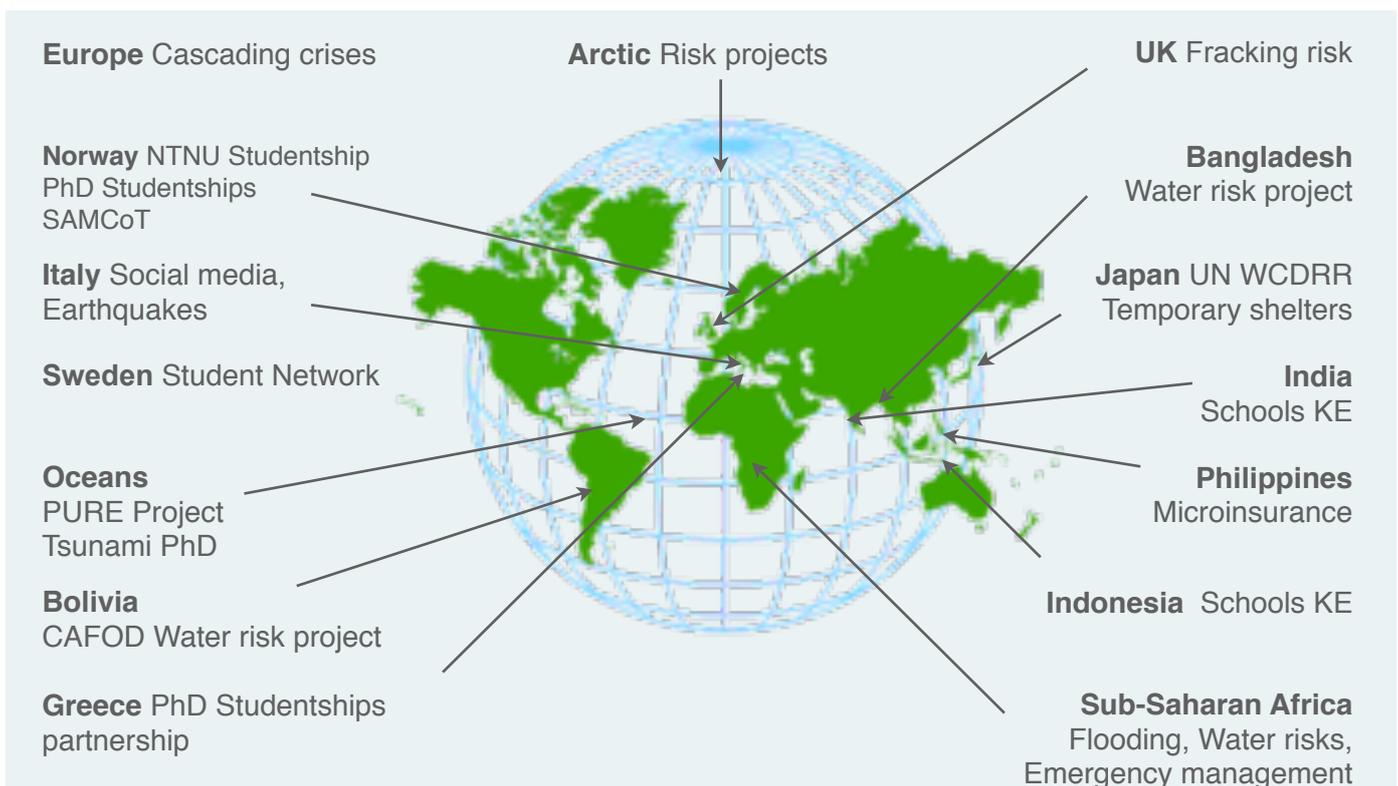
Cover image: Temporary shelters in Portoviejo, Ecuador after the April 2016 Earthquake (Bayes Ahmed)

IRDR at a Glance in 2016

Below we highlight some of the developments and achievements within the IRDR during 2015-16:

- ❑ Welcomed the appointment of Dr Farnaz Arefian and Sarah Schubert as IRDR Enterprise and Promotions Managers.
- ❑ Our members joined EEFIT earthquake engineering missions to Ecuador and Japan
- ❑ Congratulated Giorgios Papadakis and Giorgos Michas on graduating from the IRDR with PhDs, while welcoming Emmanuel Agbo, Nathanael Harwood, Janto Hess, Tasnuva Tabassum, Rory Walshe and Rebekah Yore as new IRDR PhD students.
- ❑ Our Doctoral Research Centre grew to 25 PhD students, funded from diverse sources and co-supervised across UCL.
- ❑ We held the fourth IRDR Student Forum for PhD students, fourth Spring Academy for IRDR researchers, staff and students and fifth IRDR Careers and Opportunities Fair.
- ❑ Maintained our masters student numbers at about 25.
- ❑ 600 participants attended IRDR events from UCL and beyond.
- ❑ Undertook fieldwork in the Italian Apennines, Outer Hebrides, Japan, China, the Philippines, Indonesia, Nigeria, New Zealand, Mexico and Colombia.
- ❑ Published over 50 papers and book chapters in 2015-16.
- ❑ Joined the UNISDR Science and Technology Conference in Geneva, and the World Bank GFDRR Understanding Risk Conference in Venice.
- ❑ At the invitation of the Governor of Fukushima, four IRDR PhD and MSc students went with David Alexander to visit schools, towns and the nuclear plant.
- ❑ Developed a web-GIS based landslide early warning system for Bangladesh for which Bayes Ahmed was awarded the 'ICT Development Award'.

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 organise discussion meetings, lectures and symposia open to the UCL community and the general public, which have proved to be highly successful.

A key theme we have addressed this year was *Recovery from Disaster*, starting with a workshop and book launch for 'Recovery from Disasters' by Ian Davis and David Alexander.

Recent disasters such as the 2009 L'Aquila and 2015 Kathmandu earthquakes, and civil war in Syria have highlighted the escalating risks to our cultural heritage. The destruction of ancient monuments and artefacts in Palmyra by IS focussed global attention on the vulnerability of our world heritage. In March 2016, Farnaz Arefian (IRDR) convened an IRDR Discussion Forum on *Heritage and Disasters*, with an expert panel from the IRDR and Institute for Sustainable Heritage (ISH), the British Museum, Arts Council England and SiTL – an Italian security research institute. There is much work to be done, but also great interest across UCL, including the IRDR, ISH the Department of Civil Engineering (CEGE), while colleagues Dina A'Ayla (CEGE) and Carmine Galasso (IRDR) are working in the Philippines supported by the World Bank.

At the invitation of the Governor of the Fukushima Prefecture, Japan, IRDR's Professor David Alexander, PhD students Serena Tagliacozzo, Nurmala Nurdin, Omar Velasquez and Zoe Mildon, and MSc student Sandra Camacho along with students from UCL Academy visited the areas affected by the 2011 Tohoku earthquake and tsunami, and the site of the Fukushima-Daichi nuclear power plant incident, to mark the fifth anniversary of the disaster. As well as official visits, there were opportunities for UCL researchers to investigate post-disaster recovery. This visit was part of a unique bilateral collaboration between UCL and the Fukushima Prefecture, and follows on from a visit to UCL by students from Fukushima.



IRDR researchers Luke Wedmore, Amy Chadderton, Sally Scourfield and Katerina Stavrianaki have lectured to sixth form students, while Serena Tagliacozzo presented at the Pint of Science Festival.

Public Events in 2015-16

June 2015: *IRDR Fifth Annual Conference* attended by 170 people, with a keynote speech by Professor Sir Mark Walport, FRS, Chief Scientific Advisor to HM Government. Sessions on arctic risks, visualisation of hazards and risks, and Dr Michael von Bertele, Humanitarian Director of Save the Children, *in conversation* with Dr Smitha Mundasad, BBC science and health journalist, on managing the Ebola Crisis.

June 2015: *Third Academic Summit on Disaster Risk Reduction and Resilience*, was attended by 120 academics and practitioners from across the UK and Europe.

October 2015: *Recovery from Disaster* book launch and panel discussion attended by 120 people.

March 2015: *IRDR Careers and Opportunities Fair* with exhibitors from the public and private sector and attended by 110 graduates and students.

March 2015: IRDR public Discussion Forum on *Heritage and Disasters*, attended by 100 people.

June 2016: IRDR public Discussion Forum on *Development in the Arctic: Risks and Rewards*.

It is a key part of the IRDR mission to reduce the risks posed by disasters through our research, knowledge exchange and policy engagement.

IRDR researchers joined two EEFIT missions (Earthquake Engineering Field Investigation Team) to Japan and in Ecuador in May/June 2016 to investigate recent earthquakes there. Peter Sammonds, investigated the earthquake faulting and the implications for damage from the Kumamoto earthquake of 15 April 2016 with the team, while Bayes Ahmed investigated landsliding and geotechnical failures caused by the 16 April 2016 earthquake in the province of Esmeraldas, Ecuador. EEFIT presentations will be made at the Institution of Structural Engineers in the next few months.



Damage to buildings in Bahia, Ecuador after the April 2016 earthquake.

David Alexander co-authored two booklets of practical information on disabilities and disasters for the Council of Europe. This guidance is needed to transform the treatment of people with disabilities in a disaster, as it is their fundamental human right to be treated equally with able-bodied people.

Extreme space weather could trigger a cascade of events leading to disaster. IRDR researchers are developing the first public web platform dedicated to meet this challenge. David Alexander, Robert Wicks and Gianluca Pescaroli won a UCL Knowledge Exchange Champion award for their work on addressing the resilience of London's critical infrastructure during cascading disasters and space weather incidents. Their first workshop at the Royal Astronomical Society in May 2016 brought together participants from universities, local and central government, industry and commerce to form an applied research group on cascading events.

Simon Day is working with Serge Guillas (UCL Statistical Science) and the insurance industry on a NERC KTP on catastrophe modelling of earthquake and tsunami risks.

Bayes Ahmed developed an award-winning web-GIS based dynamic landslide early warning system for vulnerable communities in Chittagong City, Bangladesh.

Media Engagement

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

Ilan Kelman was quoted in The Guardian and BBC on the Paris climate change agreement in December 2015 and in the New Scientist and wire services on the Afghanistan earthquake in October 2015. He also writes a



regular column for 'The Foreigner', an English-language news service in Norway.

David Alexander was interviewed on Al-jazeera television about the Bento Rodrigues dam disaster in Brazil in November 2015.

At IRDR Enterprise and Innovation we are motivated by our passion for bridging the gap between practice and academia.

We in the IRDR combine industry awareness with specialised research at UCL. This creates multidimensional opportunities that place the IRDR as a hub for UCL in providing excellent research, consultancy, advice and training, to both commercial and social enterprise.

In 2016, UCL IRDR appointed Dr Farnaz Arefian and Sarah Schubert to jointly manage IRDR Enterprise and Promotion, focusing on:

- Continuing professional development (CPD)
- Consultancy
- Promotion
- Partnership
- Sponsorship
- Philanthropy.

Launch of IRDR CPD programmes

Enterprise manager Dr Farnaz Arefian has developed two new continuing professional development courses, which will launch in September 2016.

CPD: Reducing disaster risk during reconstruction and retrofit: a research-based course for managers and built environment professionals; 9 September 2016;

The Course Team: Prof. David Alexander, Dr Farnaz Arefian, Jane Elizabeth Burns, Dr Robert Wicks, Shanshan Zhou

This one-day course is for organisations and individuals involved in international and domestic disaster reconstruction and retrofit (such as earthquakes, floods and landslides) and aims to assist them in devising and implementing disaster reconstruction and retrofitting programmes that will better withstand a subsequent disaster. This short course is based on the latest research and academic advances, from a unique multidisciplinary perspective covering areas such as project management and the built environment.

CPD: Business risk and resilience in the face of disasters: a research-based workshop for leaders; 15 September 2016.

The Course Team: Prof. David Alexander, Dr Farnaz Arefian, Dr Cassidy Johnson, Dr Carmine Galasso, Dr Robert Wicks, Bayes Ahmed

This one-day course will enable businesses and organisations to prepare themselves for a major disruptive incident, such as a flood, earthquake, or terrorist attack, and show them how they can survive in the immediate aftermath of those incidents. This course is based on the latest research and academic advances on understanding disaster risk, resilience and business continuity. It will enable participants to prepare their businesses or organisations for a major disruptive incident and ensure its survival in the immediate aftermath of such incidents.



Web: www.ucl.ac.uk/rdr/business/cpd

Risk Assessment Training

UCL IRDR, in a project led by Ambiental, developed and delivered key components of a three day bespoke professional training programme on Disaster Risk Assessment for the World Bank in Washington D.C in 2016. An aim of the programme was to help World Bank Country Leaders to better understand what makes a good risk assessment and the uncertainties and limitations in creating these. IRDR's Dr Joanna Faure Walker led sessions on earthquakes, landslides, building exposure and vulnerability, and overcoming challenges with access to data.

Consultancy for the World Bank

UCL IRDR provided expertise for a consultancy for the World Bank's Global Fund for Disaster Risk Reduction (GFDRR), carrying out an assessment of the GFDRR's 5-year global strategy through analyzing the effectiveness of capacity building activities in GFDRR projects over the past five years. Staff members Dr Ilan Kelman, Dr Joanna Faure-Walker, and Dr Zehra Zaidi visited World Bank offices in March to develop the analysis and share results.

Heritage and Disasters Panel Discussion

UCL IRDR, led by Dr Farnaz Arefian, organised a successful panel discussion on heritage and disasters on 9th March 2016. This public event brought together researchers and practitioners from disasters and heritage sites in order to explore how academic discourse and research on heritage and disaster risk reduction can play a role in heritage resilience.



A mosque remains standing amid the rubble of collapsed buildings in the town of Golcuk, 60 miles east of Istanbul. Associated Press Photo by Enric Marti.

IRDR Total Ice Seminar

Sponsored by Total France, and organised by Sarah Schubert, the IRDR hosted the knowledge sharing seminar on 8th- 10th June 2016. It focused on recent research results

related to ice action and ice rheology description in ice dynamics models.

It explored the risks and rewards of the so-called 'Arctic Gold Rush' for resources and development.



Award winning initiative

Prof. David Alexander, PhD researcher Gianluca Pescaroli and Dr Robert Wicks of the IRDR won a UCL Grand Challenges Knowledge Exchange Award to promote their work on cascading disasters and space weather. The award is being used to develop a website and organise a series of meetings. The first meeting was a collaborative workshop between IRDR and EDF Energy held at UCL, and the second meeting a workshop in May 2016 at the Royal Astronomical Society, where industry, government and academics were invited to discuss the implications of cascading disasters and space weather in the UK.

Supporting London First

Max Kaiser, an IRDR MSc student is working with London First on a project called *London Bridges* that aims to optimise the benefits of community resilience in London through cross-sector efforts, and to enhance community resilience in micro-cities. He is working to develop a benchmarking tool to assess community resilience.

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 four 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 we will be admitting our first students onto our MSc in Risk and Disaster Science in September 2016. In 2017 we will be launching an MSc in Space Risk and Disaster Reduction. There are associated Postgraduate Diploma and Postgraduate Certificates for students who wish to follow only part of these programmes. These fill needs identified by practitioners and trained researchers who wish to gain a sound underpinning in the subject. In 2016-2017 we are enriching our programmes with new modules in 'The Variable Sun: Space Weather and You' and 'Conflict, Humanitarianism, and Disaster Risk Reduction'. Student learning on all our programmes is enhanced through day field trips and a scenario exercise run by Rescue Global.



IRDR Masters students participating in a scenario exercise run by Rescue Global

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.

IRDR MSc programmes are one-year full-time

(or two-year part-time) taught masters programmes. Each programme includes the following four compulsory modules:

- Integrating Science into Risk and Disaster Reduction*
- Emergency and Crisis Management*
- Risk and Disaster Reduction Research Tools*
- Research Proposal and Appraisal.*

Programmes comprise of two further programme-specific compulsory modules, and a choice of two optional modules from a list including modules taught by other departments across UCL. All MSc students undertake an *independent research project*, which cumulates in a research report and presentation and an independent project.

MSc Risk, Disaster and Resilience

Director: Dr Joanna Faure Walker

Students explore the characterisation, quantification, management and reduction of risk and disasters, and their associated impacts from a diverse range of perspectives. Programme-specific compulsory modules are:

- Natural and Anthropogenic Hazards and Vulnerability*
- Emergency and Crisis Planning*

Optional modules are available from among the following:

- Conflict, Humanitarianism, and Disaster Risk Reduction*
- The Variable Sun: Space Weather and You*
- Disaster Risk Reduction in Cities*
- Post Disaster Recovery*
- Adapting Cities to Climate Change*
- Decision and Risk Statistics*
- Earthquake Seismology and Earthquake Hazards*
- Risk, Power, and Uncertainty (Anthropology)*
- Risk and Contingency Planning (Security and Crime Science)*
- Perspectives on Terrorism (Security and Crime Science)*

MSc Risk and Disaster Science

Director: Prof Peter Sammonds

This is a complementary programme to the MSc Risk, Disaster and Resilience but with a stronger emphasis on the physical science of natural hazards, and provides an opportunity for in-depth study of the statistics of risk and disasters.

Programme-specific compulsory modules are:

- Earthquake Seismology and Earthquake Hazards*
- The Variable Sun: Space Weather and You*

Optional modules are available from among the following:

- Decision and Risk Statistics*
- Seismic Risk Assessment*
- Climate Risks to Hydro-ecological Systems*
- Natural and Anthropogenic Hazards and Vulnerability*
- Conflict, Humanitarianism, and Disaster Risk Reduction*
- Emergency and Crisis Planning*

MSc Space Risk and Disaster Reduction (Starting 2017)

Director: Dr Robert Wicks

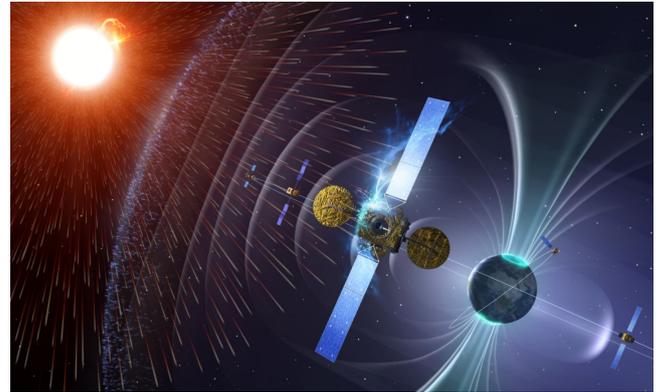
Our newest MSc programme draws upon UCL multidisciplinary expertise in risk, disasters and space science from the IRDR and the Mullard Space Science Laboratory. Compulsory modules are:

- The Variable Sun: Space Weather and You*
- Space Science, Environment and Satellite Missions*
- Space Systems Engineering*

Optional modules include a selection from among the following:

- Decision and Risk Statistics*
- Space-Based Communication Systems*
- Space Instrumentation and Applications*
- Spacecraft Design – Electronic Sub-systems*

- Mechanical Design of Spacecraft*
- Global Monitoring and Security*
- Natural and Anthropogenic Hazards and Vulnerability*
- Emergency and Crisis Planning*



MRes Risk and Disaster Reduction

Director: Prof David Alexander

This MRes is a research intensive programme to train experts to analyze and provide solutions to complex issues relating to risk and disasters. Students undertake a substantial research project in addition to the taught component that comprises five modules. This includes two skills modules:

- Risk and Disaster Reduction Research Tools*
- Research Proposal and Appraisal.*

Students pick three further IRDR modules:

- Integrating Science into Risk and Disaster Reduction*
- Emergency and Crisis Management*
- Emergency and Crisis Planning*
- Natural and Anthropogenic Hazards and Vulnerability*

Please note the contents of our programmes may change from time to time and some optional modules may be unavailable. Students should consult the IRDR website for the latest information.

Graduate Teaching

Careers and Opportunities Fair

We held our fourth IRDR Careers and Opportunities Fair, targeted at risk and disaster reduction sector. The event was 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 at the effectiveness and focus of the event. Students attending these fairs have found employment directly as a result of these events.



Busy stalls at the IRDR Careers and Opportunities Fair

Graduate Research Centre

Research students are a great asset to the IRDR, and play their part in many aspects of the IRDR mission. We have a well-established IRDR Doctoral Research Centre, with over 20 research students who are cross-disciplinary and international in perspective and are making a real societal impact. With cross-disciplinary supervisory panels, an educational programme in DRR and participation in the IRDR Student Forum, Spring Academy and Annual Conference, we are fostering a new type of graduate student

who is comfortable working in a multi-disciplinary and international environment.



Staff and students at the IRDR Spring Academy 2016

UK Alliance for Disaster Research

The UKADR was launched in the final session of the IRDR Academic Summit in UCL in June 2016. The primary motivation for the UK Alliance for Disaster Research (UK ADR) is to bring together the rich and diverse research on disaster risk reduction being generated in the UK, and to provide a platform that facilitates collaboration and partnership between academics working on disaster risk. The alliance will be utilised as a vehicle for improving representation of the DRR research community at government level in the UK, promoting dialogue with

national policy-makers, and for facilitating the implementation of the Sendai Framework for Disaster Risk Reduction in the UK context.

The first major event hosted by the UK ADR will be a conference at King's in January 2017. The interim co-chairs of the UK ADR are Professor Mark Pelling (Kings College London) and Professor Andrew Collins (Northumbria University). Amy Donovan (amy.donovan@kcl.ac.uk) can be contacted for further information.

Our public engagement, research impact and graduate teaching are underpinned by excellent academic research. In the last 12 months, IRDR researchers have produced over 50 peer reviewed research publications, presented research at leading international conferences, been invited speak at prestigious academic institutions, organised international meetings and conference sessions and have won distinguished awards.

The IRDR jointly produced a workshop for UK-Japan collaboration on disaster risk reduction with the International Research Institute of Disaster Science (IRIDeS), Tohoku University, at the Daiwa Foundation in London. This was an opportunity for researchers from IRDR, IRIDeS and partner universities to present findings of joint research projects on earthquakes, tsunami, disaster risk reduction, disaster responses, casualties and health. Research collaborations are thriving as a result of the MoU between UCL and Tohoku University. This year saw the start of a new initiative, with Zoe Mildren going to work with Shinji Toda (IRIDeS) on development of Coulomb stress modelling of active faults, supported by the Japan Society for the Promotion of Science (JSPS).

Mohammad Shamsudduha (Shams) coordinated a UK-Thailand International Workshop on Groundwater Resilience in Bangkok in February 2016 in collaboration with the King Mongkut's Institute of Technology, Ladkrabang. Shams led the UK team of 16 early career researchers and senior academics from across 10 universities. The workshop allowed young Thai and UK researchers to meet and brainstorm on groundwater resilience, adaptation to climate change, and human development. It was supported by the British Council Researcher Links programme

IRDR researchers have presented at the IUGG General Assembly, Prague; Euro-conference on Rock Physics, Ambleside; British Geophysical Association (BGA), Southampton, UK; International Conference

on Climate, Tourism and Recreation, Istanbul; American Geophysical Union Fall Meeting, San Francisco; the Tectonic Studies Group (TSG), London; UNISDR Science and Technology Conference, Geneva; and the European Geosciences Union, Vienna.

David Alexander has given invited seminars on disaster prevention and management in Austria, Germany, Portugal and the UK, following publication of a survey on this topic in the journal disaster prevention and management; Joanna Faure Walker at the University of Chieti, Italy; Robert Wicks at a Royal Astronomical Society Discussion Meeting on turbulence in space; and Peter Sammonds at TEI, Athens.



IRDR researchers at the 2016 IRDR Spring Academy

Ilan Kelman co-authored the Outstanding Paper at the 2016 Emerald Literati Network Awards for Excellence and made the Roll of Honour for the 2016 Student Choice Teaching Awards from UCLU (UCL student union). Bayes Ahmed was awarded the 'ICT for Mountain Development Award 2015' by the International Centre for Integrated Mountain Development for developing a landslide early warning system. Luke Wedmore won the prize for the best student presentation at the TSG and BGA meetings. IRDR PhD students have won funding awards from the AGU, VMSG and EURO Conference (Amy Chadderton), the JSPS (Zoe Mildon), NERC (Luke Wedmore) and the Sasakawa Foundation (Gillian Dacey).

Professor David Alexander's recently published works include a survey of current issues in disaster risk reduction, a review of the representations of disaster in Western fine art over the last two millennia, and a theoretical study of culture and disaster. He has also authored *How to Write an Emergency Plan* and joint-authored *Recovery from Disaster*. He has now completed his work for the Council of Europe on people with disabilities and disaster. The project ended with the publication of two joint-authored booklets of practical information. Both are partly based on experience drawn from surveys of the Council of Europe's 47 member states. He has been working with students and colleagues to found a cascading disasters research group. In May 2016, the group held a symposium on space weather, critical infrastructure and cascading disasters, and the cascades group is now working on a major grant proposal.



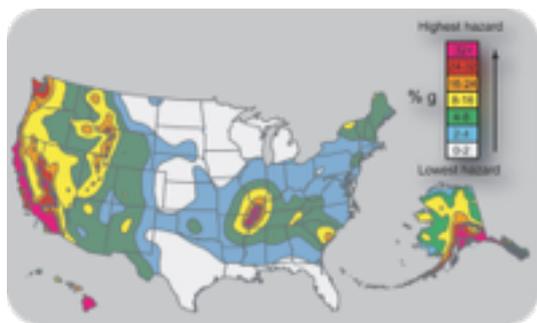
Dr Joanna Faure Walker's research focus is on continental settings that are experiencing extension, in particular the Italian Apennines. Her work has shown the importance of measuring long-term (thousands of years) rates of motion across faults in order to gain a more complete appreciation of the earthquake hazard in a region. She has further shown the importance of detailed measurements of the rate and direction of slip along an individual fault, as these parameters can affect calculations of fault recurrence intervals and hence quantifications of seismic hazard. Governments, industrial stakeholders and residents use seismic hazard and risk maps to

make disaster risk management decisions. Her work has shown that profiles of fault throw-rates along a fault are complicated by local changes in fault geometry and slip vectors. This has been confirmed by a detailed LiDAR study along a fault in central Italy. Recent work by Joanna and her collaborators shows that this has important consequences for fault-based seismic hazard assessment, especially where there are limited constraints on the slip-rate across a fault.



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. Dr Wicks also works on satellite hardware projects. The QB50 mission is an EU funded FP7 project at UCL with the aim of launching 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. Given that the quality of human life is periodically disrupted by large-scale disasters, which may be either natural (e.g. earthquakes, hurricanes) or man-made (e.g. terrorism), his interest lies in hazard modelling that involves predicting the probability of such disasters happening within a given time period. Although it is usually impossible to make deterministic predictions about the occurrence of specific disasters, it is often possible to make statistical predictions about the aggregate probability of such events occurring. His research aims to develop a general class of statistical point process models which can be applied to hazard modelling across a variety of different fields. It aims to extend the relatively successful literature on earthquake prediction using cluster point processes to other application domains, while reformulating it within a Bayesian framework to allow for pooling across multiple data sources to cope with data shortage.



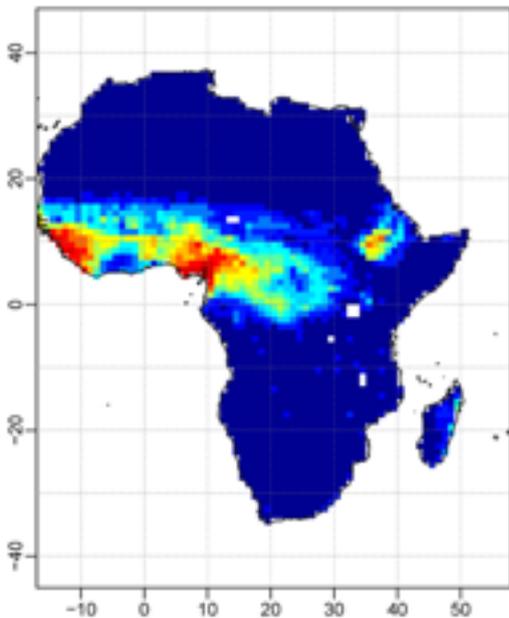
Dr Ilan Kelman is a Reader appointed 50:50 between IRDR and UCL Institute for Global Health (IGH). His research programme combines disaster research and health research, including the integration of climate change challenges and opportunities into both topics. Two main areas of case studies are priorities: 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. Through his research, he has also been helping communities at the frontlines of climate change with knowledge and ideas on how they can help themselves. Future work will be focused on engaging more with health researchers and health practitioners. Significant separation remains amongst the areas covered by his research, and he hopes to continue to bridge gaps to bring together people, sectors, and disciplines.



Dr Carmine Galasso is a lecturer in Catastrophe Risk Engineering with a joint appointment at UCL's Department of Civil, Environmental and Geomatic Engineering (CEGE) and UCL IRDR. He is also a member of the EPICentre research group and Degree Programme Director of the MSc in Earthquake Engineering with Disaster Management. His research focusses on the development and use of probabilistic and statistical tools for modelling and managing risk caused by extreme loads on the built environment. His emphasis lies on developing new tools for hazard-consistent seismic input assessment, engineering applications of earthquake early warning systems, structural reliability and flood risk assessment. His recent consultancies include the *Assessment of the Multi-Hazard Vulnerability of Priority Cultural Heritage Structures in the Philippines* in support of the Department of Tourism, and *Building Urban Resilience to Disasters in the Kyrgyz Republic* in support of the Kyrgyz Republic State Agency for Architecture, Construction and Communal Services.

Dr Mohammad Shamsudduha's ("Shams") primary research focus is on understanding how terrestrial water resources, in particular, how groundwater interacts with environment, climate and human developments, including pumping groundwater for irrigated agriculture in Asian Mega-Deltas and Africa. He is currently the Project Manager of the UK-government funded 4-year (2015-2019) consortium research project *GroFutures* (Groundwater Futures in Sub-Saharan Africa; www.grofutures.org), and is leading research on unravelling the relationships between groundwater replenishment and seasonal rainfall in Africa using a number of global-scale land-surface and hydrological models. His work also encompasses a project focussing on water, climate and policy for food production in a drought-prone region of Bangladesh, funded by UCL under its Grand Challenges programme. UCL and the government of Bangladesh are jointly exploring the limits to the valuable groundwater resource and to food security in Bangladesh.



Dr Simon Day is a senior research associate in the IRDR. He is working with Serge Guillas (UCL Statistical Science) and the insurance industry on a NERC Knowledge Transfer Project on catastrophe modelling and

tsunami risks. He is also continuing to work on existing research projects into volcanic eruptions in the Cape Verde islands and mitigation strategies for natural disasters. He 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.

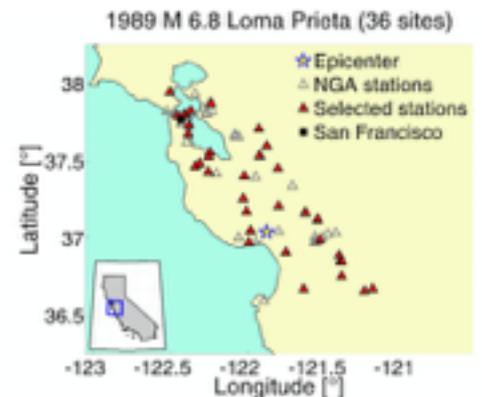
Dr Zehra Zaidi has been primarily engaged in FORTRESS, a EU FP-7 funded project that examines the cascading impacts of crisis situations. Zehra's work has also focussed on disaster risk governance, risk perception and learning from disaster events. Last year she visited the National Autonomous University of Mexico (UNAM) to investigate the use of disaster data in decision-making and planning at the local government level in Mexico City. She was recently awarded a Research Catalyst Award to collaborate with faculty in the Institute of Environmental Studies at the National University of Colombia, Manizales. There she investigated methodologies for calculating the impact of disasters, and the construction of disaster databases, especially for small and local disaster events. She was also recently awarded a Marie Curie Individual Fellowship to examine the impact of small-scale disaster events in Italy, and to explore the link between this type of disasters risk, and learning and behaviour change at the local government and community level.



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

Funding: UCL Department of Civil, Environmental and Geomatic Engineering

There has been an increasing interest in recent years in the use of synthetic ground motions for loss estimation. The aim of this research is to develop a ground motion simulation methodology and incorporate it in a seismic risk assessment framework.



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

Funding: IRDR / Earth Sciences

The permeability of fracture networks that act as fluid flow pathways is key to understanding eruptive behaviour at silicic volcanoes. Results indicate a complex permeability evolution that includes a reduction in permeability with increasing temperature.



Bayes Ahmed: “Community Vulnerability to Landslides in Bangladesh” (Start: Oct. 2013)

Funding: Commonwealth Scholarship

Landslides are common in the Chittagong Hill Districts of Bangladesh. This research will employ qualitative and quantitative techniques to compare administrative and cultural communities, and justify why one community is much more resilient to landslides than the other.



Ching-Eye Rhea Leung: “Mitigation and disaster preparedness measures enacted in remote mountainous areas affected by earthquake triggered geo-hazards.” (Start: Oct. 2014)

Funding: Self-funded (Part-time)

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.



Danielle Charlton: “The impacts of volcanic activity to urban centres” (Start: May 2014)

Funding: UCL IRDR Impact studentship with Aon Benfield Reinsurers, London, UK

Campi Flegrei is one of the most dangerous volcanoes in Europe. Managing the hazard and risk by understanding the needs of different audiences and designing new maps can be helpful.



Emmanuel Agbo C: “Evaluation of Nigeria Civil Protection Agencies: with case of flood vulnerability” (Start: June 2015)

Funding: TETFund/NUC Nigeria

Floods and their hazards are seen as the deadliest and most frequent of all natural disasters in Nigeria. The correct application of a disaster management plan could, at least, reduce their impacts to the nearest accepted level.



Gianluca Pescaroli: “The vulnerability of critical infrastructure in cascading disasters” (Start: April, 2014)

Funding: European Commission

This work analyses the emerging topic of cascading disasters to understand the vulnerability paths of complex events, and mitigate their escalation. It has promoted the creation of a research group on cascading disasters, supported by the UCL KE Champions Award.



Gillian Dacey: “Self-protective behaviour during earthquake shaking” (Start: Nov 2013) Part-time

Funding: Self

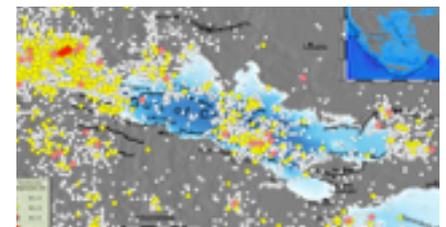
This research seeks to determine whether earthquake self-protective behaviour is effective in improving survivability from damaging earthquakes by conducting a comparative study with earthquakes from New Zealand and Japan.



Giorgios Michas: “Generalised statistical mechanics description of fault and earthquake populations in the Corinth Rift (Greece)” (Start: March 2011)

Funding: Greek State Scholarship Foundation (IKY)

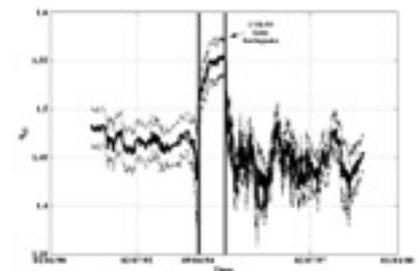
Graduated in 2016



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

Funding: Greek State Scholarship Foundation (IKY)

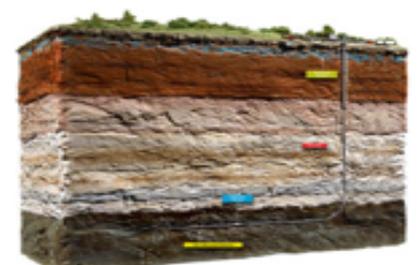
Graduated in 2016



Jabraan Ahmed: “Towards sustainable and risk free gas production from unconventional source” (Start: Sept. 2012) Part-time

Funding: UCL Impact Studentship with UCL ISR

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



Janto S. Hess: “Financing adaptation in Pacific SIDS: Investigating tourism related funds in Fiji and Vanuatu.” (Start: Sept. 2015) Part-time

Funding: Self-funded

With a focus on climate change, sustainable tourism, and adaptation finance, Janto has experience in the field of international development and particular expertise in the geographic areas of Southern Asia and the Pacific Islands.

Justine Uyimleshi Usile: “Effectiveness of the Nigerian emergency management system in respect to building collapses, human stampedes and electrical power failures.” (Start: April 2015)

Funding: Petroleum Technology Development Funds (PTDF) Nigeria

Nigeria has witnessed several disasters. This research aims at understanding disaster impacts, causes and the capability of the emergency jurisdiction to enhance planning and improve preparedness.

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

Funding: UCL IRDR Studentship

The clustering of earthquakes in time and space is widely accepted, however the existence of correlations in earthquake magnitudes is more questionable. This study aims to observe any trend of dependency between the magnitudes of aftershock earthquakes and the earthquakes that trigger them.

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

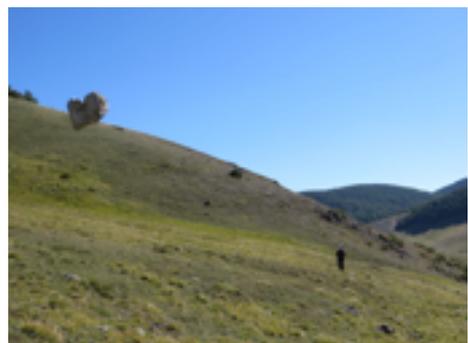
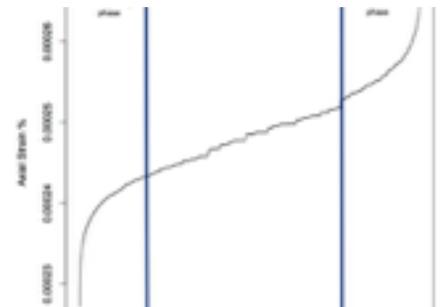
Funding: UCL Impact Studentship with CASE support from Geospatial Research Limited

I use physical models, driven by field observations of earthquake geology, to understand the behaviour of earthquake faults over a range of time periods. I focus on understanding why earthquakes cluster in both space and time.

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

Funding: Aon Benfield

This project uses proxies such as sub-marine deposit 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.



Nathanael Harwood: “A rise in the frequency of extreme weather in response to Arctic amplification and its implications for European decision-making” (Start: March 2016)

Funding: London NERC DTP Studentship

Novel techniques will be used to investigate whether a rise in extreme weather events in the northern hemisphere can be linked to ongoing environmental changes in the Arctic climatically.



Nurmalahayati Nurdin: “Disaster Education in Secondary High School in Indonesia” (Start: January 2014)

Funding: Indonesia Government, Ministry of Religious Affairs

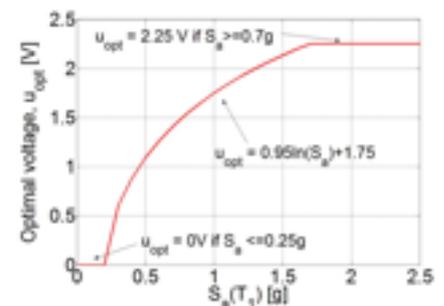
This research focuses on examining the Disaster Risk Reduction aspect of the national curriculum and investigates whether the implementation of school disaster based preparedness improves students understanding of DRR.



Omar Velazquez: “Engineering Applications of Earthquake Early Warning Systems” (Start: June 2015)

Funding: CONACYT (Mexico)/IRDR

My research focuses on the engineering applications of earthquake early warnings (EEW) for real-time seismic risk mitigation. The main aim is to integrate the estimations provided by EEW in engineering applications for reducing human and economic losses in structures/infrastructures such as rapid assessment response methods.



Rebekah Yore: “The Impact of Microinsurance on the Transitional Phase to Recovery” (Start: July 2015)

Funding: UCL IRDR Impact Studentship, co-sponsored by Rescue Global

Investigating the potential of microinsurance as a sustainable, long-term resilience strategy supporting the mechanism for rebuilding homes and livelihoods in low-income, disaster affected populations.



Rory Walshe: “Ground-truthing the assumptions of climate change impacts on small island states by cross-referencing multiple methods” (Start: March 2016)

Funding: London NERC DTP Studentship

This research will investigate the impacts of climate change on Mauritius and Tobago and will challenge assumptions regarding the effect of and response to anthropogenic climate change in this context. This will be achieved by cross-referencing multiple methods.



Sally Scourfield: “The deformation and consolidation of brash ice” (Start: April 2014)

Funding: Total and UCL Impact Studentship

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: “Leveraging web 2.0 technologies to support communications between authorities and citizens in the post-disaster reconstruction phase” (Start: Sept. 2013)

Funding: IRDR-MAPS

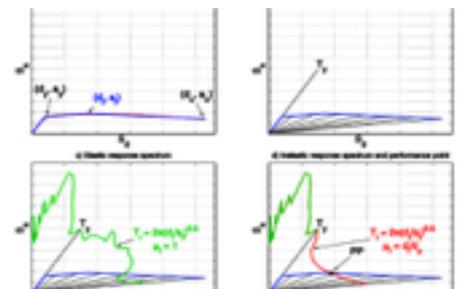
This research project seeks to uncover the dynamics of communication that occur between authorities and citizens after disasters in the long term and the opportunities to leverage web 2.0 technologies to support communication practices.



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

Funding: EPSRC with AIR Worldwide

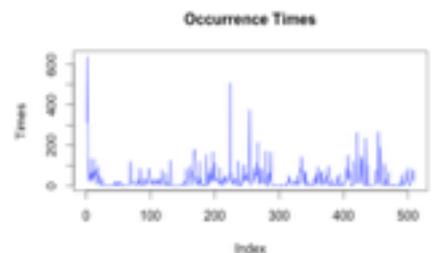
Stelio’s research is on the seismic vulnerability of mid-high-rise RC buildings. The main aim is to develop a generic framework for the derivation of analytical fragility functions using simplified analysis method.



Tasnuva Tabassum: “Assessing seismic hazards from a Bayesian perspective” (Start: Sept. 2015)

Funding: Commonwealth Scholarship Commission

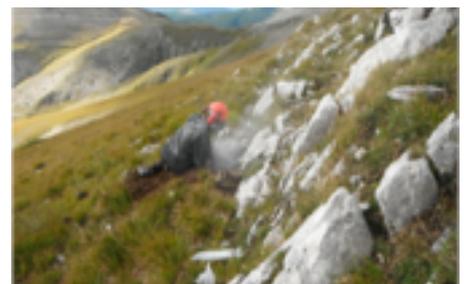
Epidemic Type Aftershock Sequence (ETAS) model has been widely used to forecast aftershocks. The study aims to estimate the Bayesian confidence intervals of the magnitude of the largest aftershock for several sequences of aftershock through using the ETAS model.



Zoe Mildon: “Structural geology and recurrence intervals of active normal faults in the central and northern Italian Apennines” (Start: Oct. 2013)

Funding: NERC

My research is focussed on studying the geometry of active normal faults in Italy and investigating the effects of coulomb stress transfer following earthquakes on these faults.



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8th June 2016

Panel Discussion: 'Development in the Arctic: Risks and Rewards'

Chaired by: *Dr Ilan Kelman*

i.kelman@ucl.ac.uk

9th September 2016

Professional Short Course: Reducing Disaster Risk During Reconstruction and Retrofit

Convenor: *Farnaz Arefian*

www.ucl.ac.uk/rdr/business/cpd

15th September 2016

Professional Short Course Business Risk and Resilience in the Face of Disasters

Convenor: *Farnaz Arefian*

www.ucl.ac.uk/rdr/business/cpd

11th October 2016

Special Seminar: Gender and Disaster Resilience

Convenor: *Dr Rosanna Smith*

rosanna.smith@ucl.ac.uk

3rd November 2016 (Provisional)

IRDR Public Meeting on Science into Policy

Convenor: *Prof. Peter Sammonds*

p.sammonds@ucl.ac.uk

22nd November 2016

Alumni Roundtable Dinner

For our alumni, visiting staff and members. Roundtable discussion and awards

Convenor: *IRDR Administrator*

irdr-enquiries@ucl.ac.uk

18th January 2017

IRDR PhD Student Forum

Convenor: *Dr Ilan Kelman*

i.kelman@ucl.ac.uk

1st March 2017

IRDR Careers & Opportunities Fair

To register as exhibitor / delegate, email:

irdr-enquiries@ucl.ac.uk

8th March 2017 (Provisional)

IRDR Public Meeting on Conflict and Disasters

Convenor: *Prof. Peter Sammonds*

p.sammonds@ucl.ac.uk

24-25th April 2017

IRDR Spring Academy Chicheley Hall

For IRDR academic and research staff and research students.

Convenor: *Dr Ilan Kelman*

i.kelman@ucl.ac.uk

21st June 2017 (Provisional)

IRDR Seventh 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

If you wish to get involved in an IRDR event

We have the following opportunities:

IRDR Forums with 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.

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IRDR Deputy Director

Dr Rosanna Smith

IRDR Administrator

Mumtaz Ghafoor

Professor, Risk & Disaster Reduction

David Alexander

Reader, Risk, Resilience & Global Health

Dr Ilan Kelman

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Robert Hall

Mumtaz Ghafoor

Research Associates

Dr Megan French (CAFOD)

Dr Rosa Sobradelo (ABUHC)

Dr Zehra Zaidi (EC)

Dr Mohammad Shamsudduha (NERC)

Honorary Professors

Virginia Murray, Public Health England

Stephen Kirby, USGS

Visting Professors

Maureen Fordham, Northumbria University

Frank Furedi, University of Kent

Dougal Goodman,

Found. Sci & Tech.

Knut Hoyland, NTNU, Trondheim

Robert Muir-Wood, RMS

Gordon Woo, RMS

Visitor

Shanshan Zhou

PhD Research Students

Emmanuel Agbo

Bayes Ahmed

Jabraan Ahmed

Amy Chadderton

Danielle Charlton

Gillian Dacey

Rhea Leung Ching-yee

Nathanael Harwood

Janto Hess

Zoe Mildon

Stelios Minas

Nurmala Nurdin

Omar Ortiz

Gianluca Pescaroli

Sally Scourfield

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Director, Institute of Ideas

Director, Foundation for Science and Technology

Director, Thinking Development

Director, Security & Resilience Network, London First

Secretary to the Board

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Annual Report 2016

UCL Institute for Risk and Disaster Reduction
University College London
Gower Street, London WC1E 6BT
United Kingdom

Location: Bloomsbury Campus, South Wing (2nd floor)



Flooding in the Niger-Delta region of Nigeria in 2012. IRDR researchers are investigating how the property damage and loss of lives in this severe natural disaster affected the country's economy.

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.

The logo for the UCL Institute for Risk and Disaster Reduction (IRDR). It features the letters 'IRDR' in a large, bold, white, sans-serif font. To the left of the 'I' is a vertical bar containing a grid of small squares, resembling a barcode or a stylized representation of a building's facade.

UCL Institute for Risk
and Disaster Reduction

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