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SECED

NEWSLETTER

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In this issue

SECED Young Members' Tour of the Schofield Centre Laboratory, University of Cambridge

Sarah Tallett-Williams
Jacobs, London, UK

Fiona Hughes
University of Cambridge, UK

On 11th April 2019, Professor Gopal Madabhushi and Fiona Hughes hosted a group of SECED Young Members at the Schofield Centre laboratory, University of Cambridge. The Schofield Centre is a world-renowned laboratory for physical modelling in geotechnics and is home to a wide range of experimental equipment, including the 10 m diameter Turner beam centrifuge (Figure 1). Dynamic centrifuge modelling, which utilises an earthquake actuator on the beam centrifuge, is an extremely powerful tool for investigating geotechnical earthquake engineering problems. The visitors spent the afternoon being shown around the laboratory and learning about state-of-the-art tests currently being performed at the centre.

Fiona gave a detailed introduction to the centrifuge and explained how the theory is put into practice. She presented the equipment used in the model preparation procedure, along with model containers and instrumentation used on the centrifuge (Figure 2a).

Professor Madabhushi took the visitors down into the facility testing pit to see the centrifuge. He discussed the operation of the centrifuge and the evolution of the dynamic testing capabilities at the Schofield Centre. He also reviewed many unexpected results the centrifuge had produced in its history.

PhD students working in the laboratory then presented their current research projects (Figure 2b). The day led to great discussions and connections, stimulated by a truly mixed group of industry professionals, academics, structural and geotechnical engineers. It is hoped that this event will be repeated at a different lab next year – look out for invites to this and other SECED Young Members' events soon!

Figure 1: The Turner beam centrifuge (© Fiona Hughes).

Figure 2: (a) Fiona Hughes explains the design of the laminar container; (b) Geoff Eichhorn discusses the use of the mini-drum centrifuge for investigating soil–structure interaction around pipelines during landslides (© Sarah Tallett-Williams).

SECED

SECED, The Society for Earthquake and Civil Engineering Dynamics, is the UK national section of the International and European Associations for Earthquake Engineering and is an Associated Society of the Institution of Civil Engineers. It is also sponsored by the Institution of Mechanical Engineers, the Institution of Structural Engineers, and the Geological Society. The Society is also closely associated with the UK Earthquake Engineering Field Investigation Team. The objective of the Society is to promote co-operation in the advancement of knowledge in the fields of earthquake engineering and civil engineering dynamics including blast, impact and other vibration problems.

For further information please contact the SECED Secretary at the Institution of Civil Engineers.

Book Review: 'Seismic Design of Foundations: Concepts and Applications'

Nick O'Riordan
Arup, London, UK

The authors have drawn upon their direct experiences of recent earthquakes to produce a good introduction to the subject that will help to infill gaps on technical bookshelves. As would be expected from academic authors the basic concepts used in codes are well covered, however it is in the practical application of these concepts that the book is light.

With increasing urbanisation in seismically active zones, increasing focus on social and business resilience, digital engineering, the instrumentation of structures and the ground, and near-instant feedback from globally deployed seismographs, this reviewer was disappointed to find no coverage of fundamentals to aid risk communication and mitigation, other than to observe, post L'Aquila, that articulation of such risks is important. Descriptions for the selection of appropriate soil properties are reasonable, although rate effects and hysteretic damping as large shear strains develop, especially at the low effective stresses that are a feature of bearing capacity triggering, are not discussed. Important areas such as spectral matching and selection of ground motions, (free-field) site-specific response analyses, liquefaction behaviour and piled foundations are described and referenced to a depth that enables the reader to locate more specialised publications.

Readers expecting to encounter detailed coverage of soil–structure interaction methods that can legitimately reduce foundation size and structural demand, or indeed aid back-analysis, will be disappointed. Inertial mass participation at various structural vibration modes is mentioned in passing but no examples are given. Whilst liquefaction assessment methods are described in some detail, the design, evaluation and effectiveness of countermeasures for controlling the associated cyclic displacements are left almost at the level of anecdote. There is very limited coverage of retrofitting installations in the aftermath of seismic events, or to comply with new code requirements.

Book information

Seismic Design of Foundations: Concepts and Applications
by Subhamoy Bhattacharya, Rolando P. Orense and Domenico Lombardi
ICE Publishing, 2019 (£85, pp 480)
find out more

SECED Newsletter

The SECED Newsletter is published quarterly. Previous issues of the SECED Newsletter are available online. All contributions of relevance to the members of the Society are welcome.

Manuscripts should be sent by email. Diagrams, pictures and text should be attached in separate electronic files. Hand-drawn diagrams should be scanned in high resolution so as to be suitable for digital reproduction. Photographs should likewise be submitted in high resolution. Colour images are welcome.

Please contact the Editor of the Newsletter, Damian Grant, for further details.

This edition of the Newsletter was co-edited by Konstantinos Gkatzogias.

Notable Earthquakes
January 2019 – April 2019

Reported by British Geological Survey

Issued by: Davie Galloway, British Geological Survey, July 2019.
Non British Earthquake Data supplied by: United States Geological Survey.

Year	Day	Mon	Time UTC	Lat	Lon	Dep km	Magnitude ML	Mb	Mw	Location
2019	01	JAN	01:18	52.41N	3.14W	7	1.6			QUABBS, SHROPSHIRE
2019	02	JAN	23:44	51.49N	0.97W	8	1.5			CAVERSHAM, READING
Felt Caversham, Reading (2 EMS).										
2019	03	JAN	02:20	56.58N	5.92W	8	2.2			MORVERN, HIGHLAND
Felt Drimnin, Lochaline and Glenborradale, Highland and in Craignure, Gribun, Tobermory, Salen, Carsaig, Gruline, Lismore and Oban, Argyll & Bute (3 EMS).										
2019	05	JAN	19:25	8.14S	71.59W	570			6.8	ACRE, BRAZIL
2019	06	JAN	17:27	2.26N	126.76E	43			6.6	MOLUCCA SEA
2019	06	JAN	22:09	51.27N	2.96W	10	1.7			LYMPSHAM, SOMERSET
2019	11	JAN	22:51	53.73N	1.09E	6	2.6			SOUTHERN NORTH SEA
2019	15	JAN	18:06	13.34S	166.88E	35			6.6	VANUATU
2019	20	JAN	01:32	30.04S	71.38W	63			6.7	COQUIMBO, CHILE
Two people killed, several others injured and at least 1,000 homes damaged in Coquimbo.										
2019	22	JAN	19:01	43.12S	42.36E	13			6.7	INDIAN OCEAN
2019	24	JAN	02:20	56.09N	5.35W	10	1.5			LOCHGAIR, ARGYLL & BUTE
Felt Castleton, Ardrishaig and Lochgilphead (3 EMS).										
2019	27	JAN	23:48	53.20N	0.25W	27	2.2			BUCKNALL, LINCOLNSHIRE
2019	01	FEB	16:14	14.68N	92.45W	66			6.7	CHIAPAS, MEXICO
One person injured and over 100 buildings damaged in southern Chiapas. 14 people injured and several buildings damaged in Guatemala.										
2019	08	FEB	11:14	59.30N	1.13W	22	1.7			NORTHERN NORTH SEA
2019	14	FEB	07:43	51.16N	0.25W	2	2.4			NEWDIGATE, SURREY
Felt Newdigate, Surrey and in surrounding towns, villages and hamlets (4 EMS).										
2019	18	FEB	01:13	62.37N	2.30E	10	2.4			NORWEGIAN SEA
2019	19	FEB	17:03	51.16N	0.25W	2	2.0			NEWDIGATE, SURREY
Felt Newdigate, Charlwood and Dorking, Surrey and in Crawley, West Sussex (3 EMS).										
2019	22	FEB	10:17	2.19S	77.05W	145			7.5	PASTAZA, ECUADOR
One person killed, nine others injured, and several houses and buildings damaged in the Morona-Santiago, Los Rios and El Oro areas.										
2019	25	FEB	16:57	54.25N	2.33W	4	1.7			COWGILL, CUMBRIA
2019	27	FEB	03:42	51.16N	0.25W	2	3.1			NEWDIGATE, SURREY

Year	Day	Mon	Time UTC	Lat	Lon	Dep km	Magnitude ML	Mb	Mw	Location
Felt throughout the epicentral region with the majority of reports coming from Newdigate, Charlwood, Horley and Dorking, Surrey and Horsham, West Sussex (5 EMS).										
2019	01	MAR	08:50	14.71S	70.16W	267			7.0	PUNO, PERU
One person killed in Arequipa, two others injured in Socabaya and several houses damaged or destroyed in Ituata.										
2019	14	MAR	14:30	52.09N	2.90W	23	2.4			BYFORD, HEREFORDSHIRE
2019	16	MAR	10:11	55.79N	6.35W	8	1.8			ISLAY, ARGYLL & BUTE
Felt Port Charlotte and Bruichladdich, Islay (2 EMS).										
2019	26	MAR	05:52	55.33N	5.29W	8	1.7			FIRTH OF CLYDE
2019	28	MAR	22:31	54.24N	0.26W	1	1.7			FILEY, NORTH YORKSHIRE
2019	30	MAR	05:03	53.68N	1.14E	9	2.4			SOUTHERN NORTH SEA
2019	07	APR	22:58	54.53N	8.61W	10	2.2			COUNTY DONEGAL, IRELAND
Felt in the Killybegs area and in Ardara and Ballyshannon, County Donegal (3 EMS).										
2019	08	APR	01:49	52.84N	2.60W	4	2.5			HODNET, SHROPSHIRE
Felt Whitchirch, Willaston, Shrewsbury and Market Drayton, Shropshire, in Telford and Newport, Telford & Wrekin and in Nantwich, Cheshire East (3 EMS).										
2019	09	APR	17:53	58.63S	25.30W	38			6.5	SOUTH SANDWICH ISLANDS
2019	12	APR	11:40	1.82S	122.58E	15			6.8	SULWESI, INDONESIA
2019	13	APR	11:20	54.25N	3.38W	7	2.2			BOOTLE, CUMBRIA
Felt Broughton Beck, Rosside, Ulverston and Millom (3 EMS).										
2019	22	APR	09:11	14.95N	120.52E	21			6.1	LUZON, PHILIPPINES
At least 18 people killed, 256 others injured and over 4,300 houses and buildings damaged in Central Luzon. Many power outages occurred, train services were disrupted, and a landslide occurred in San Marcelino. Damage estimated at $US10 million.										
2019	25	APR	10:15	51.08N	3.01W	6	1.5			NORTH NEWTON, SOMERSET
2019	29	APR	20:18	54.59N	7.97W	16	1.8			COUNTY DONEGAL, IRELAND
Felt County Donegal and in parts of County Fermanagh and County Leitrim (3 EMS).										

Forthcoming Events

Evening Lectures

Seismicity Induced by Hydraulic Fracturing Operations at Preston New Road, Lancashire, 2018

Brian Baptie

25 September 2019 (6:00 pm) at the Institution of Civil Engineers, London

Synopsis

Hydraulic fracturing of an unconventional shale reservoir in northwest England began in October 2018, over seven years after induced seismicity related to the first such operations in the UK resulted in a moratorium. We use data from a dense network of sensors to map induced seismicity in space and time and to show that seismicity rates increase significantly during operations. Current UK regulations require operators to temporarily stop injection if any events exceed a magnitude of M_L 0.5, however, we find that both magnitude uncertainty and incompleteness of the

earthquake catalogue may create a considerable problem for both operators and regulators, highlighting the problem of reliable characterisation of induced seismicity during operations.

Brian Baptie (British Geological Society – BGS)

Dr Brian Baptie is Head of Seismology at the BGS. He holds a PhD in seismology from the University of Edinburgh examining the behaviour of seismic waves in anisotropic wave guides as mechanism for identifying fractures. Since 1996 he worked for the BGS, where he has headed the Seismology section since 2008. His work with BGS has included the monitoring of both naturally occurring and induced seismicity from a wide range of sources.

Further information

This evening meeting is organised by SECED and chaired by Dr Chris Browitt (University of Edinburgh). Non-members of the society are welcome to attend. Attendance at this meeting is free. Seats are allocated on a first come, first served basis. Tea, coffee and biscuits will be served from 5:30 to 6:00 pm.

This event will be streamed live on the ICE's website; follow this link to attend the event online.

SECED Young Members' Annual General Meeting (AGM) 2019 What Does True Resilience Mean for Developing Countries?

Sebastian Kaminski, Viviana Novelli and Josh Macabuag

30 October 2019 (6:00 pm) at the Institution of Civil Engineers, London

AGM Agenda

All SECED members are invited to attend the first SECED Young Members' AGM; non-members are also welcome to attend. Only SECED Young Members will have voting rights. Three vacancies are available on the SECED Young Members' Subcommittee. A full agenda and nomination forms will be made available to all SECED Young Members soon.

Lecture Synopsis

Resilient communities are defined by the UK Government as empowered businesses and individuals able to harness local resources and expertise to help themselves and others to prepare, respond and recover from disruptive challenges as well as planning and adapting to long term social and environmental changes. As one of nature's most destructive forces, earthquakes pose a challenge to many nations, including some of the most developed. How then can we best prepare developing communities to ensure their future prosperity? As one of the Institution of Structural Engineers' 2019 technical themes, the meaning of true resilience will be jointly explored by EEFIT and the SECED Young Members in this evening meeting.

The speakers will draw on their experiences from Africa, South America and Asia and give valuable insights into training communities using environmentally and financially sustainable methods.

Sebastian Kaminski (Arup)

Sebastian Kaminski is a Chartered Structural Engineer based in Arup's Specialist Technology & Research Team in London. He has experience in international development and engineering projects in developing countries, especially permanent low-cost housing in highly seismic areas, and is a specialist in using bamboo for construction, in which he runs training workshops internationally. He has provided technical support to the Shelter Cluster after various events, including the Nepal 2015 earthquake, the Ecuador 2016 earthquake and most recently the Rohingya refugee crisis in Bangladesh. In 2011, Sebastian won the IStructE Pai Lin Li Travel Award for research into low-cost modern bamboo housing in developing countries, the findings of which led to the development of a new seismic-resistant bamboo housing system which won the IStructE's Sustainability award in 2015. He is a member of the IStructE's Humanitarian and International Development Panel.

Viviana Novelli (University of Bristol)

Dr Viviana Novelli is a structural/seismic engineer with a PhD in Earthquake Engineering from UCL. She has a robust track record in leading international projects, focusing on earthquake modelling to assess seismic building performance and practical experience in pre/post-earthquake assessment in Europe, Middle East, Africa and South America. Since February 2018, Viviana has been working for the Department of Civil Engineering at the University of Bristol as a research associate in earthquake impact for the project PREPARE (Enhancing PREParedness for East African Countries through Seismic Resilience Engineering), a 3-year EPSRC-Global Challenges Research Fund (GCRF) project. In 2019, Viviana was elected to the EEFIT Management Committee.

Josh Macabuag (Search and Rescue Assistance in Disasters)

Dr Josh Macabuag is a Chartered Civil Engineer with over 10 years' experience in disaster risk-related fields. His background is in building design, catastrophe risk modelling and disaster response. He has had experience across all stages of the disaster management cycle: from response and recovery to risk transfer/insurance. His field experience includes disaster response, design or vulnerability assessment for earthquakes, tsunamis and storm surges. He is also an Urban Search and Rescue (USAR) Engineer for the NGO SARAID (Search & Rescue Assistance in

Disasters), with several years' experience of overseas exercises and deployments including to Nepal as a USAR engineer, following the earthquake of April 2015, and to the Turks and Caicos Islands, following Hurricane Irma (2017). He is a member of the IStructE's Humanitarian and International Development Panel and Vice Chair of the EEFIT Management Committee.

Further information

This evening meeting is jointly organised by SECED Young Members and EEFIT. The meeting is chaired by Dr Sarah Tallett-Williams (Jacobs). The AGM will take place at 6:00 pm, with the talks beginning at 6:15 pm. All SECED and EEFIT members and all non members are welcome to attend. Attendance at this meeting is free. Seats are allocated on a first come, first served basis. Tea, coffee and biscuits will be served from 5:30 to 6:00 pm.

Soil–Structure Interaction and Optimum Seismic Design of Onshore and Offshore Energy Projects

Prodromos Psarropoulos

29 January 2020 (6:00 pm) at the Institution of Civil Engineers, London

Synopsis

Since society demands increased availability and reliability of energy supply, together with improved environmental standards, the structural design of any onshore or offshore energy project (including its foundation) may be very demanding, depending on the circumstances. It is evident that in the case of long energy projects that traverse remote regions with extreme terrains and/or seabeds such as a gas pipeline or a cable, the design may be more challenging due to the variety of geotechnical conditions and the potential geohazards along the routing. Nevertheless, in areas that are characterized by moderate or high seismicity the design of energy projects may be more complicated due to the various types of seismic loading. The seismic loading may be either dynamic due to the inertial forces developed on the mass of the structure(s) and/or quasi-static due to the permanent ground deformations (PGDs) caused by various earthquake-related geohazards, such as active-fault ruptures, slope instabilities, and soil liquefaction phenomena. The current presentation tries through case studies to shed some light on these interesting issues of geotechnical earthquake engineering from a structural and a geotechnical perspective. The first part of the presentation focuses on the impact of local site conditions (i.e., soil stratigraphy, bedrock geomorphology, and/or surface topography) on the ground surface motion that will dominate the dynamic structural response. In the second part, emphasis is given on the quantitative assessment of the earthquake-related geohazards and the realistic estimation of the PGDs that will actually determine the soil–structure interaction and the structural response/distress. Finally, the third part of the presentation is devoted to remote sensing and early-warning systems that are required for the safe operation of energy projects.

Prodromos Psarropoulos

Dr Prodromos Psarropoulos is a Structural and Geotechnical Engineer with a balanced scientific and professional experience in the analysis and design of various structures and geostructures for almost 25 years. After his PhD in Geotechnical Earthquake Engineering at the National Technical University of Athens (NTUA), he conducted advanced research in various institutes in Greece and Italy, while he has been an adjunct Associate Professor of Geophysics & Earthquake Engineering in the Department of Infrastructure Engineering of the Hellenic Air Force Academy. In parallel, he has been involved in the design and construction of various challenging engineering projects in Greece and abroad. His expertise is in geotechnics, soil dynamics and earthquake engineering, mainly including: (a) problems of static and dynamic soil–structure interaction (regarding foundations, retaining structures, pipelines, etc.), (b) static and seismic stability assessment of dams, slopes and embankments, and (c) numerical simulation of dynamic soil response (i.e., local site effects and microzonation studies). Currently, he is teaching courses of geotechnical engineering and offshore engineering in the School of Rural & Surveying Engineering at NTUA, while he has been a lead member of the team of experts for the quantitative geohazard assessment and the seismic design of the upgrade of the main oil-refinery in Greece and two major high-pressure gas pipelines in south-east Europe (IGI–Poseidon and TAP).

Further information

This evening meeting is organised by SECED and chaired by Dr Stavroula Kontoe (Imperial College London). Non-members of the society are welcome to attend. Attendance at this meeting is free. Seats are allocated on a first come, first served basis. Tea, coffee and biscuits will be served from 5:30 to 6:00 pm.

For up-to-date details and further information on events organised by SECED, visit the SECED website or contact Shelly-Ann Russell (020 7665 2147, societyevents@ice.org.uk)

2019 SECED Conference

Earthquake risk and engineering towards a resilient world

9–10 September 2019 in Greenwich, London

Chair: Prof. Tiziana Rossetto

Overview

The SECED 2019 Conference will be a 2-day conference on Earthquake and Civil Engineering Dynamics taking place on 9–10 September 2019 in Greenwich, London. This is the first major conference to be held in the UK on this topic since the SECED 2015 Conference.

The conference will bring together experts from a broad range of disciplines, including structural engineering, nuclear engineering, seismology, geology, geotechnical engineering, urban development, social sciences, business and insurance; all focused on risk, mitigation and recovery.

The conference will take place in the modern facilities of the University of Greenwich (Stockwell Street Library building), with the conference dinner held in the Painted Hall of the Old Royal Naval College on the evening of the first day.

Please visit the SECED 2019 Conference website for further and updated information on conference programme, keynote speakers, sessions, registration fees, sponsorships, conference committees, venue and accomodation.

University of Greenwich, Stockwell Street Library (© University of Greenwich)

Old Royal Naval College

Programme

The SECED 2019 Conference will feature seven keynote lectures and four symposia over two days. The conference programme is now available online.

Keynote speakers

- Prof. Sinan Akkar, Boğaziçi University, Kandilli Observatory and Earthquake Research Institute, Turkey
- Prof. Ioannis Anastasopoulos, ETH Zurich, Switzerland
- Prof. Jack Baker, Stanford University, USA
- Prof. Eleni Chatzi, ETH Zurich, Switzerland
- Prof. Dina D'Ayala, University College London, UK
- Prof. Ahmed Elghazouli, Imperial College London, UK
- Zygmunt Lubkowski, Arup, UK

Conference sessions

- Blast, impact & vibration
- Catastrophe risk modelling for earthquakes
- Design for nuclear safety
- Earthquake disaster risk reduction, reconnaissance & recovery
- EEFIT – Special session
- Fragility, vulnerability and infrastructure resilience
- Geotechnical earthquake engineering
- Induced seismicity
- Progress in urban & regional seismic risk assessment
- Risk assessment in developing countries
- Seismic assessment & retrofitting
- Seismic design & analysis: general; steel; bridges; concrete & codes; timber, masonry & heritage (5 sessions)
- Seismic hazard & engineering seismology
- Seismic protective devices
- Soil–structure interaction
- Vibration serviceability

The Painted Hall (© University of Greenwich)

Clock Tower (© University of Greenwich)

Registration

Registration for the SECED 2019 Conference is now open at the standard rates (early-bird registration has closed). To register, visit the Registration webpage; information on cancellation and substitution policies are also provided.

The *full registration* fee includes:

- 2-day conference sessions (9 & 10 September 2019)
- Conference bag including printed programme and USB proceedings
- Coffee breaks & light lunches
- One conference dinner ticket

The *day registration* fee includes:

- 1-day conference sessions (9 or 10 September 2019)
- Conference bag including printed programme and USB proceedings
- Coffee breaks & light lunch on selected day

Registration fees (standard rates)	Full (2 days)[1]	Day[2]
Member	£485	£245
Non member	£550	£275
Student / retiree	£325	£165
Conference dinner ticket	£130	

1. The full rate includes one conference dinner ticket. Additional dinner tickets can be purchased for guests and accompanying family members.
2. The day rate excludes a conference dinner ticket.

Best Paper and Poster Award

We are delighted to announce the presentation of two awards at the conference. The first award, sponsored by Jacobs, is *Best Paper by a Young Author* – to be eligible, the lead author must be under 35 years old on the first day of the conference. The second award, ponsored by NORSAR, is *Best Poster Presentation*. The prizes will be awarded at the close of the conference on Tuesday 10 September.

Venue

For directions to the Stockwell Street Library, please visit the University of Greenwich's website.

Accomodation

Please visit the Accomodation webpage to find details of recommended hotels in Greenwich. Further accommodation options can be found on the Visit Greenwich website.

The SECED 2019 Conference is sponsored by:

Organisers

The SECED 2019 Conference is enabled by the Organising Committee and Outsourced Events.

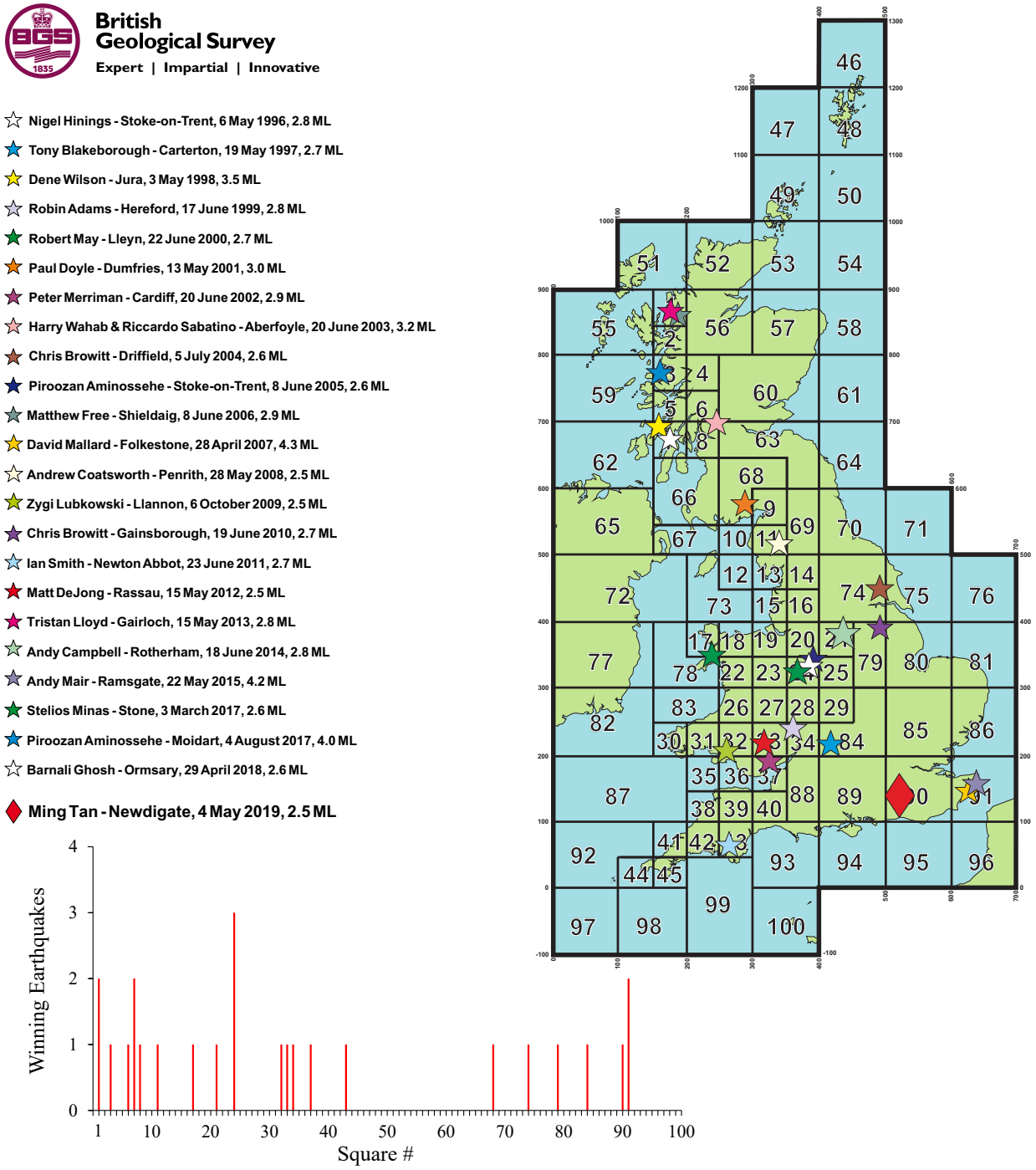
SECED Copyright Notice

SECED Earthquake Competition Result 2019

2019's SECED Earthquake Competition confirmed once more its brevity, as commented back in Vol. 22 No. 3 (2010) of the SECED Newsletter by Alice Walker, the competition organiser, and Davie Galloway in their joint article. This year, an M_L 2.5 tremor struck in Newdigate (Surrey) on 4th May, only two days after the 2019 SECED AGM signalling annually the start of the SECED's long-running contest.

Ming Tan defended Mott MacDonald's winning title and he will be presented with his prize during the September SECED event at the Institution of Civil Engineers. Being the second Mott engineer in a row successfully predicting Britain's next earthquake of M_L 2.5 or greater (after Barnali Ghosh in 2018), Ming placed his bet on the 'silent' square #90 which had remained inactive during 23 years of the competition. To spice things up, the SECED Newsletter editors decided to provide a histogram with the number of winning occurrences per square, aiming to update and supplement the chart with new features in the future.

So, select your square and look out for Alice at the next SECED AGM to enter 2020's competition!



Earthquake Competition Winners, 1996–2019