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INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)

INITIATIVE ON FORENSIC GEOLOGY (IFG)

ANNUAL REPORT FOR 2016

DR LAURANCE DONNELLY, CHAIR IUGS-IFG



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INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)

INITIATIVE ON FORENSIC GEOLOGY (IFG)

Annual Report 2016

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CONTENTS

1	TITLE OF CONSTITUENT BODY	5
1.1	Report Objective.....	5
2	AIM.....	5
2.1	Mission Statement.....	5
2.2	IUGS-IFG Objectives.....	5
3	ROLE WITHIN IUGS SCIENCE POLICY	5
3.1	Background.....	5
3.2	Main Approach	5
4	ORGANIZATION.....	6
4.1	IFG Committee Changes	6
5	EXTENT OF NATIONAL, REGIONAL & GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS.	8
6	ACKNOWLEDGEMENTS	8
7	INTERACTION WITH OTHER INTERNATIONAL PROJECTS & ORGANISATIONS.....	9
8	CHIEF ACCOMPLISHMENTS	12
8.1	JANUARY.....	12
8.1.1	69 th IUGS Executive Committee Meeting, Kunming, China ¹	12
8.1.2	Australian Facility for Taphonomic Experimental Research (AFTER) ^{1,2,3,5,25,26}	12
8.2	FEBRUARY.....	12
8.2.1	Yorkshire Regional Group of the Geological Society of London, Leeds, UK ¹	12
8.2.2	Home Office (CAST) & UCL, UK ¹	12
8.3	MARCH.....	12
8.3.1	Seminario, Geologia Forense, Università degli Studi di Catania, Sicilia, Italia ^{1,3,8,9,18}	12
8.3.2	Forensic Geologist Opportunity with the Abu Dhabi Police ^{1,23}	12
8.3.3	Experimental Forensic Geology, Colombia, South America ¹⁶	12
8.4	APRIL.....	13
8.4.1	IUGS Ad Hoc Review of IFG, Manchester, UK ^{1,11}	13
8.4.2	Seminario, Geologia Forense, Sicilia, Italia ^{1,3,8,9,18}	13
8.4.3	European Geosciences Union General Assembly, Vienna, Austria ³	13
8.5	MAY.....	13
8.5.1	Environmental Crimes, Belfast, Northern Ireland and Australia ^{2,11}	13
8.5.2	Seminario, Geologia Forense, Agrigento, Sicilia, Italia ^{1,3,8,9,18}	13
8.5.3	Taphonomic Chemistry and Grave Detection, University of Staffordshire, UK ^{1,3,8,9,18}	13
8.6	JUNE.....	14
8.6.1	Geological Society of London, (EMRG) & BGS, Nottingham, UK ¹	14
8.6.2	An Garda Síochána Headquarters, ICLVR, Dublin, Ireland ^{1,3,8,9,10}	14
8.6.3	IGI and GSI, Dublin, Ireland ^{1,3,8,9,10}	14
8.6.4	Forensic Geology and BAHID, Dundee, Scotland ¹¹	14
8.6.5	Forensic Canines Detector Dogs ^{1,5}	14
8.6.6	Forensic Geology in Japan ^{1,24}	14
8.7	JULY.....	14
8.7.1	SWGCEO, Phoenix, Arizona, USA ^{2,4,12,15}	14
8.7.2	Forensic Geology, Università degli Studi di Messina, Sicilia, Italia ^{1,3,8,9,18}	14
8.7.3	University of Leicester, Department of Geology, UK ^{1,11}	15
8.7.4	11 th GeoENV, Lisbon, Portugal ³	15
8.8	AUGUST.....	15
8.8.1	5 th European Meeting on Forensic Archaeology (EMFA), Dublin Castle, Ireland ^{1,11}	15
8.8.2	Medicolegal Death Investigation Conference, Montana, USA ¹⁴	15
8.8.3	Forensic Soil Science and Geology, 35 th IGC, Cape Town, South Africa ¹⁻²⁹	15
8.8.4	Hillsborough Castle Skeleton, Northern Ireland ¹¹	15
8.9	SEPTEMBER.....	15
8.9.1	The Disappeared, Pinochet's Dictatorship, Chile (1973-1990), UK ^{1,11}	15
8.9.2	Geological Fakes and Fraud, SWRG, University of Bristol, UK ¹¹	16

8.9.3	ANZFSS, Auckland, New Zealand ^{13,17,26}	16
8.10	OCTOBER.....	16
8.10.1	Forensic Geology and Chartered Institute for Archaeologists (CIfA) ^{1,11}	16
8.10.2	Institute of Forensic Science, Ministry of Public Security, China ^{1,9,11,14,29}	16
8.10.3	18 th International Forensic Science Symposium, Interpol, Lyon, France ^{1,2,3,11}	16
8.10.4	Field Portable Xray Fluorescence (FRXRF), JM & QUB UK ^{1,11}	17
8.10.5	Experimental Ground Penetrating Radar, Mala & QUB, UK & Ireland ^{1,11}	17
8.11	NOVEMBER	17
8.11.1	Forensic Geologist Opportunity, AFP, Australia ^{1,4}	17
8.11.2	Universidad de Antioquia y Tecnológico de Antioquia, Medellin, Colombia ¹⁶	17
8.11.3	CAC & ASTEE joint Seminar, California, USA ^{4,15}	17
8.11.4	Forensic Geology, Universities of Camerino and Verona, Italy ¹⁸	17
8.12	DECEMBER	17
8.12.1	National Crime Agency, National Search Adviser ¹	17
8.12.2	Brazilian Federal Police, Curitiba, Brazil ^{1,16,17,18}	18
8.12.3	Planning, 3 rd Iberoamerican Seminar on Forensic Geology, Argentina ^{1,16,17,18}	18
8.12.4	TV Interview on Forensic Geology, Rome, Italy ¹⁸	18
8.12.5	Geological Society of London, Forensic Geoscience Group ^{1,11}	18
8.12.6	Forensic Geology and The Media ^{1,3,11,16,18}	19
8.12.7	Forensic Geology and Crime Writer ^{1,3,11,18}	19
9	MAIN PRODUCTS IN 2015	20
9.1	Confidential Documents and Operations	20
9.2	Training Documents.....	20
9.3	Website.....	20
9.4	Flyer	20
9.5	Geoforensic International Network (GIN)	20
9.6	Certificates.....	21
9.7	Newsletter	21
9.8	Publications	21
10	MAIN PROBLEMS ENCOUNTERED IN 2016	22
10.1	Funding: A Principal Leadership Challenge.....	22
10.2	Competence, Accreditation, Regulation and Code of Conduct.....	22
10.3	Alignment with Forensic Science	22
10.4	Security and Geopolitics	22
10.5	Confidentiality	22
10.6	Publications	22
10.7	Law Enforcement Relationships	22
10.8	Media.....	22
11	SUMMARY OF EXPENDITURES IN 2015	22
11.1	Bank Account & Management.....	22
11.2	Summary of Accounts.....	22
12	WORK PLAN FOR 2017	23
13	CRITICAL MILESTONES	24
14	ANTICIPATED OUTPUTS TO BE ACHIEVED FOR 2017	24
15	BUDGET FOR 2017	24
APPENDIX I: SELECTED PUBLICATIONS IN 2016.....		26
APPENDIX II: SELECTED PHOTOGRAPHS AND ASSOCIATED INFORMATION.....		31

INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS)
INITIATIVE ON FORENSIC GEOLOGY (IFG)
ANNUAL REPORT FOR 2016

1 TITLE OF CONSTITUENT BODY

The International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG) was launched at the 62nd Executive Committee meeting of the IUGS, at UNESCO headquarters, in Paris, France, on 22nd February 2011.

1.1 Report Objective

This document is the IUGS-IFG Chair's annual report for 2016. It has been produced for the IUGS Executive Committee and it gives summary of the IFG activities throughout 2016. A financial summary of the IFG accounts is also included.

2 AIM

2.1 Mission Statement

The aim of IUGS-IFG is to develop forensic geology internationally and promote its applications.

2.2 IUGS-IFG Objectives

The objectives of the IUGS-IFG are to:

1. Collate and disseminate data and information on forensic geology applied to policing and law enforcement, criminal, environmental and civil investigations;
2. Promote international meetings, seminars, conferences and training;
3. Develop a 'Committee' to act as principal advisers, collaborators and active participants;
4. Develop an international network whereby each 'member' will act as a principal contact in their respective country for the collation and dissemination of information on forensic geology;
5. Collate, make available and where appropriate review any existing documentation and publications in forensic geology; and
6. Produce a document endorsed by the Committee to be called; '*A Guide to Forensic Geology*'.

3 ROLE WITHIN IUGS SCIENCE POLICY

3.1 Background

The documented history of forensic geology can be traced to the latter half of the 19th Century. However, in recent years there has been renewed interests and developments in the multidisciplinary fields of forensic geology throughout the world. Since about 2000 numerous international meetings, conferences, seminars and training on different aspects of forensic geology has taken place. Furthermore, several text books have been published and there are technical papers in peer reviewed scientific journals, conference proceedings, magazines, police and law enforcement magazines. Since 2011 IFG has formally represented the IUGS global interests in forensic geology. As such, IUGS-IFG provides training, capacity building, knowledge transfer and outreach events. These advocate the IUGS-IFG aim, '*to develop forensic geology internationally and promote its applications*'. The members of the IFG committee are senior representatives of their respected organisations and include geologists, geoscientists, police officers, forensic scientists and law enforcement agencies.

3.2 Main Approach

IUGS-IFG aims to raise the global awareness of forensic geology by holding meetings and conferences, promoting research, teaching, training and the operational deployment of forensic geologists. This will be consistent with the broad objectives of IUGS, and includes the following:

- **Knowledge transfer and capacity building:** This raises the levels of awareness and knowledge, and provides information about forensic geology;

- **Technology transfer:** This improvement in skill sets; and
- **Outreach:** This provides education and information to a range of stake holders that include; geologists, geoscientists, serving police officers, law enforcement organisations, the public, schools and universities, engineers, lawyers and the legal profession, forensic scientists, the media and politicians.

4 ORGANIZATION

The IUGS-IFG Committee comprises representatives from major geographical regions of the world and comprises specialists from academia, industry, consultancy, operationally based forensic geologists, the police, law enforcement agencies and forensic organisations, as shown in Figure 4.1 and Table 4.1.

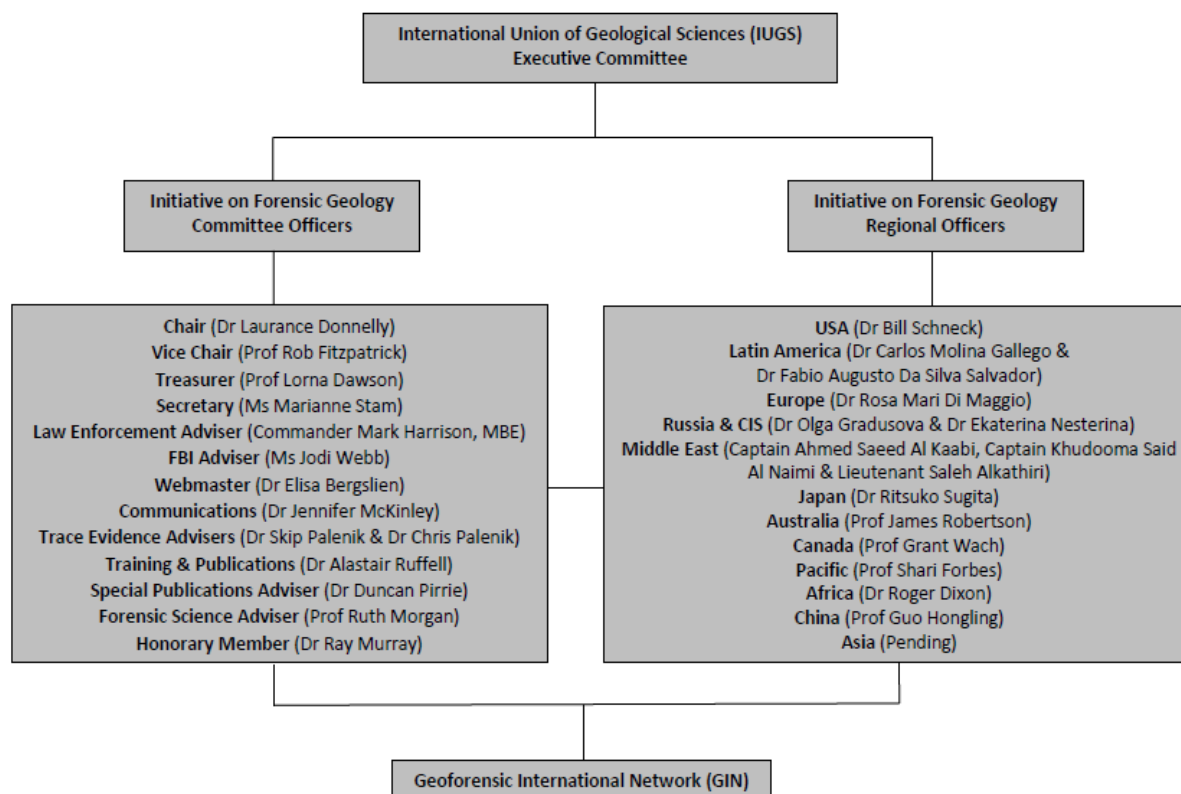


Figure 4.1 Structure of the IUGS-IFG Committee in 2016-2017

4.1 IFG Committee Changes

In 2016, Dr Guo Hongling, Institute of Forensic Science, Ministry of Public Security, Division of Trace Evidence Analysis, in China, was assigned to the IUGS-IFG Committee as the Officer for China.

Dr Ritsuko Sugita, who was the Officer for Asia will now focus on developing and promoting forensic geology in Japan.

In 2017, the IUGS-IFG committee propose to further expand and, for example, to appoint an Officer to manage the Geoforensic International Network (GIN) and appoint an Officer for Asia.

POSITION	NAME	COUNTRY	AFFILIATION
Chair	Dr Laurance Donnelly ¹	England (UK)	IUGS-IFG & Arup, Manchester, England, UK
Vice Chair	Prof Rob Fitzpatrick ²	Australia	CSIRO, Australia
Treasurer	Prof Lorna Dawson ³	Scotland (UK)	The James Hutton Institute, Aberdeen, Scotland, UK
Secretary	Ms Marianne Stam ⁴	USA	California Department of Justice, Los Angeles, USA
Webmaster/Information Officer	Dr Elisa Bergslien ⁵	USA	SUNY Buffalo State, New York, USA
Geoforensic Law Enforcement Adviser	Commander Mark Harrison, MBE ⁶	Australia	Australia Federal Police, Australia
FBI Adviser	Dr Jodi Webb ⁷	USA	Federal Bureau of Investigation (FBI), Virginia, USA
Training and Publications	Dr Alastair Ruffell ⁸	Ireland (UK)	Queens University Belfast, Northern Ireland
Communications	Dr Jennifer McKinley ⁹	Ireland (UK)	Queens University, Belfast, Northern Ireland
Special Publications Adviser	Dr Duncan Pirrie ¹⁰	England (UK)	Helford Geoscience LLP, Cornwall, UK
Forensic Science Adviser	Prof Ruth Morgan ¹¹	England (UK)	University College London, JDI Centre for the Forensic Sciences, London, UK
Geological (Trace) Evidence Advisers	Dr Skip Palenik ¹² Dr Chris Palenik ¹³	USA	Microtrace LLC, Illinois, USA
Honorary Committee Member	Dr Raymond Murray ¹⁴	USA	Forensic Geologist, Montana, USA
Officer, USA	Dr Bill Schneck ¹⁵	USA	Washington State Patrol Crime Lab
Officer, Latin America	Dr Carlos Molina Gallego ¹⁶ Dr Fabio Augusto Da Silva Salvador ¹⁷	Colombia Brazil	Instituto Nacional de Medicina Legal y Ciencias Forense, Bogota, Colombia Brazilian Federal Police, Curitiba, Brazil
Officer, Europe	Dr Rosa Maria Di Maggio ¹⁸	Italy	Geoscienze Forensi Italia (Formerly Servizio Polizia Scientifica), Rome, Italy
Officer, Russia & CIS	Dr Olga Gradusva ¹⁹ Dr Ekaterina Nesterina ²⁰	Russia	Russian Federal Centre of Forensic Science and Soil Trace Evidence Experts, Moscow, Russia
Officer, Middle East	Captain Ahmed Saeed Al Kaabi ²¹ Captain Khudooma Said Al Naimi ²² Lieutenant Saleh Ali Al Katheeri ²³	UAE	Abu Dhabi Police, Forensic Evidence, United Arab Emirates Abu Dhabi Police, Forensic Evidence, United Arab Emirates Abu Dhabi Police, Forensic Evidence, United Arab Emirates
Officer, Japan and Asia	Ritsuko Sugita ²⁴	Japan	National Research Institute of Police Science, Japan
Officer, Australia	Prof James Robertson ²⁵	Australia	University of Canberra, Australia
Officer, Pacific	Prof Shari Forbes ²⁶	Australia	University of Technology, Sydney, Australia
Officer, Canada	Prof Grant Wach ²⁷	Canada	Dalhousie University, Nova Scotia, Canada
Officer, Africa	Dr Roger Dixon ²⁸	South Africa	University of Pretoria (Formerly, Forensic Science Laboratory, South African Police Service), South Africa
Officer, China	Dr Guo Hongling ²⁹	China	Institute of Forensic Science, Ministry of Public Security, Division of Trace Evidence Analysis, China

Table 4.1 IUGS-IFG committee in 2016

5 EXTENT OF NATIONAL, REGIONAL & GLOBAL SUPPORT FROM SOURCES OTHER THAN IUGS

During 2016 support for IUGS-IFG was provided by individual committee members and their respective employers/organisations. The in-kind value of this support is considerable. IUGS-IFG has estimated that the Committee Officers have provided at least **186 person days** during 2016. This has incurred by attendance at conferences, training courses, knowledge transfer events, provision of outreach events and the management of the Initiative. The value of this in-kind support is difficult to quantify, however a commercial value to the time spent on the IUGS-IFG in 2016 would possibly be in excess of approximately **USD \$154,000**. In addition, participation in the various IUGS-IFG events during the year has also been supported directly by committee members employers and via research funding of an estimated value of approximately **USD (\$) 36,000**.

6 ACKNOWLEDGEMENTS

Throughout 2015, IUGS-IFG received support from numerous organisations, which include the following:

- IUGS Executive Committee.
- Prof Peter Bobrowsky, Dr Brian Marker MBE, Prof Calvo, Prof Komac, Mr Edmund Nickless.
- **Commercial companies:** Helford Geoscience LLP (UK), Microtrace LLC (USA), James Hutton Limited and Geoscienze Forensi Italia (Italy), Mala (Mike Langton).
- **Police Forces, Law Enforcement and Federal Agencies:** California Department of Justice, Federal Bureau of Investigation (USA), Australian Federal Police (Australia), Washington State Patrol Crime Lab (USA), Abu Dhabi Police (UAE), Russian Federal Centre of Forensic Science (RFCFS) of the Ministry of Justice of Russia (Russia), National Research Institute of Police Science of Japan (Japan), Servizio Polizia Scientifica (Italy), Carabinieri (Italy), Brazilian Federal Police (Brazil), National Crime Agency (NCA) (UK), Police National Search Centre, The College of Policing (UK), Home Office Centre for Applied and Scientific Research (CAST) (UK), Greater Manchester Police (GMP) (UK), West Yorkshire Police (UK), South Yorkshire Police (UK), Police Scotland, Inspector Graham Peffers (GMP and NCA), Inspector Colin Hope (NCA) Mike Ferguson (CAST), Inspector Jon Feather (UK), Geoff Knuffer MBE, An Garda Síochána Headquarters, Independent Commission for the Location of Victims' Remains.
- **Universities, Research Institutes and Professional Societies:** University of Messina (Sicily), The American University of Rome (Italy), Institute of Forensic Science in China, University of Pretoria (South Africa), Dalhousie University (Canada), National Research Institute of Police Science (Japan), CSIRO (Australia), Centre for Australian Forensic Soil Science (CAFSS) (Australia), Buffalo State College (USA), Queens University Belfast (Northern Ireland), the James Hutton Institute (Scotland, UK), University of Canberra (Australia), University of Technology, Sydney (Australia), University of Keele Department of Earth Sciences (UK), University College London (UK), University of Staffordshire, (UK), University of Pretoria (South Africa), Nacional Institute of Criminalistics (INC) (Brazil), Instituto Nacional de Medicina Legal y Ciencias Forense (Colombia), The Geological Society of London (Forensic Geosciences Group, Near Surface Geophysics Group, Western Regional Group, North West Regional Group), University College London, JDI Centre for the Forensic Sciences, Australian Facility for Taphonomic Experimental Research (AFTER), Yorkshire Regional Group of the Geological Society of London, East Midlands Regional Group of the Geological Society of London, Institute of Geologists of Ireland, Geological Survey of Ireland, Japanese Society of Geo-pollution Science, Medical Geology and Urban Geology, University of Leicester, Department of Geology, Organising Committee of the 35th International Geological Congress, University of Bristol, Chartered Institute for Archaeologists, John Moores University, Home Office (CAST).

7 INTERACTION WITH OTHER INTERNATIONAL PROJECTS & ORGANISATIONS

Throughout 2016, IUGS-IFG interacted and collaborated with the organisations and projects that included those listed in Table 7.1:

EVENT	TYPE OF INTERACTION	PROJECT
January		
69th IUGS Executive Committee Meeting, Kunming, China	Committee meeting	NA
Australian Facility for Taphonomic Experimental Research (AFTER)	Research	Human decomposition and searches for burials
Search for a Buried Target, UK	Operation support	Confidential
February		
Yorkshire Regional Group of the Geological Society of London, Leeds, UK	Outreach	Invited speaker
Planning, 4th International Conference on Engineering Geophysics, UAE	Knowledge exchange and capacity building	Conference in 2017
Home Office (CAST) & UCL, UK	Outreach	Invited speaker
Search for a Mine Shaft	Operation support	Confidential
March		
Seminario, Geologia Forense, Università degli Studi di Catania, Sicilia, Italia	Training	MSc
Forensic Geologist Opportunity with the Abu Dhabi Police	Employment position	NA
Experimental Forensic Geology, Colombia, South America	Research	PhD
April		
IUGS Ad Hoc Review of IFG, Manchester, UK	IUGS Review	NA
Police Search for Missing Person, Midlands, UK	Operation support	Confidential
Seminario, Geologia Forense, Università degli Studi di Palermo, Sicilia, Italia	Knowledge exchange and capacity building	MSc
Seminario, Geologia Forense, Università degli Studi di Calabria, Sicilia, Italia	Knowledge exchange and capacity building	MSc
European Geosciences Union General Assembly, Vienna, Austria	Outreach	Invited speaker
May		
Environmental Crimes, Belfast, Northern Ireland and Australia	Knowledge exchange and capacity building	International report
Seminario, Geologia Forense, Agrigento, Sicilia, Italia	Knowledge exchange and capacity building	MSc
Forensic Geology in Morocco	Planning meeting	Teaching
Taphonomic Chemistry and Grave Detection, University of Staffordshire, UK	Planning meeting	Teaching

June		
Geological Society of London, (EMRG) & BGS, Nottingham, UK	Outreach	Invited speaker
An Garda Síochána Headquarters, ICLVR, Dublin, Ireland	Knowledge exchange and capacity building	Grave location
IGI and GSI, Dublin, Ireland	Knowledge exchange and capacity building	Invited speakers
Forensic Geology and BAHID, Dundee, Scotland	Knowledge exchange and capacity building	Invited speakers
Forensic Canines Detector Dogs	Planning meeting	Conference in Spain in 2017
Search for Holocaust War Graves in Lithuania, Europe	Outreach	Grave location
Japanese Society of Geo-pollution Science, Medical Geology and Urban Geology	Knowledge exchange and capacity building	Invited speakers
July		
SWGCEO, Phoenix, Arizona	Knowledge exchange and capacity building	Professional practise
Forensic Geology, Università degli Studi di Messina, Sicilia, Italia	Knowledge exchange and capacity building	MSc
University of Leicester, Department of Geology, UK	Outreach	BSc
11th GeoENV, Lisbon, Portugal	Outreach	Invited speaker
EuroSoil 2016, Turkey	Outreach	Invited speaker
August		
5th European Meeting on Forensic Archaeology (EMFA), Dublin Castle, Ireland	Outreach	Invited speaker
Medicolegal Death Investigation Conference, Montana, USA	Outreach	Invited speaker
Forensic Soil Science and Geology, 35th IGC, Cape Town, South Africa	Knowledge exchange and capacity building	International congress
Hillsborough Castle Skeleton, Northern Ireland	Operation support	Confidential
September		
The Disappeared, Pinochet's Dictatorship, Chile	Knowledge exchange and capacity building	Invited speakers
Art Forgeries	Outreach	NA
Geological Fakes and Fraud, SWRG, University of Bristol,	Outreach	Invited speaker
ANZFSS, Auckland, New Zealand	Knowledge exchange and capacity building	Invited speakers
October		
Forensic Geology and Chartered Institute for Archaeologists (CifA)	Knowledge exchange and capacity building	Collaboration programme
Forensic Geology and Earth Science Week, GSL, Cheshire, UK	Careers advice	Advice for students
Institute of Forensic Science Ministry of Public Security, China	Knowledge exchange and capacity building	International collaboration

18th International Forensic Science Symposium, Interpol, Lyon, France	Knowledge exchange and capacity building	International collaboration
Field Portable Xray Fluorescence (FRXRF), UK	Knowledge exchange and capacity building	Search for a grave
Experimental Ground Penetrating Radar, Mala & QUB, UK & Irenad1	Knowledge exchange and capacity building	Search for a grave
November		
Forensic Geologist Opportunity, AFP, Australia	Employment position	NA
Universidad de Antioquia y Tecnológico de Antioquia, Medellin, Colombia	Knowledge exchange and capacity building	Invited speaker
The California Association of Criminalists & American Association of Trace Evidence Examiners (ASTEE) joint Seminar	Training	Professional practise
Forensic Geology, Universities of Camerino and Verona, Italy	Training	BSc and MSc
Forensic Geology & Search Training, UK Police	Training	Professional practise
December		
National Crime Agency, National Search Adviser, UK	Operational support	Graves, organised crime, terrorism
Planning, 3rd Iberoamerican Seminar on Forensic Geology, Argentina	Planning	Conference and training in 2017
Brazilian Federal Police, Curitiba, Brazil	Training	Formal request from Brazilian Federal Police
TV Interview on Forensic Geology, Rome, Italy	Outreach	NA
Rock Analysis, Police	Operational support	Confidential
International Union of Geological Sciences, Episodes	Outreach	Publication
Geological Society of London, Geoscientist	Outreach	Publication
Forensic Geology and The Media	Outreach	Popular and public interests
Forensic Geology and Crime Writers	Outreach	Popular and public interests

Table 7.1 Selected examples of IUGS-IFG collaboration in 2016

8 CHIEF ACCOMPLISHMENTS

8.1 JANUARY

8.1.1 69th IUGS Executive Committee Meeting, Kunming, China¹

From 18th to 22nd January 2016, Prof Jose Calvo, IUGS Secretary General, attended the 69th IUGS Executive Committee meeting in Kunming, China, and delivered a presentation prepared by the IUGS-IFG Chair. This gave a summary of IFG's achievements and included an overview of the global developments and advances in forensic geology. IUGS-IFG received positive feedback on its achievements to-date and was encouraged to continue expanding.

8.1.2 Establishment of the Australian Facility for Taphonomic Experimental Research^{1,2,3,5,25,26}

The University of Technology, in Sydney (UTS) opened the, 'Australian Facility for Taphonomic Experimental Research (AFTER).' IUGS-IFG Officer for Pacific region helped develop and now manages part of this facility. Other IUGS-IFG members have provided advice on geology, geophysics and geochemistry. It is proposed the results of leachate plume experiments conducted in the UK could be repeated at AFTER. It is expected the results will inform open area search strategies to locate unmarked homicide graves, missing person's remains and victims of genocide or mass disasters.

8.2 FEBRUARY

8.2.1 Yorkshire Regional Group of the Geological Society of London, Leeds, UK¹

A presentation entitled, 'Forensic Geology: The Application of Geology to Police and Law Enforcement Investigations', was provided to the Yorkshire Regional Group of the Geological Society of London, at The Adelphi Hotel, in Leeds, UK.

8.2.2 Meeting with the Home Office (CAST) & UCL, UK¹

On 24th February 2016, a presentation on forensic geology was given at University College London (UCL) by The Centre for Applied Science and Technology (CAST), which is a core part of the Home Office. This was supported and endorsed by IUGS-IFG. It provided details of land and water searches for burials and concealed targets related to homicide and counter terrorism.

8.3 MARCH

8.3.1 Seminario, Geologia Forense, Università degli Studi di Catania, Sicilia, Italia^{1,3,8,9,18}

As a continuation of the supported provided by IUGS-IFG in 2015, for the Università degli Studi di Messina, IUGS-IFG endorsed a seminar held at the University of Catania, in Sicily, on 18th March 2016. One of the IUGS-IFG committee members has been awarded the position of 'Visiting Professor' to help develop forensic geology in Messina, in Sicily.

8.3.2 Meeting on Experimental Forensic Geology, Colombia, South America¹⁶

An experimental study of forensic geophysics was carried out in two regions of Colombian to evaluate the use of geophysical methods in the search for missing person's graves. Simulated conditions were consistent with graves found by the judicial police. This included the burial in a rural location of skeletons and other objects in eight graves that measured by 2m by 2m. A further four graves measured 1.7m x 0.7m in a semi-rural location. This included; three pigs that were half covered by clothes. Three human skeletons were also buried. One of these had burned bones, one represented a beheaded skeleton and the third skeletons was complete. The burial depths were 0.5m, 0.8m and 1.2m, respectively. Soil and vegetation samples were collected and rainfall and temperature was monitored. Geophysical data were collected for 25 months in an area measuring 17m x 7m in the rural area and 12 months in an area measuring 11m x 2m in the semirural location. Ground penetrating radar, magnetic susceptibility, conductivity and electrical resistivity gave acceptable results in the rural test site and good results in the semi-rural test site.

8.4 APRIL

8.4.1 Review of IFG by IUGS, Manchester, UK^{1,11}

The IUGS Ad Hoc Review Committee (ARC) was convened to review the progress of IFG. This mandatory review was held on 4th April 2016, in Manchester, UK, under the Chairmanship of Prof Jose Calvo, Secretary General of IUGS. The other attendee at the meeting was Prof Marko Komac, Vice-President of IUGS. Both interviewed Dr Laurance Donnelly, Chair of the IUGS Initiative on Forensic Geology. Also invited to be present was Dr Alastair Ruffell the IUGS-IG Training Officer. IUGS also invited Inspector Colin Hope, the UK National Search Advisor, from the National Crime Agency. The meeting last about five hours. ARC concluded that during the period 2011-2016 IFG has met and exceeded its objectives. IUGS, via IFG, has provided the opportunity for the development and advancement of forensic geology throughout the world. This has resulted in this multidisciplinary science being firmly established in the geology profession, policing and law enforcement. Looking forward, IUGS suggested several further goals and recommended their continued support for IFG (see Calvo, 2016).

8.4.2 Seminario, Geologia Forense, Sicilia, Italia^{1,3,8,9,18}

On 5th April 2016, IUGS-IFG endorsed and supported a seminar on forensic geology in Palermo, Sicily, organised by the Università degli Studi di Messina.

On 7th April 2016, IUGS-IFG endorsed and supported a seminar on forensic geology at Università degli Studi di Calabria, Sicily, organised by the Università degli Studi di Messina.

8.4.3 Conference Contributions, European Geosciences Union General Assembly, Vienna, Austria³

IUGS-IFG was represented at the EGU General Assembly, from 17th-22nd April 2016. There was 4,863 presentations, 10,320 posters, 619 scientific sessions, 321 associated events and 13,650 scientists from 109 countries. About 25% were students and 53% early career scientists, under the age of 35 years. This provided the opportunity to draw attention to IUGs and forensic geology to wider and younger audiences.

8.5 MAY

8.5.1 Environmental Crimes, Belfast, Northern Ireland and Australia^{2,11}

Environmental crime has been reported by UNEP-INTERPOL to be a growing concern. An IUGS-IFG Officer spoke at Stormont, in Northern Ireland, about this to help inform Government on Policy. The illegal burial of waste has been a particular problem in Italy, Canadian and Ireland.

8.5.2 Seminario, Geologia Forense, Agrigento, Sicilia, Italia^{1,3,8,9,18}

On 12th May 2016, IUGS-IFG endorsed and supported a seminar on forensic geology, held at Castello Chiamontano di Favara, in Agrigento, Sicily, organised by the Università degli Studi di Messina.

8.5.3 Taphonomic Chemistry and Grave Detection, University of Staffordshire, UK^{1,3,8,9,18}

IUGS-IFG agreed to co-fund a knowledge transfer and skills development event at Staffordshire University. The focus was taphonomic chemistry as part of a multi-disciplinary group for the detection of clandestine land and water-based gravesites. The aim was to utilise a cross-disciplinary approach to identify the non-volatile chemical, biological and physico-chemical markers simultaneously through a universal model (ensuring similar decomposition-parameters between the disciplinary studies). In addition, migration patterns and the extent of migration of the identified markers will be examined to determine the usefulness of the markers in locating and confirming clandestine burials. This is based on preliminary results obtained over the past five years by IUGS-IFG members. This will improve post-mortem interval estimation to give more accurate and robust information to Police investigations and could also be used in environmental forensics (for example; illegal animal deposition). This events is proposed to take place in 2017.

8.6 JUNE

8.6.1 Geological Society of London, (EMRG) & BGS, Nottingham, UK¹

On 14th June 2016, an outreach presentation was given to the Geological Society of London, East Midlands Regional Group (EMRG), at the British Geological Survey, in Keyworth, Nottingham, on; '*Forensic Geology: The Applications of Geology to Crime, Police and Law Enforcement*'.

8.6.2 An Garda Síochána Headquarters, ICLVR, Dublin, Ireland^{1,3,8,9,10}

On 2nd June 2016, five members of the IUGS-IFG committee attended a meeting at An Garda Síochána (the Irish Police) Headquarters, in Dublin, Ireland, to discuss ground searches for burials with the Independent Commission for the Location of Victims' Remains (ICLVR).

8.6.3 Meeting of IGI and GSI, Dublin, Ireland^{1,3,8,9,10}

On 2nd June 2016, IUGS-IFG delivered a series of multi-disciplinary presentations on forensic geology to the Institute of Geologist of Northern Ireland (IGI) and Geological Survey of Northern Ireland (GSI). This was attended by over 100 delegates and included an overview of forensic geology, geological searches for burials, GIS and geometrics, soil forensic and QemScan. Numerous case studies were also presented. It was attended by An Garda Síochána and members of the ICLVR.

8.6.4 Forensic Geology and BAHID, Dundee, Scotland¹¹

IUGS-IFG was represented at the British Association for the Identification of Human Remains (BAHID) Conference, held on 10th to 11th June 2016. This included the potential contribution of geological (trace) evidence to enable the provenance and identification of human remains.

8.6.5 Forensic Canines Detector Dogs^{1,5}

The deployment of detector dogs can be an important asset for ground searches and in particular to locate shallow, unmarked, homicide graves and other buried items. This is often based on the odour discrimination abilities of the dog and a specially trained handler. Geological and other environmental factors are envisaged to control the ability of a detector dog, although this is under researched. A knowledge exchange workshop to discuss the use of canines in forensic investigations has been proposed to take place in Spain, in April 2017. IUGS-IFG will collaborate with specialised Police canine handlers and an FBI canine trainer. The objective is to collate know facts, relevant research and operational canine outcomes to provide comprehensive proof of proficiency concepts and assist in the identification of appropriate testing protocols.

8.6.6 Forensic Geology in Japan^{1,24}

IUGS-IFG was represented at the, '*26th Symposium on Geo-environments and Geotechnics*'. This was, organized by the Japanese Society of Geo-pollution Science, Medical Geology and Urban Geology, and co-organized by several other organizations including IUGS-IFG.

8.7 JULY

8.7.1 SWGGEO, Phoenix, Arizona, USA^{2,4,12,15}

IUGS-IFG committee members continued to support Scientific Working Group for Geological Materials (SWGGEO) and attended a board meeting in Arizona, USA.

8.7.2 Forensic Geology, Università degli Studi di Messina, Sicila, Italia^{1,3,8,9,18}

Following on from the training provided by IUGS-IFG in 2015, a forensic geology training session was endorsed by IUGS-IFG in Messina, Sicily. The attendees comprises forensic geology students, police officers and lawyers. The course provided training on crime scene examination, sample collection and ground searches.

8.7.3 University of Leicester, Department of Geology, BSc Module Support, UK^{1,11}

IUGS-IFG provided a module on, ‘*Geoforensics*’ for the University of Leicester, Department of Geology. This followed on from a series of past forensic geology lectures provided for BSc (Hons) Geology students.

8.7.4 11th GeoENV, Lisbon, Portugal³

IUGS-IFG was represented at GeoENV 2016, from 6th to 8th July, in Lisbon, Portugal. GeoENV conferences have been held biennially across Europe since 1966. The objective was to bring together research from hydrogeology, biology, soil sciences, air pollution or ecology and other fields, including forensic geology (soil forensics).

8.8 AUGUST

8.8.1 5th European Meeting on Forensic Archaeology (EMFA), Dublin Castle, Ireland^{1,11}

On 11th August 2016, IUGS-IFG took part in the, ‘*5th European Meeting on Forensic Archaeology*’. A presentation was given on, ‘*Geological Changes at Homicide Graves and the Influence on Search Strategies*’. This received significant positive feedback from the conference chair. This event was organised by a Consultant Forensic Scientist & Investigator working with the Association for the Identification of Victims Remains, and it was supported by The European Network of Forensic Science Institutes (ENFSI), Forensic Science Ireland (FSI) and the Geological Society of London forensic Geoscience Group (FGG).

8.8.2 Medicolegal Death Investigation Conference, Montana, USA¹⁴

An IUGS-IFG committee member took part in the Medicolegal Death Investigation Conference, held in Montana, USA on 11th to 12th August 2016. The target audience for this conference was Coroners, Medical Examiners, Death Investigators and other Public Safety Officers, Forensic Scientists, Physicians, Nurses, Emergency Medical Technicians, Police Officers, and others involved with the investigation of violent, suspicious, or unexpected deaths. Presentations were delivered by Medical Examiners, Coroners, University of Montana Law Professors, Crime Scene Investigators, Bloodstain Pattern Analysts, Forensic Scientists, Attorneys and other professionals.

8.8.3 Forensic Soil Science and Geology Session, 35th IGC, Cape Town, South Africa¹⁻²⁹

A seminar on, ‘*Forensic Soil Science and Geology*’ was held in collaboration with the, ‘*5th International Conference on Criminal & Environmental Soil Forensics Soil Forensic International (SFI-2016)*’, at the 35th International Geological Congress, Cape Town, South Africa. This provided a forum for geologists forensic geologists to showcase development of new sophisticated field and laboratory methods and strategies and to explore their experiences through case study analysis. Over 100 attendees were present and this included students, research scientists, serving police officers and forensic geologists. There were 3 keynote speakers, 17 presentations and 6 posters. The main themes were; search for burials; history and future of forensic soil science and geology; recent developments in forensic geology and soil and geology trace evidence.

8.8.4 Hillsborough Castle Skeleton, Northern Ireland¹¹

Hillsborough Castle is an official government residence in Northern Ireland. An IUGS-IFG committee member attended a skeleton recovery inside Hillsborough Castle. This was a medieval burial located by a geophysical survey, using ground penetrating radar, which detected the coffin.

8.9 SEPTEMBER

8.9.1 The Disappeared, Pinochet’s Dictatorship, Chile (1973-1990), UK^{1,11}

A delegation from Chile visited the UK and Northern Ireland to discuss, ‘*Disappeared but not forgotten: the Chilean experience regarding the search, recovery and identification of victims of human rights violations occurred during Pinochet’s Dictatorship (1973-1990)*’. A series of meetings took place in

Belfast followed by a workshop held on 14th September 2016, at the University of Bradford, Department of Forensic Archaeology, UK. Presentations were provided by the Medico-Legal Department, Government of Chile and a Professor of Transitional Justice at Ulster University's Transitional Justice Institute.

8.9.2 Geological Fakes and Fraud, South West Regional Group, University of Bristol, UK¹¹

This presentation was given for the South West Regional Group (SWRG) of the Geological Society of London, at the University of Bristol, Department of Geology, on 21st September 2016. This focused on substitution cases, mining scams, fake fossils, hydrocarbon, archaeology (Pitdown Man and the Bosnian Pyramids), art fraud and historic fraud.

8.9.3 ANZFSS, Auckland, New Zealand^{13,17,26}

IUGS-IFG was well represented at the, 'ANZFSS 23rd International Symposium on the Forensic Science', Auckland, New Zealand, from the 18th to 22nd September 2016. The conference was focused on, 'Together Informing Justice'. A keynote and numerous oral and poster presentations by IUGS-IFG committee members. These presentations focused on soil evidence, decomposition and post-mortem interval estimation and diatom analysis.

8.10 OCTOBER

8.10.1 Forensic Geology and Chartered Institute for Archaeologists (CIfA)^{1,11}

This event was organized by the Forensic Archaeology Special Interest Group and the Chartered Institute for Archaeologists (CIfA). The workshop was held on the main city campus of the University of Bradford, Department of Forensic Archaeology, UK, on Saturday 22nd October 2016. IUGS-IFG were invited to take part in this joint event. This was a combined forensic case study and workshop session and was offered as a Continuing Professional Development (CPD) training event. The forensic case study was delivered by a professor and defense lawyer involved to the Pickton Farm multiple murder case. This was followed by a workshop delivered by IUGS-IFG on the use of RAG (Red-Amber-Green) prioritization maps to assist with open area ground searches for burials.

8.10.2 Institute of Forensic Science, Ministry of Public Security, China^{1,9,11,14,29}

China is a country IUGS-IFG has been targeting for number of years in terms of developing forensic geology. IUGS-IFG committee members visited China in 2014 and 2015 to develop opportunities. Three members of the China Institute of Forensic Science were identified to become affiliated to IUGS-IFG, via the Geoforensic International Network (GIN). In Cape Town, in August 2016, IUGS-IFG held a meeting with Prof Guo Hongling and two of her colleagues from the Institute of Forensic Science, Ministry of Public Security, Division of Trace Evidence Analysis, China. Prof Hongling works closely with the Police and she has been granted permission to formally engage with IUGS-IFG. To-date they have been involved with about 30 cases requiring soil and mineral examinations. Police ground search seems to be under developed in China. Prof Hongling was assigned to the IUGS-IFG committee in December 2016 as the Officer for China.

8.10.3 Contributions at the 18th International Forensic Science Symposium, Interpol, Lyon, France^{1,2,3,11}

An IUGS-IFG member³ was invited by Interpol to attend a meeting of over 200 lab managers, police officers, Interpol agents, forensic scientists and university researchers from all over the world which was held in Interpol, Lyon, France, from 11th to 13th October. She was invited to discuss global developments in forensic science over the last three years as a paper, and an oral presentation of example case work. In addition, a poster on the work on the IUGS IFG group internationally was presented^{1,3,11}. Other invited presentations covered the topics of firearms, GSR, geology, fibres, wildlife forensics, counterfeiting, forensic chemistry, toxicology, DNA Next Generation Sequencing and Rapid DNA. Speakers had travelled from the FBI, NFI and AFP. A Chief Prosecutor, International Criminal Court gave a conference overview where she stressed the need to deliver robust evidence to

help international courts bring perpetrators to justice, including in war crimes. Transnational crime, Interpol forensic unit development and improved methods of human identification was also discussed. The Interpol General Secretariat provided an update on developments at Interpol with interest particularly in provenancing. The presentations attracted much interest with many countries never having used geology in case investigations. Invitations to work with police practitioners and associated university academics were received from Greece and Portugal. The IUGS IFG member³ was invited back to present in three years time on developments over the period 2016-2019.

8.10.4 Field Portable Xray Fluorescence (FRXRF), JM & QUB UK^{1,11}

In collaboration with a PhD research project being undertaken at John Moores University (JM), in Liverpool, experimental FPXRF field testing was carried out at a remote location where homicide graves were previously found. The instrument used was the Genius 9000 XRF (SkyRay instrument), which was designed to look for heavy metal contamination in soils. This included a control test to establish a baseline, a seeded test to check the instrumentation was operational detecting the material and a blind test area with known leachate plumes. There were five elements of interest when investigating decomposition (Ca, Fe, Mg, K and P). Experimental testwork will continue into 2017.

8.10.5 Experimental Ground Penetrating Radar, Mala & QUB, UK & Ireland^{1,11}

In collaboration with Mala UK, sophisticated GPR was tested over a control site, in a remote moorland setting in the north of England, as part of an ongoing search for a homicide grave. The GPR was able to detect and image the buried targets, which were previously not detectable using GPR. This is thought to have been successful owing to the advancements in GPR technology and changes in the engineering geological properties (eg. cohesion, moisture, density, strength, permeability, porosity) of the reinstated soils above the burial. These results have positive implication for a search of an unmarked, shallow grave, in similar geological conditions.

8.11 NOVEMBER

8.11.1 Universidad de Antioquia y Tecnológico de Antioquia, Medellin, Colombia¹⁶

IUGS-IFG was represented at the, '*International Seminar: Lowlands and Floodplains: Taphonomy Archaeological and Geophysics*'. This was held at the Universidad de Antioquia y Tecnológico de Antioquia, Medellin, Colombia, on 1st to 3rd November 2016. IUGS-IFG was particularly interested in the influence of human decomposition and preservation for the use of geophysics during the search for homicide graves.

8.11.2 CAC & ASTEE joint Seminar, California, USA^{4,15}

A Forensic Soil workshop for field investigators was hosted in California by two IUGS-IFG committee members to assist with the program for, '*The California Association of Criminalists (CAC)/American Association of Trace Evidence Examiners (ASTEE) joint Seminar*.' Excellent feedback was provided and the workshop may be featured on the cover of the next CAC News.

8.11.3 Forensic Geology, Universities of Camerino and Verona, Italy¹⁸

Buildings at the Universities of Camerino and Verona suffered structural damage as a result of the earthquakes in August 2016. Due to these circumstances a decision was taken to temporarily suspend a proposed postgraduate master courses in forensic geology. The universities that we will be ready to support this in the future when the challenges and difficult time period has passed.

8.12 DECEMBER

8.12.1 National Crime Agency, Preliminary Discussions with the New National Search Adviser¹

On 6th December 2016, a meeting was held with the UK Police National Search adviser to discuss future collaboration with respect to the search to locate graves and other items related to homicide serious organised and counter terrorism searches for burials.

8.12.2 Brazilian Federal Police, Curitiba, Brazil^{1,16,17,18}

On 12th to 15th December 2016, the Brazilian Federal Police, along with the Federal University of Paraná, the Polícia Científica of Paraná, the National Association of Federal Criminal Consultants, and the Brazilian Association of Criminalistic organised the, '*2nd Colòquio sul Brasileiro de Pesquisas em Ciências Forenses*', held at Curitiba, Paraná, Brazil. This date was chosen to coincide with the conference, '*VI Seminário Nacional de dna e ILboratórios Forenses, and Colóquio Sul-Brasileiro de Pesquisa em Cências Forenses.*' IUGS-IFG provided an overview of the objectives, governance and global achievements of IUGS-IFG. This event included numerous sessions enable to deal with many application of forensic science, and it was attended by over 500 participants. At the event, IFG officers for Europe and Latin America represented IUGS-IFG and delivered a training on Forensic Geology. The training consisted in three sessions, for a total of four hours, and was attended by about 30 participants, from Academy (students and professors) and Law Enforcements (officers and forensic scientists).

8.12.3 Planning, 3rd Iberoamerican Seminar on Forensic Geology, Argentina^{1,16,17,18}

In Brazil, UK, Northern Ireland and Italy, IUGS-IFG continued with planning and preparations for the '*3rd Iberoamerican Seminar on Forensic Geology*', which is proposed to be held in Argentina in December 2016. This is proposed to be held in, Cordoba or La Plata, Argentina in December 2017. This will be held in association with South American Law Enforcement organisations. The involvement of IUGS-IFG at this event is considered to be crucial for the further developments of Forensic Geology in Latin America, especially for those countries where Forensic Geology is not already applied including for example; Peru, Chile, Bolivia, Venezuela, Ecuador, Uruguay, Paraguay, and the Caribbean. IUGS-IFG committee members was involved in the 2nd and 1st of these events in Brazil (2013) and Colombia (2009), respectively. This may also include a visit to Santiago, Chile, to discuss the search for missing persons and graves.

8.12.4 TV Interview on Forensic Geology, Rome, Italy¹⁸

In December 2016 the IUGS-IFG Officer for Europe arranged to give an interview on the Italian TV Channel, Tele Roma Uno, with a geophysicists from the American University of Rome. This was for the TV program '*Missing*', where the efforts of IUGS-IFG was explained including the developing forensic geology and its best practice.

8.12.5 Geological Society of London, Forensic Geoscience Group^{1,11}

December 2016 marks the 10th anniversary of the establishment of, '*The Forensic Geoscience Group (FGG) of The Geological Society of London (GSL)*'. This is the newest of the Geological Society's 23 Specialist Groups and Joint Associations. It was established in December 2006 to develop forensic geology in the UK. This group led to the formation of IUGS-IFG in 2011. To celebrate the first decade of FGG an article was published in 'Geoscientist' (The journal of The Geological Society of London).

8.12.6 International Union of Geological Sciences, Episodes¹⁻²⁹

IUGS-IFG has prepared a draft manuscript for the publication of a themed issued of Episodes (Journal of the International Union of Geological Sciences) on forensic geology. The expected contents are as follows:

- Section 1: Introduction and the International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG)
- Section 2: Searching the Ground for Graves and Buried Items Related to Homicide, Terrorism and Organised Crime
- Section 3: Global Developments in Forensic Geology
- Section 4: The role of Forensic Geology in Illegal Precious Trade
- Section 5: Application of Application of Geographic Information System (GIS) in Forensics Geoscience

- Section 6: Forensic Geoscience and Biomarkers
- Section 7: Use of Geological Trace Evidence for Geolocation
- Section 8: Geology of the FBI Lab and the Challenge to the Admissibility of Forensic Geology in US Court
- Section 9: International Case in Forensic Geology; Fakes, Fraud, Homicide and Environmental Crimes

8.12.7 Forensic Geology and The Media^{1,3,11,16,18}

Throughout 2016, IUGS-IFG collaborated with the media and as a result numerous TV, radio, popular press and web sites articles were produced. A selection of these can be seen in appendix I.

8.12.8 Forensic Geology and Crime Fiction^{1,3,11,18}

Forensic science and geology continue to attract attention from writers of Crime Fiction. IUGS-IFG has provided advice to a number of crime novel authors. This has included contribution to Lin Andersons recent novel, 'None but the Dead' (as A forensic geoscientist) and to advise on BBCs TV programme, 'Silent Witness'.

8.12.9 Discussions with ENFSI (European Network of Forensic Science Institutes)³

Attendance at annual meeting and the development of common laboratory practices in forensic geoscience and soil science.

9 MAIN PRODUCTS AND OTHER SERVICES IN 2016

9.1 Confidential Documents and Operations

IUGS-IFG committee members were contacted by the Police to provide advice, guidance and assistance with operational cases related to homicide, sexual crimes, environmental crimes, searches for graves and other items associated with organised crime and counter terrorism. Due to their confidential status details are not contained in this annual report.

9.2 Training Documents

IUGS-IFG produced power point presentations and information for training courses held in Scotland, Sicily and Brazil, which included IUGS and IF logos

9.3 Website

Due to the expansion of IUGS-IFG, it was proposed at the committee meeting in Cape Town for the web site to be hosted by a different provider, which is expected to take place in 2017. The web site contains information on forensic geology including details of the IUGS-IFG committee, history, past, recent and future global events, contacts, papers, publications and popular press articles.

9.4 Flyer

The IUGS-IFG flyer was updated in 2016 and where appropriate it was issued around the world.

9.5 Geoforensic International Network (GIN)

GIN brings together forensic geologists, geoscientists and police/law enforcement officers from around the world to develop and promote forensic geology.

Those countries now represented in GIN include; Australia, Argentina, Belgium, Brasil, Canada, China, Colombia, England, France, Germany, Hungary, India, Iran, Ireland, Italy, Japan, Malta, Mexico, Namibia, New Zealand, Nigeria, Northern Ireland, Portugal, Russia, Scotland, South Africa, Spain, Sweden, Switzerland, Netherlands, United Arab Emirates, United States of America, Wales and the West Indies (Caribbean). Targeted countries for potential membership: Belarus, Greece, Kazakhstan, Kyrgyzstan, Kuwait, Mongolia, Oman, Qatar, Poland, Venezuela, Malaysia and African Countries.

9.6 War Graves

A new member for Canada became a member of GIN following a geophysical survey at various sites for a holocaust archaeology project. As part of this work they located a mass grave and mapped the location of an escape tunnel at the Ponary mass execution site, where up to 100,000 people (mostly Jews, and a number of communists and political dissidents) were executed by Nazi and Lithuanian death squads.

9.7 Police Recruitment Support

IUGS-IFG assisted the Australian Federal Police (AFP) with expressions of interest for an opportunity with AFP Forensics, Soil Capability Implementation. This was to assist with the further development and implementation of a provenancing capability within its forensics portfolio and soil examinations. This included validated methods for the comparison of soils using micro-spectrophotometry, infrared spectroscopy and elemental analysis, however requires further development and implementation for provenancing examinations utilising mineralogical examinations, XRD analysis and mapping.

IUGS-IFG supported Abu Dhabi Police following their request for the identification of a suitably qualified and experienced forensic geology to join the Abu Dhabi Police, Forensic Geology Group. IUGS-IFG was able to identify suitable candidates from around the world whose details were forward on to Abu Dhabi Police for their consideration.

9.8 Certificates

IUGS-IFG certificates were issued to delegates who attended forensic geology training in Scotland, Sicily and Brazil. As noted above, an IUGS-IFG certificate was awarded to Prof Rob Fitzpatrick for his significant global contributions to forensic geology. An IUGS-IFG 'Best Student' award certificate was also presented to Jennifer Young.

9.9 Newsletter

IUGS-IFG published the third newsletter in June 2016, which was subsequently issued and circulated globally.

9.10 Publications

A list of publications by IUGS-IFG and/or including IUGS-IFG committee members and related articles are presented in Appendix I.

10 MAIN PROBLEMS ENCOUNTERED IN 2016

10.1 Funding: A Principal Leadership Challenge

IUGS-IFG was successful in attracting funding and funding in kind throughout 2016, however the core funding provided by IUGS remains critically important for the continued success and growth of this Initiative.

10.2 Competence, Accreditation, Regulation and Code of Conduct

There is no internationally recognised professional body for the accreditation of forensic geologists. This continues to be an important debate and discussion within IUGS-IFG.

10.3 Alignment with Forensic Science

IUGS-IFG are progressing the alignment of forensic geology with forensic science.

10.4 Security and Geopolitics

IUGS-IFG continues to not be active in some parts of the world where security risks remain high.

10.5 Confidentiality

Due to the sensitive and often high profile nature of forensic geology it is not always possible to publish or discuss some aspects of forensic geology.

10.6 Publications

IUGS-IFG continue to receive regular request for publications in forensic geology for scientific literature, commercial text books, popular press magazines and web sites.

10.7 Law Enforcement Relationships

IUGS-IFG committee members have development excellent relationships with Police and Law Enforcement officers. It is common in many forces for offers to rotate their positions every 3 to 6 years, which means the forensic geologist has to start again developing new relationships.

10.8 Media

Managing the media and journalist that seek information on operational cases of forensic geology strategies continues to be challenging for some IUGS-IFG committee members.

11 SUMMARY OF EXPENDITURES IN 2016

11.1 Bank Account & Management

The IUGS-IFG bank account remains in Aberdeen, Scotland, and is managed by the IUGS-IFG Treasurer.

11.2 Summary of Accounts

The income and expenditure on the account for 2016 is summarised in Table 10.1. As the IUGS-IFG bank account is held in the UK, the income and expenditure is shown in £ sterling and \$USD equivalent.

EVENT IN 2016	SPEND (USD \$)	PAID (GBP £)	DATE / DESCRIPTION
Dublin, Ireland	2,123.00	1,441.02	June 2016
Cape Town, South Africa	10,750.00	7,394.30	August 2016
Lyon, France	1,000.00	942.50	September 2016
Brazil, South America	2,500	1,735.75	December 2016
Total spend	16,373	11,367.77	Monies spent
Awarded by IUGS in 2016	10,000.00	6,943	Credit
Awarded plus carry over minus 2016 actual spend	7,473.38	5,188.78	Credit
Carry over from 2015	13,846.39	9,613.55	Credit
Remaining	7,473.39	5,188.78	Credit remaining

Conversion based on rate at 01.06.2016 (1USD \$ = 1GBP 0.6943)

Table 10.1 IUGS Treasurers Accounts 2016 Transaction

12 WORK PLAN FOR 2017

The objectives for 2017 and beyond are to implement recommendations for the IUGS ARC, including the following:

- i. Expand the committee;
- ii. Engage with new technologies;
- iii. Attract new audiences and increase the diversity of membership and opportunities for all wishing to access IFG, particularly young people, those from 'harder to reach' communities and developing nations;
- iv. Develop relationships and engage with other IUGS Task Groups and Initiatives;
- v. Enhance accessibility to IFG materials through translation and distribution internationally;
- vi. Include collaboration with other specialist groups in police and law enforcement, such as archaeology ecology and provide blended training;
- vii. Promote engagement with forensic science regulators in the UK;
- viii. Publish, 'A Guide to Forensics Geology';
- ix. Develop the IUGS-IFG web site and enhance visibility; and
- x. Establish an 'excellent in research framework' and support via a peer review network.

In addition, IUGS-IFG propose to implement the following throughout 2017 (subject to approval and confirmation):

- i. Produce guidance regarding the application of forensic geology to police and law enforcement investigations;
- ii. Publish a themed issue of forensic geology in 'Episodes (Journal of the International Union of Geological sciences);
- iii. Provide outreach, knowledge transfer and capacity building, and training in forensic geology;
- iv. Expand and diversify to include environmental forensics, geotechnical forensics, geohazards, fakes and fraudulent crimes;
- v. Enhance further public and media exposure;
- vi. Where possible, continue to use the IUGS logo on materials published.
- vii. Collaborate with the Geological Society of London, Corporate Affairs Committee (January 2017);
- viii. Participate in, '*Sharing an Uncertain World: Lessons in Managing Risk: Managing Risk in Forensic Geology*' at the Geological Society of London (July 2016);
- ix. Forensic geology event, Belfast, Ireland (February 2017);
- x. Collaboration with Australian Taphonomy Experimental Research (AFTER) and in particular the influence of geology on human decomposing and leachate plume detection;

- xi. Continue engagement with schools and the general public to raise awareness of the applications of forensic geology;
- xii. Provide training the UK Police in ground searches for burials associated with homicide, organised crime and counter terrorism;
- xiii. Provide training for the South Africa Police Force (SAPS);
- xiv. Developing forensic geology in China, following the elevation of Dr Hongling from GIN member to IUGS-IFG committee member;
- xv. Outreach to Asia and Africa;
- xvi. Provide support for forensic geology courses at BSc and MSc level;
- xvii. Support for PhD research in forensic geology;
- xviii. Support the Victim Detector Dog (VDD) workshop in Spain (April 2017);
- xix. Provide forensic geology training for the Abu Dhabi Police, UAE (October 2017);
- xx. Support the 4th International Conference on Engineering Geophysics, session on Forensic Geophysics and Environmental Forensics, Al Ain, UAE (October 2017);
- xxi. Continue research to the generation, migration and detection of volatile organic compounds (VOCs) and leachate plumes too help locate homicide graves;
- xxii. Support the 3rd Iberoamerican Course on Forensic Geology, planned to be held in, Cordoba or La Plata, Argentina (December 2017);
- xxiii. Collaborate with authorities in Chile regarding victims of human rights violations that occurred during Pinochet's Dictatorship (December 2017);

13 CRITICAL MILESTONES

Critical milestones for 2016 included the following:

- Successful completion of the IUGS Ad Hoc Review;
- Provided benefits for IUGS including high profile global recognition, raised public, political, media and police awareness;
- IUGS-IFG remains non-political, non-governmental, impartial and on-profit making;
- The advancement of forensic geology in teaching to school children from 8 to 18 years old, and at universities at BSc, MSc and PhD levels;
- The provision of publications of information on forensic geology
- Advancement of the draft on 'A Guide to Forensic Geology' and agreement for this to be published by The Geological Society of London;
- Successful organisation of the forensic geology session at the 35th IGC in Cape Town attended by over 100 delegates; and
- Provision of forensic geological support for several serious crimes.

14 ANTICIPATED OUTPUTS TO BE ACHIEVED FOR 2017

The main outputs expected for 2017 include the following:

- Finalise the draft of, 'A Guide to Forensic Geology';
- Publication of a themed issue of forensic geology in 'Episodes';
- Publication of an article on forensic geology in 'Geoscientist' (completed in December 2016);
- Delivery of further training, knowledge transfer and outreach events;
- Update of the IUGS-IFG web site;
- Implementation of the ARC recommendations; and
- Publications and marketing of IUGS-IFG.

15 BUDGET FOR 2017

In 2016, IUGS-IFG was successful in attracting additional financial support to assist with international events IUGS-IFG will continue to request and obtain contributory funding and funding services in-kind, however this relies on the core funding that is provided by IUGS. This approach is expected to provide

a basis and for the continued global development and advancement of forensic geology. In 2017, IUGS-IFG proposes to generate a small surplus for events in 2018 or to break even.

IUGS-IFG would request that we can 'roll forward' the current balance of GBP.

IUGS-IFG kindly requests the maximum available budget of USD\$15,000 funding from the IUGS Executive Committee for 2017 so the Initiative can deliver the recommendations provided by the IUGS ARC and proposed 2017 programme.

APPENDIX I: SELECTED PUBLICATIONS IN 2016

The list below includes information on forensic geology authored or co-authored by IUGS-IFG committee members. This list also includes publications not authored by IUGS-IFG committee members on forensic geology, forensic geoscience and related fields.

Books, Book Chapters and Monographs

1. Forbes, S.L. & Nugent, K. Dating of Anthropological Skeletal Remains of Forensic Interest, in S. Blau and D. Ubelaker (eds.), *Handbook of Forensic Anthropology and Archaeology*, Second Edition, Taylor and Francis, New York, NY, 2016. pp. 213-225.
2. Blau, S. and Forbes, S.L. Anthropology: Taphonomy in the Forensic Context, in J. Payne-James and R.W. Byard (eds.) *Encyclopaedia of Forensic and Legal Medicine* (2nd ed). Elsevier Academic Press, Oxford, UK, 2016. pp. 227-235.

Papers, Published and Refereed Articles, Reviews

3. Anderson, D.; Milek, K.; Haurrault, L.; Dawson, L.A. 2017. Panel Title: Dwelling in an evanescent landscape: people's strategies to deal with chronical uncertainty. Shifting sands and climate change: Modalities of dwelling at Yarte, Yamal, Siberia. *Ways of Dwelling: Crisis - Craft - Creativity*. 13th International Congress for the Society for Ethnology and Folklore (SIEF2017), Gottingen, Germany, 26 - 30 March 2017.
4. Armstrong, P., Nizio, K.D., Perrault, K.A., and Forbes, S.L. Establishing the volatile profile of pig carcasses as analogues for human decomposition during the early postmortem period. *Heliyon* e00070, 2016.
5. Breton, H., Kirkwood, A.E., Carter, D.O. and Forbes, S.L. 2016. The impact of carrion decomposition of the fatty acid methyl ester (FAME) profiles of soil microbial communities in southern Canada. *Canadian Society of Forensic Science Journal*. 49: 1-18.
6. Calvo, J.P. 2016. International Union of Geological Sciences (IUGS) Ad Hoc Review of Initiative on Forensic Geology (IFG). *Episodes* Vol. 39, no. 3, 535-537.
7. Dawson, L.A. 2016. Invited article in the LKA (State office of criminal investigations in state of Rheinland-Pfalz) - Kriminalpolizei.
8. Dawson, L.A. 2016. Forensic geology: a review, 2013-2016. Interpol review of International Forensic Science. Published by INTERPOL, Confidential document. September 2016.
9. Demaneche, S.; Schauser L, Dawson LA, Franqueville L, Simonet P 2016. Microbial soil community analyses for forensic science: Application to a blind test. *Forensic Science International* 270: 153–158.
10. Donnelly et al., 2017. Forensic Geology Themed Issued. *Episodes*. *Journal of the International Union of Geological Sciences* (pending).
11. Donnelly, L.J., Cassella, J., Pirrie, D., Dawson, L., Harrault, L., Blom, G., Davidson, A., Arnold, P. Harrison, M and Ruffell, A. 2016. Analysis of leachate, VOCs, fatty acids and mineralogy following the discovery of a homicide grave: Potential implications for police led open area ground searches for burials. 35th International Geological Congress, Cape Town, 29 August 2016, T6.1 - Forensic Soil Science and Geology.
12. Donnelly, L. J. 2016. Geological Society of London (GSL), Forensic Geoscience Group (FGG); the first 10 years and the International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG); the first 5 years. 35th International geological Congress, Cape Town, 29 August 2016, T6.1 - Forensic Soil Science and Geology.
13. Donnelly, L.J. and Ruffell, A. 2016. The Geological Society of London (GSL), Forensic Geoscience Group (FGG): The First Decade, 2006-2016. *Geoscientist*. December 2016.
14. Eley, Y.; Dawson, L.A.; Pedentchouk, N. 2016. Investigating the carbon isotope composition and leaf wax n-alkane concentration of C-3 and C-4 plants in Stiffkey saltmarsh, Norfolk, UK. *Organic Geochemistry*, 96, 28-42.
15. Forbes, S.L., Troobnikoff, A.N., Ueland, M., Nizio, K.D. and Perrault, K.A. Profiling the decomposition odour at the grave surface before and after probing. *Forensic Science International*. 259: 193-199, 2016.
16. Habtom, H.; Demaneche, S.; Dawson, L.A.; Azulay, C.; Matan, O.; Robe, P.; Gafny, R.; Simonet, P.; Jurkevitch, E.; Pasternak, Z. 2016.) Soil characterisation by bacterial community analysis for forensic applications: a quantitative comparison of environmental technologies. *Forensic Science International*, 26, 21-29.
17. Marhoff, S.J., Fahey, P., Forbes, S.L., and Green, H. 2016. Estimating post-mortem interval using accumulated degree days and a degree of decomposition index in Australia: a validation study. *Australian Journal of Forensic Sciences*. 48: 24-36.
18. Miller, D.R.; Dawson, L.A.; Morrice, J.; McKeen, M.; Donnelly, D. 2016. Report on prototype spatial geoforensic database. EU Project MiSAFE, Deliverable 5.8, Report to the European Commission, EU FP7 MISAFE Project, 313149.

19. Molina, C.M., Pringle, J.K., Saumett, M. and Evans, G.T. 2016. Geophysical and botanical monitoring of simulated graves in a tropical rainforest, Colombia, South America. *Journal of Applied Geophysics*. 135, 232–242.
20. Molina, C.M., Pringle, J.K., Saumett, M. and Evans, G.T. 2016. Geophysical monitoring of simulated graves with resistivity, magnetic susceptibility, conductivity and GPR in Colombia, South America. *Journal of Applied Geophysics*. 261, 106–115.
21. Perrault, K.A. and Forbes, S.L. Elemental analysis of soil and vegetation surrounding decomposing human analogues. *Canadian Society of Forensic Science Journal*. E49: 138-151, 2016.
22. Roberts, R.J., Dixon, R.D. and Merkle, R.K.W. (2016). Distinguishing between legally and illegally produced gold in South Africa. *Journal of Forensic Sciences*, 61: S230-S236. doi: 10.1111/1556-4029.12886.
23. Ruffell, A., Donnelly L.J., Knupfer, G.C. 2016. Successes and Failures in Detecting Buried Non-metallic Objects Using Ground (and Water) Penetrating Radar (WPR and GPR). 35th International geological Congress, Cape Town, 29 August 2016, T6.1 - Forensic Soil Science and Geology.
24. Rust, L., Nizio, K.D., and Forbes, S.L. The influence of ageing and surface-type on the odour profile of blood-detection dog training aids. *Analytical and Bioanalytical Chemistry*. 408: 6349-6360, 2016.
25. Waqar-un-Nisa, N.B.; Rukya Saleem, A.; Rashid, A.; Dawson, L.A. 2016. Effect of diesel contamination on the physico-chemical characteristics of soil and growth of vetiver grass. *Soil and Environment*, 35, 91-98.

Selected Conference Paper

26. Harrault, L.; Milek, K.; Dawson, L.A.; Anderson, D. 2016. A study of a possible early reindeer domestication site on the lamal peninsula (Russia) using geoarchaeological methods and lipid biomarkers. European Geosciences Union General Assembly 2016, 18 April 2016. EGU2016-6682.
27. Harrault, L.; Milek, K.; Dawson, L.A.; Anderson, D. 2016. A study of a possible early reindeer domestication site on the lamal peninsula (Russia) using geoarchaeological methods and lipid biomarkers. EGU General Assembly 2016, 18 April 2016. *Geophysical Research Abstracts*, 18, EGU2016-6682.
28. Marlof, A.R.; Dawson, L.A.; Ross, J.; Massonnet, G.; Vennemann, G.; Vennemann, T. 2016. Forensic geology: analysis of plant wax compounds on Molassic soils in public sites in the greater Lausanne area, Switzerland. ENFSI, APST Working Group Meeting, Prague, 13 April 2016.
29. Somma, R., Silvestro M., Cascio, M., Dawson, L., Donnelly, L.J., Harrison, M., McKinley, J. and Ruffell, A. 2016. The use of a GIS Red-Amber-Green (RAG) system to define search priorities for burials. *Geophysical Research Abstracts*, Vol. 18, EGU2016-16379, 2016, EGU General Assembly 2016.

Selected Popular Press, Web Sites, Media Articles, TV, Radio

30. Buckland, E.; Dawson, L.A. 2016. Soil as evidence in r v Halliwell. *Swindon Advertiser*, 12 September 2016.
31. Dawson, L.A.; Rodway, P. 2016. *Soils of the crofts*. The James Hutton Institute Publication with Crofting Connections, Aberdeen, 2nd ed., 57pp.
32. Dawson, L.A. 2016. The answer to crime riddles answers lies in the soil. *Sunday Express and Scottish Sunday Express*, 4 September 2016.
33. Dawson, L.A. 2016. Interview for BBC Wiltshire / BBC West Radio, 20 September 2016.
34. Dawson, L.A. 2016. Invited Interview for Public Video Presentation, Royal Society of Edinburgh Whiz a Quiz, Edinburgh, 29 August 2016.
35. Dawson, L.A. 2016. Interview on event to be held in Byres Road Glasgow. *Sunday Telegraph*, 4th September 2016.
36. Dawson, L.A. 2016. The woman who digs the dirt to catch serial killers. Title: Temporal fatty acid profiles of human decomposition fluids in soils <http://www.bbc.co.uk/news/uk-scotland-37561722> Authors: Suzanne Allan. BBC Online Web Site Article, 8 October 2016.
37. Dawson, L.A. 2016. Radio interview by Fiona Stalker, BBC Radio Scotland.
38. Dawson, L.A. 2016. Project on soil provenance and feature on soil forensics for The One Show. Interview for BBC the One Show, 09 August 2016.
39. Dawson, L.A., Anderson, L. 2016. None but the dead; forensic fact meets crime fiction. Byres Road Book Festival, Glasgow, 24 September 2016.
40. Dawson, L.A. 2016. The use of soil in the criminal justice system. *Soils: Environment, Health and Society - A Summary Booklet of Research Highlights from the RESAS Work Programme 2011-2016*, Chapter 8.

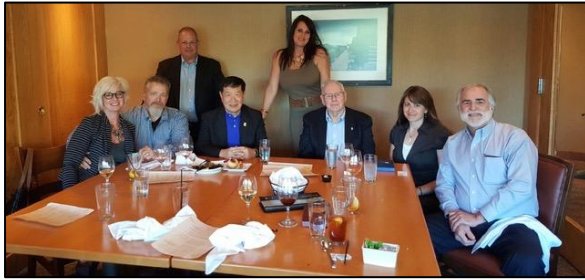
41. UNEP-INTERPOL Environmental Crimes: http://unep.org/documents/itw/environmental_crimes.pdf
42. MSc University of Messina, Sicily, Italy:
 - i. <http://comunicatistampa.unime.it/2016/02/15/al-via-la-ii-edizione-del-master-universitario-di-i-livello-in-geologia-forense/print/>
 - ii. http://www.unime.it/dipartimenti/biomorf/_bandi_e_concorsi_studenti/master_di_i_livello_in_geologia_forense_ii_ediz_a_a_2015_2016-45267.html
 - iii. Sito web ufficiale: http://web.unime.it/unigeolab/_pagine/-15696.html
<https://www.facebook.com/mastergeologiaforense/>
 - iv. <http://www.agenda.unict.it/11362-geologia-forense.htm>
43. <https://www.eventbrite.ie/e/forensic-geology-applications-to-crime-police-law-enforcement-tickets-25316329824>
44. <https://www.westpark.co.uk/conference-centre>
45. University College London: <https://blogs.ucl.ac.uk/forensic-sciences/cfs-seminar-series-mike-ferguson-cast/>
46. Art Forgeries: https://en.wikipedia.org/wiki/Shawn_Greenhalgh
47. AFTER: More than 40 interviews have been conducted in 2016, these include the following:
 - v. <http://www.abc.net.au/news/2016-10-18/australia-s-only-body-farm-helping-crime-scene-investigators/7939664>
 - vi. <http://www.nationalgeographic.com.au/science/australias-first-body-farm-flooded-with-donations.aspx>
 - vii. <http://www.abc.net.au/classic/content/2016/09/28/4542014.htm>
 - viii. <https://www.pressreader.com/australia/the-australian-womens-weekly/20160801/281590944874962>
 - ix. <https://www.newscientist.com/article/mg23030760-600-life-amid-death-at-australias-new-body-farm/>
 - x. <http://www.abc.net.au/news/2016-03-07/selling-the-idea-of-a-body-farm-to-illawarra-seniors/7226248>
 - xi. <https://www.odt.co.nz/news/dunedin/forensic-scientist-shares-insights>
48. Holocaust war Graves, Lithuania
 - i. <http://www.pbs.org/wgbh/nova/next/military/vilnius-tunnel/>
 - ii. http://www.nytimes.com/2016/06/29/science/holocaust-ponar-tunnel-lithuania.html?_r=0
 - iii. <https://www.theguardian.com/world/2016/jun/29/researchers-map-wartime-escape-tunnel-in-lithuanian-forest>
 - iv. <http://news.nationalpost.com/news/canada/a-canadian-pinpointed-the-secret-tunnel-nazi-prisoners-dug-to-escape-the-holocaust-in-lithuania>
 - v. <http://calgaryherald.com/news/local-news/calgary-geophysicists-help-uncover-world-war-ii-escape-tunnel>
49. **35th International geological Congress, Cape Town, South Africa**

Soil Forensic Seminar, 35th IGC, Cape Town, South Africa: <http://www.35igc.org/Themes/6/Soil-Science>

 - A. Presentations:
 - i. Successes and Failures in Detecting Buried Non-metallic Objects Using Ground (and Water) Penetrating Radar. Dr Alastair Ruffell (WPR and GPR).
 - ii. A GIS-based landscape approach to Forensic Search Strategies and RAG mapping. Dr Jennifer McKinley.
 - iii. Analysis of leachate, VOCs, fatty acids and mineralogy following the discovery of a homicide grave: Potential implications for police led open area ground searches for burials. Dr Laurance Donnelly.
 - iv. Establishing Australia's first Body Farm - The Australian Facility for Taphonomic Experimental Research (AFTER). Prof. Shari Forbes.
 - v. The Importance of the Field of Forensic Soil Examination being Aligned with the Wider Discipline of Forensic Science, Prof Hilton Kobus.
 - vi. Geological Society of London (GSL), Forensic Geoscience Group (FGG); the first 10 years and the International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG); the first 5 years. Dr Laurance Donnelly.
 - vii. Igneous Phosphate Resources of East and South east Africa Mr Wondafrash Mammo Ghebre
 - viii. Predicting the origin of soil evidence: high throughput eukaryote sequencing and MIR spectroscopy applied to a crime scene scenario. Dr Jennifer Young.
 - ix. Introduction to the Exploitation of Microscopic Traces for the Geo-sourcing of Forensic Soil and Dust Evidence: Methods and Examples from Casework. Mr Skip Palenik.
 - x. Forensic Geophysics: ground penetrating radar application in archaeological research in Tekoha Jevy village, Parana, Brazil. Mr Fábio Salvador
 - xi. Comparison of ginseng planting field soil to solve a murder case. Ms Hongling Guo
 - xii. Novel use of monochromatic light mineral separation techniques to enhance agromineral concentration for plant nutrient release from mesocratic and leucocratic fractions of Pelotas monzogranite, RS, Brazil. Mr Matheus Grecco
 - xiii. Development of Chernozem – Luvisol toposequence in the North-east Namibia. Dr Vit Penizek
 - xiv. Preliminary results of a geoelectrical survey in a vineyard in Estremoz, Portugal. Prof Antonio Correia.
 - xv. Prairie Mound Morphology and Age in the Arkansas River Valley, south-central United States. Dr Brad Lee.
 - xvi. Estimation of Volumetric Oil Content in Unsaturated Soils using Thermo-TDR Techniques. Mr Shinsuke Aoki

- xvii. Interpreting the transfer method of soil evidence on clothing by identifying trace soil patterns. Prof Robert Fitzpatrick.
 - xviii. Trace evidence examination using laboratory and synchrotron X-ray diffraction techniques. Mr Mark Raven.
 - xix. Mineralogy and forensic geology to solve a foreign trade trickery. Mr Fabio Salvador.
 - xx. The importance of geological and soil materials as trace evidence in solving criminal investigations in Australia. Prof Robert Fitzpatrick.
 - xxi. Tracing illicit gold from South America. Dr Roger Dixon.
 - xxii. Tracing the source of stolen PGM smelter products. Dr Roger Dixon.
 - xxiii. Portable X-ray Fluorescence (PXRF) Spectrometry of Soils: Method Limitations. Dr Elisa Bergslien.
 - xxiv. The application of forensic ecology and the use of near-surface geophysics in a search for concealed human remains. Mr Colin Hope.
 - xxv. Environmental magnetic studies of soil profiles from tropical Southern India: A window to pedogenic processes and sediment-source linkage. Dr Rajasekhariah Shankar.
 - xxvi. Ecological services and biophysical functioning of agriecological soils of Burkina Faso. Prof Mikael Motelica-Heino.
 - xxvii. Plant Growth Promoting Rhizobacteria (PGPR) Enhance Plant Drought Stress Tolerance: Physicochemical and Hydrological Changes in Rhizospheric Soil. Prof Yan Jin.
 - xxviii. Bromine in soil. Dr Irina Shtangeeva
 - xxix. Hydrochemical Characterisation And Quality Appraisal Of Soil In The Foothills Of Himalaya In Parts Of Uttarakhand India. Mrs Resmi Sathikumar.
 - xxx. Novel potash fertiliser from nepheline syenite for Africa's agricultural growth. Mr Annock Chiwona.
 - xxxi. Forensic Geosciences applied to the presence or absence of a corpse. Dr Rosa Maria Di Maggio.
 - xxxii. Geoforensics in Italy: Education and Research Standards. Dr Rosa Maria Di Maggio.
 - xxxiii. Possibility of describing sand grain morphology by image analysis. Dr Ritsuko Sugita.
- B. Posters:
- i. Forensic Geophysics: ground penetrating radar application in archaeological research in Tekoha Jevy village, Parana, Brazil. Mr Fabio Salvador.
 - ii. Geophysical monitoring over graves simulated in Colombia, South America. Dr Carlos Molina
 - iii. Comparison of ginseng planting field soil to solve a murder case. Ms Hongling Guo.
 - iv. Geoforensics in Italy: Education and Research Standards. Dr Rosa Maria Di Maggio.
 - v. Forensic Geosciences applied to the presence or absence of a corpse. Dr Rosa Maria Di Maggio.
 - vi. Possibility of describing sand grain morphology by image analysis. Dr Ritsuko Sugita.
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 - x. Estimation of Volumetric Oil Content in Unsaturated Soils using Thermo-TDR Techniques. Mr Shinsuke Aoki.
 - xi. Techniques Development of Chernozem – Luvisol toposequence in the North-east Namibia. Dr Vit Penizek.
 - xii. Erosion and sedimentation in the Daryan watershed, north west of Iran. Dr Javad Darvishi Khatooni.

APPENDIX II: SELECTED PHOTOGRAPHS AND ASSOCIATED INFORMATION



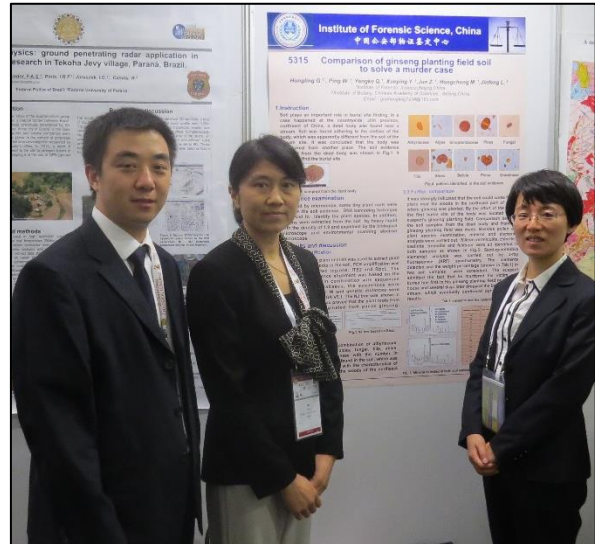
Dr Ray Murray, at the Medico legal death investigation conference, Montana, USA (Photo: Dr Ray Murray)



Students at the University of Messina, MSc in Forensic Geology (Photo: Dr Alastair Ruffell)



Prof Lorna Dawson representing IUGS-IFG at Interpol, in Lyon, France, October, 2016 (Photo: Prof Lorna Dawson)



Prof Hongling colleagues (Institute of Forensic Science, Ministry of Public Security, Division of Trace Evidence Analysis, China) at the 35th IGC in Cape Town (Photo: Prof Guo Hongling)



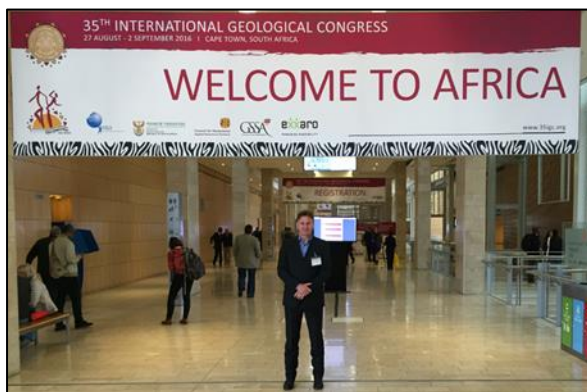
Prof Shari Forbes at the Australian Facility for Taphonomic Experimental Research (AFTER) (Photo: Prof Shari Forbes)



Dr Carlos Molina Gallego conducting research in decomposition and search, in Colombia (Photo: Dr Carlos Molina Gallego)



Experimental, simulated grave, University of Messina (Photo: University of Messina)



IUGS-IFG Chair, at the opening of the Forensic Geology Session, 35th International Geological Congress, Cape Town, South Africa (Photo: Dr Laurance Donnelly)



Experimental deployment of field portable XRF in the vicinity of a former homicide grave (Photo: Dr Laurance Donnelly. Equipment, Ms Carole Davenport, John Moores University, Liverpool, UK)



IUGS-IFG welcome colleagues from China to the forensic geology session, 35th IGC Cape Town (Photo: Dr Laurance Donnelly)



Ground search for a burial, Northern Ireland (Photo: Dr Alastair Ruffell)



IUGS-IFG at the Geological Survey of Ireland (Photo: Dr Laurance Donnelly)



Experimental use of ground penetrating radar to over a control site associated with an unknown grave, in the north of England (Photo: Laurance Donnelly. Mala geophysical supplied courtesy of Mr Mike Langton. Geophysics support from Dr Alastair Ruffell)



University of Messina, MSc in Forensic Geology with the Polizia (Photo: Alastair Ruffell and Roberta Somma)



Geology students and police undergo endorsed and supported by IUGS-IFG, Italy (Photo: DR Alastair Ruffell and University of Messina, Sicily)



IUGS-IFG deliver training in Forensic Geology with the Brazilian Federal Police, the LAMIR, Isotope laboratory for analyses of minerals and rocks and 2nd Coloquio Sul Brasileiro en Ciencias Forenses, Brazil, December 2016 (Photo: Dr Fabio Augusto Da Silva Salvador, Dr Carlos Molina Gallego and Dr Rosa Maria Di Maggio)

Institute of Geologists of Ireland / Geological Survey of Ireland Evening Seminar

Forensic Geology: The Applications of Geology to Crime, Police and Law Enforcement

IGI/GSI Evening Seminar

5pm, Thursday 2nd June 2016
Geological Survey of Ireland (Haddington Road, Beggars Bush, Dublin, Ireland, D04 K7X4)

Dr Laurance Donnelly
BSc (Hons), PhD, CGeol, CSci, EurGeol, FGS, FGSA
Forensic Geologist & Police Ground Search Advisor
Further information attached.

Programme

17:00-17:10: Introduction
Marie Fleming, Institute of Geologists of Ireland & Anup

17:10-17:40: Forensic Geology in Ireland
Dr. Alastair Ruffell, Queens University Belfast

17:40-18:10: Search and Trace Evidence
Prof. Lorna Dawson, James Hutton Institute

18:10-18:40: Q&A
Prof. Duncan Pirrie, Helford Geoscience LLP

18:40-19:10: GIS in Forensic Geology
Dr. Jennifer McKinley, Queens University Belfast

19:10-20:00: Keynote Lecture: Forensic Geology: The Applications of Geology to Crime, Police and Law Enforcement
Dr. Laurance Donnelly, International Union of Geological Sciences, Initiative on Forensic Geology & Anup

20:00-20:10: Closing Remarks
Koen Verbruggen, Geological Survey of Ireland

ARUP

To register for this event please click the link below.

[Register Here](#)

The Geological Society of London:
East Midlands Regional Group

Forensic Geology: The Applications of Geology to Crime, Police and Law Enforcement

With
Dr Laurance Donnelly (Forensic Geologist & Police Ground Search Advisor)

(Source: Photographs © Laurance Donnelly, IUGS-IFG)

Forensic geology is the application of geology to crime, policing and law enforcement, which may potentially be applicable to a court of law. This by no means is new since documentary evidence suggests that geology has been applied to some criminal investigations since at least the middle part of the eighteenth century, and possibly earlier. Nowadays, forensic geology is applied throughout the world for a variety of applications which includes; homicide, ground searches for buried graves and other concealed items, sexual assaults, counter terrorism, organised crime, kidnapping, humanitarian incidents, environmental crimes, precious minerals theft and fraudulent crimes. This presentations draws on operational case experiences and provides information on some of the logistical and operational aspects of working with the police as a forensic geologist.

Tuesday 14th June 2016
De La Beche Conference Suite, British Geological Survey, Keyworth, Nottingham. NG12 5GG

Refreshments available 6.30pm, talk starts at 7pm

--Everyone welcome--

Example of flier's for IUGS-IFG outreach events.

FIND YOUR OASIS IN FORENSIC SCIENCE

CAC & ASTEE Joint Meeting

HOSTED BY: CA DOJ RIVERSIDE LABORATORY
OCTOBER 31 – NOVEMBER 4, 2016

2016 Fall Seminar

OMNI RANCHO LAS PALMAS RESORT & SPA
RANCHO MIRAGE, CA (PALM SPRINGS AREA)

The International Union of Geological Science- Initiative on Forensic Geology: Impacting on Search and Trace Evidence provision internationally

Lorna Dawson, Laurance Donnelly and Alastair Ruffell.

Forensic Geoscience: Geoforensics (known also as Forensic Geology or Forensic Geoscience) is the application of geology to criminal investigations. Forensic geologists/soil scientists assist the police to determine what happened, where and when it occurred, or to help search for homicide graves or other objects buried in the ground. In a law enforcement context, geoforensics specialists may support the police in the main areas of geoforensics: search/trace reconstruction and in the provision of trace evidence. IUGS-IFG. The IUGS-IFG aims to raise the global awareness of forensic geology by holding meetings and conferences, promoting research, teaching, training and enabling the operational deployment of forensic geologists.

Search/Crime Reconstruction:
Geological techniques are used to help the police search for the location of land recovery off objects buried in the ground, including for example, homicide graves, mass graves related to genocide, weapons, firearms, improvised devices, explosives, drugs, stolen items, money, coinage and jewellery. These searches may take place in urban, rural or remote locations. In both the terrestrial and aqueous environments. A search may be conducted to: (a) obtain evidence for prosecution, (b) gain intelligence, (c) deprive criminals of their resources & opportunities, (d) locate vulnerable persons, (e) protect potential targets, (f) search for homicide graves & associated buried items or objects.

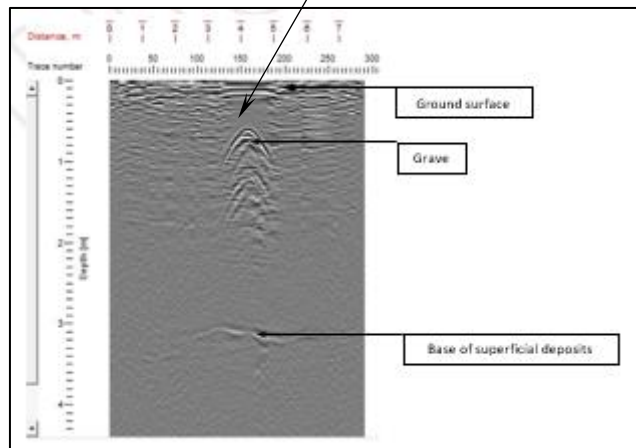
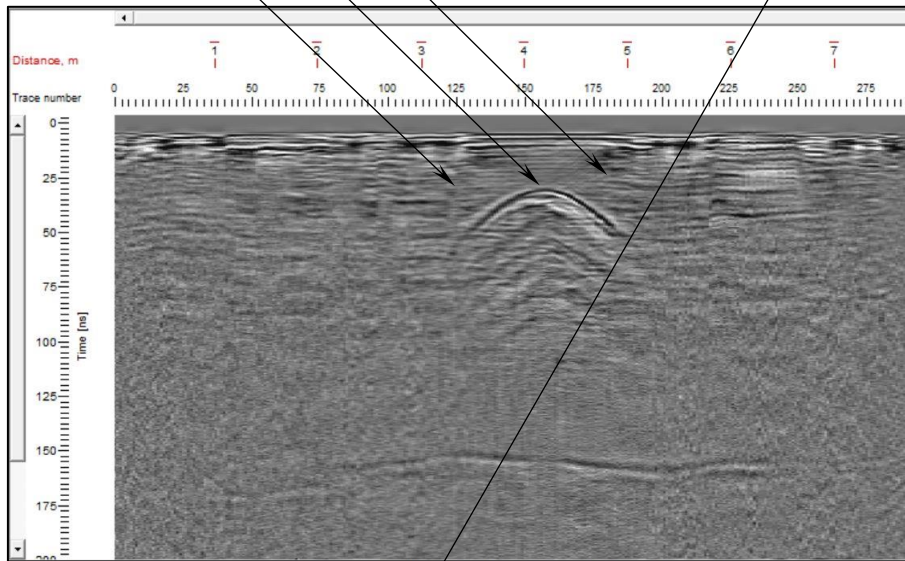
Geological (trace) Evidence:
The collection, analysis, interpretation, presentation and explanation of geological evidence as intelligence and as evidence. Geological trace evidence can vary and may include: rock fragments, soils and sediments, which occur naturally in the ground, artificial (anthropogenic) man-made materials derived from geological raw materials (such as bricks, concrete, glass or plaster board), or micro-fossils. Trace evidence may be transferred onto a body, person or the clothing of a victim or offender or onto vehicles or objects from and to a crime scene.

Knowledge Exchange:
The IUGS-IFG is raising the global awareness of forensic geology by holding meetings, conferences, promoting research, teaching, training and enabling the operational deployment of forensic geologists. This is consistent with the objectives of IUGS, and includes capacity building through raising awareness about forensic geology, technology transfer through improvement of skills, and outreach through working with police, law enforcement organisations, geoscientists and the general public.

Case Example: R v Muir.
Through the use of soil on gloves recovered from the suspects vehicle, sites were excluded and a priority site located, subsequently revealing the remains of the victim, 700m away from the site identified through wax markers and mineralogy. Evidence presented in court helped the jury convict Adrian Muir of Pamela Jackson's manslaughter.

For further information see:
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(Left) The California Association of Criminalists (CAC)/American Association of Trace Evidence Examiners (ASTEE) joint Seminar (Source: Ms Marianne Stam). (Right) IUGS-IFG & James Hutton Institute Poster for the meeting with Interpol, France, September 2016



IUGS-IFG development of ground search strategies for burials. The radar gram from ground penetrating radar survey in the UK Pennines was carried out above a buried spade and clothing. Note the detection of the grave cut and the control item (Source: Dr Laurance Donnelly. GPR supplied by Mala courtesy of Mr Mike Langton and supported by Dr Alistair Ruffell. Submitted for publication in Episodes)

**Forensic Geoscience Group****The Geological Society**
-serving science & profession

International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG)

&

The Geological Society of London, Forensic Geoscience Group (FGG)

Acknowledges the contribution made by

Symposium: Forensic soil science and geology: 5th International Conference on Criminal & Environmental Soil Forensics Soil Forensic International (SFI-2016)

35th International Geological Congress,

Cape Town, South Africa 27 August 2016 to 4 September 2016



Dr Laurance Donnelly, Chair IFG



Dr Jamie Pringle, Chair FGG



Dr Alastair Ruffell, Training IFG



DRAFT





The International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG)

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with the

Brazilian Federal Police

held at

2nd Colóquio Sul Brasileiro de Pesquisas em Ciências Forenses, Curitiba, Brazil

Monday 12th to Thursday 15th December 2016

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Mr Fabio Augusto Da Silva Salvador
IUGS-IFG, Latin America

Dr Carlos Molina Gallego
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Examples of IUGS-IFG certificates

IUGS, INITIATIVE ON FORENSIC GEOLOGY (IFG), ELECTRONIC NEWSLETTER, NUMBER 3, JUNE 2016



INTERNATIONAL UNION OF GEOLOGICAL SCIENCES
INITIATIVE ON FORENSIC GEOLOGY
ELECTRONIC NEWSLETTER



Official Electronic Newsletter of the International Union of Geological Sciences, Initiative on Forensic Geology

The International Union of Geological Sciences (IUGS), Initiative on Forensic Geology (IFG), was officially launched during the 62nd Executive Committee Meeting of the IUGS, which was held at UNESCO headquarters, in Paris, France, on 22nd February 2011. The objectives of the IUGS-IFG are to:

- Collate and disseminate data and information on forensic geology applied to policing and law enforcement, criminal, environmental and civil investigations;
- Promote international meetings, seminars, conferences and training;
- Develop a 'Committee' to act as principal advisers, collaborators and active participants;
- Develop an international network whereby each 'member' will act as a principal contact in their respective country for the collation and dissemination of information on forensic geology;
- Collate, make available and where appropriate review any existing documentation and publications in forensic geology; and
- Produce a document endorsed by the Committee to be called; 'A Guide to Forensic Geology'.



IUGS-IFG with staff and delegates from the MSC in Forensic Geology, University of Messina, Sicily, Italy (Photo: Università degli Studi di Messina)

IUGS-IFG COMMITTEE

The IUGS-IFG Committee comprises representatives from major geographical regions of the world and includes specialists from academia, industry, consultancy, operationally based forensic geologists, the police, law enforcement agencies and forensic organisations. In 2015, three new members were assigned to the IUGS-IFG Committee: Dr Duncan Pirrie, Special Publications Adviser; Dr Ruth Morgan, Forensic Science Adviser and Mr Fabio Augusto Da Silva Salvador, joint Co-officer for Latin America

IUGS-IFG GEOPRENSIC INTERNATIONAL NETWORK (GIN)

The Geoforensic International Network (GIN) brings together forensic geologists, geoscientists and invited police/law enforcement officers from around the world, who have a desire and interest in the development of forensic geology. New contacts have been provided for potential members in; Belarus, China, Kazakhstan, Kyrgyzstan, Kuwait, Mongolia, Oman, Qatar, Poland and Venezuela. Countries now represented in GIN include; Australia, Argentina, Belgium, Brasil, Canada, Colombia, England, France, Germany, Hungary, India, Iran, Ireland, Italy, Japan, Latvia, Malta, Mexico, Namibia, New Zealand, Nigeria, Northern Ireland, Portugal, Russia,



For further information

<http://www.forensicgeologyinternational.org> or <http://www.forensicgeologyinternational.org>



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