

**ANNUAL REPORT OF IAEG COMMISSION C1  
ENGINEERING GEOLOGICAL CHARACTERISATION AND VISUALISATION**

**1) Chair persons**

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**2) Aims and key objectives of the Commission**

The proposed focus of Commission No 1 since 2007 has been on two initiatives with four goals:

***Initiative 1: Engineering Geology for Actuarial Purposes***

- Goal 1. Characterise geohazards in terms that can be used directly by actuarial scientists
- Goal 2. Characterise physical damage caused by geohazards
- Goal 3. Characterise transient and dynamic environmental factors in systematic ways that quantify variability and uncertainty

***Initiative 2: Digital Initiative for Engineering Geology***

- Goal 4. Monitor, review and make recommendations on good practices for effective use of information technology in engineering geological characterisation and visualisation

Key objectives of the Commission :

- 1. Contribute in a meaningful way to geoscience-based, quantitative assessment of risks related to natural hazards, and
- 2. Promote improvements in the ways engineering geologists document, analyse, display, and communicate quantitative technical information with examples that demonstrate basic and advanced principles (i.e., general guidance rather than performance standards).

**3) Most recent meeting of the Commission**

In 2008 and 2009, the Commission held the following meeting :

The Commission held its meeting in Madrid, Spain, on 16 September 2008 at the EuroEnGeo08 Conference. The Commission meeting was attended by the following individuals:

Jeffrey Keaton, Chairman, USA  
Martin Culshaw, United Kingdom  
Feng Quanhong, Sweden  
Markus Poetsch, Austria

Claudia Meisina, Italy  
Keith Turner, USA  
Andreas Gaich, Austria  
Sebastian Dupray, France

Commission meeting began with a review of the proposed C1 activities developed by Dr. Keaton who took over C1 leadership from Dr. Culshaw at the IAEG Council meeting in Vail USA in June 2007. The status of C1 activities in 2007-08 was reviewed. Plans for 2008-09 were discussed, including interactions with other IAEG Commissions. Plans for a C1 meeting in 2009 were discussed, with the intention of meeting at the 7th Asian Regional Conference of IAEG in Chengdu, China.

Topics discussed included technical interests of individuals and the timing of abstract deadlines for future IAEG meetings, notably the 11th IAEG Congress in Auckland, New Zealand, 5-10 September 2010, and the conference in Chengdu. IAEG C1 has been accepted as a non-financial co-sponsor of a symposium on digital technology in engineering geology to be held in September 2009 at South Lake Tahoe, USA, in conjunction with the Association of Environmental and Engineering Geologists annual meeting. The organizers of the symposium are Dr. William Haneberg and Dr. Keaton, both members of C1. Another opportunity for C1 activities will occur at a meeting in Portland, Oregon, USA, in October 2009.

#### **4) On going research**

Research of varying style is being conducted on a variety of topics relevant to C1 goals and objectives. Little effort has been put into an attempt to compile a list of organisations or individuals engaged in research on relevant topics. Contributors to major efforts that are published are listed in the publications; such lists have value, but tend to be out of date quickly. The IAEG commission websites provide a potentially useful mechanism for compiling and maintaining lists of researchers, as well as research topics and results.

The general research focus on the two C1 initiatives is :

Initiative 1 : Jeff Keaton and Richard Roth, Jr.

Initiative 2 : Holger Kessler, Keith Turner, Martin Culshaw, and William Haneberg

The British Geological Survey is continuing to promote the use of 3D geological modelling and visualisation in the environmental and engineering sector through:

1. Development of GSI3D (see <http://en.wikipedia.org/wiki/GSI3D> and Journal publication and User Manual identified below in Section 5),
2. Formation of an International modelling community through organising conferences and workshops. (see [http://www.geoconnexion.com/geouk\\_online\\_article/2nd-International-GSI3D-Conference/263](http://www.geoconnexion.com/geouk_online_article/2nd-International-GSI3D-Conference/263) and conference abstract (Mathers, S.J., editor, 2008) listed below in Section 5,
3. Dissemination of software and knowledge through a trial evaluation and a planned consortium,
4. Presentations at conferences (see examples below in Section 5),
5. Carrying out commissioned research for Regulators and Engineering Consultants.

#### **5) Output and publications**

Mathers, S.J., Kessler, H. & H.-G. Sobisch. 2009. 3D Geological Modelling at the British Geological Survey using the GSI3D software and methodology [extended abstract]. In: EUREGEO 2009 : European congress on Regional Geoscientific Cartography and Information Systems, Munich, Germany, 9-12 June 2009. Augsburg, Bayerisches Landesamt fur Umwelt, 82-84.	<a href="http://nora.nerc.ac.uk/7823/1/Mathers_extended_abstract_5.pdf">http://nora.nerc.ac.uk/7823/1/Mathers_extended_abstract_5.pdf</a>
Kessler, H., Mathers, S.J. & H.-G. Sobisch. 2009. The capture and dissemination of integrated 3D geospatial knowledge at the British Geological Survey using GSI3D software and methodology. Computers & Geosciences, 35, 1311–1321.	<a href="http://dx.doi.org/10.1016/j.cageo.2008.04.005">http://dx.doi.org/10.1016/j.cageo.2008.04.005</a> ; <a href="http://nora.nerc.ac.uk/7207/1/Kessler CG_GSI3D_article_final.pdf">http://nora.nerc.ac.uk/7207/1/Kessler CG_GSI3D_article_final.pdf</a>
Keaton, J.R., and Roth, R.J., Jr., 2008, Mapping Landslides for the Insurance Industry – Lessons from Earthquakes: EuroEnGeo08, Madrid, Spain, 15-20 September 2008.	
Smith, B. Kessler, H. et al. 2008. 3D Modelling of geology and soils - A case study from the UK. In: A.E. Hartemink et al. (eds.), Digital Soil Mapping with Limited Data, Springer. 436pp.	<a href="http://www.globalsoilmap.net/Riobook.html">http://www.globalsoilmap.net/Riobook.html</a>

Mathers, S. & H. Kessler. 2008. GSI3D the software and methodology to build systematic near-surface 3-D geological models - Version 2.6. British Geological Survey, (OR/08/064) 130pp.	<a href="http://nora.nerc.ac.uk/4903/1/GSI3D_manual_V2_6_OR08064.pdf">http://nora.nerc.ac.uk/4903/1/GSI3D_manual_V2_6_OR08064.pdf</a>
Mathers, S.J., Kessler, H. & H.-G. Sobisch. 2008. The geological maps of the future: 3D modelling at BGS using the GSI3D software and methodology. Presentation at the International Geological Congress, Oslo, 6-14 August 2008.	<a href="http://www.cprm.gov.br/331GC/1257345.html">http://www.cprm.gov.br/331GC/1257345.html</a>
Mathers, S.J. (editor). 2008. Extended Abstracts of the 2nd International GSI3D Conference, 2-3 September 2008. British Geological Survey Open File Report (OR/08/054), 30pp.	<a href="http://nora.nerc.ac.uk/4477">http://nora.nerc.ac.uk/4477</a>
Turner, A. K., Price, S., Kessler, H., & M. Culshaw. 2008. Creating 3D Geological Subsurface Models for Urban Areas. Geological Society of America Annual Meeting in Houston.	<a href="http://gsa.confex.com/gsa/2008AM/finalprogram/abstract_146137.htm">http://gsa.confex.com/gsa/2008AM/finalprogram/abstract_146137.htm</a>
Kessler, H., Turner, A.K., Culshaw, M.G., and Royse, K.R., 2008, Unlocking the Potential of Digital 3D Geological Subsurface Models for Geotechnical Engineers: EuroEnGeo08 Conference, Madrid, Spain, 15-20 September 2008.	<a href="http://nora.nerc.ac.uk/3817/1/EUROENGE08_2008_Kessler_et_al.pdf">http://nora.nerc.ac.uk/3817/1/EUROENGE08_2008_Kessler_et_al.pdf</a>
Culshaw, M.G., 2008, 3D Assessment of Urban Aquifer Vulnerability using Geological and Buried Asset Models – Case Study from Knowsley Industrial Park, NW England: EuroEnGeo08 Conference, Madrid, Spain, 15-20 September 2008.	<a href="http://nora.nerc.ac.uk/4997/">http://nora.nerc.ac.uk/4997/</a>
Keaton, J.R., 2009, Close-Range Terrestrial Photogrammetry for Geotechnical Characterization and Visualization: American Society of Civil Engineers Geo-Institute Geo-Strata, v. 10, issue 2 (March/April), p. 18-20.	
Haneberg, W.C., 2009, Rapid Prototyping of Computer Models to Characterize Discontinuous Rock Masses: American Society of Civil Engineers Geo-Institute Geo Strata, v. 10, issue 2 (March/April), p. 22-26.	

## **6) Future plans of the Commission**

A meeting of the Commission is being planned to take place at the Geological Society of America (GSA) Annual Meeting in Portland, Oregon, USA. The Engineering Geology Division of GSA is coordinating the meeting place at the conference; the C1 meeting will begin at 5 pm local time on 18 October 2009. Neither the Chair nor the Secretary is able to attend the conference in Chengdu in September 2009, but both are planning to attend the GSA conference in Portland. C1 was successful in becoming co-sponsor of two thematic sessions and Holger Kessler is co-convenor of those 2 sessions:

### ***T1. Geological Mapping: Key to Successful Management of Water and Land Resources***

*GSA Geology and Society Division; Association of American State Geologists; U.S. Geological Survey; British Geological Survey; GSA Geology & Public Policy Committee; International Association for Engineering Geology and the Environment (IAEG); GSA Engineering Geology Division*

***T2. Geologic Maps, Digital Geologic Maps, Geophysical Maps, and Derivatives from Geologic Maps (Posters)***  
*GSA Geology and Society Division; GSA Structural Geology and Tectonics Division; Association of American State Geologists; U.S. Geological Survey; British Geological Survey; GSA Geology & Public Policy Committee; International Association for Engineering Geology and the Environment (IAEG); GSA Engineering Geology Division.*

A symposium entitled, “Digital and Electronic Technology in Engineering Geology” has been organized by Dr. Haneberg with assistance from Dr. Keaton. These two C1 members will serve as moderators and present papers in this symposium at the Association of Environmental and Engineering Geologists annual meeting at South Lake Tahoe, USA, on 24 September 2009.

The Chair contacted the organizers of IAEG Congress 2010 with proposals to organize two symposia related to the initiatives of C1. The general topic titles for the Congress include categories that are suitable for C1 initiatives, but the titles proposed by C1 do not appear in the topic list. Abstracts have been submitted by the Commission Chair and Secretary for presentation at the IAEG Congress 2010 Conference, and other members of C1 also have submitted abstracts.

The two C1 initiatives appear to remain appropriate; however, the goals for Initiative 1 appear to be too ambitious to accomplish in the limited time that has been available. A reconsideration of these goals will be discussed at the C1 meeting in Portland, and again at the C1 meeting that is planned for the IAEG Congress 2010 in Auckland. The goal for Initiative 2 appears to be reasonable.

Updating the content of the IAEG website pertaining to Commission No 1 has been a challenge because the Chair and Secretary have been preoccupied with other demands. A more diligent effort is needed and attempts will be made during the summer and fall of 2009.