

## CV and Expertise

**PROF. DR. RER. NAT. DR. H. C. RAFIG AZZAM**  
Head of Department of Engineering Geology  
and Hydrogeology  
Faculty of Georesources and Material Engineering  
RWTH Aachen University of Technology



### POSITIONS HELD AND PROFESSIONAL EXPERIENCE:

- |                 |   |
|-----------------|---|
| Since Dec. 2010 | Centre Coordinator of "Indo-German Centre for Sustainability" at IIT Madras within the initiative "A New Passage to India".   |
| Since Sep. 2002 | Head of the Department of Engineering Geology and Hydrogeology at RWTH Aachen University, Germany.  |
| Sep. 1999-2002  | Director of the Institute of Geotechnical Engineering at the Freiberg University of Science and Technology, Germany.  |
| Mar. 1993       | Full professor and head of Engineering Geology and Environmental Geotechnics at the Freiberg University of Science and Technology and member of Faculty Board, Germany. |
| July 1992       | Habilitation, (qualification of professorship) RWTH Aachen University.  |
| Apr. 1987       | Senior lecturer at the Department of Engineering Geology and Hydrogeology, RWTH Aachen, Germany.  |
| Dec. 1984       | Research fellow at the Department of Civil and Systems Engineering, James Cook University of North Queensland, Australia.   |
| April 1984      | PhD hon. (summa cum laude) from the RWTH Aachen University, Germany   |
| Jan. 1980       | Research assistant at the Department of Engineering Geology and Hydrogeology, RWTH Aachen, Germany.   |

### AWARDS

**IN 2015 AWARD OF THE GOVERNMENT OF SHEJIANG PROVINCE, CHINA "THOUSAND TALENT FOREIGN EXPERTS"**

**IN APRIL 2008 AWARDED WITH HONORARY DOCTORATE OF THE UNIVERSITY OF SHANGHAI FOR SCIENCE AND TECHNOLOGY (USST).**

**RECOGNIZED FOR EXCELLENCE BY WHO' S WHO INTERNATIONAL ORGANIZATION SINCE 1999**

**IN 2009 THE DEPARTMENT HAS BEEN AWARDED THE PRIZE OF THE GERMAN GOVERNMENT AND INDUSTRY "GERMANY LAND OF IDEAS"**

**IN 1984 AWARDED WITH "BORCHERS MEDAILLE" OF THE RWTH UNIVERSITY OF AACHEN**

## **PROFESSIONAL SOCIETIES**

- Chair of the German National Group of the "Association of Engineering Geology and the Environment" for the period 2008-2016.
- Vice president of the International Association of Engineering Geology and the Environment IAEG in the period 2015-2018.
- Member of the Executive Board of the German Association for Geotechnical Engineering (DGGt).
- Core Member of the Joint Technical Committee JTC 3 „Education and training“ of the IAEG.
- Member of the board of directors of the Interdisciplinary centre of Excellence for Brownfields CIF.
- Reviewer of the German Research Council (DFG) and DAAD.
- Member of German Industrial Standardization (DIN), Section "NABau" (focussing civil engineering subjects).
- RWTH University delegate to India (responsible for the University cooperation with India).
- Founder of the Indo-German Centre for Sustainability (IGCS) and German Centre Coordinator: [www.igcs-chennai.org](http://www.igcs-chennai.org)
- Advisor for the International Atomic energy Agency (IAEA).
- Advisor for many international science organizations on research programs such as the Greek Ministry of Research and Technology, the Research Council of Norway - research cooperation with India, the Austrian Foundation for Advancement in Scientific Research (FWF), the Chinese Academy of Sciences, etc.

- Audit member of the organization ASIIN for the accreditation of University curricula.
- Reviewer of many international Journals such as Environmental Geology, Waste Management etc.

## **SUBJECTS OF RESEARCH (SELECTED)**

### **CO<sub>2</sub>-Sequestration**

Two projects have been funded by the BMBF (Federal Ministry of Education and Research) are dealing with CO<sub>2</sub> sequestration. One considers the transformation and adsorption of CO<sub>2</sub> and its injection into the underground for storage purposes and the other deals with gasification of coal seams and subsequent storage of CO<sub>2</sub>. Another project is CO<sub>2</sub>SINUS, for which we won the prize of the German Government and Industry in 2009.

### **Hydro Geological Mapping**

The Department of Engineering Geology and Hydrogeology started its hydro geological mapping works in 1950 and continues it within a complete rearrangement by digital execution with Geographical Information Systems. Nowadays the department develops and processes two hydro geological maps the year for the geological survey of the federal state North-Rhine Westphalia. Scientific advancements focus the further integration of additional information layers, which concentrate e.g. on water supply and distribution, risk assessment for landslides and groundwater vulnerability.

### **Vulnerability of the Groundwater Resources**

Vulnerability aspects and evaluation of the potential of groundwater contamination are very important for the protection of aquifers. The department is dealing with this important topic since decades and it has carried out many projects in this area.

### **Groundwater Management Conceptions**

Prof Azzam maintains continuous contacts with many scientists in the Middle East and North-Africa region. In 2003 he was involved in producing a book about Jordan Valley, where he develops several ideas preventing aquifer from overexploitation and water quality deterioration. Prof. Azzam and his team pay very much attention on water management concepts using or treating brackish and/or salt water by desalination. Measures on integrated and sustainable water resource management like rainwater harvesting, storm water storage, water reuse and conservation methods and artificial recharge are under investigation improving water deficit situations in many parts of the world.

## **Water Management in fast-growing Mega-Cities**

Migrants from rural areas live not in urbanised areas but mostly in areas with insufficient infrastructure and difficult living conditions. The improvement of these circumstances starts with the basic need for a supply of water for drinking and domestic use in sufficient quality and quantity, as well as the prevention of water related diseases. The establishment of an appropriate distribution network takes a long time and is very costly. In order to provide basic water supply in a good quality and in a sufficient quantity for great parts of the population, small scale integrated and decentralised supply and disposal systems for inhabitants, could be established by a "waterhouse" considering the local situation. The "waterhouses" in a modern sense serve beneath the social needs primary the basic needs as the allocation of potable water, water for sanitation and laundry for a lot of people, which daily migrate to the megacities. It is just one step forward to integrate the directive of sustainability by treating the wastewater or give the possibility to reuse less polluted water within a cycle.

## **Electrokinetics**

Prof. Azzam and his team have also many years of experience in scope of electro kinetics in geotechnical and environmental engineering. In particular, they developed an electro-chemical injection method for soil improvement, which was successfully used for stabilizing the foundations of historical buildings. He has been developing many apparatus and methods for geotechnical testing for many years, for which he has owned five patents. Additional applications referring electro kinetics are.

- Extraction of heavy metals from soil
- Enhancement of water transport (electro osmosis)
- Application of adsorption membrane for water treatment/ disinfection from pathogens

## **Geohazards and Early Warning**

The Department develops risk assessment maps for geo-hazards such as landslides and landslide hazards. Investigations are running in respect to a comparison between different methodical approaches like the adoption of neuronal networks, geostatistics and/or geographical information systems. With the project SLEWS an early warning system based on self-organized sensor network has been developed and is now under test conditions. For more information: [www.slews.de](http://www.slews.de)

## **Seepage Water Prognosis, Pollutant Transport**

Another scientific focus of the Department is the prognosis of water and pollutant transport in the unsaturated zone. Emphasis is given in respect to preferential flow, which is under investigation by use of computer tomography.

## **ACADEMIC CO OPERATIONS WITH FOREIGN UNIVERSITIES AND VISITING LECTURES,**

### **SELECTED**

- Belgium: University of Liège (common organised EurEnGeo-Conference)
- Netherlands: University of Delft (common organised EurEnGeo-Conference)
- Jordan: University of Jordan (Aman), Yarmouk University (Irbid), University of Science and Technology (Irbid)
- Syria: Damascus University (Damascus), Al Baath University (Homs)
- Egypt: University of Alexandria, Department of Geology
- Morocco: Faculty of Sciences and Technology, University Sidi Mohamed, Fez
- Morocco: Département de Géologie, Fac. Sci. Semlalia, Marrakech
- Pakistan: Nuclear Institute for Agriculture and Biology of the Pakistan Atomic Energy Commission (Hyderabad, Faisalabad)
- India: Indo-German workshop and cooperation with Periyar Maniammai College of Technology for Women (Thanjavur), Indian Institute of Technology (IIT Madras) and Anna University (Chennai), Indo-German Centre for Sustainability at IIT Madras.
- China: Fakultät für Geotechnik, USST (Shanghai)
- China: Chinese Academy of Sciences, Peking
- Brazil: University of Sao Paulo
- Mexico, University of geosciences in Linares

**For more information please see: [www.lih.rwth-aachen.de](http://www.lih.rwth-aachen.de)**

### **SELECTED INTERNATIONAL RESEARCH PROJECTS**

- International treatment of brackish waters for sustainable utilization in cooperation with Nuclear Institute for Agriculture and Biology of the Pakistan Atomic Energy Commission and Department of Engineering Geology and Hydrogeology, RWTH (2004).
- Water resources in Jenin Governorate /North of the West Bank – Palestine – A part of the water problem in the Middles East (1998).

- Evaluation of clay sediments from Surabaya region, Indonesia, as geological barrier and mineral sealing material for waste disposal sites (1998 and 1999). Building of a new dump and rehabilitation project of a waste disposal site funded by GTZ.
- Development of a Spatial Data Infrastructure for the Derivation of Geoinformation from Distributive Geodata - Prototyping a Geoservice for Groundwater Vulnerability (2002-2005) BMBF funded joint project (Coordinator) with *ahu* (Aachen) and STE (Forschungszentrum Jülich)
- Seepage Water Prognosis: Evaluation of preferential flow as part of transport mechanisms in the unsaturated zone; prognosis of pollutant transport in the unsaturated zone. BMBF funded joint project (2001-2004)
- Water and Megacities, project funded by the DAAD in India <http://www.waterandmegacities.org/>

## SELECTED RESEARCH PROJECTS

During my carrier Over 90 industry-funded projects have been accomplished. Also numerous research projects funded by research organizations or government have been carried out. Some recent projects are listed:

- DFG SPP 1233 "Megastädte: Informelle Dynamik globalen Wandels"  
Verbundprojekt (Coordinator): „Analysis of informal dynamics in mega urban areas - based on spatial structure and steering mechanisms focused on water in the Pearl River Delta“, ongoing.
- BMBF/DFG Sonderprogramm GEOTECHNOLOGIEN – Verbundprojekt:  
„Entwicklung und Bewertung innovativer Strategien zur mineralischen und physikalischen Bindung von CO<sub>2</sub> in geologischen Formationen – CO<sub>2</sub>Trap“, just completed.
- BMBF/DFG Sonderprogramm GEOTECHNOLOGIEN – Verbundprojekt  
(Coordinator): „SLEWS – Entwicklung einer Geodateninfrastruktur als Grundlage von Frühwarnsystemen für Massenbewegungen durch die Integration von Echtzeitsensorik“, till 2010.
- BMBF/DFG Sonderprogramm GEOTECHNOLOGIEN – Verbundprojekt  
(Coordinator): „CO<sub>2</sub>-Speicherung in in-situ umgewandelten Kohleflözen – CO<sub>2</sub>SINUS“, just granted.

For more information please see: [www.lih.rwth-aachen.de](http://www.lih.rwth-aachen.de)

## PATENTS

4 Patents, obtainment: two in 1986, one in 2000 and one in 2004

## SUPERVISION

SINCE 1993 SUPERVISION OF MORE THAN 100 MASTER AND MORE THAN 50 PHD STUDENTS

## PUBLICATION

MORE THAN 220 PUBLICATIONS IN INTERNATIONAL AND NATIONAL JOURNALS

## SELECTED ACTIVITIES SINCE 2004

Co-organizer of EurEnGeo 2004 in Liege/Belgium	2004
Editor of scientific journals and books: ISSN 0341-3853 ISBN 3-86012-121-9 ISBN 3-86012-162-6	Since 1993
Editor CiF Publication: ISSN 1613-4753	Since 1997
Editor of "Engineering Geology for Infrastructure Planning in Europe", Springer, 2004, ISBN 3-540-21075-104	2004
Organization of the status-seminar in frame of Geotechnology program „Early Warning Systems in Earth Management”	July 2004
Co-organizer: The Second Environmental Symposium of German-Arab Scientific Forum for Environmental Studies, Amman, Jordan	Sept. 2004
Co-organizer: The Third Environmental Symposium of German-Arab Scientific Forum for Environmental Studies, Frankfurt a.M.	Sept. 2006
Co-organizer: International Congress on Integrated Water Resources Management and Challenges of Sustainable Development, Marrakech/Morocco	22.-25.05.2006
Co-organizer: The Fourth Environmental Symposium of German-Arab Scientific Forum for Environmental Studies, Fes, Morocco	07. – 08.10.2008

Coordination of the join-project "SLEWS" in frame of the BMBF/DFG special program Geotechnology „Early Warning Systems in Earth Management“



2002-2005

Coordination of the join-project „Development of an information infrastructure for the rule-based derivation of geoinformation from distributive, heterogeneous geodata inventories“ in frame of the BMBF/DFG special program Geotechnology "Information Systems in Earth Management"

Coordination of the join-project „Analysis of informal dynamics in mega urban areas - based on spatial structure and steering mechanisms focused on water in the Pearl River Delta“ in frame of the DFG priority program 1233 "Megacities Megachallenge: Informal Dynamic of Global Change"

2006-2008

NanoFlow

2009-2012

Mobility of synthetic Nano-particle in water saturated and partly saturated underground



Inprotunnel

2008-2011

Processes of boundary surfaces between mineral and tool surfaces

Reasons, problems and solutions exemplified on machine tunnelling [www.inprotunnel.org](http://www.inprotunnel.org)



petraSalt

2010 -2013

Investigation of the salt weathering of stone monuments utilizing modern self-organized sensor network exemplified on Monuments of Petra / Jordan



MegaCities: Informal Dynamik of global Change


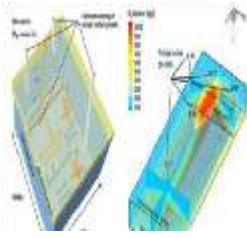
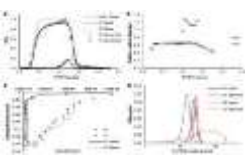

Investigation of the informal dynamic in mega urban agglomeration areas with the help of urban units exemplified on the cycle of water resources in Perl river delta, China

2006 bis 2012



<http://www.megaurban-water.org> <http://www.waterandmegacities.org>



<p>Nonlinear mechanical analysis of rock slopes:          With the economic and social development, more and more huge-scale civil engineering projects are developed. Many geotechnical problems are</p>	<p>2013-2015</p>
<p>becoming more and more complicated and influenced by many factors. Especially when it comes to build dams and hydro-power stations.</p>	
<p>CO2RINA          Risk-assessment of underground CO2 storage is often based on expert knowledge in order to evaluate individual storage-scenarios. Depending on personal expertise, events and processes may pose safety risks, environmental threats or health dangers. The disadvantage of this methodology is given by the subjectivity of the decision maker. Stochastic methodologies offer a more future oriented strategy. They support the reduction of complex models under use of process modelling and lay the foundations for Monte-Carlo simulations.</p>	<p>2011-2014</p> 
<p>Nanomobil, Interdisciplinary project on:          Synthetic Silver-Nano-Particles in the System Soil-Groundwater: Mobility, Influence on the Biocoenosis and Interaction between Hydrosphere and Biosphere.</p>	<p>2014-2017</p> 
<p>Research on water and mega cities: <a href="http://www.waterandmegacities.org">www.waterandmegacities.org</a>          Urban water management and pollution transport. Interaction between urbanization and water resources. Within the program "A w Passage to India" funded by the German Government through DAAD.</p>	<p>Ne 2011-2016</p> 

Coordination of the Indo-German Centre of Sustainability at ITT Madras  
And University delegate to India [www.IGCS-chennai.org](http://www.IGCS-chennai.org)

2010-now



## SELECTED PUBLICATIONS (Staff Member in Red)

Christ, Kilian, **Azzam, Rafig**, Fromhold-Eisebith, Martina (2015): Interaction between water related informal processes and water management: the example of Hyderabad, India 02/19/2015, Interaktion zwischen wasserbezogenen informellen Prozessen und der Siedlungswasserwirtschaft: das Beispiel Hyderabad, Indien.

Nakaten, Natalie Christine, **Azzam, Rafig**, Kühn, Michael (2014, 2015): Economic competitiveness of underground coal gasification combined with carbon capture and storage in the Bulgarian energy network 2014-08-14, Wirtschaftlichkeit der Untertagevergasung von Kohle gekoppelt an eine Abscheidung und Speicherung von CO2 im bulgarischen Energiesystem.

Braun, Anika, **Azzam, Rafig**, Klumpp, Erwin, **Neukum, Christoph** (2015): Method development for the characterization of transport processes of engineered nanoparticles in saturated soils with focus on silver nanoparticles 2015-05-07, Methodenentwicklung für die Charakterisierung von Transportprozessen künstlicher Nanopartikel in gesättigten Böden mit Fokus auf Silbernanopartikel.

Al-Kharabsheh, Noor M., ELS2014 –The Earth Living Skin: Soil, Life and Climate Changes, EGU – SSS Conference Bari 09/22/2014 - 09/25/2014, **Azzam, Rafig, Neukum, Christoph**, Aljazzar, Taiseer (2014): Comparison between the Intrinsic and Specific Vulnerability Using a Diffusion Cell, in: [ELS2014 –The Earth Living Skin: Soil, Life and Climate Changes, EGU – SSS Conference, ELS2014, 22.09.2014-25.09.2014, Bari, Italy].

Braun, Anika, Klumpp, Erwin, **Azzam, Rafig, Neukum, Christoph** (2014): Transport and deposition of stabilized engineered silver nanoparticles in water saturated loamy sand and silty loam, in: The science of the total environment In Press S. 11, doi: 2014.

Li, Cheng, **Azzam, Rafig**, Klapperich, Herbert (2015): Multi-sensor data fusion for geohazards early warning system – an adapted process model 2015-07-29.

Benedikt, Bader, **Baier, Klaus, Azzam, Rafig** (2015): Abwasserbehandlung in der indischen Megastadt Hyderabad : Zustand und Verbesserungsmöglichkeiten, in: Wasser und Abfall 17.7/8, S. 62-66, doi: 2015.

**Fernández-Steeger**, Tomás Manuel, IAEG XII Congress : Engineering Geology for Society and Territory Torino 2014-09-15 2014-09-19, Hu, Hui, Li, Cheng, **Azzam, Rafig** (2015, 2014): Wireless Sensor Networks and Sensor Fusion for Early Warning in Engineering Geology, in: Engineering Geology for Society and Territory - Volume 2 : Landslide Processes / edited by Giorgio Lollino, Daniele Giordan, Giovanni B. Crosta, Jordi Corominas, Rafig Azzam, Janusz Wasowski, Nicola Sciarra.

Hu, Hui, IAEG XII Congress : Engineering Geology for Society and Territory Torino 2014-09-15 - 2014-09-19, **Fernández-Steeger**, Tomás Manuel, Dong, Mei, **Azzam, Rafig** (2015, 2014): Deformation Monitoring and Recognition of Surface Mine Slope Using LiDAR, in: Engineering Geology for Society and Territory - Volume 2 : Landslide Processes / edited by Giorgio Lollino, Daniele Giordan, Giovanni B. Crosta, Jordi Corominas, **Rafig Azzam**, Janusz Wasowski, Nicola Sciarra.

**Klebingat, Stefan**, IAEG XII Congress : Engineering Geology for Society and Territory Torino 2014-09-15 - 2014-09-19, **Azzam**,

**Rafig**, Schulten, Marc, Kempka, Thomas, Schlüter, Ralph, Fernández-Steeger, Tomás Manuel (2015): Modeling Optimized UCG Gas Qualities and Related Tar Pollutant Production Under Different Field Boundary Conditions, in: Engineering Geology for Society and Territory. - Vol. 6: Lollino, Giorgio and Giordan, Daniele and Thuro, Kurosch and Carranza-Torres, Carlos and Wu, Faquan and Marinos, Paul and Delgado, Carlos.

Nguyen, Hieu Trung, IAEG XII Congress : Engineering Geology for Society and Territory Torino 2014-09-15 - 2014-09-19, **Fernández-Steeger**, Tomás Manuel, Köhler, Hans-Joachim, **Azzam**, **Rafig** (2015): Remote Analysis of Rock Slopes with Terrestrial Laser Scanning for Engineering Geological Tasks in Reservoir Planning, in: Engineering Geology for Society and Territory. - Vol. 6: Lollino, Giorgio and Giordan, Daniele and Thuro, Kurosch and Carranza-Torres, Carlos and Wu, Faquan and Marinos, Paul and Delgado, Carlos.

Heinrichs, Kurt, Azzam, Rafig (2015): Quantitative analysis of salt crystallization : dissolution processes on rock-cut monuments in Petra/Jordan, in: Engineering Geology for Society and Territory / edited by Giorgio Lollino, Daniele Giordan, Cristian Marunteanu, Basiles Christaras, Iwasaki Yoshinori, Claudio Margottini. - Vol. 8 : Preservation of Cultural Heritage.

Li, Cheng, **Fernández-Steeger**, Tomás Manuel, Bitsch Link, Józsega, May, Matthias, **Azzam**, **Rafig** (2014): Use of MEMS accelerometers/inclinometers as a geotechnical monitoring method for ground subsidence, Anwendung von MEMS Beschleunigungs-/Neigungssensoren für das geotechnische Monitoring von Setzungen, in: Acta geodynamica et geomaterialia 11.4, S. 337-348, doi: 10.13168/AGG.2014.0015.

**Neukum**, **Christoph**, **Braun**, **Anika**, **Azzam**, **Rafig** (2014): Transport of engineered silver (Ag) nanoparticles through partially fractured sandstones, in: Journal of contaminant hydrology 164 S. 181-192, doi: 10.1016/j.jconhyd.2014.05.012.

Wakode, Hemant Balwant, Baier, Klaus, Jha, Ramakar, Ahmed, Shakeel, **Azzam**, **Rafig** (2014): Assessment of Impact of Urbanization on Groundwater Resources using GIS Techniques- Case Study of Hyderabad, India, in: International journal of environmental research 8.4, S. 1145-1158.

**Baier**, **Klaus**, **Schmitz**, **Kristina-Sabine**, **Azzam**, **Rafig**, **Strohschön**, **Ramona** (2014): Management Tools for Sustainable Ground Water Protection in Mega Urban Areas : Small Scale Land Use and Ground Water Vulnerability Analyses in Guangzhou, China, in: International journal of environmental research 8.2, S. 249-262. **Wakode**, **Hemant Balwant**, **Baier**, **Klaus**, **Jha**, **Ramakar**,

**Azzam**, **Rafig** (2014): Analysis of urban growth using Landsat TM/ETM data and GIS : a case study of Hyderabad, India, in: Arabian journal of geosciences 7.1, S. 109-121, doi: 10.1007/s12517-013-0843-3. **Nakaten**, **Natalie**, **Schlüter**, **Ralph**, **Azzam**, **Rafig**, **Kempka**, **Thomas** (2014): Development of a techno-economic model for dynamic calculation of cost of electricity, energy demand and CO2 emissions of an integrated UCG-CCS process, in: Energy : the international journal 66 S. 779-790, doi: 10.1016/j.energy.2014.01.014.

**Chen**, **You-Liang**, **Ni**, **Jing**, **Jiang**, **Li-Hao**, **Liu**, **Ming-Liang**, **Wang**, **Peng**, **Azzam**, **Rafig** (2014): Experimental study on mechanical properties of granite after freeze-thaw cycling, in: Environmental earth sciences 71.8, S. 3349-3354, doi:

10.1007/s12665-013-2725-0. **Neukum**, **Christoph**, **Braun**, **Anika**, **Azzam**, **Rafig** (2014): Transport of stabilized engineered silver (Ag) nanoparticles through porous sandstones, in: Journal of contaminant hydrology 158 S. 1-13, doi: 10.1016/j.jconhyd.2013.12.002.

**Nakaten**, **Natalie**, **Azzam**, **Rafig**, **Kempka**, **Thomas** (2014): Sensitivity analysis on UCG-CCS economics, in: International journal of greenhouse gas control 26 S. 51-60, doi: 10.1016/j.ijggc.2014.04.005. **Neukum**, **Christoph**, **Köhler**, **Hans Joachim**,

**Fernández-Steeger**, **Tomás Manuel**, **Hennings**, **Sibylle**, **Azzam**, **Rafig** (2014): Pumpspeicherbecken im Karstgrundwasserleiter

des Weißen Jura der Schwäbischen Alb, in: Grundwasser : Zeitschrift der Fachsektion Hydrogeologie in der Deutschen Geologischen Gesellschaft (FH-DGG) 19.2, S. 107-117, doi: 10.1007/s00767-014-0261-9.

**Wakode, Hemant Balwant, Baier, Klaus, Jha, Ramakar, Ahmed, Shakeel, Azzam, Rafig** (2014): Resources using GIS Techniques- Case Study of Hyderabad, India, in: International journal of environmental research 8.4, S. 1145-1158. **Azzam, Rafig,**

**Strohschön, Ramona, Baier, Klaus, Lu, Lin, Wiethoff, Katharina, Bercht, Anna-Lena, Wehrhahn, Rainer** (2014): Water Quality and Socio-Ecological Vulnerability Regarding Urban Development in Selected Case Studies of Megacity Guangzhou, China, in:

Megacities : Our Global Urban Future / Hrsg. Frauke Kraas S. 33-58, doi: 10.1007/978-90-481-3417-5\_4.

**Spagnoli, Giovanni, Stanjek, Helge, Feinendegen, Martin, Azzam, Rafig** (2014): Mineralogical, mechanical and electrical properties of the clays and their relation with regard to the clogging during mechanical tunnel driving, in: Geo-Congress 2014 technical papers : geo- characterization and modeling for sustainability ; proceedings of the 2014 congress ; February 23 - 26, 2014 Atlanta, Georgia / ed. by Murad Abu-Farsakh ... S. 495-504, doi: 10.1061/9780784413272.047.

**Strohschön, Ramona, Wiethoff, Katharina, Baier, Klaus, Lu, Lin, Bercht, Anna-Lena, Wehrhahn, Rainer, Azzam, Rafig** (2013):

Land use and Water Quality in Guangzhou, China: A survey of ecological and Social Vulnerability in Four Urban Units of the

Rapidly Developing Megacity, in: International journal of environmental research 7.2, S. 343-358. **Kumar, Shikhar, Baier,**

**Klaus, Jha, Ramakar, Azzam, Rafig** (2013): Status of arsenic contamination in potable water of Northern areas of Mizoram State and its adjoining areas of Southern Assam, India, in: Arabian journal of geosciences 6.2, S. 383-393, doi:

10.1007/s12517-011-0373-9.

**Baier, Klaus, Jahn, Heiko J., Azzam, Rafig** (2013): Wassermangel und dessen Gesundheitskonsequenzen : Eine Folge des Klimawandels, in: Klimawandel und Gesundheit : Internationale, nationale und regionale Herausforderungen und Antworten / herausgegeben von Heiko J. Jahn, Alexander Krämer, Tanja Wörmann S. 85-98, doi: 10.1007/978-3-642-38839-2\_5.

**Song, Jie,**

**Fernández-Steeger, Tomás Manuel, Hu, Hui, Azzam, Rafig** (2013): Stabilitätsuntersuchung einer geklüfteten Felsböschung mit LiDAR und der FE-Methode, in: Veröffentlichungen zur 19. Tagung für Ingenieurgeologie und zum Forum für Junge Ingenieurgeologen : München, 13.-16. März 2013 / Verant.: Fachsektion Ingenieurgeologie, DGGT - Deutsche Gesellschaft für Geotechnik e.V. Hrsg.: Kuroschi Thuro S. 522-527.

**Klebingat, Stefan, Azzam, Rafig, Schulten, Marc, Quicker, Peter, Kempka, Thomas, Schlüter, Ralph, Fernández-Steeger,**

**Tomás Manuel** (2013): Quantitative tar pollutant production and water solubility prognoses in the frame of Underground Coal Gasification (UCG), in: Proceedings of the 19th Conference on Engineering Geology and of the Forum for Young Engineering Geologists Munich, 13th to 15th March 2013 / Fachsektion Ingenieurgeologie DGGT Deutsche Gesellschaft für Geotechnik e.V. DGG Deutsche Gesellschaft für Geowissenschaften e.V..

**Hu, Hui, Fernández-Steeger, Tomás Manuel, Dong, Mei, Azzam, Rafig** (2013): Deformationsüberwachung und Modellierung mit LiDAR-Daten für Beurteilung der Hangstabilität, in: 440 Veröffentlichungen zur 19. Tagung für Ingenieurgeologie und zum Forum für Junge Ingenieurgeologen : München, 13.-16. März 2013 / Verant.: Fachsektion Ingenieurgeologie, DGGT - Deutsche Gesellschaft für Geotechnik e.V. Hrsg.: Kuroschi Thuro S. 528-533.

**Nguyen, Hieu Trung, Fernández-Steeger, Tomás Manuel, Wiatr, Thomas, Azzam, Rafig** (2013): Landslides and cascading effects on Madeira Island, in: Veröffentlichungen der 19. Tagung für Ingenieurgeologie und des Forums für junge Ingenieurgeologen : München, 13. - 15. März 2013 / Hrsg.: Kuroschi Thuro. - München : Techn. Univ. S. 225-228. **Heinrichs, Kurt, Azzam,**

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## **Plan of Performance**

During my scientific carrier in the last 25 years as full professor and head of Engineering Geology at RWTH Aachen University, I have focused on worldwide networking in scientific cooperation. With more than 200 publications and supervision of over 60 PhD students from around the world I have worldwide connections as acknowledged engineering geologist. I am planning to continue my efforts to attract many new national groups to join the IAEG. During the current period the executive committee was looking into different aspects to improve the performance of IAEG. As vice president, I was member of the executive and I believe that a continuity is important to achieve the targets.

Together with the new executive committee I am confident that we will be able to promote IAEG in many countries and improve its visibility in the society.

In case my election as president, I am planning to address the following aspects:

- Modernization process of IAEG including all IT aspects that are necessary for successful operation.
- Continuation of Reaching out to our members and intensifying the relationship between IAEG and National Groups.
- Reactivating and supporting the regional conferences, joint events with different national groups, and promoting the young engineering geologists to organize sessions within these conferences.
- Revision of the work of the commissions, and develop mechanisms to evaluate their work progress. Commission chairs should organize sessions in regional conferences and report to executive. Furthermore, rules should be set up about the work of the commissions and their feedback to the executive.
- Offer further education and training to the members such as summer and winter schools, especially for young engineering geologists, by inspiring senior members to offer courses and visit low-income countries to support their national group in education and organization of scientific events.
- IAEG can act as a catalyst to mobilize the synergy of Universities, Research Institutes and Industry.
- Encourage the National Groups to organized well focused field trips for senior and young engineering geologists together.

As one of the organizers of the EUROPEAN IAEG MEETING IN TORINO - JUNE 22, 2018, I do support the outcome of this meeting and the targets identified and written in the report to the Presidents of the National Groups.

I am confident that I will be able to motivate the new executive committee as well as the Presidents of the National Groups to work hand in hand to achieve the targets for the benefit of our IAEG.