



Report on the 12th International German Summer School on Hydrology 12– 26 September 2018, Bochum

12th "International German Summer School on Hydrology (IGSH 2018) – Groundwater and Urbanization"

The 12th "International German Summer School on Hydrology (IGSH)" was held at Ruhr-Universität Bochum (RUB) from 12th to 26th September 2018 with this year's focus on "Groundwater and Urbanization". The aim of IGSH is to enhance the knowledge and technical capabilities of early career professionals and academics on hydrology-related environmental issues.

The International German Summer School on Hydrology focuses on training international junior scientists and early professionals from the fields of water and the environment, engineering sciences, as well as from geography, hydrology, chemistry, etc. IGSH provides a program of hydrological training courses which vary each year. In 2018, 26 participants from 19 different countries were selected out of over 200 applicants (list of participants annexed). Most participants were from South America, Asia and Africa. The number of applicants is increasing year after year and participants are selected on a competitive basis. The selection criteria include: the quality of a statement of motivation, relevance of the course to the applicant's present career or research activities, and qualification of the applicants. Also age and gender aspects are taken into account.

Since its inception in 2007, the International German Summer School on Hydrology is held annually with the support of UNESCO. Starting in 2015, IGSH has additionally been sponsored by the German Academic Exchange Service (DAAD) as serial summer school on sustainable water management. The newly implemented DAAD full scholarships have increased the attraction of the Summer School course resulting in record numbers of applications.

The lecturers of the International German Summer School on Hydrology are from the Department of Applied Geology of Ruhr-Universität Bochum, invited high-level professionals from the private sector in Germany and international and national partner universities. The lectures included theoretical as well as practical lessons with field excursions. The field

excursions and locations differ from year to year depending on the type of the respective course. It also was supplemented by cultural trips and social events.

The courses of the IGSH 2018 covered the following topics:

- Hydrogeology and groundwater monitoring
- Development of the Ruhr Area (environment, economy, demography)
- Geothermal energy
- Subsurface energy storage
- Applications of isotopes in hydrogeology
- Impacts of climate change on the urban water cycle
- Flow and transport in urban groundwater systems
- The conflict between land use and groundwater use in urban areas
- Urbanization: consequences for agricultural development

The following lecturers were involved this year: Prof. Dr. Stefan Wohnlich,, Dr. Andrea Niedermayr, Thorsten Gökpinar, Sascha Frank (Ruhr-Universität Bochum, Hydrogeology); Prof. Dr. Harald Zepp (Ruhr-Universität Bochum, Applied Physical Geography); Prof. Dr. Harro Stolpe (Ruhr-Universität Bochum, Civil Engineering); Prof. Dr. Steffen Bender (Climate Service Center, Hamburg), Prof. Dr. Frank Eulenstein (Leibniz – Centre for Agricultural Landscape Research, Müncheberg); Dr. Seynabou Cissé, (Dakar University, Senegal) and Dr. Ali Mahdavi Mazdeh (Iman Khomeini International University Qazvin, Iran).

During the course, the participants also worked in small groups on questions relevant to their own projects with the help of the methods learned during IGSH. At the end of the course, the participants were given the opportunity to evaluate and comment on the different aspects of the Summer School course (such as their expectations from the course, scientific competence of the lecturers and the organization of the course). We consider a suchlike quality control very important for successive optimization of the IGSH goals. Those who wanted to gain 4 Credit Points to use in their study and doctoral programs were tested by means of a successful written final examination. Finally, participants were awarded with a certificate by Prof. Dr. Stefan Wohnlich and Dr. Andrea Niedermayr.

The course was held in a very friendly, cooperative and productive atmosphere, which allowed the participants to establish close contact to each other and to the lecturers as well. These opened opportunities for future collaboration to establish scientific cooperation and social networks, and to extend the IGSH scientific community. Generally, the Summer School course provided

knowledge transfer and exchange on hydro(geo)logical processes relevant in energy production and management.

The IGSH organizers would like to thank the DAAD and the German IHP/HWRP National Committee of UNESCO for the financial and ideal support of IGSH. The next IGSH "Groundwater and Agriculture" will take place in September 2019.

Lecturers, field-work directors and field assistants:

Prof. Dr. Stefan Wohnlich

Ruhr University Bochum, Applied Geology, Hydrogeologist

Prof. Dr. Harald Zepp

Ruhr University Bochum, Applied Physical Geography, Geographer

Prof. Dr. Frank Eulenstein

Leibniz Centre for Agricultural Landscape Research, Müncheberg, Agricultural Engineer

Prof. Dr. Harro Stolpe

Ruhr University Bochum, Civil Engineering

Prof. Dr. Steffen Bender

Climate Service Center, Natural Resources Department, Science officer, Hamburg

Dr. Seynabou Cissé,

Dakar University, Senegal, Hydrogeologist

Dr. Ali Mahdavi Mazdeh

Imam Khomeini International University, Qazvin, Iran, Hydrogeologist

Dr. Andrea Niedermayr

Ruhr University Bochum, Applied Geology, Geochemist

M.Sc. Sascha Frank

Ruhr University Bochum, Applied Geology, Hydrogeologist

Thorsten Gökpinar

Ruhr University Bochum, Applied Geology, Laboratory and Field Technician

Annexes:

1. Course Program
2. List of Participants
3. Statistics of Participants
4. Statistical evaluation of Questionnaire
5. Photos

1. Course Program

IGSH 2018 Course Program – Groundwater and Urbanization: September 12 – 26, 2018

Week – 1

Date	Time	Activities	Speakers/Lead
Wednesday, 12-09-2018		Arrival of Participants	
	17:00	Campus Tour and Welcome Dinner (Qwest)	Applied Geology group, RUB
Thursday, 13-09-2018	08:30 – 09:30	Welcome lecture: Brief introduction to the course, organizational affairs and the Ruhr University	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
	09:30 – 10:15	Welcome lecture: The multiple transformations of the urban landscape Ruhr – Introducing its physical environment, economy and demography	Prof. Dr. Harald Zepp, Applied Physical Geography, RUB
	10:30 – 12:00	Workshop: Introduction of participants and short presentations by participants	All participants and lecturers
	13:15 – 16:45	Workshop: Introduction of participants and short presentations by participants	All participants and lecturers
	17:00	City tour: Visit to the city of Bochum	Applied Geology group, RUB
Friday, 14-09-2018	08:30 – 12:00	Lecture/Exercise: Basics of urban Hydrogeology and Monitoring I	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
	13:15 – 14:45	Lecture/Exercise: Basics of urban Hydrogeology and Monitoring II	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
	15:00	Workshop: Group forming and project discussion	All participants and group leaders
Saturday, 15-09-2018	09:00 – 13:00	Field trip: Mining heritage in the Ruhr Area: Zeche Zollverein	Guided tour in former mine; Applied Geology group, RUB
	afternoon	Free time	
Sunday, 16-09-2018		Free day	
Monday, 17-09-2018	08:30 – 12:00	Lecture/Exercise: Impacts of climate change on the urban water cycle	Prof. Dr. Steffen Bender, Climate Service Center Germany, Hamburg
	13:15 – 14:45	Lecture/Exercise: Future of urban energy supply? Geothermal energy and pumped storage plants	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
	15:00 – 16:30	Visit to International Geothermal Centre Bochum (IGB)	IGB staff
	16:45	IGSH Barbecue around Lake Kemnade, Bochum	All participants and lecturers
Tuesday, 18-09-2018	08:30 – 12:00	Lecture/Exercise: Flow and Transport in Urban Groundwater Systems	Dr. Ali Mahdavi Mazdeh University of Qazvin, Iran
	13:15 – 14:45	Field trip: Regional geology: the “Geological Garden”, Bochum	Applied Geology group, RUB
	15:00	Field trip: Hydrological and cultural visit to Cologne city centre	Applied Geology group, RUB

Week - 2

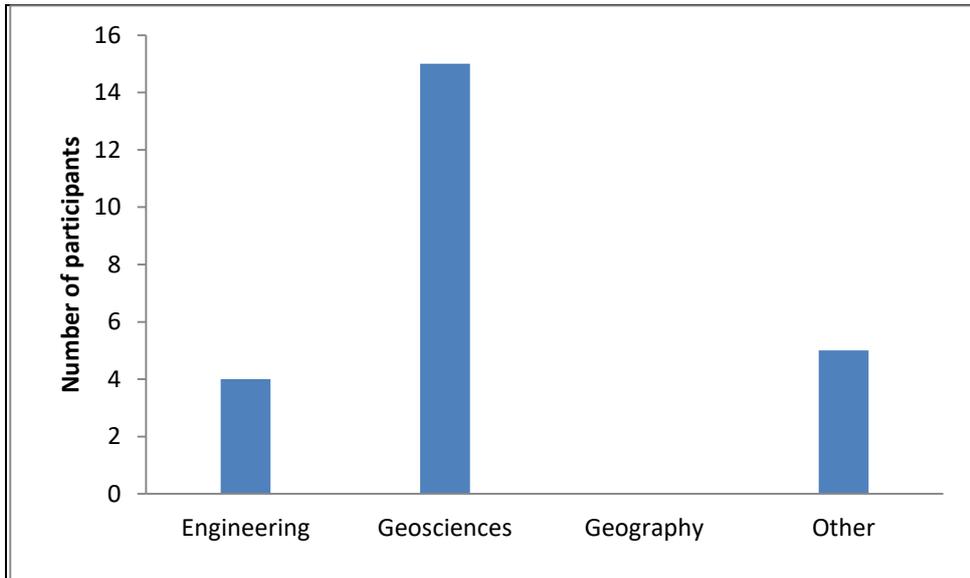
Date	Time	Description	Speakers/Lead
Wednesday, 19-09-2018	08:30 – 12:00	Lecture/Exercise: Urban water resources characterization: use of isotopes	Dr. Andrea Niedermayr, Applied Geology, RUB
	13:15 – 16:30	Lecture/Exercise: Water Supply and Management in Teheran/Iran	Dr. Ali Mahdavi Mazdeh University of Qazvin, Iran
	16:45	Workshop: Discussions in working groups and evaluation of first results	All participants and group leaders
Thursday, 20-09-2018	08:15 – 12:00	Field exercises: Groundwater monitoring and sampling techniques Lake Kemnade well field, Bochum	Dr. A. Niedermayr, T. Gökpinar Applied Geology, RUB
	13:15 – 17:00	Field exercises: Hydraulic tests and their interpretation Lake Kemnade well field, Bochum	Dr. A. Niedermayr, T. Gökpinar Applied Geology, RUB
Friday, 21-09-2018	08:30 – 10:00	The conflict between land use and groundwater use in urban areas on the example of Hanoi, Vietnam – problems and possible solutions	Prof. Dr. Harro Stolpe Civil Engineering, RUB
	10:15 – 12:00	Workshop: Discussions in working groups	All participants and group leaders
	13:15 – 16:30	Field trip: Institute for Underground Infrastructure (IKT), Gelsenkirchen	C. Bennerscheidt, IKT Applied Geology group, RUB
Saturday, 22-09-2018		Free day	
Sunday, 23-09-2018	12:00 – 17:00	Cultural field trip: History and architecture: the city of Münster	Petra Dückershoff Applied Geology, RUB
Monday, 24-09-2018	08:30 – 12:00	Lecture/Exercise: Urban water management and isotope applications: case studies from Senegal	Dr. Seynabou Cissé, Dakar University, Senegal
	13:00 – 15:45	Lecture/Exercise: Urbanization: consequences for agricultural development	Prof. Dr. Frank Eulenstein, Leibniz-Zentrum für Agrarlandschafts-forschung, Müncheberg
	16:00	Workshop: Discussion in working groups: open questions and presentation of concepts	All participants and group leaders
Tuesday, 25-09-2018	08:30 – 13:00	Written examination (8:30-9:30); Participants present their group project (9:45-11:45); Final discussion, course evaluation by participants, award of certificates (12:00-13:00)	All participants and lecturers
	13:30 – 15:00	Farewell lunch (Trattoria Falcone)	
Wednesday, 26-09-2018		Departure of participants	

2. List of Participants

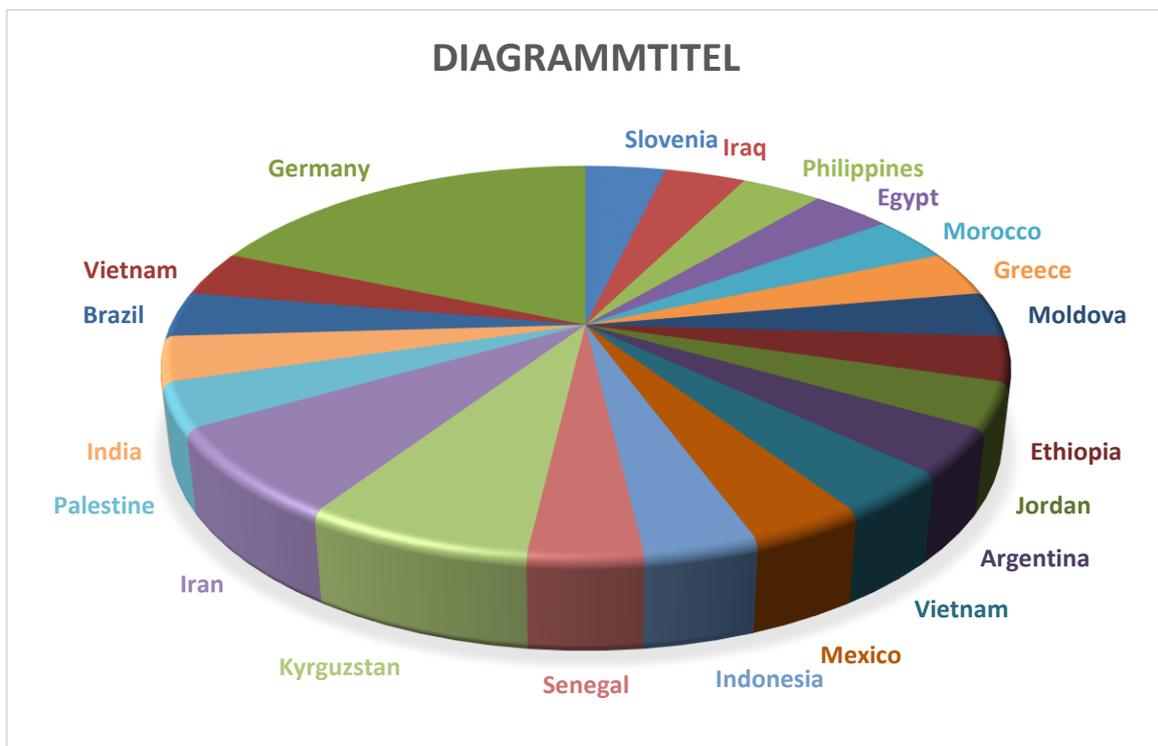
First Name	Last Name
Saeid	Sotoodehnia
Ritu	Bala
Cristian Abraham	Rivera Armendariz
Nouraldin	Halayqa
Ana Claudia	Emerenciano Guedes
Adrian	Wetten
Ermias Hagos	Girmay
Djim Mouhamadou Lamine	Diongue
Zuura	Azhibekova
Tham	Nguyen
Fitrie Atviana	Nurritasari
Viktor	Jeleapov
Despoina	Charchousi
Nezha	Mejjad
Ahmed	Hassan
Sandra	Manulat
Omeed Hussein Ali Ehsan	Al-Kakey
Ibraheem	Hamdan
Katja	Koren
Shima	kabiri
Pauline Ingado	Onjira
Mona	Ribbers
Florian	Wintersberg
Ilka	Hinzer
Malte	Poser
Tesfay Kiros	Mebrahtu
Quang Tuan	Tran

3. Statistics of Participants

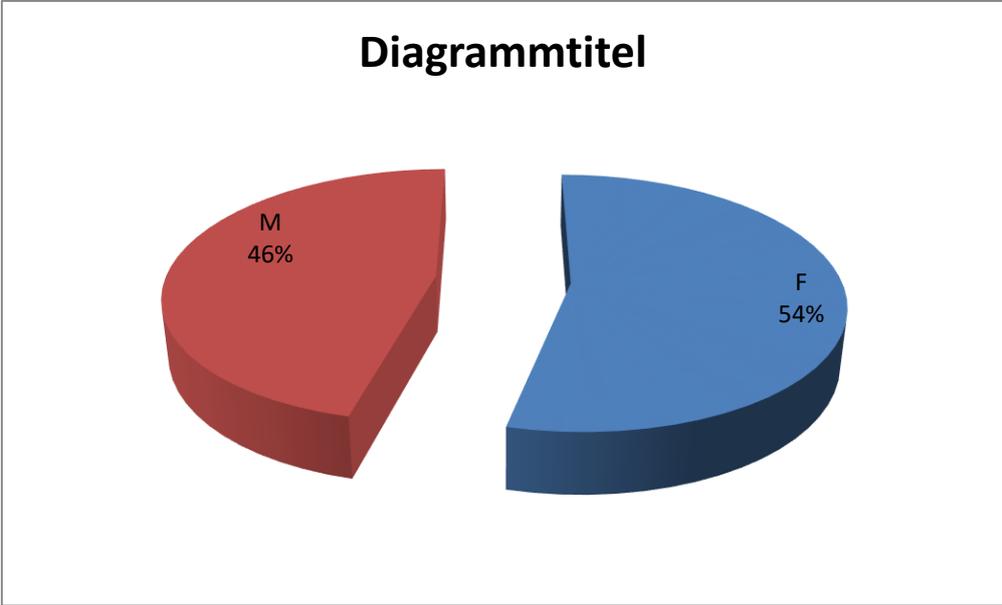
Professional background



Country

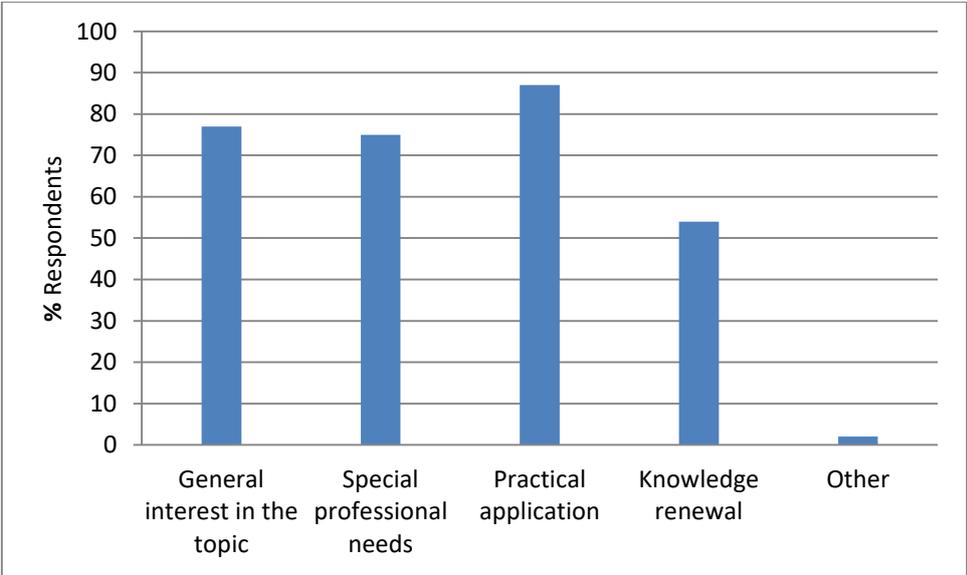


Gender Distribution

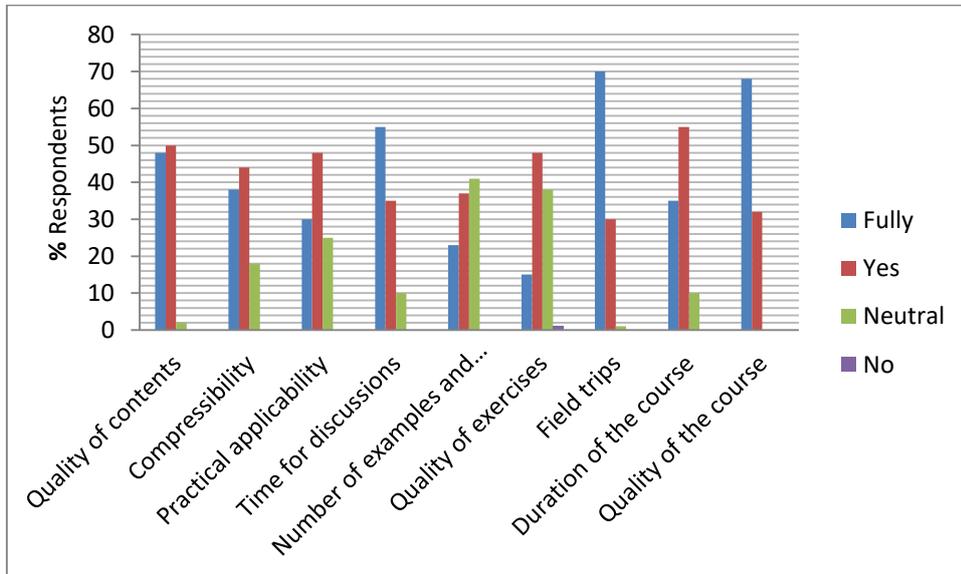


4. Statistical Evaluation of Questionnaire

A - Reason(s) of attendance



B – Quality of content of the course, Practical Applicability and Quality of Exercises



5. Photos



