

**Report on the 13<sup>th</sup> International German Summer School on Hydrology  
11– 25 September 2019, Bochum**

**13<sup>th</sup> "International German Summer School on Hydrology (IGSH 2019) – Groundwater and Agriculture"**

The thirteenth "International German Summer School on Hydrology (IGSH)" was held at Ruhr-Universität Bochum (RUB) from 11<sup>th</sup> to 25<sup>th</sup> September 2019 with this year's focus on "Groundwater and Agriculture". 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 2019, 19 participants from 17 different countries were selected out of over 250 applicants (list of participants annexed). Most participants were from 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 attractiveness 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. The 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 2019 covered the following topics:

- Hydrogeology and groundwater monitoring
- Development of the Ruhr Area (environment, economy, demography)
- Groundwater hydraulics
- Hydrogeochemistry and contamination
- Water resource management
- Sustainable agriculture
- Effects of climate change
- GIS applications
- Hydrogeochemical modelling

The following lecturers were involved this year: Prof. Dr. Stefan Wohnlich (Ruhr-Universität Bochum, Hydrogeology), PD Dr. Andre Banning (Ruhr-Universität Bochum, Hydrogeology), Sascha Frank (Ruhr-Universität Bochum, Hydrogeology); Prof. Dr. Steffen Bender (Climate Service Center, Hamburg), Prof. Dr. Frank Eulenstein (Leibniz – Centre for Agricultural Landscape Research, Müncheberg), Dr. Ali Mahdavi Mazdeh (Iman Khomeini International University Qazvin, Iran), Dr. Till Kasielke (Ruhr-Universität Bochum, Applied Physical Geography), Prof. Dr. Tobias Licha (Ruhr-Universität Bochum, Hydrogeology), Dr. Roland Schindler (NEW NiederrheinWasser, Mönchengladbach), Dr. Christian Jolk (Ruhr-Universität Bochum, Umwelttechnik und Ökologie im Bauwesen), Dr. Sandra Greassidis (Ruhr-Universität Bochum, Umwelttechnik und Ökologie im Bauwesen), Dipl.-Geol. Christian Skark (Institut für Wasserforschung, Schwerte), Dr. Thomas Heinze (Ruhr-Universität Bochum, Hydrogeology), Dr. Helena Banning (Umweltbundesamt, Dessau).

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. Claudia Färber.

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. This 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 Energy" will take place in September 2020.

#### **Lecturers and assistants:**

Prof. Dr. Stefan Wohnlich

Ruhr University Bochum, Applied Geology, Hydrogeologist

Prof. Dr. Tobias Licha

Ruhr University Bochum, Applied Geology, Hydrogeologist

Prof. Dr. Frank Eulenstein

Leibniz Centre for Agricultural Landscape Research, Müncheberg, Agricultural Engineer

Prof. Dr. Steffen Bender

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

Dr. Andre Banning

Ruhr University Bochum, Applied Geology, Hydrogeochemist

Dr. Ali Mahdavi Mazdeh

Imam Khomeini International University, Qazvin, Iran, Hydrogeologist

Dr. Till Kasielke

Ruhr University Bochum, Applied Physical Geography, Geographer

Dr. Roland Schindler

NEW NiederrheinWasser, Mönchengladbach

Dr. Christian Jolk

Ruhr-Universität Bochum, Umwelttechnik und Ökologie im Bauwesen

Dr. Sandra Greassidis

Ruhr-Universität Bochum, Umwelttechnik und Ökologie im Bauwesen

Dr. Thomas Heinze

Ruhr-Universität Bochum, Hydrogeology

Dr. Helena Banning

Umweltbundesamt, Dessau

Dipl.-Geol. Christian Skark

Institut für Wasserforschung, Schwerte

M.Sc. Sascha Frank

Ruhr University Bochum, Applied Geology, Hydrogeologist

### **Annexes:**

1. Course Program
2. List of Participants
3. Statistics of Participants
4. Participants' comment collection sheet (Open questionnaire)
5. Statistical evaluation of Questionnaire
6. Photos

## Annex-1: IGSH 2019 Course Program - Groundwater and Energy: September 11 – 25, 2019

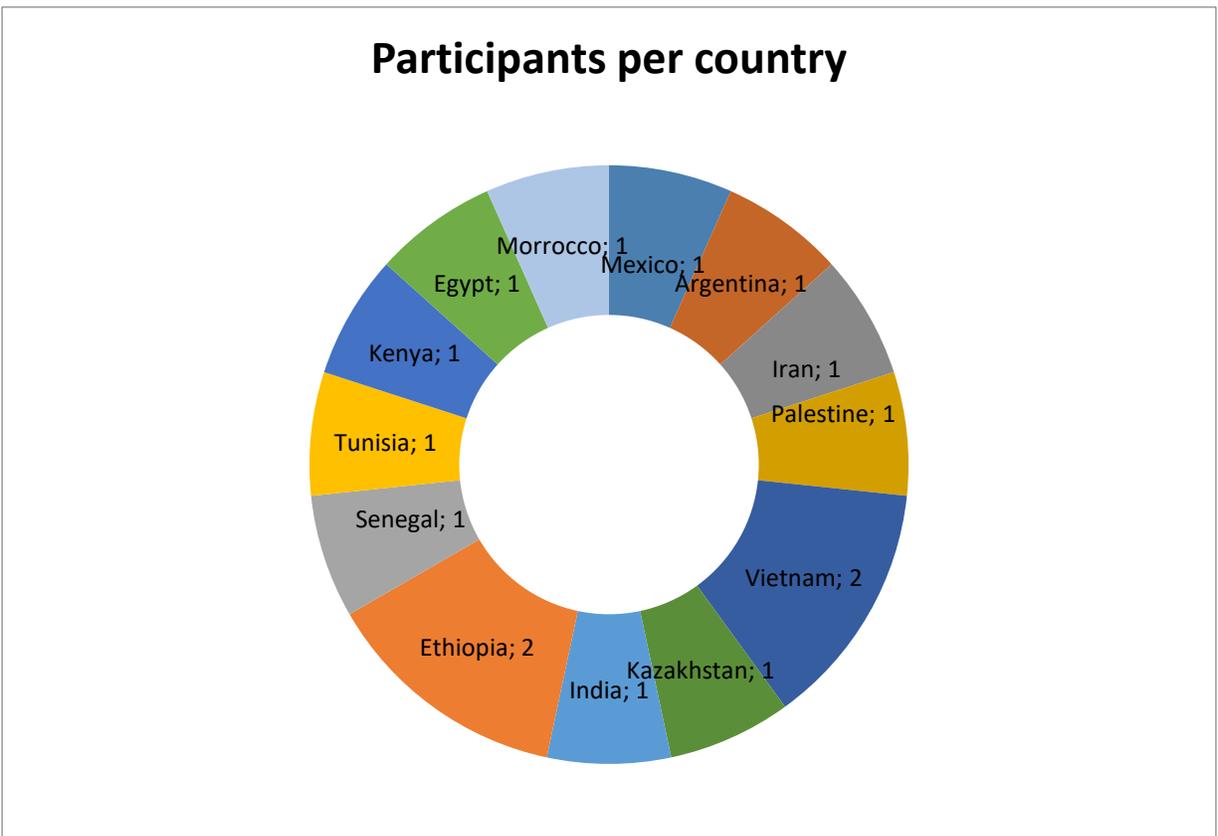
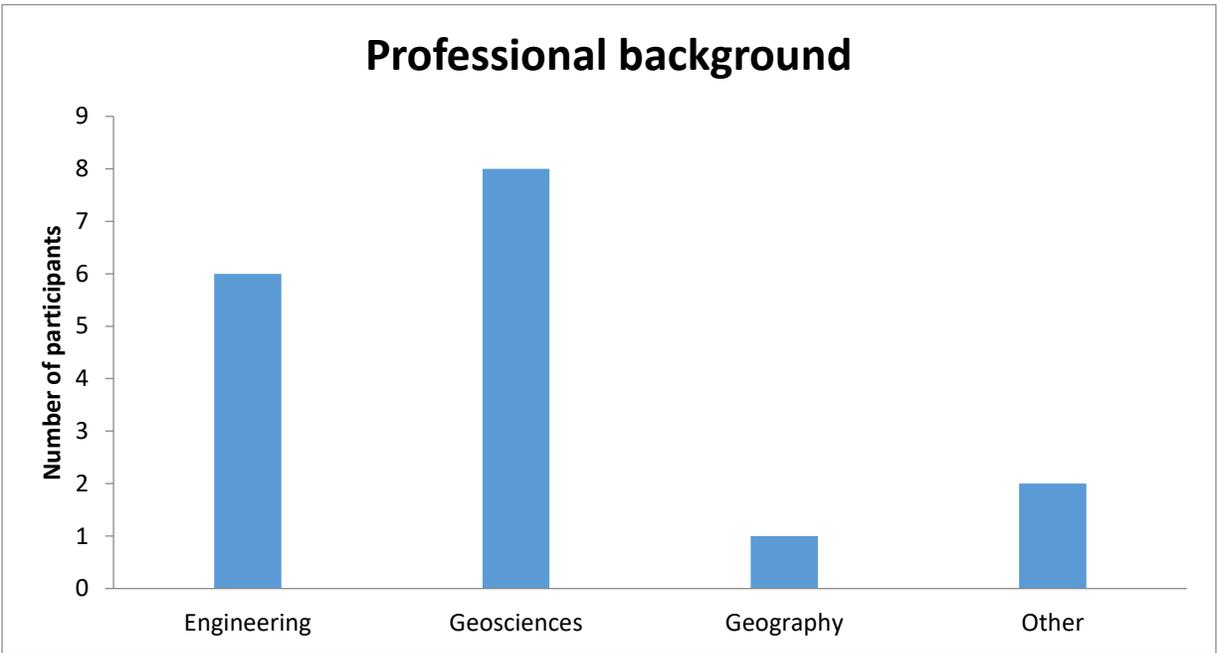
Date	Time	Activities	Speakers/Lead
Wednesday, 11-09-2019	Arrival of participants		
	17:00 – 20:00	Campus tour and Welcome Dinner – QWest	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
Thursday, 12-09-2019	08:30 – 09:30	Brief introduction to the course, organizational affairs and introduction of the Ruhr Area	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
	09:30 – 10:15	Lecture: The multiple transformations of the urban landscape Ruhr	Dr. Till Kasielke, Applied Physical Geography, RUB
	10:30 – 12:00	Workshop: Introduction of participants and short presentations by participants	All participants and lecturers
	13:15 - 17:00	Workshop: Introduction of participants and short presentations by participants	All participants and lecturers
	Evening	City tour: Visit to the city of Bochum	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
Friday, 13-09-2019	08:30 – 12:00	Lecture/Exercise: Basics of Hydrogeology and Introduction to Rural Hydrogeology	Prof. Dr. Stefan Wohnlich, Applied Geology, RUB
	13:15 – 15:00	Lecture/Exercise: Environmental forensics	Prof. Dr. Tobias Licha, Hydrogeochemistry, RUB
	15:15 – 16:45	Lecture/Exercise: Hydrogeochemical modelling – introduction	PD Dr. Andre Banning, Applied Geology, RUB
	17:00 – 18:00	Workshop: Group forming and project discussion	All participants and lecturers
Saturday, 14-09-2019	10:00 – 14:00	Cultural field trip: History, architecture and medieval handicraft: LWL Freilichtmuseum (Open Air Museum) Hagen	Applied Geology, RUB
	Afternoon	Free	
Sunday, 15-09-2019	Free day		
Monday, 16-09-2019	08:30 – 12:00	Lecture/Exercise: Nutrients in Groundwater I	Prof. Dr. Frank Eulenstein, Leibniz-Zentrum für Agrarlandschaftsforschung, Müncheberg
	13:15 – 17:00	Lecture/Exercise: Nutrients in Groundwater II	Dr. Roland Schindler, NEW NiederrheinWasser GmbH, Mönchengladbach
	Evening	Barbecue around Lake Kemnade, Bochum	All participants and lecturers
Tuesday, 17-09-2019	08:30 – 12:00	Lecture/Exercise: Integrated Water Resources Management in rural areas I	Prof. Dr. Harro Stolpe, Faculty of Civil and Environmental Engineering, RUB
	13:15 – 17:00	Lecture/Exercise: Integrated Water Resources Management in rural areas II	

<b>Date</b>	<b>Time</b>	<b>Activities</b>	<b>Speakers/Lead</b>
Wednesday, 18-09-2019	08:30 – 10:00	Groundwater and agriculture – Qazvin challenges	Dr. Ali Mahdavi Mazdeh, University of Qazvin, Iran
	10:15 – 12:00	Lecture/Exercise: Hydrogeochemical modelling – rural examples	PD Dr. Andre Banning, Applied Geology, RUB
	13:15 – 17:00	Lecture/Exercise: Organic Agrochemicals and Water Resources	Dr. Christian Skark, Institute of Water Research, Schwerte
	17:15 – 18:15	Workshop: Discussions in working groups and evaluation of first results	All participants and lecturers
Thursday, 19-09-2019	08:30 – 18:00	Technical field trip: Morning: Waterworks Gelsenwasser/Haltern am See Afternoon: Waterworks RWW and Aquarius Museum/Mülheim an der Ruhr	Applied Geology, RUB
Friday, 20-09-2019	08:30 – 12:00	Lecture/Exercise: Groundwater modelling in rural areas	Dr. Thomas Heinze, Applied Geology, RUB
	13:15 – 17:00	Lecture/Exercise: Sustainable agriculture and water quality	Dr. Helena Banning, Umweltbundesamt, Dessau
Saturday, 21-09-2019	10:00 – 13:00	Field trip: Deutsches Bergbaumuseum Bochum	Guided tour in national museum of mining, Applied Geology, RUB
	Afternoon	Free	
Sunday, 22-09-2019	Free day		
Monday, 23-09-2019	08:30 – 12:00	Lecture/Exercise: The rural water sector under climate change I	Prof. Dr. Steffen Bender, Climate Service Center, Hamburg
	13:15 – 14:45	Lecture/Exercise: The rural water sector under climate change II	
	15:00 – 16:00	Workshop: Discussion in working groups: open questions and presentation of concepts	All participants and lecturers
Tuesday, 24-09-2019	08:30 – 09:00	Presentation: Introducing UNESCO´s International Centre for Water Resources and Global Change	Dr. Claudia Färber, International Centre for Water Resources and Global Change (UNESCO)
	09:00 – 12:30	Workshop: Participants present their group project, and final discussion Course evaluation by participants Final written examination	All participants and lecturers
	13:00 – 15:00	Award of certificates Departure ceremony – Farewell lunch Trattoria Falcone	
Wednesday, 25-09-2019	Departure of participants		

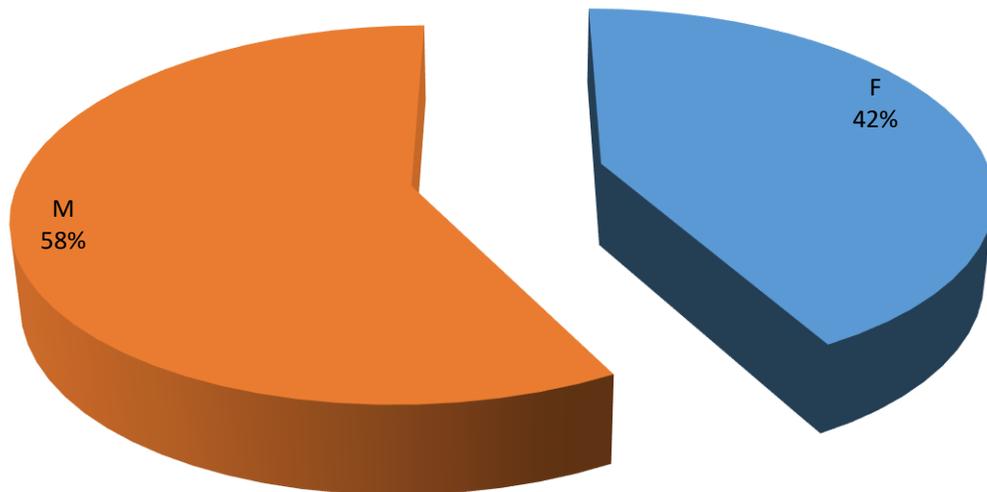
**Annex-2: IGSB 2019 Participants List**

<b>S/No.</b>	<b>First Name</b>	<b>Last Name</b>	<b>Gender</b>	<b>Country</b>
1	Cristian Abraham	Rivera Armendariz	Male	Mexico
2	Rodrigo	Gentili	Male	Argentina
3	Behnoush	Kamali	Female	Iran
4	Mahmoud	Hammad	Male	Palestine
5	Anh	Nguyen	Female	Vietnam
6	Ravza	Achshanova	Female	Kazakhstan
7	Karanveer	-	Male	India
8	Yohannes	Degu	Male	Ethiopia
9	Abibatou	Camara	Female	Senegal
10	Wiem	Goussouma	Female	Tunisia
11	Zachariah	Omweri	Male	Kenya
12	Reham	Besila	Female	Egypt
13	Laila	Ait Abbou	Female	Morocco
14	Anis	Khudonazarov	Male	Tajikistan
15	Kumar	Love	Male	Pakistan
16	Kuei-Hua	Hsu	Female	Taiwan
17	Omed	Mustafa	Male	Iraq
18	Wondmyibza	Tsegaye Bayou	Male	Ethiopia
19	Tuan	Tran Quang	Male	Vietnam

### Annex-3: Statistics of Participants



## Gender distribution



## Selection of participants

### Priority applications

- 1 – Self sponsored applicants (with relevance of academic background to the course to be given, and submission of complete application documents)
  - 2 – Course scholarship applicants (with a relevant background and complete application document)
  - 3 – Partial scholarship applicants with relevant background, motivation letter, experience
  - 4 – Full scholarship applicants with very relevant background and experience, very strong motivation letter, mainly from Sub-Saharan Africa, South America and Asian countries
- One from each country (no two applicants from the same country is given a full scholarship unless special cases are considered)

**Excluded applications**

- 1 - Professors and Doctors with over 12 years experience
- 2 - Applicants with over 20 years of experience
- 3 - Applicants older than 50 and younger than 23
- 4 - Applicants with BSc and very limited experience
- 5 - Applicants with farthest academic and industry background from the course
- 6 - Applicants who participated in the same course in the previous years organized by IGSH
- 7 - Applicants who participated three or more times in the past may not be given a chance to take part in this course
- 8 - Applicants who failed to submit their CV and addresses of their referees (incomplete application)
- 9 - No two persons from the same country are allowed to take part in the course unless special conditions govern the situation
- 10 - Full scholarships for applicants from Europe, USA, Canada, Australia etc. should not be given unless special conditions govern the situation
- 11 - Applicants who failed to meet the application deadline (applications may be considered based on the type of scholarship they are applying for and their academic background)

**Annex-4:****IGSH 2019 Participants' comment collection sheet**

<b>Your reason(s) of attendance?</b>	
General interest in the topic	
Special professional needs	
Practical application	
Knowledge renewal	
Other	

<b>What is your professional background?</b>	
Engineering (please specify)	
Geosciences (please specify)	
Geography	
Other (Please specify)	

<b>Are your expectations fulfilled by the course with respect to:</b>					
	Fully	Yes	Neutral	No	No idea
Quality of contents					
Selection of lecture topics					
Practical applicability					
Relevance for own research/work					
Time for discussions					
Number of examples and exercises					
Quality of exercises					
Field trips					
Duration of the course					

<b>Scientific competence</b>	Very good	Good	Average	No idea
Prof. Dr. Stefan Wohnlich				
Dr. Till Kasielke				
Prof. Dr. Tobias Licha				
PD Dr. Andre Banning				
Dr. Roland Schindler				
Dr. Christian Jolk/Dr. Sandra Greassidis				
Dipl.-Geol. Christian Skark				
Prof. Dr. Steffen Bender				
Dr. Ali Mahdavi Mazdeh				
Prof. Dr. Frank Eulenstein				
Dr. Thomas Heinze				
Dr. Helena Banning				

	Yes	Neutral	No
Have you got enough time for questions/discussions?			
Have your questions been satisfactorily discussed?			

Have you been satisfied with the organization of the course?	Very much	Yes	Neutral	No	No idea
Lecture room					
Equipments in the lecture rooms					
Organization of field trips					
Meals and coffee-break services					
Accommodation					

**How satisfied were you in general with IGSH-2019 course?**

Very satisfied

Very unsatisfied

**1**

**2**

**3**

**4**

**5**






**What other improvements would you like to suggest?**

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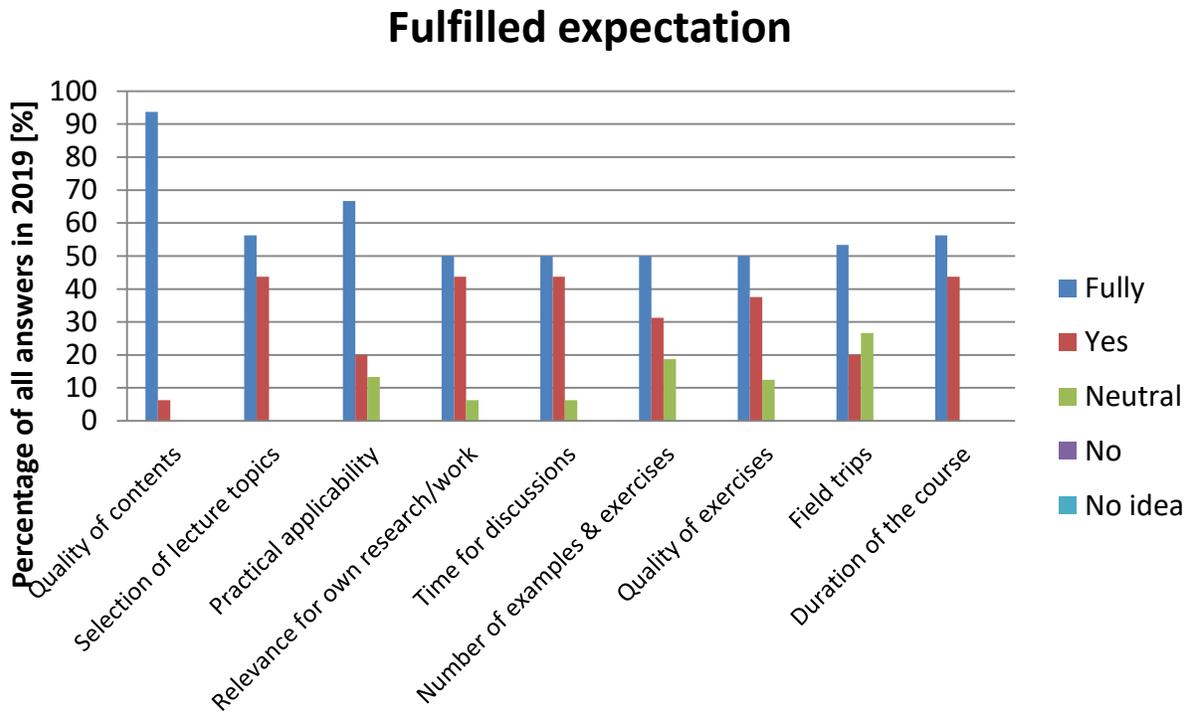
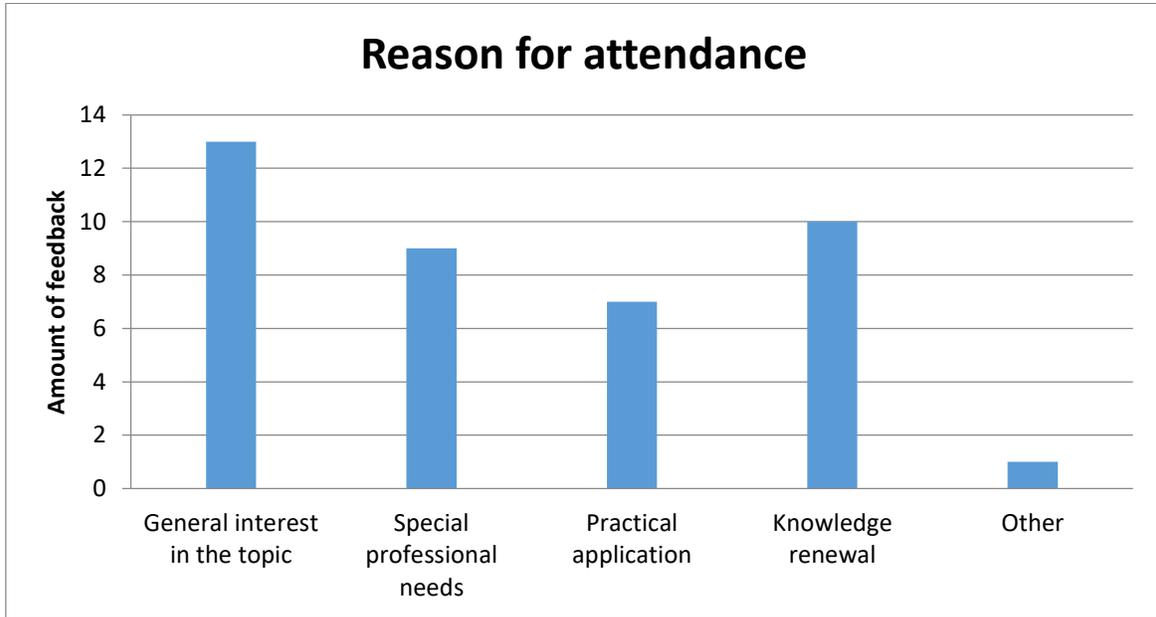


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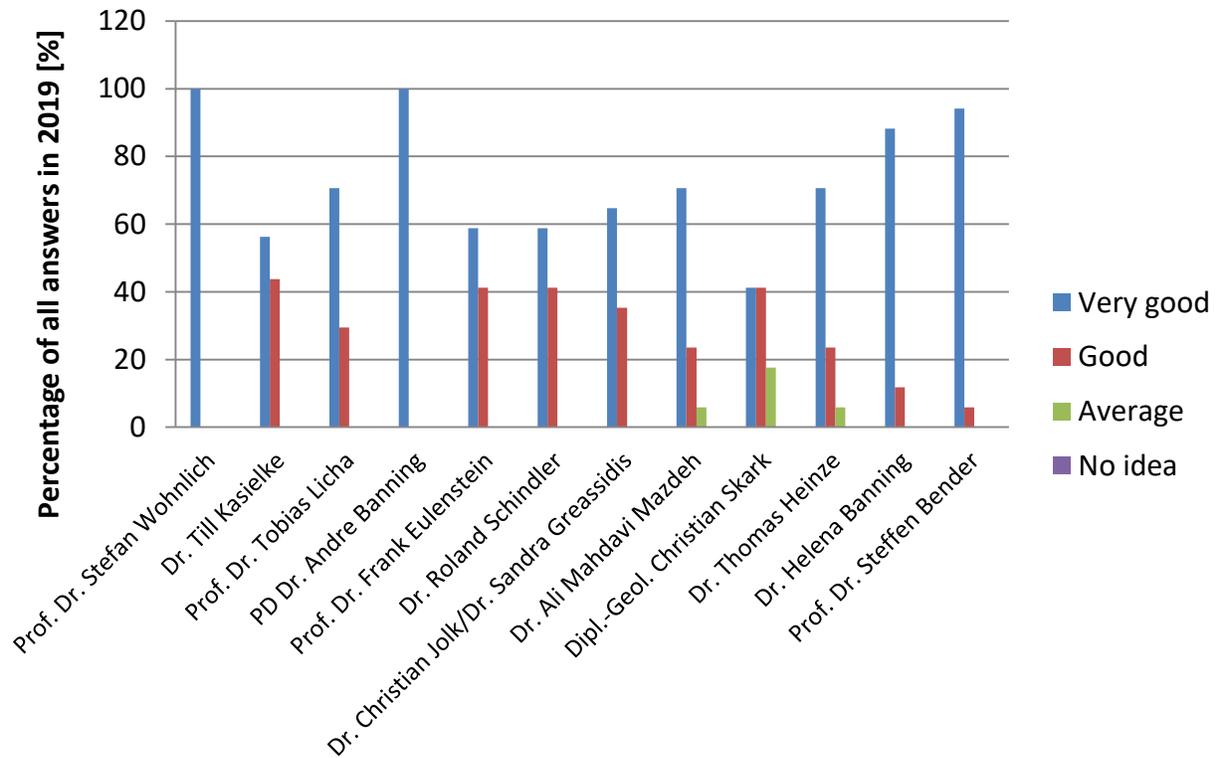


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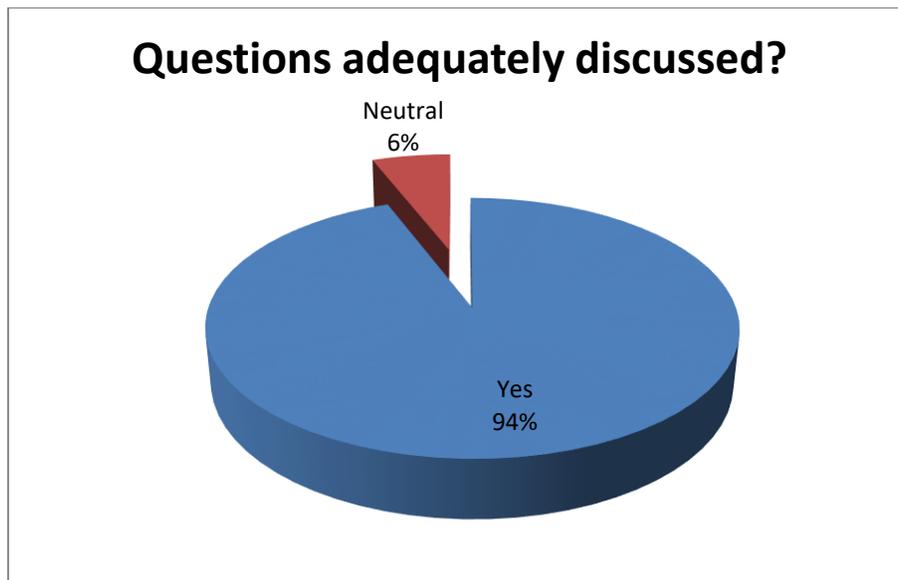
## Annex-5 Statistical Evaluation of Questionnaire



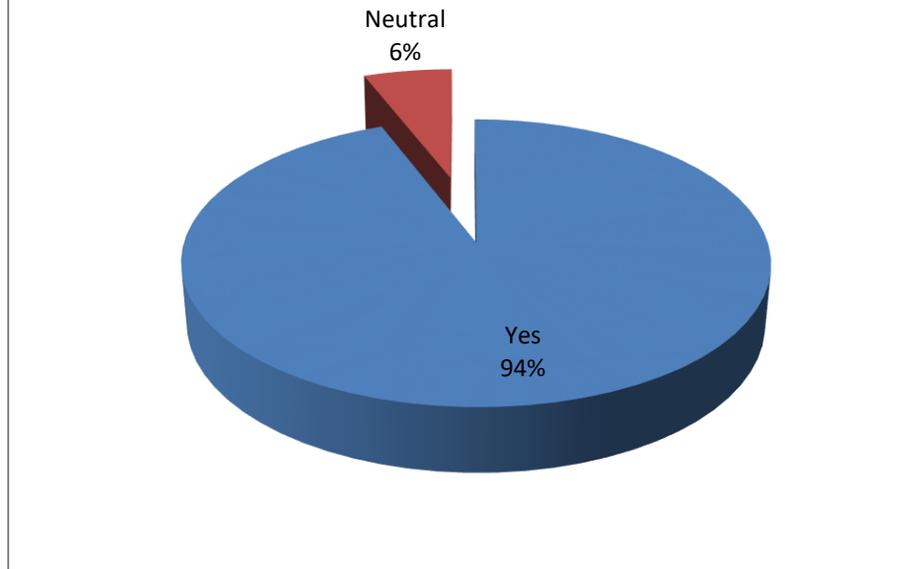
## Scientific competence of lecturers



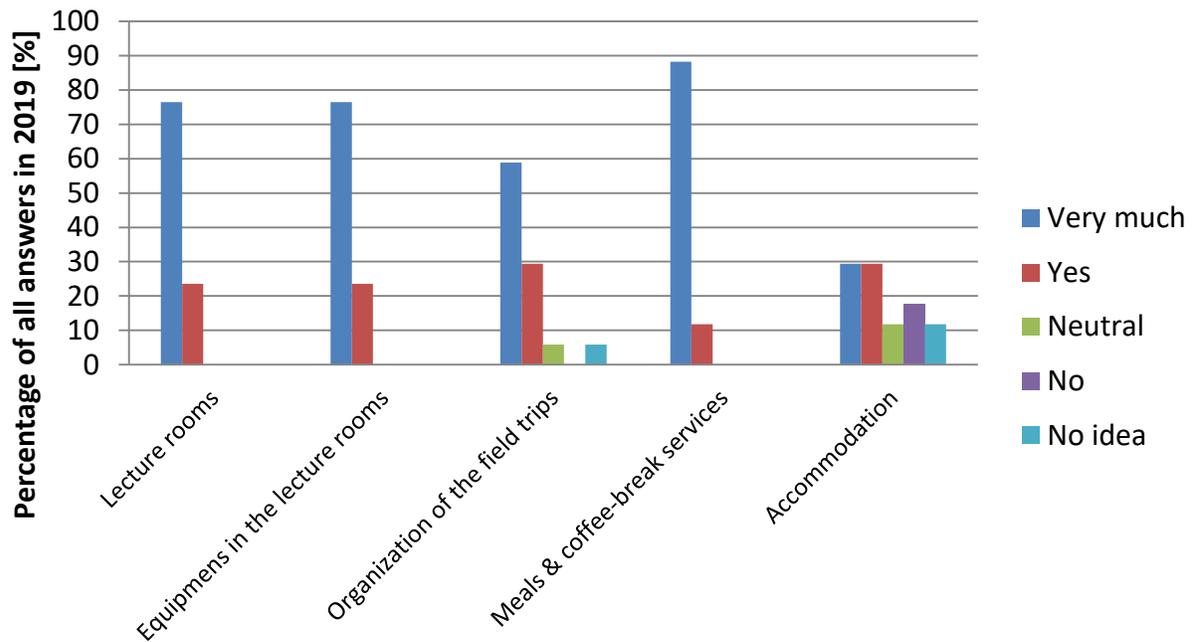
## Questions adequately discussed?



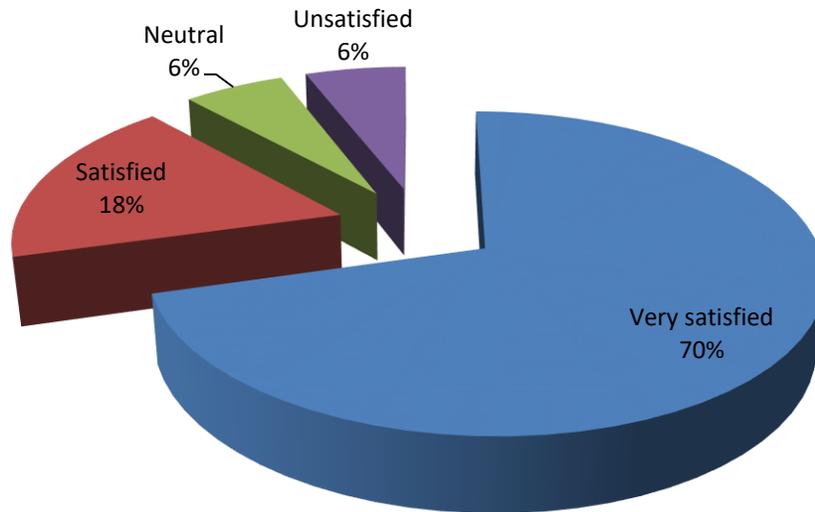
## Sufficient time for questions?



## Course organization



## How satisfied were the participants with the IGSH?



**Annex-6: Photos**

**Photos during Lectures**



**Photos during Social Events**



**Photos during the certificate award**

