Integrated Water Resources Management

Sino-German-Summer School in Augsburg

18 – 29 September 2013

Venue: Hotel Alpenhof, Donauwörther Straße 233, 86154 Augsburg

Program,
organizational details
and Abstracts

Financed by:

Hosted by:

Technische Universität München

Organized by:

Institute for Water and Environment
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Date	Time	Activities	Lecturer	Chairman
17.09.2013	05:30	Bus pick up from Munich Airport to Hotel Alpenhof		
	20:00	Arrival of participants		
18.09.2013 Responsible: Patrick Keilholz	08:30	Registration for Summer School		
	9:00-9:30	Opening ceremony	M. Disse Su Buda	
	9:30-10:30	Get-to-know of participants and lecturers Preparation and first exchanges on affiliations, topics and interests	M. Disse Su Buda	
	10:30-11:00	Group photo	Patrick Keilholz	
	11:00-11:30	Tea Break		
	11:30-13:00	Model-supported implementation of Water Management in Arid Regions	P. Brunner	Valentina Krysanova
	13:00-15:00	Lunch		
	15:00-16:00	Climate change Mitigation from the point of earth system modeling view	Dong Wenjie	Jiang Tong
	16:00-17:00	Flood Risk assessment and management	Bruno Merz	
	17:00-18:00	Climate Change Impact Assessment on Water Availability and Water-related Extremes in Germany	V. Krysanova	
	18:30	Pick up with Bus to transfer to Munich for dinner		
	19:30	Dinner in Munich at Paulaner am Nockherberg		
19.09.2013 Responsible: Lina Kliucininkaite	9:00-10:00	Climatic changes and lake ecosystem responses	Xue Bin	Su Buda
	10:00-11:00	Integrated soil and water processes from a subtropical agricultural catchment	Zhang Bin	
	11:00-11:30	Tea Break		
	11:30-12:30	How to understand the up scaling of hydrological processes from observation scale to a regional level?	Zhao Chengyi	
	12:30-13:30	Modules of Flood Area and examples of their application	A. Assmann	
	13:30-15:00	Lunch		
	15:00-16:00	Climate Change Scenarios for China and Germany and its Impact on Water	Z. Kundzewicz	Andre Assmann
	16:00-17:00	Water saving strategies and techniques in urban areas	J. Drewes	
	18:00	Dinner at hotel		

Date	Time	Activities	Lecturer	Chairman
20.09.2013 Responsible: Lina Kliucininkaite	09:00-10:00	Sustainable water resources management of river oases along the Tarim River in North-West China	M. Disse	Stefan Becker
	10:00-11:00	A decision support system for sustainable water allocation in the Tarim Basin	A. Brieden	
	11:00-11:30	Tea Break		
	11:30-12:30	The water-energy-food nexus – a great challenge for sustainable solutions	P. Rutschmann	
	12:30-13:30	Lysimeters – A Perfect Tool for Climate Change Research	Sascha Reth	
	13:30-15:00	Lunch		
	15:00-16:00	Cross-comparison of impact assessments and adaptation strategies across large river basins in Europe, Africa and Asia	S. Becker	Xue Bin
	16:00-17:00	Adaptation tool to Climate Change: Weather Index Based Insurance	Su Buda	
	18:00	Dinner at hotel		
21.09.2013	Free time in Augsburg			
22.09.2013	Free time in Augsburg			

Date	Time	Activities	Lecturer
23.09.2013	09:00-12:00	An overview of the DHI software and solutions	Christian Pohl
	13:00-18:00	Set up of computers, Build up of a simple MIKE SHE model	Schumacker Maluf & Keilholz
	18:00	Dinner at hotel	
24.09.2013	09:00-12:00	Build up a simple MIKE SHE model (SZ)	Schumacker Maluf & Keilholz
	13:00-18:00	coupling of MIKE SHE and MIKE 11 (SZ, OC & OL)	Schumacker Maluf & Keilholz
	18:00	Dinner at hotel	
25.09.2013	09:00-12:00	Build up a simple unsaturated model (UZ & ET) with Irrigation	Schumacker Maluf & Keilholz
	13:00-18:00	Solute transport module	Schumacker Maluf & Keilholz
	18:00	Dinner at hotel	
26.09.2013	09:00-12:00	Self-Practice MIKE SHE	Schumacker Maluf & Kliucininkaite
	13:00-18:00	Build up a simple MIKE Hydro model	Schumacker Maluf & Kliucininkaite
	18:00	Dinner at hotel	
27.09.2013	09:00-12:00	Add irrigation and reservoirs into simple MIKE Hydro model	Schumacker Maluf & Kliucininkaite
	13:00-18:00	Post processing	Schumacker Maluf & Kliucininkaite
	18:00	Dinner at hotel	
28.09.2013	09:00-12:00	Self-Practice (Build up a full MIKE Hydro model)	Schumacker Maluf & Yassin
	13:00-14:00	Final Conclusions, Handout of Certificates	Jiang Tong
	14:00-18:00	Free time in Augsburg	Yassin
	18:00	Dinner at hotel	
29.09.2013	08:45	Bus pick up at Hotel Alpenhof	
	09:00-18:00	Excursion to Castle Neuschwanstein	Yassin & Kasparek
	18:00	Bus pick up at Castle Neuschwanstein	
30.09.2013	10:15	**Return flights to China / int. Destinations** Bus pick up from Hotel Alpenhof to Munich Airport	

In the second week there will be one coffee break during the morning and one in the afternoon. The times will be set flexible during the training. Lunch will be around 12:00 h at the hotel in the second week.

Travel information:

The Hotel is situated in the North of Augsburg (see figure 1)

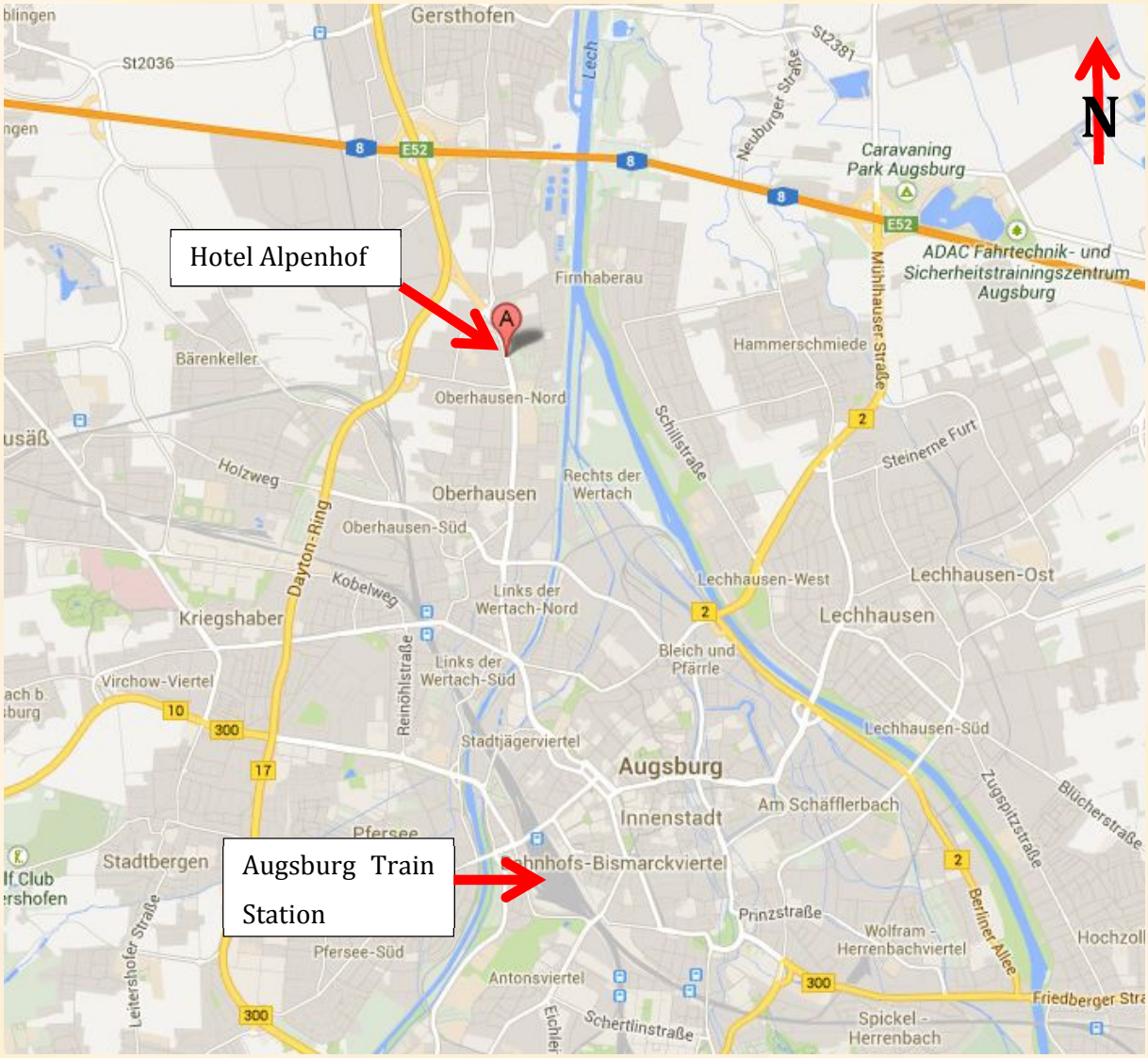

Figure 1: Hotel in Augsburg and Augsburg Train Station.

Public transport in Augsburg:

Homepage: avv-augsburg.de

How to get from Augsburg Train station to the Hotel Alpenhof:

Right in front of the main entrance of Augsburg train station look for bus station D. Take the bus B11 (direction: Moritzplatz). Alight at the station “Rathausplatz”. Cross the street and take the Tram number 64 (direction: Augsburg-Nord). The tram will drive in the opposite direction as the bus (see figure 2). Alight at the station “Alpenhof”. From the tram station “Alpenhof” it is about five minutes’ walk to the north (see figure 3). The sign of the hotel can be seen from the tram station. Tickets can be bought in the bus from the bus driver.

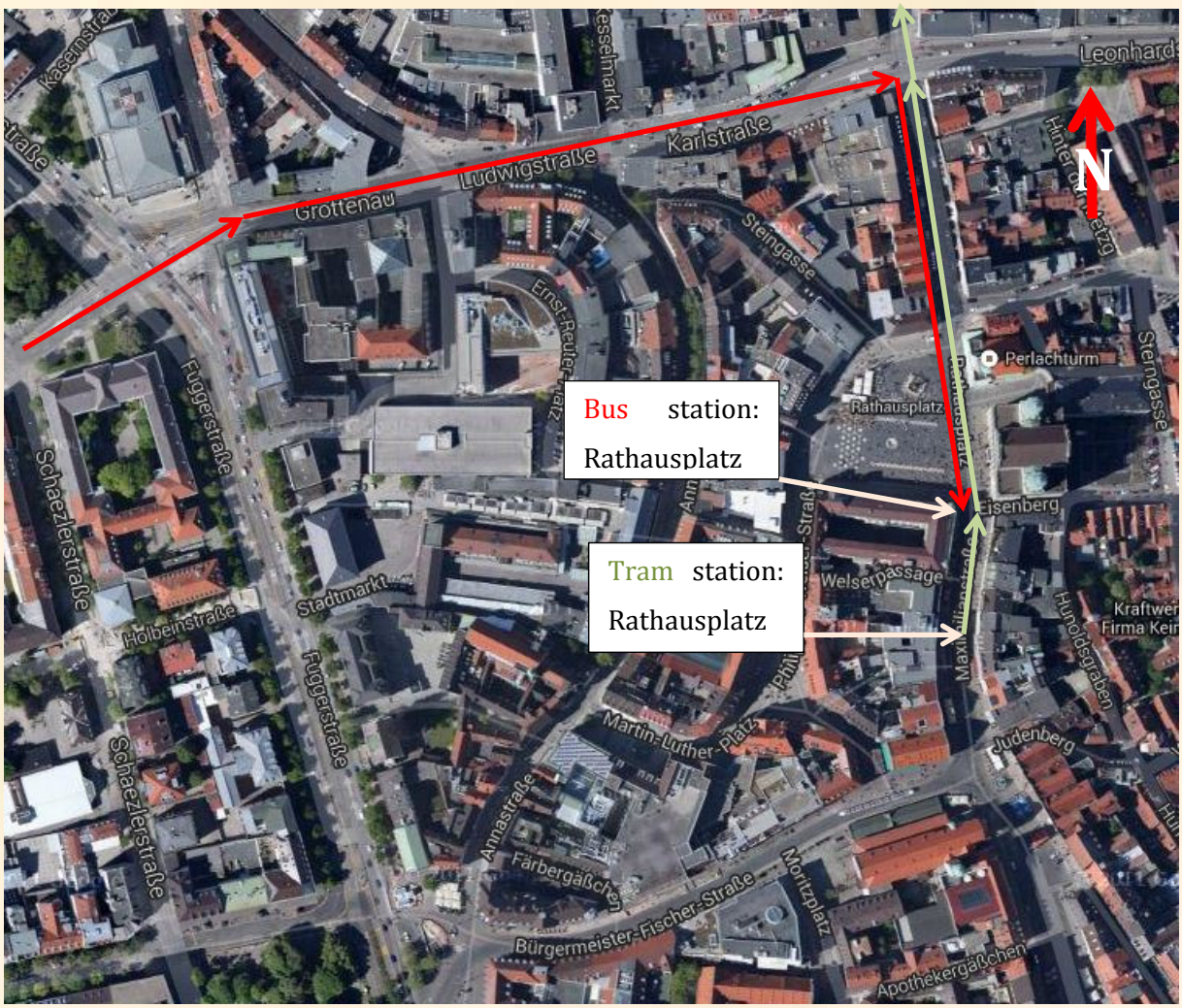

Figure 2: Changing transportation at Rathausplatz

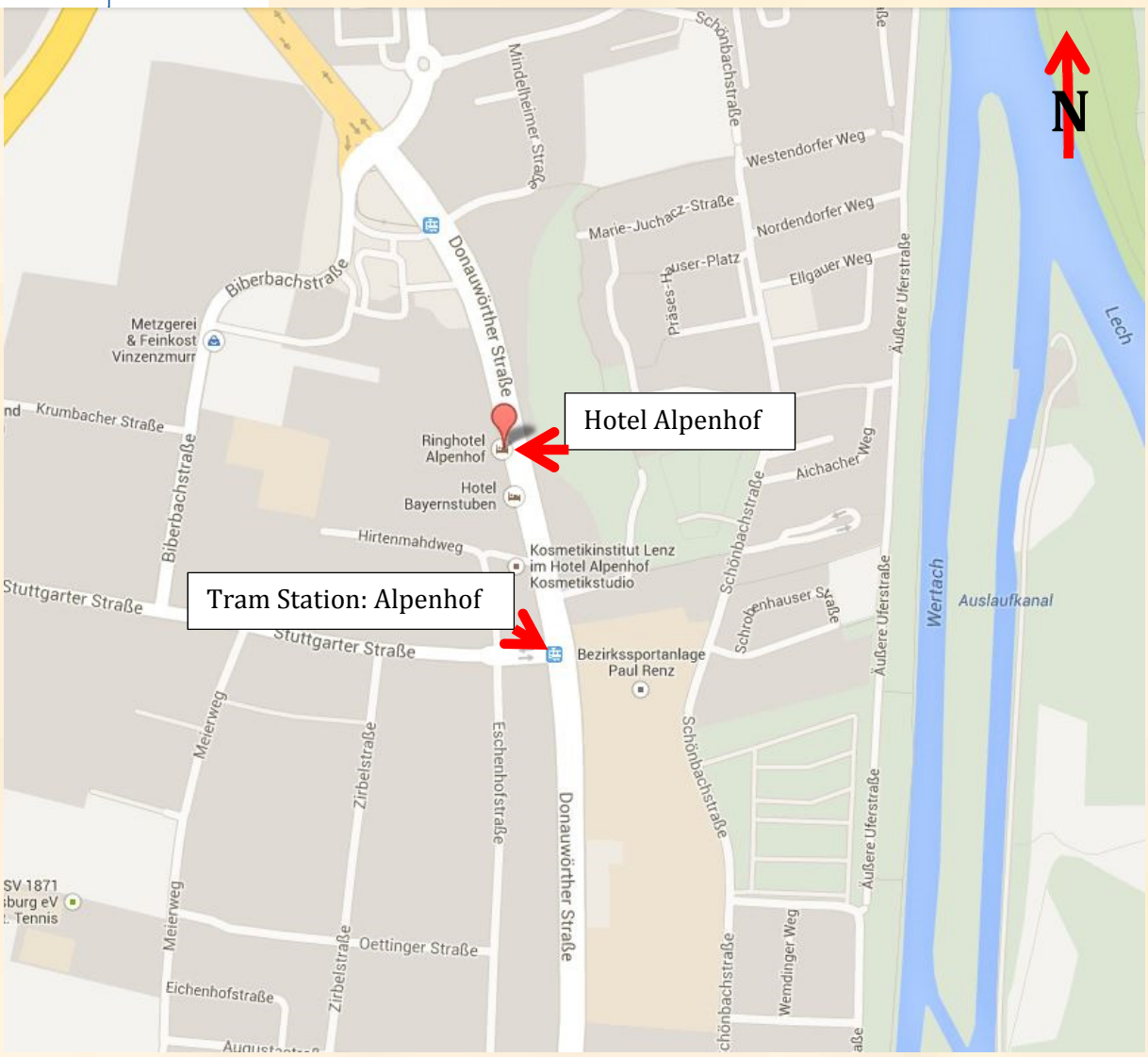

Figure 3: Tram station close to the Hotel Alpenhof.

In Munich:

At 05:30 h there will be a bus at the airport picking the Chinese guests up arriving with the airplane CA961. The bus driver will pick you up at the gate and will hold the following sign: "Summer School "Integrated Water Resources Management" sponsored by Deutsch-Chinesisches Zentrum für Wissenschaftsförderung, Technische Universität München"

S-Bahn Line number 1 or 8 takes you directly from the Airport Munich to Munich Train station. The S-Bahn station is opposite of Terminal 2. Leave the building of terminal 2 and cross the big square outside. The S-Bahn sign Ⓢ can be seen at the end of the square. Take the stairs down to the platform. The tickets can be bought at the ticket vending machine. Select "English" and follow the instructions to get a ticket to Munich Main Train station. In Munich Main Train station: follow the sign "Fernverkehrszüge" and the sign DB. Find the "Reisezentrum" people can help you to buy a ticket to Augsburg.

At the hotel:

At the reception all guests will receive codes for the internet access. There will be a code for every day staying at the hotel.

The hotel will provide:

- Breakfast (buffet)
- Lunch (buffet) there is one drink (0.4 l) included
- Dinner (buffet) there is one drink (0.4 l) included. The dinner includes one soup, a main dish and salad buffet.
- During coffee breaks: coffee, tea, soft drinks and cookies
- All drinks during the presentations are included
- Conference hall

The hotel has a swimming pool and several saunas for relaxation (bring your swim suits).

A two-day-ticket for Augsburg (6.00 Euros) can be bought at the hotel reception for the free time in Augsburg.

Most of the double rooms will be equipped with two beds. All rooms have a bath room with shower, toilet, hair dryer, radio, TV and access to W-LAN (use the codes received at the reception) and a Minibar (not included in the price).

Dinner

On **17th of September** there will be the dinner at the hotel.

On **18th of September** dinner will be in **Munich** at the **Paulaner am Nockherberg**, Hochstraße 77 (Tel. 089 4599130). The reservation is on the name of "Rumbaur". There will be a bus picking all guests up at the Hotel Alpenhof (18:30 h) and will drive to Munich and will bring all guests back to Augsburg to the hotel. A menu is already ordered for everyone. A soup, roast pork and Bavarian crème as desert.

At the rest of the days dinner will be at the hotel.

Excursion

29th September: A bus will pick up all guests up at the Hotel Alpenhof at 08:45 h. The bus will bring all guests back starting at Neuschwanstein at 18:00 h. **Please be on time!**

List of participants:

Gender	Name	Affiliation
Mr.	Zhang Bin	Chinese Academy of Agricultural Sciences
Mr.	Xue bin	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences
Ms.	Lu Hong	Guangxi Autonomous Region Climate Center
Mr.	Zhao Chengyi	Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences
Mr.	Zhu Chunmei	Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences
Mr.	Jiang Tong	National Climate Center, China Meterological Administration
Mr.	Cai Qinghua	Institute of Hydrobiology, Chinese Academy of Sciences
Ms.	Wu Youmei	National Climate Center, China Meterological Administration
Mr.	Dong Wenjie	Beijing Normal University
Mr.	Li Yonghua	National Climate Center, China Meterological Administration
Mr.	Li Xicang	Inner Mongolia Autonomous Region Climate Center
Ms.	Su Buda	National Climate Center, China Meterological Administration
Ms.	Zhang Fengju	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences
Ms.	Wang Xiaocui	Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences
Mr.	Shen Henglun	Institute of Hydrobiology, Chinese Academy of Sciences
Mr.	Wang Yuzhe	Institute of Hydrobiology, Chinese Academy of Sciences
Ms.	Zheng Jing	Guangdong Climate Center
Mr.	Zhu Xiaochen	Nanjing University of Information Science &Techonology
Ms.	Qian Jing	Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences
Mr.	Dong Xiaoyu	Institute of Hydrobiology, Chinese Academy of Sciences
Mr.	Zhai Jianqing	Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences
Ms.	Yang Jing	Inner Mongolia Autonomous Region Climate Center
Ms.	Gao Ge	National Climate Center, China Meterological Administration
Mr.	Gao Feng	China Meteorological Administration Training Center
Ms.	He Hui	Guangxi Climate Center
Mr.	Wang Tengfei	Nanjing University of Information Science &Techonology
Mr.	Wang Wenpeng	Hehai University
Mr.	Philp Brunner	ETH Zürich
Ms.	Yang	ETH Zürich
Mr.	Zbigniew Kundzewicz	Potsdam Institute for Climate Impact Research
Mr.	Bruno Merz	GeoForschungsZentrum Potsdam
Ms.	Valentina Krysanova	Potsdam Institute for Climate Impact Research
Mr.	Lucas Schumacker Maluf	DHI
Mr.	Fuad Yassin	Technische Universität München
Ms.	Altyn Akimalieva	Universität Greifswald
Mr.	Patrick Keilholz	Universität der Bundeswehr München
Ms.	Lina Kliucininkaite	Universität der Bundeswehr München
Ms.	Hannah Patalong	Technische Universität München

Gender	Name	Affiliation
Mr.	Stefan Becker	Lehmann College of the City University, New York
Mr.	Andre Assmann	geomer
Mr.	Markus Disse	Technische Universität München
Mr.	Jörg Drewes	Technische Universität München
Mr.	Peter Rutschmann	Technische Universität München
Mr.	Andreas Brieden	Universität der Bundeswehr München
Mr.	Han Ming	Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences
Mr.	Wolfgang Rieger	Technische Universität München
Ms.	Zhan Meisi	Technische Universität München
Mr.	Axel Kasparek	Technische Universität München
Mr.	Christian Pohl	DHI

Integrated Water Resources Management

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Abstracts

Content of Abstracts

Day 1, 18. September

Day 2, 19. September

Day 3, 20. September

Model-supported implementation of Water Management in Arid Regions

Philip BRUNNER

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Abstract: The talk covers a range of topics that are relevant for environmental modeling in arid and semi-arid regions. A common challenge to set up and verify numerical models is the lack of data. In this context, the potential to use remote sensing products for constructing and verifying numerical models is explored. The calculation of a soil salinity map as well as a map of phreatic evaporation is discussed in detail and their application in numerical models is demonstrated for the Yanqi basin in Xinjiang. The second topic is on quantifying uncertainty of numerical models. Methods to quantify uncertainty of a given prediction, as well as approaches to identify the worth of observation data in reducing the uncertainty are presented. Case studies are the Yanqi basin as well as the Tarim river. Some final conclusions are drawn.

Key words: modeling; remote sensing; parameter estimation; uncertainty; Xinjiang

Climate change Mitigation from the point of earth system modeling view

Wenjie DONG

Beijing Normal University

Abstract: At the United Nations Framework Convention on Climate Change Conference in Cancun, in November 2010, the Heads of State reached an agreement on the aim of limiting the global temperature rise to 2 °C relative to preindustrial levels. They recognized that long-term future warming is primarily constrained by cumulative anthropogenic greenhouse gas emissions, that deep cuts in global emissions are required, and that action based on equity must be taken to meet this objective. However, negotiations on emission reduction among countries are increasingly fraught with difficulty, partly because of arguments about the responsibility for the ongoing temperature rise. Simulations with two earth-system models (NCAR/CESM and BNU-ESM) demonstrate that developed countries had contributed about 60–80%, developing countries about 20–40%, to the global temperature rise, upper ocean warming, and sea-ice reduction by 2005. Enacting pledges made at Cancun with continuation to 2100 leads to a reduction in global temperature rise relative to business as usual with a 1/3–2/3 (CESM 33–67%, BNU-ESM 35–65%) contribution from developed and developing countries, respectively. To prevent a temperature rise by 2 °C or more in 2100, it is necessary to fill the gap with more ambitious mitigation efforts.

Flood Risk Assessment and Management

Bruno MERZ

GeoForschungsZentrum Potsdam

Abstract: Floods are a worldwide phenomenon with strongly increasing losses, and climate change and other drivers of change are expected to further increase flooding. Hence, sound flood risk assessment and management approaches are of highest importance. This presentation discusses the basic concepts of flood risk assessment and management. Flood hazard, vulnerability and risk are introduced. It is illustrated via case studies and real world examples, how they can be quantified. In addition, the reliability of flood risk assessments and the effects of change are explored. It is shown that the quantification of past and future changes in flood risk is plagued with considerable uncertainty. Climate change and other 'unpredictable' dynamic processes increase the uncertainty of flood risk assessments. This uncertainty should be considered in the design of risk reduction measures.

Climate Change Impact Assessment on Water Availability and Water-related Extremes in Germany

Valentina KRYSANOVA, Shaochun HUANG, Fred HATTERMANN

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Abstract: The first German-wide impact assessment of water fluxes dynamics and extreme events under climate change was performed in a spatially and temporally distributed manner. All large river basins in Germany (lower Rhine, upper Danube, Elbe, Weser and Ems) were included. The eco-hydrological model SWIM (Soil and Water Integrated Model) was used for the assessment. In advance, it was validated for river discharge and high and low percentiles of discharge showing a good agreement with observations. In the study on seasonal dynamics the statistical regional climate model STAR was used to generate climate scenarios. For the studies on extremes, climate data generated by two dynamical Regional Climate Models, REMO and CCLM, and one statistical-empirical climate model, Wettreg, were applied to drive SWIM. The Generalized Extreme Value (GEV) distribution was fitted to the annual maximum series of river runoff for each realization for the control and scenario periods, and the changes in flood generation over the whole simulation time were analyzed. The 50-year flood values estimated for two scenario periods (2021-2060, 2061-2100) were compared to the ones derived from the control period using the same climate models. The occurrence of the 50-year low flow during 1961 to 2000 was estimated for the same two scenario periods using the GEV distribution.

The results for the second scenario period 2051-2060 show that water discharge in all rivers would be 8% - 30% lower in summer and autumn compared to the reference period, and the strongest decline is expected for the Saale, Danube and Neckar. Higher winter flow is expected in all of these rivers, and the increase is most significant for the Ems. The results driven by the statistical-empirical model Wettreg show a declining trend in the flood frequency for most rivers under all climate scenarios. The simulations driven by the dynamical models REMO and CCLM give various change directions depending on region, scenario and time period. The 50-year low flow is likely to occur more frequently in western, southern and part of central Germany after 2061 as suggested by more than

80% of the model runs. The current low flow period (August - September) may be extended until the late autumn at the end of this century. In general, the uncertainty of impacts, especially in winter and for extreme events, remains high.

Key words: climate change; river discharge; flood; low flow; Germany

Climatic changes and lake ecosystem responses

Bin XUE

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Abstract: Lakes, formed under multi-geological backgrounds, have fluctuated in its status (lake level/depth/area/salinity/nutrient/ecology) in a long-time scale (natural background / Geological periods) under the climatic changes impact, or in short-time scales of annual to millennial under human-nature interaction. Broadly regional synchronous changes in lake status since Last Glacial Maxmimum reflect regional changes in precipitation and precipitation minus evaporation, in associated with the atmospheric circulations. Recently enhanced human activities and human impact on lake status change occurred especially in the past decades. There are many human-nature stories to be told with reference to the lake eco-environment.

A synthesis of lakes status data from China showed that, the relatively wet conditions of western China from Last Glacial Maxmimum to Mid-Holocene was probably related to the precipitation brought by the westlies and the low evaporation in Glacial period, and summer monsoon precipitation in Holocene. And the climate turned drier since late-Holocene. Most area in eastern China during LGM and late-Glacial was relatively dry, and turned wetter in Holocene. The summer monsoon precipitation during Mid-Holocene might reach the whole western China.

For Yangtze basin with densely population, lake status changed, strongly influenced by human activities in the past century and more. Three stages might be divided as follows, enhanced catchment erosion occurred in the cold Little Ice Period due to a rapid population increase along the basin, irreversible environment change towards the present phase since 1950's induced by agriculture and hydrological engineering works, accelerated deterioration of lake environment since late 1970's caused by rapid economic growth. Although the human impacts were enhanced in the past decades, the recent warming climate may also play very important role on the lake water eco-problems, e.g. the increased algae bloom the northern and eastern China. However uncertainty does exist for what is the consequence of climatic change impact on lake system, under the human and nature interaction.

Integrated soil and water processes from a subtropical agricultural catchment

Bin ZHANG[1,2] Yi WANG[2] Jialiang TANG[2]

1 Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, Beijing.
2 Institute of Soil Science, Chinese Academy of Sciences, Nanjing.

Abstract: Subsurface lateral flow from agricultural hillslopes is often overlooked compared with overland flow and tile drain flow, partly due to the difficulties in monitoring and quantifying. This study was carried out at different temporal and spatial scales to examine how subsurface lateral flow generates through soil pedons from cropped hillslopes and to quantify its contribution to nitrate loading in the streams through a typical agricultural catchment in the subtropical region of China. Generation of subsurface lateral flow was identified from the profiles of soil water potential along hillslopes during simulated rainfalls and its comparison with the hydro-chemographs during two heavy rainstorm events. Subsurface lateral flow was estimated by direct measurement for the simulated rainfall on the cropped hillslopes, by modeling using Hydrus-2D on the cropped hillslopes, using chemical mixing model for the stream flows through the catchment and using catchment model (WaSIM) for the whole catchment. The annual soil moisture regime showed soil water saturation in deeper soils at the lower slope positions and the difference between different land uses. The dynamics of soil water potential during typical rainstorms showed positive soil water potential over an impermeable soil layer at 0.6 to 1.50 m depth, indicating earlier soil water saturation in the deeper soil than in the surface soil and drainage processes along the hillslopes irrespective of land uses. Dye tracing experiments before and during simulated rainfall showed the different paths of preferential flow between two land uses, one shallow rooted peanut cropping system and another agroforestry system with peanut crops intercropped with deep rooted citrus. The hydro-chemographs in the streams, one trenched below a cropped hillslope and one at the catchment outlet, showed that the concentrations of particulate nitrogen and phosphorus corresponded well to stream flow during the storm, while the nitrate concentration increased on the recession limbs of the hydrographs after the end of storm. All the synchronous data revealed that nitrate was delivered from the cropped hillslope through subsurface lateral flow to the streams during and after the end of the rainstorms. Water balance during the simulated rainfall revealed

that subsurface lateral flow accounted for 5% to 38% of rainfall in the agroforestry system and for 40% to 62% in the peanut cropping system. The chemical mixing model based on electricity conductivity (EC) and H+ concentration showed that the subsurface lateral flow accounted for 29% to 45% of total stream flow in the stream trenched below the peanut hillslope and for 5.7% to 7.3% of total stream flow at the catchment outlet during two typical storm events. The Hydrus-2D modeling estimated that annual subsurface lateral flow accounted for 14% to 34% of annual rainfall in the agroforestry system and for 25% to 42% in the peanut cropping system. The European catchment hydrological modeling WaSIM estimated that subsurface lateral flow from the whole catchment accounted for 35% to 39% of annual rainfall. The Hydrus-2D estimated that nitrate lost with subsurface lateral flow accounted for 15% to 49% of total annual nitrate loss or 10% to 30% of applied N fertilizer in the agroforestry system, and for 40%-64% of total annual nitrate loss or 31%- 40% of applied N fertilizer in the peanut cropping system. The chemical mixing model estimated that the subsurface lateral flow is responsible for 86% of total nitrate loss (or 26% of total N loss), and for about 69% of total nitrate loss (or 28% of total N loss) during two storms. The results suggest that subsurface lateral flow through hydraulically stratified soil pedons have to be paid more attention for controlling non-point source surface water pollution from intensive agricultural catchment and deep rooted crops should be introduced to the landscape in controlling nutrient loss through subsurface lateral flow.

How to understand the up scaling of hydrological processes from observation scale to a regional level?

Chengyi ZHAO

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Abstract: Synthesize the hydrology and soils complexity from nano-scale to global scale is an important issue and hot yam on ecological and hydrological processes simulation. Pattern, or spatial-temporal organization, offers rich and comprehensive insights regarding many phenomena in nature. Pattern identification may offer new way of demystifying soil variability. We should emphasize the importance of spatial pattern identification in combination with long-term monitoring in our scientific investigations. Soil as a central link in the hydrologic cycle.Soil-landscape relationships: the essence of geomorphology, catena, and fundamental landscape units. Hydrologic patterns: pedologic control and temporal stability. Interface as a critical control: macropore-matrix interface, soil horizon interface, water-air interface, soil-root interface, microbe-aggregate interface.

An eco-hydrology model (TRHM) that could combine hydrological process and ecoloicaly process was developed.Response of vegetation to ecological sluices operation is quantified. Probability Populus and Tamarix distribution patterns are predicted. Consider the response of vegetation, through numerical experiments, the operation of ecological sluices is optimized

Moduls of FloodArea and examples of their application

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Abstract: The presentation gives an overview on the fields of application, the functionalities and characteristics as well as on the technologies used in the FloodArea software. Also it describes the differences between the available product versions.

FloodArea is a hydrodynamic 2D-modell for the calculation of inundated areas that is completely integrated into ArcGIS. The internal calculation is based on an iterative calculation of water level slope and resulting flow direction, the flow velocity calculation is based on Manning's equation. The flow exchange volume is shifted in each iteration step within a 16 direction neighbourhood; the water will mostly be distributed towards 2 target cells, the result is a smoother flow.

The software can be used for the production of flood hazard maps, calculation of dike failure scenarios or the failure of reservoirs. Using an additional pre-processor it can also be used as a combined hydrological and hydraulic model, here the hazard of pluvial flooding is the main field of application. The references for FloodArea contain the flood risk atlases for the large European rivers like Rhine, Odra, Elbe and Danube. FloodArea is also been applied in operational use, here the Hunza river blockage by a landslide in Pakistan as well as a dike failure in the recent Elbe flood are good examples.

For model validation both comparisons to results from other models as well as recalculation of real events have been performed.

FloodArea HPC can use all computers and cores in a cluster; the cluster management is done via a web console. If sufficient hardware is available the number of calculation nodes is not limited, project areas with more than a billion nodes have been calculated.

The desktop version is limited to the resources of a single computer but therefore integrated into ArcGIS, still about 30 million nodes can be calculated in the GUI version, and the toolbox variant is only limited by the available memory.

In both versions a batch processing is available, this is especially valuable if a high number of dike failure scenarios have to be performed. Another advantage of FloodArea is the high stability, also in wetting and un-wetting situations.

Key words: hydraulic model; ArcGIS; high performance computing

Climate Change Scenarios for China and Germany and its Impact on Water

Zbyszek KUNDZEWICZ

Potsdam Institute for Climate Impact Research

Abstract not available at date of printing

Water Saving strategies and techniques in urban areas.

Jörg DREWES

Technische Universität München

Abstract not available at date of printing

Sustainable water resources management of river oases along the Tarim River in North-West China

Markus DISSE

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Abstract: During the past five decades intensive exploitation of water resources, mainly by agriculture, has changed the temporal and spatial distribution of water resources and has caused serious environmental problems in the Tarim River Basin. Therefore, the overarching goal of the SuMaRiO project is to support oasis management along the Tarim River under climatic and societal changes. Specifically, the project investigates how to incorporate the concept of ecosystem services into IWRM. This is done in a transdisciplinary manner to integrate multidisciplinary scientific and multi-sectoral stakeholder knowledge. In order to support management decisions of the responsible stakeholders, a decision support system (DSS) will be developed which score the consequences of different management strategies.

In the second part of the presentation new hydrological modeling results are presented. The vegetation along the Tarim river is heavily dependent on the access to shallow groundwater which can be provided either by the Tarim itself or by inundation recharge of the regularly summer floods. In order to quantify the influence of the inundation areas on groundwater recharge and therefore on the vitality of riparian vegetation, a new algorithm is presented. This approach combines remote sensing and GIS data with hydrological and hydrodynamic modeling.

Key words: Sustainable Land and Water Management, Ecosystem Services, Ecosystem Functions, Transdisciplinary research, Modeling of Surface Water and Ground Water, Remote Sensing

A decision support system for sustainable water allocation in the Tarim Basin

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Abstract: Optimizing decisions: From theory to practice In this talk an Introduction is given on how different Optimization techniques can help to support practical decisions. Starting with theoretical basics from decisions theory we end up with relating the lessons learned with the optimization system developed within Sumario.

The water-energy-food nexus – a great challenge for sustainable solutions

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Abstract not available at date of printing

Lysimeters – A Perfect Tool for Climate Change Research

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Abstract: Lysimeters are an efficient tool for water-balance studies in agriculture, forestry and other environmental settings. In particular, they make it possible to quantify actual evaporation from a bare soil or actual evapotranspiration from a soil covered by vegetation. Moreover, seepage from lysimeters can be collected, which allows an assessment of the water loss from a soil profile and thus groundwater
recharge. The seepage water can be analysed in the laboratory for its various constituents. Hence, lysimeters can be used to monitor the fate of solutes in a soil.
Weighable lysimeters can monitor the mass continuously and thus provide detailed information about water-storage changes in the soil for any time period. In conjunction with rainfall and seepage measurements, water losses can then be specified as seepage or evapotranspiration. Lysimeters simulate the natural relationship between soil, atmosphere and plants and represent the link between studies in the laboratory and in the field scale. The flexible lysimeter design, the facilities and additional electronic measuring devices to allow the investigation of various environmental questions.
Gravitation lysimeters are used to measure parameters for the calculation of water and solute balances in soils. Due to the high resolution weighing system the input water fractions are measured with a resolution of 0.01 mm, including dew, rain, the water equivalent of snowfall and small rates of evapotranspiration. In connection with the additional recording of the amounts of percolating water and precipitation it also permits the quantification of the water balance of the soil column.

Key words: weighable lysimeters, evapotranspiration, transport, water transport, dew, climate change

Cross-comparison of impact assessments and adaptation strategies across large river basins in Europe, Africa and Asia

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Abstract not available at date of printing

Adaptation tool to Climate Change: Weather Index Based Insurance

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Abstract: Due to the increasing extreme weather events observed in the recent decades, the economic risk induced by climate change carries ever growing weight in the total economic risks. The better adaptation methodology, the research on climate risk management tools and its market application draw increasing attention from whole society. Establishing a country-wide, efficient climate risk trading market, that has a perspective of great demands in nowadays, would be an adoptable approach to reduce the impact of economic variability on the social lives and promotion of the sustainable economic development. Therefore, the research frontier of the weather derivatives, the weather-index based insurance, the securitisation of catastrophic climate risk and their market development process in western countries are introduced in the current study, and the hedging mechanism of these products is also explained as well. According to the feasibility study of the China Meteorological Administration on the weather-index-based insurance, the aim of this paper is to discuss the appropriate organisation structure and the perspective of the climate risk trading market in China as well as its regulatory issue.

Key words: climate change; Threshold; index-based weather insurance.