3. Annual Report

International Helmholtz Network

Helmholtz-CAS

"Research Centre for Environmental Information Science"

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"Research Centre for Environmental Information Science"

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Summary

The Sino-German Research Centre for Environmental Information Science (RCEIS) was established in March 2014. It shall become a Sino-German competence centre and research platform for Earth systems observation and prediction by combining expertise in the fields of environmental and information sciences using modern information technology. In this report, the working results for the second year from March 2016 to February 2017 are presented and the future plans and activities are introduced as well. The third year was regarded to be very successful and a lot have been achieved regarding the scientific contributions, new projects and the network extension. These achievements and activities are listed in the following table. As highlights of the third RCEIS year, the delegation led by the Helmholtz association President Prof. Wiestler visited Qingdao, Beijing and Shanghai. The Helmholtz Association – Chinese Academy of Sciences: "Strategic Partnership – Moving Ahead Together" Scientific Symposium took place in the institute of high energy physics (IHEP) of the Chinese Academy of Sciences (CAS) in Beijing. On this symposium, the results of RCEIS were presented by German and Chinese cooperation partners. In the context of the 4. Governmental Consultations be-

tween Germany and PR China on 13.06.2016 in Beijing, AMC and WISUTEC as well as HC System and Ewaters signed a Memorandum-of-Understanding for future cooperation between the German and Chinese SMEs. Their major interest is in building a joint venture for future cooperation in developing environmental information technology (including both soft- and hardware solutions) for sensor-based monitoring of environmental systems (e.g. for water supply and waste water).

RCEIS Activity Time Table (3rd Year)

No.	When	Activities	
1	13.03- 14.03.2016	BMBF project "Urban Catchments" visits the Chaohu Construction Bureau regarding the design of the planned "Environmental Data Center - Chaohu"	
2	15.03.2016	Visiting Institute of Hydrobiology, China Academy of Sciences, Wuhan China	
3	16.03.2016	Visiting Hubei Research Institute of Environmental Sciences and Institute of Rock and Soil Mechanics, China Academy of Sciences, Wuhan, China	
4	17.03.2016	From 16-17.03.2016 the "Deep Geothermal Resources Conference" orga- nized by the China University of Geosciences was hold in Beijing	
5	19.04.2016	The BMBF CLIENT project "Managing Water Resources – Urban Catch- ments" status meeting in Leipzig	
6	12.04.2016	Article about German contributions to the Major Water Program in China: "Innovation Cluster - Major Water" was published	
7	20.05- 25.05.2016	The visiting program in Wuhan/Nanjing/Shanghai, China from 20- 27.May.2016	
8	13.06.2016	Urban Catchments: Sino-German SME Partnership in Beijing	
9	04.07.2016	Urban Catchments: German Company AMC / WISUTEC visiting HC System / EWaters in Shanghai	
10	07.07- 13.07.2016	6th Digital Earth Summit in Beijing on 07-08.July.2016 and Visiting Chao Lake Management Authority	
11	13.07.2016	Project Lead "Urban Catchments" visiting Chinese companies in Shanghai	
12	08.2016	Prof. Zhenliang Liao from Tongji University visiting CAWR in Dresden in Au- gust 2016	

13	14.08- 15.08.2016	Sino-German Lysimeter Workshop took place in Beijing at the Beijing Nor- mal University from 14th to 15th August 2016
14	16.08- 18.08.2016	EU project SUSTAIN HO2 final workshop in Beijing
15	15.10- 22.10.2016	The Helmholtz Delegation led by President Prof. Wiestler in Qingdao, Bei- jing and Shanghai
16	18.10.2016	Helmholtz Association – Chinese Academy of Sciences: "Strategic Partner- ship – Moving Ahead Together" Scientific Symposium in Beijing
17	22.10.2016	Visiting of the Delegation of the Helmholtz Association to the Tongji Univer- sity
18	17.10- 19.10.2016	The second Sino-German Workshop of the Institutes of Hydrobiology (IHB) in Wuhan (China) and Dresden (Germany) took place in the Institute of Hydrobiology in Dresden from 17-19.Oct.2016
19	23.10- 27.10.2016	The third Workshop and Research visiting program of DFG-NSFC Project: A Cooperation Group about "A modeling platform prototype for environmental system dynamics" in Tianjin, China from 23-27.Oct.2016
20	31.10- 05.11.2016	Saxony delegation and entrepreneurs travel in China, under the guidance of Minister of State Martin Dulig (The Saxon State Minister for Economic Affairs, Labour and Transport)
21	09.12.2016	Sino-German Major Water Programme Conference, Shanghai
22	20.12.2016	Proposal for BMBF project "Forschungspräsenz für Umweltforschung in China" was submitted on 20.12.2016
23	31.12.2016	The first version of the document about UFZ#CAWR ChinaConcept was completed in Dec, 2016
24	14.02.2017	BMBF project "Urban Catchments" Magdeburger –Bouy travelled to China
25	15.02.2017	Proposal for BMBF project "RIVERCHALLENGE- Challenges in river manage- ment: The Yangtze from the source to the sea" was submitted on 15.02.2017

RCEIS Activity Map (3 Year)

The study areas of the RCEIS projects (work packages) are listed in the following table and highlighted in the following figure:

WP	Study area	Projects	Partners
1	Songhua-Liaohe River Basin	EU EuropeAid Project SUSTAIN H2O (Thematic Issue in EES)	CRAES UFZ CEH
2	Yellow River Delta	BMBF project DELIGHT "Delta Information System for the Geo-Environmental and Human Habitat Transition"	DLR CAS-IGSNRR
За	Chao Lake	BMBF CLIENT project "Managing Water Resources for Urban Catchments"	UFZ CAS-HYB CAS-NIGLAS TONGJI
3b	Poyang Lake	DFG-NSFC project about a Cooperation Group "A mod- eling platform prototype for environmental system dynamics"	CAS-IGSNRR UFZ KIT DLR
4	Heihe River Basin	Water resource management of Heihe River: Optimising irrigation in oasis desert eco-systems	FZJ CAS-IGSNRR
5	Heihe River Basin	Belmont Forum proposal about "Sustainable manage- ment of water resources and ecosystem services in the Heihe river basin"	UFZ CAS-IGSNRR TU Dresden Virginia Uni
6	Han River basin	BMBF CLIENT II Proposal about "Design of an Environ- mental Information System (EIS) for the Han River Basin in Hubei"	UFZ HRAES HTWK



Fig.1 RCEIS study area in China

Sino-German Activities and Networking

1. BMBF project "Urban Catchments" visits the Chaohu Construction Bureau regarding the design of the planned "Environmental Data Center - Chaohu"

On 13-14, March, 2016, representatives from BMBF project "Urban Catchments" as well as from Chaohu City, Tonji University, Chinese companies, HC Systems and Ewaters Environmental Science & Technology (Shanghai) Ltd met each other in Chaohu regarding the planned establishment of the "Environmental Data Center Chaohu". After the welcome speech from Mr. ZHANG who is the head of the Chaohu Construction Bureau, Prof. Zhenliang LIAO and his co-workers presented the results of the Chaohu project of the Tongji University within the framework of the Major Water Program. Prof. Kolditz then reported (Fig 3) on the BMBF-CLIENT project "Managing Water Resources for Urban Catchments - Chaohu" and demonstrated the current status of data integration using a mobile visual-

ization facility. The visit was planned to help local users and stakeholders of the planned ADB project to set up an environmental information center on the concepts and possibilities for environmental information systems developed within the framework of "Urban Catchments". The Technologies, equipment and software from the German companies (AMC, bbe Moldaenke, itwh, WISUTEC) would be used in this project. The discussion was chaired by Mr. WANG (Chaohu Construction Bureau), who is responsible for implementation of the ADB project. The representatives of the Chinese companies Hr. LUO Xian Wei and Hr. JIANG Kai (HC Systems) and Hr. ZHANG Weijun (Ewaters) were impressed by the progress of the project and expressed great interest in working with the German companies of "Urban Catchments".



Fig. 2: "Urban Catchments" visits the Chaohu Construction Bureau (14 March, 2016).

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Fig. 3: Prof.Olaf Kolditz demonstrated the Chaohu Environmental Information System (14 March, 2016).

2. Visiting Institute of Hydrobiology, China Academy of Sciences, Wuhan

On March 15, 2016, a meeting of the project management of "Urban Catchments" with colleagues from the Institute of Hydrobiology of the Chinese Academy of Sciences took place in Wuhan (Fig 4). Within the framework of a workshop, Prof. Kolditz presented the BMBF CLIENT project and demonstrated the results of the "Environmental Information System Choahu" to professors and students with the help of a mobile visualization unit. Dr. Chen has reported on the CAS Helmholtz network RCEIS (www.ufz.de/rceis). CAS-HYB can look back on almost 100 years of history, even if the new name of the institute was introduced only 20 years ago, reported by Prof. Hongzhu Wang (head of the institute). With more than 300 employees, CAS-HYB is one of the largest research facilities in hydrobiology worldwide and already has contacts with the Leibniz Institute for Water Ecology and Inland Fisheries (IGB). The institute also includes a facility for the breeding of Yangtze River dolphins (finless porpoises), which are threatened with extinction and have a retreat hut only in the Poyang Lake (Fig 5). CAS-HYB is a project partner of "Urban Catchments" and cooperates in particular with the TU Dresden (Institute of Hydrobiology, Prof. Thomas Berendonk). There is a common interest in biomonitoring. At the end of May 2016, the colleagues of the Dresden University of Technology (Drs. Jungmann and Rybicki) started a biomonitoring tour together with the company bbe Moldaenke in various institutions in Wuhan, Nanjing and Shanghai (CAS-HYB, Tongji University, NIGLAS) to propagate the new methodology / technology and strategies for early warning systems for the continuous monitoring of water quality, for example in the field of drinking water monitoring, in China.



Fig. 4: Visiting Institute of Hydrobiology, China Academy of Sciences, Wuhan on 15 March, 2016



Fig. 5: Visiting Institute of Hydrobiology, Yangtze River dolphins, on 15 March, 2016

3. Visiting Hubei Research Institute of Environmental Sciences and Institute of Rock and Soil Mechanics, China Academy of Sciences, Wuhan, China

On March 16, 2016, a meeting was held with representatives of the Hubei Research Institute of Environmental Sciences (HRAES) in Wuhan to explore possibilities for cooperation within the framework of the 13th Five-Year Plan (FYP). Hubei and the Free State of Saxony have been cooperating in economic and scientific areas for many years. The contact to the UFZ was established by the visit of the institute's President Prof. Gang ZHANG in Leipzig in December 2014 and a visit in October 2015 during the delegation trip of the Saxon state led by Minister for Environment and Agriculture Dr. Schmidt. Prof. SHEN, head of the Department of Water Resources, explained the problems of the Han River, the most important river in the province of Hubei, which flows into the Yangtze River in Wuhan. The DanJiangKou reservoir in the middle reaches of the Han River is the starting point of the South-to-North Water Division Project, which supplies additional water to Beijing and Tianjin in the north. Due to the massive water extraction from the Han River, the natural self-cleaning potential in the lower reaches of the river is getting worse. HRAES would like to intensively investigate these changes in the ecosystem services in the next FYP and to develop a master plan, in which the measures must be taken to further improve the water quality of the Han River despite deficiencies.

On 16.03.2016 Prof. Kolditz and Dr. Chen visited the Institute of Rock and Soil Mechanics of the Chinese Academy of Sciences (CAS-IRSM). Prof. LI Qi welcomed the delegation from Germany and introduced current research activities of the institute. Prof. Kolditz gave a lecture on "Writing and Publishing Scien-tific Papers" in his function as the Editor-in-Chief of ISI Journals. The cooperation between UFZ/TU Dresden and CAS-IRSM is lasting since several years in particular regarding the joint participation to the DECOVALEX international benchmarking initiative (www.decovalex.org). CAS-IRSM is also involved into the Sino-German Geothermal Research Centre.



Fig.6: Visiting Institute of Rock and Soil Mechanics, Chinese Academy of Sciences , Wuhan 16 March, 2016

4. From 16-17.03.2016 the "Deep Geothermal Resources Conference" organized by the China University of Geosciences was hold in Beijing

From 16-17.03.2016 the "Deep Geothermal Resources Conference" organized by the China University of Geosciences was hold in Beijing. During this event the "Sino-German - Geothermal Research Centre" (SG-GRC) was launched as intended after the Sino-German Symposium on "Sustainable Utilization of Geothermal Energy Resources" in October 2015. SG-GRC shall become a hub for joint geothermal research including project generation, education and networking.



Fig.7: Signing ceremony, Beijing on 17 March, 2016

5. The BMBF CLIENT project "Managing Water Resources – Urban Catchments" status meeting in Leipzig

The first statutory seminar of the BMBF CLIENT project "Managing Water Resources for Urban Catchments" took place in Leipzig on 19 April 2016, almost one year after the start of the project (Fig.6).

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The aim of the project is the development of a drinking water early warning system concept for the Chinese city of Chaohu, which draws its raw water from the lake of the same name. Chaohu lake suffers massive algae blooms each year due to pollutant inputs and this is a major problem for the city's water supply. The partners are CAWR (UFZ # TUDD) together with four SMEs (AMC, BBE, ITWH, WISUTEC) and OGS eV. In the first year of the project, the project team has already built the first models of the urban water system (TP-A) and the lake (TP-C and TP-B) and biomonitoring (TP-C) as well as a first version of the environmental information system (TP-D) with online data connections to UC monitoring systems and 3D visualization. The cooperation with the Chinese partners (CLMA, CCB in Chaohu, Tongji University in Shanghai, NIGLAS Nanjing, CAS Hydrobiology in Wuhan) has reached a new level through intensive workshops already with first joint publications and concrete plans for joint ventures. An important milestone was the "Germany tour" of the Chinese cooperation partners to all locations of the Urban Catchments team (from Dresden to Kiel).



Fig. 8: The BMBF CLIENT project "Managing Water Resources – Urban Catchments" status meeting in Leipzig, 19.April.2016

6. Article about German contributions to the Major Water Program in China: "Innovation Cluster - Major Water" was published

The article with the title as German contributions to the Major Water Program in China: "Innovation Cluster - Major Water" has been published in the international journal Environmental Earth Sciences. The journal contribution provides an overview of the three ongoing BMBF-CLIENT projects "SinoWater", "SIGN" and "Urban Catchments", which have joined the "Innovation Cluster - Major Water", to whose the spokesperson Prof. Dohmann from TU Aachen was appointed. This close-up of the collaborative projects is intended to promote the professional and strategic coordination of the German research projects. On the other hand, the joint appearance, the visibility of German water research in China, is to be increased. The "Major Water" innovation cluster is a platform for development and implementation in the cooperation in the water sector between research facilities and business enterprises. The prominent representatives of Chinese water research institutes have also contributed to the publication, which is intended to optimize the integration of the German research projects into the "Major Water Program" of the 13th Five-Year Plan of the Chinese Government.

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INTERNATIONAL VIEWPOINT AND NEWS

German contributions to the Major Water Program in China: "Innovation Cluster–Major Water"

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Fig.9: The article was published on Journal of Environmental Earth Sciences, in April, 2016

7. The visiting program in Wuhan/Nanjing/Shanghai, China from 20-27.May.2016

Mid of May a delegation of the Urban Catchment Project consisting of Dr. Dirk Jungmann and Dr. Marcus Rybicki (TU Dresden), Dr. Cui Chen and Thomas Aubron (UFZ Leipzig) and Christian Moldaenke from bbe Moldaenke realised a visit of scientific institutes in China. The aim was to deepen the cooperation with the Chinese institutes and stimulate research opportunities within the Sino-German-Cooperation. The first stop was to the Institute of Hydrobiology of the Chinese Academy of Sciences in Wuhan. The delegation visited a field station on Biandantang Lake near Wuhan and performed a workshop focusing on the application of online biomonitoring and other online-monitoring techniques for the research of the institute. It is planned to establish a water quality monitoring program for a river running through conservation area. The second stop was at the Nanjing Institute of Geology and Limnology of the Chinese Academy of Sciences. In addition to the existing cooperation in the area of lake modelling, the workshop revealed possible cooperation in the field of 1) sediment toxicity and 2) the planning of decentralized wastewater management. The third stop was to visit the Tongji-University to exchange on decentralized wastewater management projects in the Chaohu Lake region. This meeting saw the intervention of a new potential cooperation partner having ongoing projects in the Lake Chaohu region: Jiaotong University (Shanghai). Jiaotong University was thus visited to learn about their ongoing projects and exchange data. Finally, a visit of the Shenshan botanical garden (Shanghai) was organized to learn about their research on river-water treatment (nonpoint source pollution) and soil remediation in order to establish future collaboration. The next steps will be the organization of workshops with the respective institutes in Germany and the initiation of a student exchange to consolidate the scientific relationship.



Fig. 10: The Sino-German meeting in the CAS Institute of Hydrobiology, Wuhan, China on 22.05.2016



Fig. 11: The field trip to Biandantang Lake near Wuhan, China on 23.05.2016



Fig. 12: Visiting Nanjing Institute of Geography and Limnology, China on 24.05.2016



Fig. 13: Visiting Tongji University in Shanghai, China on 25.05.2016

8. Urban Catchments: Sino-German SME Partnership in Beijing on 13.06.2016

The BMBF-CLIENT project "Managing Water Resources for Urban Catchments" succeeded in building a first SME partnership. In the context of the 4. Governmental Consultations between Germany and PR China on 13.06.2016 in Beijing, AMC and WISUTEC as well as HC System and EWaters signed a Memorandum-of-Understanding for future cooperation between the German and Chinese SMEs.

Their major interest is in building a joint venture for future cooperation in developing environmental information technology (including both soft- and hardware solutions) for sensor-based monitoring of environmental systems (e.g. for water supply and waste water). The company representatives as well as from Prof. Kolditz (UFZ/TUDD) and Prof. LIAO (Tongji University) attended the 8. German Chinese Forum on Economic and Technology Cooperation hold at the same day and reported about ongoing projects in the Major-Water-Program as well as Sino-German cooperation concepts in future. The cooperation between research institution and companies – the so called "2+2 Concept" – shall foster research and development as well as implementation of novel environmental technologies.



Fig.14: Signing the MoU in Beijing on 13 June, 2016



Fig.15: Jonathan FAN (CEO HC System), Jan Richter (CEO GEOS/WISUTEC), Dr. Frank Neubert (CEO AMC) and Weijun ZHANG (GM EWaters) (from left to right) after the Signing Ceremony



Fig.16: Frank Neubert (CEO AMC), Cui CHEN (UFZ), Olaf Kolditz (UFZ/TUDD), Jonathan FAN (CEO HC System), Nicole Umlauf (BMBF Project Office Clean Water), LIAO (Tongji University), Weijun ZHANG (GM EWaters), Jan Richter (CEO GEOS/WISUTEC) during the 8. German Chinese Forum on Economic and Technology Cooperation (from left to right)

9. Urban Catchments: German Company AMC / WISUTEC visiting HC System / EWaters in Shanghai

The German companies AMC (http://www.amc-systeme.de) and WISUTEC (http://alvis.software) met in Shanghai on 04.07.2016 with the Chinese companies HC System (http: //www.haocang .com) and Ewaters (http://www.ewaters.biz) to coordinate cooperation in setting up a monitoring program for the city of Chaohu. In the successful discussions, the partners agreed on a joint, future cooperation (see above). The companies had previously signed a cooperation agreement at the 8th Forum for Economic and Technological Cooperation in Beijing on June 13, 2016 with the aim of jointly developing and implementing environmental information systems for Chinese cities. The talks took place in a very constructive atmosphere and served mainly to inform each other about their own product lines and to find interfaces for possible joint developments. Within the framework of an invitation to tender from the Asian Development Bank (ADB), the Sino-German consortium intends to apply for an environmental data center together. After the official part, there was also time for a city tour through Shanghai (see below)

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Fig. 17: The meeting in HC System in Shanghai on 04.07.2016



Fig. 18: The meeting in HC System in Shanghai on 04.07.2016 – City Tour

10. 6th Digital Earth Summit in Beijing on 07-08. July. 2016 and Visiting Chao Lake Management Authority

The Digital Earth Summit was held in Beijing from 07 - 08.07.2016, organized by the Chinese Academy of Sciences (Institute for Remote Sensing and Earth Observation). The "Virtual Environ- ment Information System - Chaohu" and the Helmholtz-CAS network "Research Center for Environmental In- formation Science" (RCEIS) were introduced as part of the session "Virtual Geographical Environments" (VGE). The embedding of environmental information systems into virtual realities is of great interest both for scientific purposes (e.g., integration of large heterogeneous data sets) as well as for decision-makers to visually support complex planning processes. In the second part of the 3rd UC trip this year, Prof. Kolditz, Prof. LIAO, Prof. KUANG and Mrs. Umlauf visited the Chaohu Lake Management Authority on 12.07.2016. On the way from Shanghai to Chaohu a stop was made in Wuxi. The Wuxi New District Construction Bureau was informed about the possibilities of environmental information systems. On the campus of the TONGJI University, the location for the urban measuring station was inspected.



Fig. 19: Visiting Chaohu Lake Management Authority on 12.07.2016

11. Project Lead "Urban Catchments" visiting Chinese companies in Shanghai

The Sino-German UC Company Consortium HC System/EWaters # AMC/WISUTEC is going to establish a sustainable Sino-German cooperation on eves level (see also recent News on 04.07.2016). On 13.07.2016, Prof. Olaf Kolditz visited both HC System and EWaters partner companies in Shanghai. HC System, with more than 100 employees, is a growing expert for developing environmental system solutions in various areas. EWaters is a highly specialized consultant for water solutions planning based on their modeling expertise. Prof. Kolditz briefly reported about the progress of the "Managing Water Resources for Urban Catchments" project in Chaohu and particularly emphasized the related

"Environmental Information System". However, comprehensive urban development includes much more than water resources and drinking water supply, i.e. domestic heating/cooling, energy supply ... (City 4.0). Virtual Information Systems (VIS) may play an essential role in this context – if professionally developed and deployed (Fig. in middle). Prof. Kolditz admired the professional working level and the "young and dynamic" Chinese teams – an excellent prerequisite for a long-term cooperation. Many things have to be sorted out carefully, of course – but there is a huge potential deserving to be leveraged. In a nutshell "We would be stupid not using this unique windows of opportunities" (HC System CEO Jonathan FAN, EWaters CEO Chen DAI, Olaf Kolditz PI Urban Catchments).



Fig. 20: Visiting HC System in Shanghai on 13.07.2016



Fig. 21: Visiting Ewaters Environmental Ltd. in Shanghai on 13.07.2016

12. Prof. Zhenliang Liao from Tongji University visiting CAWR in Dresden in August 2016

The visit of Prof. LIAO to CAWR (Center for Advance Water Research, http://www.ufz.de/cawr/) was worth it. Prof. LIAO was invited as a reviewer of the doctoral thesis of (Dr.) Jin Zhang, who has intensively dealt with pollutants in urban areas, especially by road traffic. Prof. LIAO was also a speaker at the CAWR Summer School "From Dynamics of Structure to Functions of Complex Networks", which was organized together with Purdue University and the University of Florida, and reported on the water situation in Shanghai. The opportunity was of course also used to discuss the state of both Chaohu projects "Urban Catchments" and "Key Technologies and Management Modes for the Water Environmental Rehabilitation of a Lake City from the Catchment Viewpoint". Dr. Moldaenke from bbe has informed Prof. LIAO about the new possibilities of biomonitoring.



Fig. 22: Prof. Zhenliang Liao from Tongji University visiting CAWR in Dresden

13. Sino-German Lysimeter Workshop took place in Beijing at the Beijing Normal University from 14th to 15th August 2016

The RCEIS-funded Sino-German Lysimeter Workshop took place in Beijing at the Beijing Normal University from 14th to 15th August 2016 with the aim to share research results and discuss evapotranspiration ground observations technology, such as lysimeters. The workshop was organised by Prof. Harry Vereecken (Forschungszentrum Jülich) and Prof. Shaomin Liu (Beijing Normal University) as chairman and deputy chairman as well as by Dr. Zhongli Zhu (Beijing Normal University) and Dr. Thomas Pütz (Forschungszentrum Jülich). 40 scientists, managers, students, and representatives of instrument companies with background in lysimeter research, hydrology, meteorology, ecology, and remote sensing technology from China, Austria, Germany, and the US took part in the workshop. Eight speakers from China and nine speakers from Austria, Germany, and the US presented their work.

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Fig. 23: Lysimeter workshop at Beijing Normal University 14th to 15th August 2016

14. EU project SUSTAIN HO2 final workshop in Beijing

On August 16-18, 2016, the Final Conference of EU ESP Project on "Demonstration of Pollution Discharge Management for Water Quality Improvement in Songhuajiang-Liaohe River Basin" (SUSTAIN H2O, DCI-ASIE/2013/323-261) was successfully held in Shenyang, Liaoning Province, China.

The meeting was organized by Chinese Research Academy of Environmental Sciences (CRAES), and co-organized by Liaoning Academy of Environmental Sciences (LAES). Prof. SONG Yonghui, the vice president of CRAES, as well as representatives from government of Liaoning Province attended the meeting and addressed their opening speeches.

During the meeting, representatives from all the Work Packages gave the project progress report, along with the presentations from project partners UFZ, Germany and CEH, UK. Additionally each working packages presented scientific posters highlighting the main results of their work. Then the work package members exchange their ideas towards future work and collaboration required for dealing with further environmental challenges in North-East China. A Field study was also conducted after the meeting to the Lianhuahu Wetland Park and Tieling City to learn more about the treatment of urban sewage water in constructed wetlands.

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Fig. 24: The Final Conference of EU ESP Project 16th to 18th August 2016, Shenyang

15. The Helmholtz Delegation led by President Prof. Wiestler in Qingdao, Beijing and Shanghai

From 15-22.Oct.2016

On 16.10.2016, the Helmholtz delegation visited the Qingdao Ocean Science and Technology National Laboratory, as well as their high-performance scientific computing and system simulation platform across the sea. In the afternoon, the Helmholtz delegation entered the Jimu campus of Shangdong University. University President Zhang and Qingdao's mayor Wang welcomed the German guests. The two parties participated in the opening ceremony for "Sino-German College" and "Shandong University-Helmholtz Institute for Biotechnology (SHIB)".

On 17.10.2016, in the morning, the delegation visited the Qingdao Institute for Bioenergy and Bioprocess Technology (Chinese Academy of Sciences), which was founded in 2006. Based on the past collaboration, a Helmholtz – China Ocean University International Research School was suggested by Prof. Wiestler. The Helmholtz Center for Ocean Research Kiel (GEOMAR), Helmholtz Centre for Environmental Research (UFZ), Helmholtz Center for Polar and Marine Research (AWI) and Helmholtz Center Geesthacht Center for Material and Coastal Research (HZG) will take part in this project.

On 19.10.2016, the visit of Helmholtz President Prof. Wiestler with 8 delegates in the Cancer Centre of the Chinese Academy of Medical Sciences was on the subject of "Medicine and Health". They dis-

cussed with President He Jie. In the afternoon, they visited the Institute of Neurosurgery at the Tiantan Hospital and the Glioma Research Team led by Vice President Jiang tao. Another delegation with Prof. Marquardt, the Helmholtz vice president and chairman of the Jülich Research Center, attended the Institute of Physics (Chinese Academy of Sciences) and the National Center for Nanotechnology.

On 20.10.2016, the Helmholtz Delegation visited the Shanghai Institute of Microsystems and Information Technology (Chinese Academy of Sciences). With the help of Prof. Zhang Yi, the Institute for Microsystems and Information Technology has been cooperating with Forschungszentrum Jülich since 2006.

On 21.10.2016, in the morning, the Helmholtz Delegation visited the Shanghai Proton and Schwerinenzentrum (SPHIC), financed by the Shanghai government. Schwerionen-Strahlentherapie was researched 25 years ago by the physicists of the GSI Helmholtz Center for Heavy Ion Research and the German Cancer Research Center and is gradually used in clinical treatment. Thereafter, the delegation attended the Shanghai Synchrotron Radiation Facility, which belongs to the Shanghai Institute of Applied Physics. The director Zhao Zhengdong introduced the institute. He then discussed with the German guests on various topics. In the afternoon, President Jiang Mianheng from ShanghaiTech University met with the Helmholtz Delegation.



Fig. 25: Helmholtz Delegation in China

16. Helmholtz Association – Chinese Academy of Sciences: "Strategic Partner-ship – Moving Ahead Together" Scientific Symposium in Beijing

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On 18.Oct.2016, the Helmholtz Association - Chinese Academy of Sciences: "Strategic Partnership -Moving Ahead Together" Scientific Symposium took place in the institute of high energy physics (IHEP) of the Chinese Academy of Sciences (CAS) in Beijing. After the opening greetings from Prof. Otmar D.Wiestler, the president of Helmholtz association and Prof. Tieniu Tan, the vice-president of Chinese Academy of Sciences, both sides have given presentations about the past, ongoing projects and future strategies. The first part of the symposium is about the insight into the past and perspectives for the future. The vice-president of Helmholtz Association, Prof. Wolfgang Marquardt from Jülich Research Centre (FZJ) has presented their institute and its-cooperation with the institutes of CAS. Dr. Christian Haringa from German Electron Synchrotron (DESY) has talked about DESY's cooperation with Chinese partners. Prof. Long Wei from the CAS institute of high energy physics talked about its cooperation with the Helmholtz association. For the second part of the symposium about Helmholtz-CAS joint research groups (HCJRG), Prof. Thomas Stöhlker from Helmholtz Centre for Heavy Ion Research (GSI) presented the experiments with stored highly-charged ions and Prof. Yu Wang from CAS Institute presented the new technology about the space-borne microwave remote sensing for natural hazard prevention and analysis. The last part of the symposium is about the strategic approach toward the future. Bilateral cooperation in the field of health and life sciences, and brain sciences are given by Prof. Dirk Heinz from the Helmholtz Centre for Infection Research (HZI) and Prof. Simon Eickhoff from FZJ, respectively, together with their Chinese partners. Prof. Olaf Kolditz from Helmholtz Centre for Environmental Research (UFZ) has presented the joint Sino-German Research Centre for Environmental Information Sciences (RCEIS) and its cooperation projects in China. Prof. Tao Pei from State Key Laboratory of Resources and Environmental information system talked about his research on the city environment. Prof. Karl-Friedrich Ziegahn from Karlsruhe Institute of Technology (KIT) presented the research on energy storage and material technology.

During the lunch break, the president of CAS, Prof. Chunli Bai joined the discussion and exchanged with the Helmholtz delegation. The two sides together identified the areas of strategic partnerships. They decided to share the information at various levels, as well as the discussions between vice-presidents of all sectors and between outstanding scientists. Prof. Wiestler made a proposal to establish a joint international research school for the Talent Training Plan and the Doctoral Research as well as the coordinating institutes.

Prof. Wiestler summarized the results of the bilateral Strategic Symposium. In addition, he proposed that China and Germany should open bilateral research programs in the following fields, such as geoand environmental sciences, brain research, health and life sciences, energy materials and energy storage technology so that the outstanding scientists can exchange ideas in order to achieve the winwin-based future-oriented strategic cooperation and the cooperation model should be guaranteed by joint research institutes.



Fig. 26: Helmholtz-CAS Symposium took place on 18.10.2016 in Beijing

17. Visiting of the Delegation of the Helmholtz Association to the Tongji University on 21.Oct.2016

On 21. October.2016, the delegation of the Helmholtz Association visited the Tongji University, in Shanghai. The president from Tongji University Prof. Zhihua Zhang gave the welcome speech and introduced the University. In the first session about "Information and data science", the president of Helmholtz association, Prof. Otmar D. Wiestler introduced the Helmholtz strategy on information & data science. The vice-president of Tongji University, Prof. Zhiqiang Wu gave a talk about the innovation strategy of the university. Several talks in the area of smart manufacturing and industry 4.0 were given by the Chinese colleagues from Tongji University. Afterwards, the potential cooperation between Helmholtz association and Tongji University were discussed. Prof. Olaf Kolditz from Helmholtz Centre for Environmental Research (UFZ) showed a video about the visualization of the environmental information system in Chao Lake, which is their current China-German cooperation project in China, funded by German ministry of Eduation and Research (BMBF). On the second session about "Clean water program", Prof. Xiaohu Dai, the Dean of College of Environmental Science and Engineering from Tongji University presented the Sino-German cooperation in Water Science, Technology and Education. Mrs. Nicole Umlauf, head of BMBF-Project "Clean Water" Office Shanghai, gave the talk about the BMBF water projects in China. Prof. Olaf Kolditz and Prof. Zhenliang Liao from Tongji University gave a joint presentation about the BMBF CLIENT project "Managing Water Resources for

Urban Catchments - Chaohu", and the industry partner from this project, the general manager of HC System from Shanghai, Mr. Yuefeng Fan introduced the Sino-German Company Consortium: The need of Environmental Information Systems for Stakeholders Water 4.0. In the end, Prof. Wiestler and Prof. Zhiqiang Wu summarized the workshop. They emphasized the need to strengthen cooperation in the fields of water science, information technology and industry.

18. The second Sino-German Workshop of the Institutes of Hydrobiology (IHB) in Wuhan (China) and Dresden (Germany) took place in the Institute of Hydrobiology in Dresden from 17-19.Oct.2016

From IHB Wuhan Professor Dr. WANG Hongzhu, head of the Department of Freshwater Ecology, and Associate Professor Dr. WANG Haijun attended to the three-day workshop. After a short introduction of the IHB Dresden by Professor Thomas U. Berendonk and three additional talks of institute staff, Professor WANG Hongzhu talked about the current state of freshwater assessment in China using organisms (bioindicators) and current problems of aquatic ecosystems in China. Subsequently, Associate Professor WANG Haijun explained the mesocosm facility of the Institute on the Biandantong lake near Wuhan and the ongoing experiments, which focus on the effects of heavy nitrate pollution. The first day of the workshop was finalized by a visit of the biomonitoring field station of the IHB Dresden in the waste water treatment plant in Kreischa near Dresden. Dr. Marcus Rybicki explained the functioning of the station and the successful implementation and usage of the DaphniaToximeter from bbe Moldaenke. The second day of the workshop focused in two sessions on the enhancements and adjustment of the project ideas for the joint DFG-NSFC Call in 2017 and the second phase of the Urban Catchments Project. Professor Thomas Berendonk and Dr. Dirk Jungmann introduced the current project ideas and headed the following discussion. Dr. Bertram Boehrer from UFZ Magdeburg attended the session about the second Urban Catchments phase to complete the scientific partners of project part C. The workshop was finalized in the morning of the third day with the signature of a Memorandum of Understanding of both Institutes. A visit of our industry partners Dr. Frank Neubert (AMC) and Dr. Matthias Haase (WISUTEC) in Chemnitz accomplished this fruitful and discussion rich workshop.



Fig. 27: The second workshop at Technische Universität Dresden (TUD), Germany from 17-19.Oct.2016



Fig. 28: Dr.Marcus Rybicki (TUD) explained their research project to Chinese partners from Wuhan on 18.Oct.2016

19. The third Workshop and Research visiting program of DFG-NSFC Project: A Cooperation Group about "A modeling platform prototype for environmental system dynamics" in Tianjin, China from 23-27.Oct.2016

From 23-27.Oct.2016, the third Workshop and Research visiting program of DFG-NSFC Project: A Cooperation Group about "A modeling platform prototype for environmental system dynamics" took place in Tianjin, China. More than 30 participants from both Germany and China have attended the workshop. From the German side, UFZ, TU Dresden, Hochschule Weihenstephan and DLR are involved. From Chinese side, CAS, NIGLAS, Beijing Normal University, MRLDO-Office of the Mountain-River-Lake Development Committee of Jiangxi province, Jiangxi Normal University, Tsinghua University are involved. The workshop has been divided into two parts: the first part is the field trip and the second part is the symposium on the joint research topics. Four sessions are: Water resources, land cover and use, ecosystems and modeling platform prototype. Both sides have intensively discussed about the joint research proposals which would be submitted to DFG and NSFC in April 2017. The topics were identified and the Sino-German team for each proposal has been established.



Fig. 29: Participants of the 3rd Workshop of the Sino-German Cooperation Group in Tianjin (23-27.10.2016).

The Sino-German Cooperation Group is funded by the German Research Foundation (DFG) and National Science Foundations of China (NSFC). The funding under grant GZ 1167 workshop is greatly acknowledged. This project started officially from July 01, 2015 and will last for three years. The project coordinator is UFZ from German side and CAS-IGSNRR from Chinese side.

20. Saxony delegation and entrepreneurs travel in China, under the guidance of Minister of State Martin Dulig (The Saxon State Minister for Economic Affairs , Labour and Transport)

From 31.10-05.11.2016, Saxony delegation and entrepreneurs travelled in China with the guidance of Minister of State Martin Dulig. The delegation visited several cities in Hubei province. Hubei is the official partner state with Saxon and is one of the most important economic partners in China. The major purpose of the trip is to investigate the possible market for the automobile, mechanical engineering and equipment in Hubei.



Fig. 30: Saxony delegation visited XENON Company in Suzhou on 04.11.2016

21. Sino-German Major Water Programme Conference, Shanghai

The Sino- German Major Water Programme Conference took place in Shanghai on 9th December, 2016. The Conference was to ensure the implementation of technical cooperation projects and promote the greater achievements of the Sino-German cooperation.

As Chinese representatives, Dr. Chen Chuanghong, the Director General from Office of Major S&T Projects Most, and Mr Liu Zhiquan, the General Inspector and Deputy Director General from the Department of S&T and Standards, MEP gave opening talks. As German representative, MinDirig Wilfried Kraus, the BMBF Deputy Director General gave an opening speech. During the conference, Prof. MENG Wei, who is an Academician and the technical team leader of Major Water Projects, talked about the progress of Major Water Program and Suggestions for Sino-German Cooperation. Dr. Christian Alecke from BMBF Division Resources and Sustainability introduced BMBF CLIENT Programme. In addition to that, the topics about Major Water Program in 13th -5-year plan such as the german prospects for future cooperation in Beijing-Tianjin-Hebei region and Tai lake Basin and system design for eutrophication control of Taihu Lake were also discussed.

In the afternoon Session, proposal for Major water projects of 13th Five-Year Plan based on existing projects and similar experiences were discussed. Prof. Dai Xiaohu from Tongji University talked about the progress of the Sino-German Major Water Programme. Prof. Kolditz from UFZ, together with Prof. Liao Zhenliang from Tongji University, gave presentations about recommendations for Monitoring, modeling, early warning programs and information systems. Prof. Andreas Tiehm together from German Water Centre, together with Chinese partner, introduced the recommendations for drinking water safety, treatment and distribution.

This conference was organized by the Ministry of Science and Technology of PRC, Ministry of Environmental Protection, Ministry of Housing and Urban-Rural Development and the German Federal Ministry of Education and Research.

The German partners have also visited the Chinese company HC System in Shanghai and discussed about the future activities on 10, Dec 2016.



Fig. 31: Sino-German Major Water Programme Conference, Shanghai on 09.Dec.2016



Fig. 32: The German partners have also visited the Chinese company HC System in Shanghai on 10.Dec.2016.

22. Proposal for BMBF project "Forschungspräsenz für Umweltforschung in China" was submitted on 20.12.2016

The proposal for the BMBF project **"Forschungspräsenz für Umweltforschung in China" was submitted in Dec, 2016.** The rapid economic development and population growth in the People's Republic of China is accompanied by increasing urbanization, growing megacities, industrialization and an intensification of agriculture. As a result, many natural resources are increasingly under pressure. The solution to the environmental problems in China will mainly depend on integrated, targeted strategies for the sustainable management of all natural resources. The basic objective of the research project "Environmental Research in China" is to support the activities of both research facilities and interested SMEs in China environmental research and environmental technology in China. In order to achieve this goal, a corresponding research structure is being developed which will build on several existing networks and will be able to bundle these activities synergistically in the future. In this context, a new organizational infrastructure is necessary in order to secure the further development of long-term cooperation with engagement in China and cooperation with Chinese research institutes. This is coordinated by the German side based on a structure to be founded in China. These objectives are being implemented in cooperation with Chinese universities, research facilities and German and Chinese companies.

The planned research project "Environmental Research in China" is primarily intended as a supporting institution for the development and realization of innovative research ideas by German and Chinese institutions. A successful solution to complex environmental problems requires the development of system solutions based on interdisciplinary environmental research in close cooperation with stakeholders and companies for the implementation of technology. This new way of working is to be demonstrated as an example in two thematic approaches, urban and natural laboratories, as well as linked to one another through a methodological concept, environmental information systems. The project aims are to be designed and implemented through "one-to-one" ("1 + 1") partnerships.

23. The first version of the document about UFZ#CAWR ChinaConcept was completed in Dec, 2016

China is a very important strategic partner to Germany, not only in the economic market, but also in the research areas. The reasons for this ChinaConcept are:

- the BMBF continues to regard China as an important cooperation partner and welcomes support in the implementation of its China strategy adopted a year ago, and

- the Helmholtz President, Prof. Dr. Wiestler, in his China travel in October 2016, has determined the relevance of China to the Helmholtz Association and is very interested in the connection of Helmholtz activities with excellent Chinese partners.

- CAWR#China Concept: The joint "Centre for Advanced Water Research" (CAWR) of UFZ and TU Dresden focusses on strategic cooperation in the field of water research, education and training as well as transfer of research with the overall mission "safe water for humans and environment".
- UFZ#China Concept: This strategy covers a broader spectrum of interdisciplinary environmental sciences highly relevant for tackling environmental challenges in China. While the topic water is thoroughly covered by the CAWR#China Concept, it considers issues such as land use in a bio-based economy vs. protection of biodiversity as well as maintaining ecosystems services or risks posed by chemicals in the environment.

Both strategic efforts together form an excellent basis and roadmap for future cooperation in environmental research described in the following document.

Purpose of this document is to:

- Describe the current situation as well as challenges and re- search demands for future cooperation
- Present selected highlights of existing cooperation projects
- Define topics and a research agenda for future collaboration
- Provide comprehensive (statistical) information on previous activities and existing cooperation (Appendices).

The first version of the document about UFZ#CAWR ChinaConcept was completed in Dec, 2016. The present document serves also as a "handbook for collaboration" and will be updated on an annual basis.

24. BMBF project "Urban Catchments" Magdeburger –Bouy travelled to China on 14.Feb.2017

The Chaohu buoy was sent to China on 14.Feb.2017 and has now arrived in Nanjing. The shipments were carried out in disassembled form by airplane (in several crates) and will now be reconciled with the cooperation partner NIGLAS. The UFZ team drives to Nanjing and Chaohu in early March to place the buoy in the Chao Lake. There is also press release in the Magdeburger Volksstimme

(http://www.volksstimme.de/deutschland-welt/wirtschaft/technik-export-magdeburger-boje-reistnach-china). The buoy is an important element of the "Chaohu Environmental Information System".

25. Proposal for BMBF project "RIVERCHALLENGE- Challenges in river management: The Yangtze from the source to the sea" was submitted on 15.02.2017

Proposal for BMBF project: Directive on the promotion of innovation Concepts for the expansion of China's competence at German universities with the title as "RIVERCHALLENGE- Challenges in river management: The Yangtze from the source to the ocean" was submitted by TU Dresden (CAWR).

The aim of the project is to strengthen the co-operation of the Center for Advanced Water Research (CAWR) with its Chinese partners in teaching and research as well as the sustained strengthening of the Chinese competence of students and academics of the CAWR. A "subject-oriented education and training as well as research" is to be established on the basis of scientific questions on water quality risks along a river catchment area - WATERRISK. The Yangzte River is to be used as a challenging pilot project, in which exemplary problems concerning the risks of water quality changes "from the source to the ocean" can be studied and analyzed. Based on WATERRISK, a study module, which will be integrated into the international master's program "Water Science and Engineering" at the TU Dresden, and a lecture series for students in various master and doctoral programs will be developed and implemented.

Projects

Until now, the RCEIS has strongly supported the projects application and ongoing projects in the three sponsors: European Union, BMBF and DFG. Furthermore, RCEIS is trying to get more chances for the joint cooperation with China in the area of environmental information sciences, water sciences and geothermal energy.

1. EU EuropeAid Project SUSTAIN H2O

EU-China Environmental Sustainability Programme

Demonstration of Pullution Discharge Management for Water Quality Improvement in the Songhuajiang-Liaohe River Basin (SUSTAIN H2O)

This is an EU funded cooperation project with China Research Academy of Environmental Sciences. RCEIS has supported strongly for the project management and the developing process of this project. The major aim is to develop and demonstrate management tools and practices for pollution reduction and water quality improvement in the Songhuajiang-Liaohe River Basin (SLRB) to achieve the water pollution control designated in the "12th Five-Year Plan" of China.

SUSTAIN H2O will initiate a range of research activities and generate new resources including the development of risk source identification and assessment methods, water source pollution prevention and risk reduction strategies and decision making and management guidelines.

UFZ will review the legislation, methodologies and techniques about water risk assessment and sensitive water body management and will develop a groundwater contamination model for the demonstration areas in SLRB.

This project has started in September 2013 and will end up in August 2016. Erik Nixdorf, as PhD student, is now working on this project and trying to find out the scientific solutions. He would also give courses in China for the environmental modeling software OpenGeoSys which is used as simulation platform in this project. The first study tour about this project has been successfully taken place in Germany in November 2014. The Chinese cooperation partners are: Chinese Research Academy of Environmental Sciences (CRAES), Haerbin Research Academy of Environmental Sciences (HRAES) and Liaoning Research Academy of Environmental Sciences (LRAES).

2. BMBF Project "Managing Water Resources for Urban Catchments"

The overall goal of the project Urban Catchments is the development of sanitary and environmental engineering system solutions for sustained water quality improvement in Chaohu City. It will involve an innovative approach: urban water resources management (UWRM) that provides for efficient sanitary systems in urban and rural areas as well as for the needs of natural aquatic ecosystems. Chao Lake plays a central role as the ecological and economic resource and drinking water source for Chaohu City to be protected for future generations. This project contributes greatly to the sustainable development of the Chaohu region and to Anhui provincial government's master plan "Ecological Lake – Chaohu City".



Fig. 33 Urban Catchments' environmental information system (EIS) for early warning of drinking water supply in Chaohu. It shows elements of Chao Lake (upper right), the Urban Observatory (lower right), biomonitor (lower left) and the data station (upper left) for technical data integration. The EIS is embedded in a virtual reality environment to provide a realistic geographic context. EIS implementation is independent on specific site conditions and therefore easily transferable to other regions. Data integration conducted by K. Rink using OpenGeoSysDataExplorer (UFZ)

The methodology to achieve the project goal deploys the UWRM concept — holistically viewing the urban water network and all levels of the aquatic system according to the principle of emissions (source of pollution) / immissions (contamination). Urban water management involves comprehensive look at all urban resources: the lake as a source of drinking water and asset worthy of protection, restoration of the urban waters network, storm water management, and wastewater treatment. Due to rapid development rates in the demonstration region, suburban and rural areas and the effects of agriculture (non-point pollution sources) will be fully considered. The UWRM concept is based on a regional implementation strategy with flexible decentralized cluster solutions for wastewater treatment. An important basis for successful implementation of the UWRM concept is the establishment of extensive monitoring platforms (urban and lake observatories) for the sources of water pollution as well as the recipient, Chao Lake. The observatories serve as an early warning system for operational water management (drinking water). Long-term monitoring also enables reliable assessment of measures and any observations of emerging pollutants, such as micropollutants. An Environmental Information System (EIS) will make data available for the UWRM concept, including necessary data infrastructures, interoperable simulation tools, and Web services (Fig. 5). Details of the EIS data workflow are depicted in Fig. 7. The combination of monitoring and modeling platforms in EIS firstly allows for the identification of contaminant sources and paths in the entire catchment, and secondly, is an important tool for the operational water management and long-term water quality prognoses. The modeling platforms examine all levels of the coupled hydrologic system, including soils, groundwater, and surface waters (Beinhorn et al. 2005, Beyer et al. 2006, Centler et al. 2010, Kalbacher et al. 2012, Rink et al. 2012, Rinke et al. 2013).

The implementation concept will be developed in close cooperation with regional stakeholders, public utilities, and development banks (e.g. Asian Development Bank). Demonstration projects involving five German companies play an important role in the cooperation between business and science and the real-world applicability of the outcomes.

The overall project goals, the methodology, and the implementation concept have led to the following project structure for the R&D project "Urban Catchments", regionally divided into 4 sub-projects: (A) the urban, (B) the suburban/rural areas, (C) Chao Lake and (D) the EIS acting as an integrating element of the project (Fig. 6).



Fig. 34 Urban Catchments' concept and project structure, which includes methodical elements as well as regional elements: A Urban water management; B Decentralized wastewater management; C Chao Lake, the central asset; and D the lake observatory environmental information system

Definition of the project study area: In response to current programs in the municipality Chaohu, representatives from the leading research institution, Tongji University, recommended that Chao City and the eastern side of the lake become the focus of the project's model region. Due to rapid urbanization there, suburban and rural areas will be included for expandable decentralized wastewater techniques and for closing the water mass balances of Chao Lake to model the entire catchment area. Efficient management of water resources calls for a monitoring network and modeling tools to plan and construct appropriate measures.



Fig. 35: Data workflow of the Environmental Information System including monitoring (AMC data station), data integration (WISUTEC AL.VIS), modeling (Rinke et al. 2013) as well as visualization elements (Bilke et al. 2014)

In addition to technological and solution-oriented subprojects of the larger R&D project, dealing with the cross-cutting issue of capacity development (CD) shall be pursued. The most important aspects in CD are found in all subprojects in the areas of plant planning, operation, and maintenance; quality assurance; and certification, data management, and software training in the use of the environmental information system (monitoring and modeling).

The following German cooperation partners are engaged in the Urban Catchments pilot project in Chaohu. (Updated information can be found on the project website: www.ufz.de/urbancatchments.)

- Helmholtz Centre for Environmental Research UFZ
- Technische Universität Dresden (Technical University of Dresden)
- AMC Analytik und Messtechnik GmbH, Chemnitz
- bbe Moldaenke, Kiel
- Institut für technisch-wissenschaftliche Hydrologie GmbH (itwh), Hanover
- OpenGeoSys e.V., Leipzig-Kiel
- WISUTEC Umwelttechnik GmbH, Chemnitz

Our Chinese cooperation partners are:

- Chaohu Lake Management Authority (CLMA)
- Chaohu City
- Tongji University, Shanghai
- Chinese Research Academy of Environmental Sciences (CRAES)
- Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences (NIGLAS)
- Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan

3. NSFC-DFG Project: Cooperation Group

National Science Foundation of China – Deutsche Forschungsgemeinschaft (NSFC-DFG) Project

Cooperation group about "A modeling platform prototype for environmental system dynamics"

As the first outcome of this Sino-German Symposium on Sustainable Water Management and Ecosystem Restorations in Poyang Lake Basin, a joint proposal about "A modeling platform prototype for environmental system dynamics" for an international cooperation project from Sino-German Centre for Science Promotion has been submitted in January 2015. The general goal for this initiative is to build a Sino-German research network by leading Chinese scientists with their research groups and German experts in the field of environmental informatics, hydrology, climatology and remote sensing (satellite born earth observation). This initiative will form the basis for intensive exchange of research methods and knowledge, and is intended to the development of bilateral research project proposals e.g. to the Ministry of Science and Technology of the People's Republic of China (MOST), National Natural Science Foundation of China (NSFC), German Research Foundation (DFG), German Federal Ministry for Education and Research (BMBF) and/or European Commission (EC). The Poyang Lake (PL) is an appropriate and prominent investigation area, well suited for the interdisciplinary eco-

hydrology research concept. The Poyang Lake wetland is of international importance. More than 300,000 waterfowls migrate from Siberia to the wetland as a winter staging ground. The biodiversity value of Poyang Lake is noteworthy, particularly because of the sizable human population present within its system. Therefore, in the middle term, the hereby suggested research activities will concern the water and ecosystem management aspects and in the long term, the impact of climate change on the eco-and hydrosystems evolution will be studied.

The total participants from both sides are divided into four cooperation groups and the general objective will be approached by conducting the following four model-oriented objectives:

- 1) Models for simulating water resources changes
- 2) Models for detecting land-cover changes
- 3) Models for modeling ecosystem-change driving forces

4) A modelling platform prototype: to integrate the models for water-resource change, landcover change and driving forces of the changes, to simulate the interactive mechanisms taking Poyang Lake Basin as an example, and to realize dynamic visualization of the land-cover and waterresource change as well as their interactions.

This initiative is coordinated by Prof. Dr.-Ing. Olaf Kolditz, Helmholtz-Centre for Environmental Research and Technische Universität Dresden, Germany, and Prof. Dr. Tian-Xiang Yue, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, China, who are the acting directors of RCEIS.

Helmholtz RCEIS Partner Activities

1. Karlsruhe Institute of Technology (KIT)

Project coordinator: Prof. Harald Kunstmann

Jianhui Wei, a Chinese scholar, did his PhD study at KIT/IMK-IFU and has successfully finished the defense of his doctoral thesis in April 2016 at University of Augsburg. Under the supervision of Prof. Dr. Harald Kunstmann and Dr. Hans-Richard Knoche, both from KIT/IMK-IFU, Jianhui Wei developed an age-weighted regional evaporation tagging approach to investigate the information on the time-scales for the atmospheric branch of the hydrological cycle, i.e. atmospheric water residence times. This novel approach has been applied to a case study for the Poyang Lake region in Southeast China, the largest freshwater lake in the country. The key result of their recently published study is that for the whole year 2005 the annual-aggregated, area -averaged atmospheric residence time (10 hours) of transpired water from the Poyang Lake region until falling out as precipitation in Southeast China is longer than that (6.6 hours) of directly evaporated water from the same region (Figure xx). The result reveals different fate of transpired/directly evaporated water from the Poyang Lake region. This newly developed approach has the potential to be used for addressing how atmospheric water residence times change regionally under global warming and land-use/land-cover change, which is

particularly relevant for a better understanding of environmental system dynamics in the Poyang Lake basin.



Fig. 36: (Left) Annual mean atmospheric residence times (in hours) of transpired water from the Poyang Lake region (the area lies within the black rectangle) until falling out as precipitation in Southeast China for the whole year 2005. (Right) The same as the left Figure but for directly evaporated water.

Dr. Dominikus Heinzeller is a senior scientist at KIT/IMK-IFU specialising on atmospheric modelling in both contexts numerical weather prediction and climate research. Besides standard modelling approaches used widely in the communities, he is working intensively with the new Model for Prediction Across Scales (MPAS). This model is mainly developed by the National Centre for Atmospheric Research (NCAR) and the Los Alamos National Laboratory (LANL) in the US. Based on an unstructured Voronoi mesh, it allows global meshes with arbitrary regions if refinement in areas of interest and smooth transitions between them. Our work with MPAS previously concentrated on the African monsoon regions and shows that such an approach leads to an improved model accuracy because of the smaller distortion of large-scale flows and the awareness of teleconnection features. It can therefore be expected that other monsoon regions in the world, as for example the Asian monsoon regions including China, will also benefit from this novel approach. The purpose of Dr. Heinzeller's business trip to the AGU 2016 was to present our work and future research plans for a joint modelling of the monsoon regions and to establish contacts with researchers in and on the Asian monsoon regions. Dr. Heinzeller also presented and discussed work on the influence of anthropogenic aerosols on local and regional weather and climate, a research field he has recently worked on, with PhD students and postdocs from China and surrounding countries. This work raised a high level of interest due to the latent problems with air pollution in Asian megacities.

2. German Aerospace Centre (DLR)

Project coordinator: Dr. Claudia Künzer, Juliane Hutz

2.1 National Climate Centre (NCC) and National Centre on Climate Change (NCCC) - Prof. Jiang Tong with researchers group – Visit at DLR Oberpfaffenhofen – June 16, 2016

On June 16, 2016 a group of scientists from National Climate Centre (NCC) and National Centre on Climate Change (NCCC) China led by Prof. Jiang Tong visited the Earth Observation Center (EOC) of the German Aerospace Center (DLR). About 10 researchers presented current research work and previous scientific results on observations of climate change effects in China. After presentation of EOC research and introduction of also RCEIS cooperation achievements with China a fruitful discussion brought up some ideas of future cooperation in the field of research on climate change effects and adaptation.

2.2 Finalization of DELIGHT Project under BMBF-CLIENT I and Closure Meeting on June 29, 2016

Besides answering pressing research questions on environmental and hydrodynamic change processes in the Yellow River Delta an Environmental Information System was developed at DLR for the Yellow River Delta to support local planning institutions in Dongyings local government. Furthermore, a strong capacity development component represented an important part of the DELIGHT project for comprehensive training of the stakeholder institutions in China. In 2015 the DELIGHT environmental information system was first installed for testing and demonstration purpose in the project region in China on strong and fail-safe technical server infrastructure. In 2016 an extensive software update was provided and installed Dongying. The 5th and final information system training courses was held in the stakeholder institution from 11th to 15th of April 2016 as a follow-up to the four training courses in 2013, 2014, and 2015. The main stakeholder and main user of the system is the Yellow River Delta Sustainable Development Institute of Shandong Province in Dongying City. Main goals of the training were to train and qualify data managers to use the Yellow River Delta Information System and to integrate own geospatial data sets in the system and use it in their daily routines. Furthermore, system maintenance was trained to qualify technical staff in independent error handling.



Fig. 37: 5th and final DELIGHT User and Maintenance Training Course for the Yellow River Delta Environmental Information System.

Last project activities in the DELIGHT project in 2016 (funded by BMBF-CLIENT-I program since 2013) included the Hand Over Workshop at the Institute for Sustainable Development of the Yellow River Delta of Shandong Province that was organized by DLR together with the Chinese project partner Institute of Geographic Sciences and Natural Resource Research (IGSNRR under CAS) on April 12, 2016 in Dongying City. Beside the Director of the main stakeholder institution further stakeholders from the Yellow River Delta Nature Reserve and the Bureau of Land and Resources took part in the Hand Over Ceremony and Workshop (Group picture provided in last report). The DELIGHT Information System contains all scientific project results from 3 years of joint research between Germany and China in the fields of e.g. hydrodynamic and water quality analyses of the Yellow River Estuary, detailed quantification of the urbanization in Dongying city and district, a prognosis of its future development, the analyses of coastal dynamics and land use changes over the last two decades with respect to food supply for this fast developing river delta region as well as to environmental impacts such as salinization of soils etc. Furthermore, the information system provides access to map material related to natural resources of the wetlands, and impacts of industrial development.

The DELIGHT project will share its experience and gained expertise with RCEIS, the Sino-German Centre for Environmental Information Science.



Fig. 38: View of the main Map Component of the DELIGHT Yellow River Delta Environmental Information System.

On June 29, 2016 the final meeting of the Sino-German research project DELIGHT was held in Oberpfaffenhofen at the German Aerospace Center (DLR). Guests from the Chinese stakeholder institution from Dongying – the Institute of Sustainable Development of the Yellow River Delta in Shandong Province under Dongying Municipality – participated in this official project closure meeting. Finally,

this meeting brought together the German project consortium for an exchange of overall results and project outcomes. The Yellow River Delta information system was presented in its final version and online to all participants. The final stakeholder discussion revealed the importance of the scientific project results for the Yellow River Delta region, and especially its usefulness for the stakeholder institutions in China. In his final statement the representative of the stakeholder institution summarized over 3 years of close cooperation, its relevance for the region, and fruitfulness of scientific exchange and training measures.



Fig. 39: Group picture of the DELIGHT Project Closure Meeting at DLR Oberpfaffenhofen, June 29, 2016

After about 9 months since official system hand over the Yellow River Delta environmental information system developed at DLR and installed at the stakeholder institution in China the system is up and running online – reported by an independent source (article published in German newspaper Sueddeutsche Zeitung on January 9th, 2017).

2.3 Virtual RCEIS Meeting – with Telecon on December 6, 2016

To furthermore discuss the development of a future RCEIS2.0 approach and possible new concepts a telephone conference was held on December 6th 2016. DLR participated together with KIT and UFZ to come up with strategic ideas and discuss cooperation opportunities for 2017 and beyond.

2.4 Research conducted at DLR that relates to RCEIS activities

In China the two Yangtze floodplain lakes Poyang and Dongting are complementary in terms of ecosystem composition and functions, etc. Furthermore, both lakes face similar threads from anthropogenic induced development upstream and within the project region itself. DLR will contribute gained experience and information on Dongting Lake related research and support future projects at Poyang Lake such as planned for a Sino-German Cooperation Group project mentioned above.

DLR previously conducted further analyses and satellite data processing to reveal inundation dynamics on Poyang and Dongting Lakes based on a daily-resolved intra-annual time series of MODIS satellite data from 2014 – results for 2013 were presented in RCEIS report of 2015.

New analyses were conducted due to availability of new, innovative Sentinel-1A satellite data. The Copernicus Programme of the European Union is providing the Sentinel-1 datasets (also Sentinel-2 and Sentinel-3) via a scientific data hub - https://scihub.copernicus.eu – free of charge. In Figure X first results of data analyses using Sentinel-1A data for the Poyang Lake are displayed – data have been available for selected regions on Earth since October 2014. A semi-automated approach (WaMaPro – Water Mask Processor; Kuenzer et al. 2013) based on empiric threshold derivation from the 15 available Sentinel-1A SAR images was used to derive surface water extent and coverage. Details of generated inundation frequency maps of Poyang Lake – see box A, B, C – reveal a highly dynamic lake environment, as occurs in the Nature Reserve area (detail A). Dark blue color displays areas where water was detected in all 15 analyzed satellite scenes – such as permanent water bodies and main lake body. Whereas, reddish to yellow colors in the maps reveal locations of temporal water coverage, such as dynamically changing wetlands or flood prone areas. For comparison the boxes on the right (see Fig. X) provide a mono-temporal Google Earth view on the same spots.



Fig. 40: Inundation pattern of Poyang Lake 2014 derived from Sentinel-1A data

3. Forschungszentrum Jülich (FZJ)

Project coordinator: Prof. Harry Vereecken by Carsten Montzka and Harry Vereecken

General

The RCEIS-funded Sino-German Lysimeter Workshop took place in Beijing at the Beijing Normal University from 14th to 15th August 2016 with the aim to share research results and discuss evapotranspiration ground observations technology, such as lysimeters. The workshop was organised by Prof. Harry Vereecken (Forschungszentrum Jülich) and Prof. Shaomin Liu (Beijing Normal University) as chairman and deputy chairman as well as by Dr. Zhongli Zhu (Beijing Normal University) and Dr. Thomas Pütz (Forschungszentrum Jülich). 40 scientists, managers, students, and representatives of instrument companies with background in lysimeter research, hydrology, meteorology, ecology, and remote sensing technology from China, Austria, Germany, and the US took part in the workshop. Eight speakers from China and nine speakers from Austria, Germany, and the US presented their work.

Background

Actual evapotranspiration (ET) is after precipitation the second largest flux of the terrestrial water cycle. Recent studies showed that actual (as well as potential) ET has been influenced by global climate change even though the changes differ in sign and size depending on the region. Actual ET can be estimated in situ either by measuring micrometeorological variables (e.g. Eddy covariance method or Bowen ratio method) or by measuring the soil water balance (Lysimeters). Actual ET values obtained using the eddy covariance method are typically around 20 % smaller than values obtained by lysimeters because the energy balance cannot be entirely closed.

Presentations

The presented works showed that lysimeter systems are globally operated, multi-purpose instruments. The technical equipment is still evolving in the search of new solutions for new research questions (e.g. Jane Li, Aozuo Ecology Instrumentations Ltd. presented large weighable lysimeters built and produced in China; Pütz, TERENO-SOILCan Lysimeter Network in Germany). The following paragraph will give a short overview about the presented usages, research experiments, and developments.

28 February 2017



Fig. 41: Presentations and discussion about lysimeter research and long-term climate change records

Lysimeters are used in agriculture in Bushland (semi-arid region in Texas/US, Evett), in different places in China (e.g. on the North China Plain, YCES/CAS, Zhigang Sun; Zhongli Zhu; etc.), and in Brandis (Germany, Haferkorn) to optimise water, fertilizer, pesticide and plant management (crop water consumption, water use efficiency) with regard to high yields, environmental protection and global climate change. Lysimeters have been also used in anti-desertification studies in Northern China with the aim to characterize and quantify the actual ET of shrub communities in an arid desert ecosystem (Xinping Wang/Yafeng Zhang).

Lysimeter data can also be used as input and verification data for models and, thus, as basis for scenario simulations displaying, for example, the impacts of land-use and climate changes (Klöcking, ArcEGMO). Data assimilation provides an opportunity to improve the lysimeter soil hydraulic parameter estimation, which leads to improved flux-estimates at the top and bottom boundaries of the lysimeter (Montzka).

Two studies presented lysimeter-based approaches to quantify the impact of climate change by transporting soil to other climatic regions (Pütz, TERENO-SOILCan) and by, for example, applying CO2 or altering the surrounding air temperature on the lysimeters (Herndl). Long-term actual ET series (length of minimum 20 years) obtained on lysimeters can provide an insight into the impact and changes in ET caused by global climate change on this flux (Haferkorn, Röseler).

It was also highlighted that lysimeters have limitations (soil disturbance, high staff costs, etc.; Pütz, Evett, Yanjun Shen, Zhongli Zhu), but, if maintained and managed correctly lysimeters systems can be ideal tools to determine actual ET. A topic mentioned by several presenters was the lack of defined quality standards for lysimeter equipment, management, monitoring, and data processing (Vereeck-en, Evett, Herndl, Klöckner, Röseler, etc.). So far several solutions and approaches exit parallel.

Comparisons between lysimeter and eddy covariance ET measurements typically show a deviation of 20 % (as mentioned in the background section; Zhongli Zhu, Sien Li). In a study at a test site in Rollesbroich (Germany) the difference could be reduced to 3.8 % (Hendricks-Franssen). A study by the IWHR compared different methods for measuring actual ET on different spatial scales (EC, lysimeter, Bowen-ratio, sap-flowmeter, scintillometer, photosynthesis apparatus; Yu Liu). This point was strengthened by the fact that redundant measurements with different equipment analysing different temporal or spatial scales or relying on different approaches are highly useful to get a better estimate of the "true" value, to understand the underlying processes better and the measuring systems (Evett, Yu Liu).

Future Plans

• To establish a database of long-term lysimeter and meteorological data with a minimum length of 20 years from stations all over the world:

It should include measured actual ET, leachate, and precipitation time series as well as meta-data information about the station, the equipment, and the monitoring.

It should also include time series of additional weather variables of the same length (Minimum: sunshine duration, solar radiation -if available-, precipitation measured with another technique than the lysimeter, wind speed, wind direction, cloud cover -if available-, air temperature (minimum, maximum, mean), and relative air humidity).

- To strengthen the exchange in lysimeter research between China and Germany by further collaborations (PhD students, etc.)
- To agree on standards in equipment, station management, meta-data monitoring, as well as processing lysimeter data. A lack in systematic and broadly applied standards is a hindrance for the broader acceptance of lysimeter usage.

Exchanging experience on station and equipment management, on quality checking/pre-processing routines, as well as on the various possibilities that lysimeter research offers (long-term evaluations of ET data with focus on climate change, water and fertilizer management studies in agriculture, experiments with xerophytic shrub communities for preventing further desertification)

RCEIS Flyer

The RCEIS flyer is presented as following:

28 February 2017

HELMHOLTZ-CAS - RESEARCH CENTRE FOR ENVIRONMENTAL INFORMATION SCIENCE - RCEIS

nan Project Partners no b. Tholin minin - (juliane,huth@dir.de) ur_Carsten Monte& (cmontzka@lz-juelich.de) ur_Carsten Monte& (cmontzka@lz-juelich.de)

aam CAS IGSNIRR: Prof. Ur. Transvang Yue (yweelreisacon inghua Unic Prof. Dr. Bing X.: (bingkuetsinghua edu.cn) iam MBL: Zhasanaha

C www.ufz.de/rceis



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ollaboration with Hohai University, Nanjing, the fully coupled,

mesoscale regional atmospheric-hydrologic modeling system WRF-HMS was developed, which allows in particular investiga

WRF-HAS was developed, which allows in particular investiga-tions of the long-term interactions between groundwater, the land surface and the atmosphere. In addition, an age-weighted evaporation tagging approach was implemented in a regional climate model, which allows as-sessments of atmospheric water residence times. Research fo-cues on the Poyang Lake basin in South China.

1

🗖 RCEIS

on local to regional scales.

1

CASE STUDY

TEAM KIT







TEAM CAS IGSNRR The Institute of Geographic Sciences and Natural Resources Researd+IGSNRR is a multidisciplinary research institute focusing on physical geography and global change, human geography and regional development, natural resources and the environment, geographical information systems and sur-face simulation, the terretrial water cycle and water resources, ecosystem network observation and modeling, and Chinese agricultural policy. The institute aims to solve major natu-ral resource and environmental problems related to national sustainable development and improve its own innovative capacity at the same time.

TEAM CAS IGSNRR

CASE STUDY



C



IGSNRR developed a surface modeling method which aims to simulate climate change, DEM, soil properties, and other vironmental variables; set up a dynamic model for simulating environmental variables set up a dynamic model for simulating spatial disribution of human population; detected land-cover changes with higher spatial and temporal resolutions and established a distributed hyp-diological model and simulated revolution process of water resources under different climatic scenarios. These models were used in many regional areas in China, such as in the Poyang Lake basin in South China.

RCEIS ino-German Research Centre for invironmental Information Science



Fig. 42: The front page of the RCEIS flyer



Fig. 43: The back page of RCEIS flyer

Publications

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Recently, there are several papers published in the international journal of Environmental Earth Sciences (EES) regarding the current severe environmental problems in China. The special issue titled "Environmental Problems and Solutions in China" was published in 2011 and more than 20 scientific papers have declared the current environmental situation, programs and solutions. In addition to that, there are several thematic issues related to China have been published:

Thematic Issues in Environmental Earth Sciences on several lakes in China:

- Erhai Lake
- Liao River Basin
- Tai Lake
- Dianchi Lake
- Environment & Health in China I

Thematic Issue about "Developing Dynamic VGEs for Geographic Research" has been published, which includes the paper presented on the international conference for Virtual Geographical Environment in HongKong, on 04 - 09, November, 2014. The Prof. Hui Lin, Dr. Min Chen from the Chinese University of Hong Kong and Dr. Cui Chen are the guest editors.

Thematic Issue about "Environment and Health in China" has been published. This TI includes the recent scientific results in the surface modeling, geographical information sciences and the health problems in China. Prof. Tianxiang Yue from CAS and Prof. Bin Xu from Tsinghua University, Olaf Kolditz and Cui Chen from UFZ are guest editors.

The recent publications are:

Dohmann M, Chen C, Grambow M, Kolditz O, Krebs P, Schmidt K.R, Subklew G, Tiehm A, Wermter P, Dai X.H, Liao Z.L, Meng W, Song Y.H, Yin D, Zheng B.H (2016): German contributions to the Major Water Program in China - "Innovation -Cluster Major Water", Environ Earth Sci., submitted.

Chen M, Lin H, Kolditz O and Chen C (2015): Developing dynamic Virtual Geographic Environments (VGEs) for geographic research, Environ Earth Sci.,74:6975–6980. doi: 10.1007/s12665-015-4761-4

Yue T.X, Xu B, Zhao N, Chen C* and Kolditz O (2015): Thematic Issue: Environment and Health in China - I, Environ Earth Sci., 74:6361–6365. doi: 10.1007/s12665-015-4758-z

Chen C, Sun F, Kolditz O (2015): Design and integration of a GIS based data model for the regional hydro-logic simulation in Meijiang watershed, China. Environ Earth Sci., doi: 10.1007/s12665-015-4734-7.

Wang S.R, Zheng B.H, Chen C, Dohmann M, Kolditz O (2015): Thematic issue: water of the Erhai and Dianchi Lakes, Environ Earth Sci., 74:3685–3688. doi: 10.1007/s12665-015-4727-6.

Wang CL, Zhao N, Yue TX, Zhao MW and Chen C (2015): Change trend of monthly precipitation in China with an improved surface modeling method. Environ Earth Sci., doi: 10.1007/s12665-014-4012-0

Han, X.J., X. Li, G.W. He, P. Kumbhar, C. Montzka, S. Kollet, et al. 2015. DasPy 1.0 – The Open Source Multivariate Land Data Assimilation Framework in Combination with the Community Land Model. Geophysical Model Development Discussions.

X. Han, H.-J. H. Franssen, R. Rosolem, R. Jin, X. Li, and H. Vereecken (2015): Correction of systematic model forcing bias of CLM using assimilation of cosmic-ray Neutrons and land surface temperature: a study in the Heihe Catchment, China. Hydrol. Earth Syst. Sci. 19, 615-629, doi: 10.5194/hess-19-615-2015

Nixdorf E, Chen C, Sun Y.Y and Kolditz O (2015): Persistent organic pollutants contaminate Chinese water resources: overview of the current Status, challenges and European strategies. Environ Earth Sci., doi: 10.1007/s12665-015-4448-x

Kuenzer, C., Moder, F., Jaspersen, V., and Dech, S. (2016): A Water related Information System for the Sustainable Development of the Mekong Delta: Experiences of the German-Vietnamese WISDOM Project. In: Integrated Water Resources Management: Concept, Research and Implementation Springer International Publishing. p. 11-22.

Kuenzer, C., Moder, F., Jaspersen, V., Ahrens, M., Fabritius, M., Funkenberg, T., Huth, J., Vo Khac, T., Trinh Thi, L., Lam Dao, N., and Dech, S. (2016): A Water Related Information System for the Sustainable Development of the Mekong Delta: Experiences of the German-Vietnamese WISDOM Project. In: Integrated Water Resources Management: Concept, Research and Implementation Springer. P. 377-412.

Huth, J., Ottinger, M., Eisfelder, C., Liu G., und Kuenzer, C. (2016): Landnutzungswandel im Delta des Gelben Flusses, China – eine Fernerkundungsanalyse. Geographische Rundschau, Themenheft: Deltaregionen Asiens, Vol. 7/8, S. 36-43.

Ottinger, M., Clauss, K., and Kuenzer, C. (2016): Aquaculture: Relevance, Distribution, Impacts and Spatial Assessments – A Review. Ocean & Coastal Management, 119, p. 244-266.

Clauss, K., Yan, H., and Kuenzer, C. (2016): Mapping Paddy Rice in China in 2002, 2005, 2010 and 2014 with MODIS Time Series. Remote Sensing, Vol. 8 (5).

Wei, J., H. R. Knoche, and H. Kunstmann (2016), Atmospheric residence times from transpiration and evaporation to precipitation: An age-weighted regional evaporation tagging approach, J. Geophys. Res. Atmos., 121, 6841-6862. doi: 10.1002/2015JD024650.

Wohlfart, C., Liu, G., Huang, C., and Kuenzer, C. (2016): A River over the Course of Time – Multitemporal Analyses of Land Surface Dynamics in the Yellow River Basin (China). Remote Sensing, Vol. 8 (186).

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Wolters, M., Sun, Z., Huang, C., and Kuenzer, C. (2016): Environmental awareness and vulnerability in the Yellow River Delta: Results based on a comprehensive household survey. Ocean & Coastal Management, 120, p. 1-10.

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Future strategy and plan

For the second year, we are planning more networking activities, events and trying to get more joint projects with our cooperation partners in China and with RCEIS partners in Germany as well.

The following workshops are coming soon and some are still in the preparation:

1. Status Meeting of BMBF CLIENT Project "Urban Catchments"

The second project year has almost been gone (01.04.2015 -31.03.2017). The second Status meeting about the BMBM CLIENT project "Urban Catchments" will take place on 17.April.2017 at UFZ in Leipzip. We will present the current results and discuss about the next steps.

2. Saxony delegation and entrepreneurs travel in China, under the guidance of Minister of State Thomas Schmidt

From 06-13.05.2017, Saxony delegation and entrepreneurs will travel in China with the guidance of Minister of State Thomas Schmidt. The delegation will travel several cities in Hubei province and Chongqing. Hubei is the official partner state with Saxon and is one of the most important economic partners in China. The major purpose of the trip is to organize a technology forum and investigate the possible market in China.

3. DFG-NSFC cooperation group summer school

A 14-days summer school in the context of the DFG-NSFC cooperation group " A modelling platform prototype for environmental system dynamics" will take place in July/August 2017. The total participants are 16, of which 8 are from Germany (including 5 from local organizations), 8 from China. There are one Chinese and three Germany professors/Lecturers (all from local area) who will give the lectures. A two-day field excursion will also be arranged.

Appendices

Appendix 1: RCEIS partners and on-going projects



The network is open and explicitly invites further participants.

(A1) The **Helmholtz Centre for Environmental Research** - **UFZ** is a national centre of excellence for integrative environmental research. It was established in 1991 as the only centre in the Helmholtz Association exclusively devoted to environmental research in a great variety of fields. Founded in response to the severe pollution prevailing in East Germany, the UFZ has become a world-wide acknowledged centre of expertise in the remediation and restoration of contaminated landscapes, as well as the preservation of biodiversity, natural land-scapes and water resources.

Principle Investigators (PIs):

- Olaf Kolditz is Head of the Department of Environmental Informatics at the UFZ and Professor for Applied Environmental System Analysis at Technische Universität Dresden. He is the Speaker of the Helmholtz Graduate School for Environmental Research HIGRADE.
- Haibing Shao is PostDoc at the Department of Environmental Informatics and Visiting Professor at the Chinese Academy of Sciences with the Guangzhou Institute of Energy Conversion (CAS-GIEC).

Ongoing Sino-German research activities:

- RCEIS: The idea and concept of a Sino-German "Research Centre for Environmental Information Science" has been developed during 2 workshops in October 2012 and May 2013 in Beijing together with CAS-IGSNRR (Prof. YUE, Prof. XU)
- CSC: more than 10 finished and on-going CSC PhD projects in Environmental Sciences, e.g. the NANKOU project with Beijing Hydrological Centre concerning groundwater remediation in Beijing
- DAAD-CSC: with CAS-GIEG on geothermal resources in China and gas hydrates in marine systems (related to Pearl River delta)
- EuropeAid: with CRAES on restoration of the Songhua-Liaohe River system in northeastern China ("Demonstration of Pollution Discharge Management for Water Quality Improvement in the Songhuajiang-Liaohe River Basin, EU-China Environmental Sustainability Programme, EuropeAid/133-582/L/ACT/CN-1 funded by the European Commission)
- BMBF-CLIENT definition project "Urban Catchments": with TONGJI University on restoration of the Lake Chao (Anhui Province, related to Yangtze River)

- Helmholtz-CAS Joint Research Group (HCJRG) "Gas hydrate deposits in the South China Sea and their production by thermo-chemical activation and depressurization" CAS-GIEC and GEOMAR (scheduled for funding)
- HIGRADE: Helmholtz Graduate School for Environmental Research at the UFZ, currently 15 PhD students from China are completing the PhD program. Olaf Kolditzbrings in his HIGRADE experience for the supervision of the Young Scientists Program and the development of the RCEIS PhD School.

(A2) German Aerospace Centre – DLR

The research and development work conducted by DLR in the field of Earth observation covers virtually the entire range of satellite-based Earth observation topics, from innovation in sensor systems and evaluation of data to the preparation and development of new missions, their ground operations and data processing for applications. Using the wide range of expertise at its disposal, DLR works closely with industry, academia, and public sector users to make the entire range of applications of satellite-based remote sensing available for the benefit of society (see DLR Website).

PIs: Claudia Künzer (CAS Visiting Professor)

The Earth Observation Center (EOC) of the German Aerospace Center (DLR) has been and currently is involved in the following China-related activities over the past decade:

- Sino-German Coal Fire Research Initiative (funded by BMBF). Assessing underground coal fires in remote mining regions of north-central and northwest China as well as mining hazards employing remote sensing as well as in-situ geophysical technologies (multispectral and thermal airborne and space-borne imaging and mapping, helicopter based magnetics, in-situ geo-electrics, micro-seismic etc.). Coordination and remote sensing/GIS in a large consortium of over 10 partner institutions from science and industry (2001-2009).
- Dr. Claudia Kuenzer was a visiting scientist to Beijing for four months in 2005; half of the time at Beijing Normal University (BNU), half the time at the Institute of Remote Sensing Applications (IRSA-CAS).
- EOC of DLR is coordinating (project lead: Dr. Claudia Kuenzer) the large BMBF-funded Sino-German CLIENT project DELIGHT (Delta Information System for Geoenvironmental- and Human Habitat Transition). Over 16 institutions from science and industry contribute on both the German and Chinese sides. The Chinese side's coordination is with IGSNRR-CAS, Beijing. The project started in May 2013 and will run for 3 years. Focus is the socio-ecological development in the delta, upstream impacts on downstream flows and sediment budgets, as well as the dynamics of the natural environment and the urban sphere.
- Dr. Claudia Kuenzer is PI (Principal Investigator) of the ESA funded project "Assessing flood-, wetland- and land use dynamics of Dongting Lake, China" in the context of the DRAGON-3 program. Dongting Lake is a Yangtze River flood-path lake, and work in the area (including field work) has been undertaken since 2009 and is on-going. In the con-

text of this project, several Chinese guest researchers have stayed in C. Kuenzer's team "Land Surface Dynamics" of the EOC of DLR.

- Dr. Claudia Kuenzer was awarded a CAS Visiting Professorship of the Chinese Academy of Sciences (2012/2013) at the Center of Earth Observation and Digital Earth (CEODE); this year fused with the Institute of Remote Sensing Applications, and now named RADI (Institute of Remote Sensing and Digital Earth). In this context, she spends 1-2 months per year at RADI in Beijing.
- CSC: application for PhD position related to Coastal Zone Management research awaiting decision soon

EOC of DLR is cooperating with a variety of Chinese partner organizations in the context of watershed developments in the upper Mekong basin (Lancangjiang). This cooperation is associated to the BMBF-funded WISDOM project (Water related Information System for the Mekong Delta) lead by Dr. Kuenzer. Lancangjiang related exchange is on-going with colleagues of IGSNRR-CAS, RADI, BNU, and the Kunming Institute of Botany, CAS.

(A3) Forschungszentrum Jülich – FZJ develops technologies that benefit research in Germany and worldwide in the areas of health, energy, and climate, as well as information technology. Land use and climate change bring about long-term changes to terrestrial ecosystems. The increasing demand for food and energy has necessitated the intensification of land use and agriculture, resulting in greater strain on fertile arable land and water resources.

The Agrosphere Institute, IBG-3, is part of the Institute of Bio- and Geosciences. It analyses transport and conversion processes in soils and surface near groundwater systems with the aim to contribute to a sustainable use of resources in agro-ecosystems. Agrosphere is coordinating TERENO.

Pls: Harry Vereecken, Stefan Kollet, Carsten Montzka, Harrie-Jan Hendricks-Franssen, Heye Bogena

- CSC: more than 10 finished and on-going 9 CSC PhD projects in Agricultural- and Geoscience
- Soil moisture network in Hei He with Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI), CAS Lanzhou; Prof. Xin Li
- Predicting hydrological fluxes in the Hai He river basin using remote sensing and data assimilation methods SP2: Determining hydrological fluxes at lysimeter and foot-print scale with Beijing Normal University, School of Geography, Prof. Shaomin Liu
- ESA Dragon 3 project (Close water cycle at the river basin scale using remote sensing data) with Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI), CAS Lanzhou; Prof. Xin Li

(A4) Karlsruhe Institute of Technology – KIT was founded 2009 as a merger of Forschungszentrum Karlsruhe (KIT Campus North) and University of Karlsruhe (KIT Campus South). KIT/Campus North is a large-scale research institution of the Helmholtz Association conducting program-oriented provident research on behalf of the Federal Republic of Germany. Its remote lab KIT/IMK-IFU is located in Garmisch-Partenkirchen, and for many years it has had several successful collaborations with Chinese research institutes (e.g. Institute of Atmospheric Physics, Chinese Academy of Sciences) and universities (e.g. Hohai University in Nanjing - the leading university for hydrology, and the China Agricultural University in Beijing - the leading university for agricultural research). KIT/IMK-IFU has organized two Sino-German symposia funded by Sino-German Center for Research Promotion for the topics "Steppe Ecosystems and Climate and Land Use Changes – Vulnerability, Feedbacks and Possibilities for Adaptation" in 2009 and "Modelling approaches and observational techniques for the quantification of fast environmental changes and its impacts on land use and water resources" in 2011.

PIs: Harald Kunstmann, Klaus Butterbach-Bahl

- Prof. Harald Kunstmann is an expert in the field of climate- and hydrological modeling and is currently leading a DFG-project on the Poyang Lake region and fully coupled atmosphere-hydrology modeling (PREFEED). He also supervises and hosts two Chinese CSC scholars.
- Prof. Butterbach-Bahl is a leading scientist in the field of Biosphere-Atmosphere Exchange and has led several projects in China funded by different agencies (e.g. DFG, CSC, BMBF); he is also professor at the Chinese Academy of Science.

(A5) Involving Universities

RCEIS explicitly invites universities for participation. TU Dresden, as a member of the BMBF-CLIENT initiative "Urban Catchments" and several CSC PhD projects with different Chinese research institutions (e.g. TONGJI University in Shanghai) are already involved. This process involving universities will be continued.

(A6) Chinese Partners

The Helmholtz International Research Network "Helmholtz-CAS Research Centre for Environmental Information Science" (RCEIS) will involve leading Chinese institutions in environmental and landscape research, from the Chinese Academy of Sciences, Universities and Authorities. The Chinese part of the network is coordinated by the Institute for Geographical Sciences and Natural Resources Research of the Chinese Academy of Sciences (CAS-IGSNRR).

Chinese Research Institutions			Pls
CAS-IGSNRR	Chinese Academy of Sciences, CAS, Beijing	WP2	
Chinese lead	Institute for Geographical Sciences and Natural	WP4	
	Resources Research		
RCEIS	Research Centre for Environmental Information	WP3	Prof. YUE
	Science		
AJU	Anhui JianZhu University, Hefei	WP3	Prof. HUANG
ВНС	Beijing Hydrological Centre	WP7	Dr. SUN
BNU	Beijing Normal University, School of Geography	WP5	Prof. LIU
		WP6	
BU	Beijing University	WP6	NN
CAS-CAREERI	Cold and Arid Regions Environmental and Engineer-	WP5	Prof. LI
	ing Research Institute, CAS, Lanzhou	WP6	
CAS-GIEC	Institute of Energy Conversion, CAS, Guangzhou	WP4	Prof. WU
CAS-IAP	Institute of Atmospheric Physics, CAS, Beijing	WP3	NN
CAS-NIGLAS	Institute of Geography and Limnology, CAS Nanjing	WP3	Prof. KONG
			Prof. HU
CAS-RCEES	Research Center for Eco-Environmental Science,	WP3	Prof. YANG
	CAS, Beijing		
CAU	China Agricultural University, Beijing		NN
CLMA	Chaohu Lake Management Authority and Chaohu	WP3	Mr. ZHANG
	City, Planning Buro		Mr. WANG
			Mr. XU
			(CEOs)
CRAES	Chinese Research Academy on Environmental Sci-	WP1	Prof. MENG
	ences, Beijing		Prof. SONG
HRAES	Hubei Research Academy on Environmental Sci-	WP1	Prof. ZHANG
	ences, Wuhan		Prof. SHEN
НОНАІ	Hohai University, Nanjing	WP3	NN
JTU	Jiao Tong University, Shanghai	WP3	NN
NRSCC	National Remote Sensing Center of China, Beijing	WP2	NN
TONGJI	Tongji University, Shanghai	WP3	Prof. DAI
UCAS	University of Chinese Academy of Sciences, Beijing	WP7	Prof. WANG

Appendix 2: List of abbreviations

ACROSS	Advanced Remote Sensing – Ground Truth Demo and Test Facilities
BMBF	Bundesministerium für Bildung und Forschung
BNU	Beijing Normal University
CAREERI	Cold and Arid Regions Environmental and Engineering Research Institute
CAS	Chinese Academy of Sciences
CEODE	Center of Earth Observation and Digital Earth
ССВ	City Construction Bureau
CLIENT	Internationale Partnerschaften für nachhaltige Klimaschutz- und Umwelttechnologien
	und –dienstleistungen
CLM	Community Land Model
CLMA	Chaohu Lake Management Authority
CRAES	Chinese Research Academy of Environmental Sciences
CSC	Chinese Scholarship Council
DELIGHT	Delta Information System for Geoenvironmental and Human Habitat Transition
DFG	Deutsche Forschungsgemeinschaft
DLR	Deutsches Zentrum für Luft- und Raumfahrt, German Aerospace Centre
EIS	Environmental Information System
EOC	Earth Observation Centre
ESA	European Space Agency
FZJ	Forschungszentrum Jülich
GIEC	Guangzhou Institute for Energy Conversion
HIGRADE	Helmholtz Graduate School for Environmental Research
НТWК	Hochschule für Technik, Wirtschaft und Kultur Leipzig
IGSNRR	Institute for Geographical Sciences and Natural Resources Research
IRSA	Institute of Remote Sensing Applications
КІТ	Karlsruhe Institute of Technology
Lol	Letter of Intent
MOST	Ministry of Science and Technology (MOST) of China
NRSCC	National Remote Sensing Center of China
OGS	OpenGeoSys, www.opengeosys.org
PI	Principal Investigator
PREFEED	Long Term Land Use - Precipitation Feedbacks in the Hai River and Poyang Lake Region
	In China Institute of Demote Sensing and Digital Farth
	Institute of Remote Sensing and Digital Earth
RCEES	Research Centre for Environmental Information Sciences
RUEIS	
SLRB	Songhua-Liaone river basin
SIVIE	Small and Medium Enterprise
	University of CAS
	Heimiouz-Zentrum für Umweitforschung, Heimnoltz-Centre for Environmental Rese-
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	Water related information System for the Mekong Delta
1 YSP	j Young Scientists Program