



Newsletter
May 2011

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Contributions should be submitted by e-mail in Microsoft Word to the Group Chairman or to the Group Secretary:

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We thank the following persons for their contributions to this Newsletter:

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CHAIRMAN'S NOTE

Dear ICA SG Members,

Welcome to this Spring 2011 edition of our newsletter, where you will find, as usual, featured articles, upcoming events, reports on Ph.D. thesis, etc. In particular I want to draw your attention to the featured article, which deals with an overview of the use of ICA not only for wastewater treatment plants, but to the whole urban water management. It is enlightening to see that ICA is certainly permeating to more and more application areas.

The ICA SG has been active in the support or organization of several upcoming events. The key event fully organized by the ICA SG is the 4th AutMoNet Conference, which will take place in the city of Querétaro in central Mexico, September 18-21, 2011, right after the Independence Day activities in Mexico, which is a very nice time to come and enjoy the country. The conference will bring together specialist from all over the world to discuss the current state of the art in instrumentation, monitoring, sensor technology and automation for water systems. Another two events that are quickly approaching are the Watermatex Conference that will take place in San Sebastián, Spain, June 20-22, 2011, and the 18th IFAC World Congress which will be held in Milan, Italy, August 28-September 2, 2011, where the ICA SG is supporting an invited session on "Optimization and Control in (Waste)water Treatment".

This newsletter unfortunately also carries some sad news. Prof. John F. Andrews died April 10, 2011, aged 80. He was certainly an ICA pioneer in wastewater treatment and will be remembered by many of us, both because of his legacy as a teacher, mentor and friend, and for being a key initiator of our specialist group and its first conferences.

I want to link this remembrance of Prof. Andrews with some thoughts regarding some recent personal experience. A few weeks ago I was in Belgium for some days for a meeting of a current project. I met some colleagues that I already knew and also some I had never met before. With the last ones we quickly realized that we had common acquaintances: colleagues who also work on the same field and with whom we share common interests; we are now in the process of sharing ideas for future research projects together. This led me to think that we indeed are part of a global network of professionals, which is precisely what our association is about. Networks need two basic components: individuals and connections between them. However, there are individuals that also serve as connectors; these are people who link other people together, and who provoke chain reactions for connections to happen, so in the end, as part of a network, we are linked to these connectors although we may have never met them personally. As an ICA pioneer, Prof. Andrews and many more have been or are still such

connectors. Their legacy as initiators in our group must therefore be gratefully acknowledged.
Take some time to enjoy this newsletter. I am sure you will find very useful information inside.

Best regards,



Alejandro Vargas

Chair of the IWA Specialist Group on Instrumentation, Control and Automation

Senior Researcher, Laboratory for Research on advanced Processes for Water Treatment, Instituto de Ingeniería, UNAM, Querétaro, Mexico

CURRENT MANAGEMENT TEAM OF THE SPECIALIST GROUP

The Management Team of the Specialist Group consists of the following people.

Formal Members		
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Please visit the group webpage for more information:

[http://www.iwahq.org/Home/Networks/Specialist_groups/List_of_groups/Instrumentation, Control and Automation/](http://www.iwahq.org/Home/Networks/Specialist_groups/List_of_groups/Instrumentation,_Control_and_Automation/)

GROUP DESCRIPTION

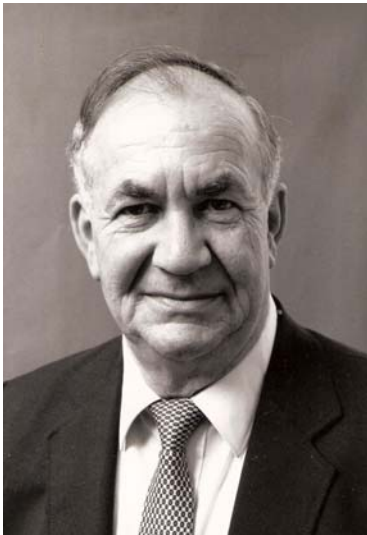
The ICA specialist group provides a forum to exchange methodologies and experience internationally on all aspects of sensor technology, instrumentation, control and automation for water systems. Practical experiences, case studies, management problems, operator aspects and integrated solutions of those systems are important parts of the activities. Specific topics may include: sensors and instrumentation; modelling and simulation for control and operation; control systems for water and wastewater treatment and transport; detection and early warning; diagnosis systems; plant wide control and integrated control; control as means of obtaining better sustainability; practical experience of instrumentation and control; information systems for operation; decision support; risk assessment; system optimization for potable water, surface water and wastewater.

HOW TO JOIN THE ICA SPECIALIST GROUP

Membership of the Specialist Group on Instrumentation, Control and Automation is open to all members of IWA. Specialist Groups represent the core vehicle for issue-based interaction on scientific, technical and management topics. The specialist groups facilitate collaboration and product generation, including conferences and publications. The specialist groups within IWA are self-managed and include groups covering all-important topics in the water management sector. Spread across IWA's membership in more than 130 countries, IWA's Specialist Groups are an exceptionally effective means of international networking, sharing information and skills and making good professional and business contacts.

Every IWA member can join an unlimited number of specialist groups and each group has its own program of conferences and other meetings and a regular newsletter or web-based discussion forum. To join the Specialist Group on Instrumentation Control, and Automation, IWA members can update their contact details on-line: <https://www.portlandpress.com/iwa/membership/change.cfm>.

IN MEMORIAM: A TRIBUTE TO JOHN F. ANDREWS (1930-2011)



One of our ICA pioneers, professor John F. Andrews, has passed away. Since his retirement he lived in Fayetteville, Arkansas, USA. The last ICA conference that he attended was in 2001 in Malmö, Sweden.

John and I met for the first time in London in 1973, at the first ICA conference, then under the sponsorship of IAWPR (the predecessor of IWA). This was my first contact with international water professionals. John represented a new thinking in wastewater and water operations. I was a control engineer who desired to learn about automation in wastewater systems. It appeared that John was the key person in the profession. What immediately fascinated me about John were not only his scientific results, but his dedication and his generosity. The conference was organized thanks to the pioneering efforts by John Andrews (then at Clemson University, USA) - as the academic representative - together with Carmen Guarino (City of Philadelphia, USA), Tony Drake (Greater London Council, UK), and Ron Briggs (Water Pollution Research Laboratory, UK). John Andrews also presented some control challenges for activated sludge systems and demonstrated simulation results.

Philadelphia, USA), Tony Drake (Greater London Council, UK), and Ron Briggs (Water Pollution Research Laboratory, UK). John Andrews also presented some control challenges for activated sludge systems and demonstrated simulation results.

In the late 1960s and early 1970s the first dynamical models of the activated sludge process were developed. John Andrews and his group, first at Clemson University and later at the University of Houston and Rice University in Houston, made significant progress in modelling and understanding of the dynamics of anaerobic digestion and the activated sludge process. His students, notably Steve Graef, Joe Busby, Mike Stenstrom, Mike Barnett, Cello Vitasovic, Bob Hill, Masa Goto, Ricky Clifft and many others have made significant contributions to the profession in John's spirit.

In 1974 a workshop was held at Clemson University, S.C., USA addressing *Research Needs for Automation of Wastewater Treatment Systems*. The workshop was sponsored by the USEPA and became a landmark in the early ICA development for wastewater treatment systems. John Andrews together with Heinrich O. Buhr and Thomas M. Keinath (later the IWA President) organised the workshop. Many participants and speakers were invited from government regulatory and research agencies, universities, operating engineers and managers of large treatment systems, consulting engineering firms and equipment manufacturers. Without any doubt this meeting had a great influence on subsequent priorities of the ICA research. I was fortunate to attend the Clemson workshop. It was

obvious that John was the key inspiration source. I remember that I felt very humble in this group but John surprised me by being so generous, welcoming and genuinely interested in the thoughts of a young man coming from distant Sweden. At this workshop John had a clear vision of the future of wastewater treatment operations. He was well ahead of his time and recognized the need for education at all levels as he noted: “A course in *Process Dynamics and Control* is commonly found in most chemical engineering curricula. We would be well advised to include a course in *Dynamics and Control of Wastewater Treatment Systems* in environmental engineering curricula.” Today there are such courses, but it has taken a long time to make John’s vision come true.

I was invited by John to come to the University of Houston in 1975 and we had a most rewarding and enjoyable half year period. I learnt a lot of process dynamics from him and he wanted to learn more on control theory. He had an attitude to research, to knowledge, to people, to students and to colleagues that has inspired me for the rest of my professional life. Never before or after I have seen anybody so dedicated, so eager to teach, so generous in his frame of mind. All the time he reminded how to improve and never compromise in research quality. He taught theory and how to think rather than simply what he referred to as the “nuts and bolts” of water and wastewater engineering. The whole Andrews family took care of me and my family. John gave me a ride to the university every day, which meant that the research discussions started at the garage. And his teaching was not restricted to normal working hours. He could discuss our research in evenings and weekends. His capacity for work was legendary, so much so that he carried not one but two briefcases between his office and home.

John always reminded that research has to meet reality all the time. He wanted to see the ideas from the research lab being implemented in real full scale systems. We continued over the years to cooperate, sometimes in Houston, sometimes elsewhere in the USA, at IWA conferences and at private meetings. All the time John encouraged and saw opportunities. Every meeting was not only business but a most pleasant experience with a lot of laughter and cheerful talking.

John may be seen as the “father” from the research community that formed the ICA specialist group. He was a wonderful, unpretentious, generous, and honest mentor and teacher to me personally, to his younger colleagues, and to students. His legacy of hard work, high quality teaching and research, integrity, and self-effacing humour will always be remembered by his family, colleagues, friends, and students. As our ICA Newsletter editor Eveline reminded me: great teachers and inspiring people never die, they are always with us.

Gustaf Olsson
Professor Em., Lund University, Lund, Sweden

I thank for input from Dennis Clifford, Thomas and Laura Hsu Professor Emeritus, Dept. of Civil and Environmental Engineering, Univ. of Houston, Texas

MESSAGE FROM IWA

New from IWA – the IWA Water Wiki!
Invitation to Participate



www.iwawaterwiki.org

The **WaterWiki** is a website providing a place for the water community to interact, share knowledge and disseminate information online.

Since the site was launched, we have been working with IWA Specialist Groups, offering them the opportunity to set up their own group work spaces on the WaterWiki – we now have over **20** Groups using the site to communicate and network online.

Want to get involved? We would like to invite members of the **Instrumentation, Control Automation** Specialist Group to set up their own private Group Space on the Wiki.

WaterWiki Group Spaces – Why participate?

Establishing a Group Space on the WaterWiki is an excellent way share information within your group. You can:

- Include contact details of key members in the group
- Upload PDFS, Word documents, presentations etc.
- Circulate minutes from meetings, events, conferences etc.
- Plan up coming events and webinars
- Discuss research developments and group activities

Once you have established your group space on the Wiki, members can add, remove, or edit content at anytime – and we have a dedicated support team on hand to answer any technical queries.

If you are a member of the **Instrumentation, Control Automation** IWA Specialist Group and would like to establish a Group Space on the WaterWiki, please contact Victoria Beddow.

New Contributions

We are currently looking for new articles in your subject area. If you are able to write on any of the following subjects (about 600-1000 words), please do contact Victoria Beddow:

Geographic information systems and virtual imaging; Internet-based applications for Hydroinformatics; Tools, environments and language etc.

Victoria Beddow
IWA WaterWiki Community Manager
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IWA website

General

<http://www.iwahq.org/>

Information on the ICA specialist group

[http://www.iwahq.org/Home/Networks/Specialist_groups/List_of_groups/Instrumentation, Control and Automation/](http://www.iwahq.org/Home/Networks/Specialist_groups/List_of_groups/Instrumentation,_Control_and_Automation/)

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Make a splash.

Recognising excellence and innovation
in water projects throughout the world.



Project
Innovation
Awards

2012 IWA Project Innovation Awards

The IWA Project Innovation Awards (PIA) is a prestigious global awards programme aimed at recognising excellence and innovation in water engineering projects around the world.

Awards are given for the following project categories:

- Applied Research
- Design
- Operations/Management
- Planning
- Small Projects

We invite you to submit your projects in four different regions in Americas, Europe & Western Asia, East Asia and Asia-Pacific for the Regional PIA Awards. All regional winners will be advanced into the global level to compete for the Global Grand PIA Awards which will be presented at the IWA World Water Congress in Busan, Korea in September 2012.

The European and Western Asia Regional PIA is now open for submissions from 15 April to 1 July 2011.



Project
Innovation
Awards
Development

2011 Project Innovation Awards – Development

The IWA Project Innovation Awards – Development are given in recognition of water and sanitation projects in low and middle income countries, in urban and peri-urban areas.

Entries will be submitted under one of two primary categories:

- Drinking Water Supply;
- Sanitation and Wastewater

Within each category, projects which fall within one or more of the following sub-categories will be eligible for consideration:

- Hardware (i.e. physical infrastructure)
- Software (i.e. advocacy, outreach, educational campaigns, etc)
- Applied Research

If you have a project in a low and middle income country that demonstrates innovation and sustainability in one of the above project categories, we invite you to submit it for the 2011 PIA-Development Awards which will be presented at the 2nd IWA Development Congress in Kuala Lumpur, Malaysia in November 2011.

The PIA-Development is now open for submissions until 1 July 2011.



For more information, please visit www.iwa-pia.org
or contact us at pia@iwahq.org / PiaDevelopment@iwahq.org

IWA Task Group on Benchmarking of control strategies for wastewater treatment plants

The goal of the Task Group is to promote the use of the benchmark simulation protocols (BSM1, BSM1_LT and BSM2) and produce a Scientific and Technical Report (as part of IWA Publishing's series). In the mid 90s, the IWA Task Group on Respirometry began to work on the development of a simulation-based protocol (a 'simulation benchmark') that would be used for the objective comparison and evaluation of wastewater treatment plant control strategies. The main reason for initiating this work was that it was discovered that over the years numerous WWTP control strategies had been proposed in the literature, however, the literature did not provide a clear basis for comparison of these strategies because of the many confounding influences that have an impact on the system.

The 'benchmark protocol', as it is currently, is defined in terms of a comprehensive description of a standardized simulation and evaluation procedure including plant layout, simulations models and model parameters, a detailed description of disturbances to be applied during testing and evaluation criteria for testing the relative effectiveness of simulated strategies. The success of the BSMs in terms of publications (already more than 300 when counted two years ago) and research groups world-wide requesting access to the tool are strong indications of the need for this research.

The Task Group maintains a website for publication of on-going activities (www.benchmarkwwtp.org) and the Scientific and Technical Report is to be published this year — see the IWA Publishing website for pre-publication information and to reserve a copy: <http://www.iwapublishing.com/template.cfm?name=isbn9781843391463>. Several papers and posters related to the work of the BSM Task Group will be presented at WaterMatex 2011.

Information: Dr Ulf Jeppsson (chair), IEA, Faculty of Engineering, Lund University, PO Box 118, SE-221 00 Lund, Sweden. Phone: +46 46 2229287; fax: +46 46 142114; e-mail: ulf.jeppsson@iea.lth.se.

The IWA Task Group on Design and Operations Uncertainty (DOUTgroup)*Overview*

During the two years that the DOUT TG has been active, a working team of 26 volunteers has been put together, who are compiling the material for each of the chapters of an IWA Scientific and Technical Report. Besides, 33 expert reviewers from across 4 continents have been assigned. The DOUT group is preparing 6 white papers which address the priority topics identified at the inception of the group:

1. Document how uncertainty/risk are currently handled in the wastewater industry
2. Clarify the terms and definitions used
3. Develop a list of the sources of uncertainty
4. Evaluate existing methods for evaluating uncertainty
5. Identify gaps in current knowledge and developments required
6. Incorporate knowledge from other fields

Conference Activities

Following two very successful workshops in North America (during the IWA 2010 World Congress in Montreal and the WEFTEC 2010 conference in New Orleans), the DOUT group will be organising its first European workshop during the 11th IWA Specialised Conference on Design, Operation and Economics of Large Waste Water Treatment Plants to be held in Budapest (September 4-8, 2011) titled: 'How close to your permit do you design or operate your plant - effluent regulations, sampling strategies and risk'.

Joined Activities with other Specialist Groups or Task Groups

The DOUT Group is continuing its collaboration with the IWA Task Group on Good Modelling Practice (GMP) and is contributing to the workshop titled: The Role of Calibration and Validation in Wastewater Modelling. The workshop is organised by the IWA GMP Task Group and will be held on Monday 20 June 2011 during the Watermatex conference.

As part of the DOUT group outreach to other disciplines the group organised an interdisciplinary meeting during SPN6 in Australia (SPN6: Interdisciplinary Meeting on Uncertainty in Water Systems, Goldcoast, Australia, November 11-12, 2010). The key objective was to reach out to researchers working on related systems, such as river basin and urban drainage systems, to ensure that an exchange takes place between the different fields. The outcome of the meeting has been summarised in a paper 'Uncertainties in water system models - Breaking down the water discipline silos', which will be presented at the Watermatex 2011 conference.

More information

For more information see our IWA website:

http://www.iwahq.org/Home/Networks/Task_groups/Task_Group_on_Uncertainty/

The website includes a brief description of the task group structure, goals and work plan. It also includes task group publications. Alternatively contact the Task Group Chair, Evangelina Belia, belia@primodal.com

IWA Task Group on Good Modelling Practice

The GMP Task Group continues to be very active finishing the Scientific Technical Report and promoting Good Modelling Practice around the world. Some of these activities are listed below.

Scientific and Technical Report (STR)

The first draft of the STR on Good Modelling Practice has been completed and is currently undergoing an extensive external review process. Several comments have already been received and more are expected soon to enable the Task Group to complete the report. Details of the STR are available via the following link:

<http://www.iwapublishing.com/template.cfm?name=isbn9781843391746>

Upcoming Events

The Final meeting of the GMP Task Group will be held at Cemagref Bordeaux, June 15-18, 2011, Bordeaux, France.

A Good Modelling Practice workshop "The Role of Calibration and Validation in Wastewater Treatment Modelling" will be held at the 8th IWA Symposium on Systems Analysis and Integrated Assessment (Watermatex 2011), June 20, 2011 in San Sebastian, Spain. (http://www.watermatex2011.org/?page_id=364)

A Good Modelling Practice modelling course will be held at the 11th IWA Specialised conference on Design, Operation and Economics of Large Wastewater Treatment Plants, September 2-3 2011 in Budapest, Hungary.

In 2012, the 3rd IWA/WEF Wastewater Treatment Modelling Seminar (WWTmod2012) will be held at Mont-Sainte-Anne, Quebec, Canada (February 26-28, 2012) (http://www.iwahq.org/Home/Events/IWA_events/Event_listing/2012/WWTmod2012/)

For details on modelling courses, workshops or other events please contact Guenter Langergraber (Guenter.Langergraber@boku.ac.at).

Standard Notation

The TG continues to promote the use of the standard notation proposed by Corominas et al (2010) <http://www.iwaponline.com/wst/06104/wst061040841.htm> in order to facilitate clear communication in describing process models. Model developers and model users are strongly encouraged to use the

notation.

GMP Website (<https://iwa-gmp-tg.cemagref.fr/>)

Our website is continuously updated and now contains plenty of material for downloading. For instance it includes error-checked and corrected Gujer Matrices for 7 published models.

Recent publications of the GMP group

For a list of recent publications with GMP contributions please visit our website (<https://iwa-gmp-tg.cemagref.fr/literature-and-downloads>).

More information

For more information see our website: <https://iwa-gmp-tg.cemagref.fr/> or contact the Task Group Chair, Leiv Rieger, rieiger@envirosim.com.

Task group on ‘the use of water quality and process models for minimizing wastewater utility greenhouse gas footprints’

The ICA SG supported Task Group GHG has been very active in the last year. Focused on modelling N₂O and CH₄ of wastewater systems, the Task Group has held open meetings, presented technical papers, contributed in workshops and seminars at the following events: WWTmod 2010, WWC 2010, Novedar_Consolider Seminar, Water and Energy Conference, and the Nutrient Recovery and Management 2011 Conference. The TG has created a global network of researchers and practitioners and has begun engaging them for demonstrating cases, performing modelling experiments, collecting and sharing data, and most importantly for building consensus on models, tools, and methodologies. Ultimately the work will be compiled in a Scientific and Technical Report due in early 2013 and will include consensus-based and peer-reviewed models, similarly to efforts from other Task Groups for the development of models such as the IWA Activated Sludge and Anaerobic Digestion Models. The TG has also formed a collaboration with the Water Environment Research Foundation (WERF) and has begun calibrating N₂O models using lab-scale and full-scale WWTP data. The TG is also currently working on a plant-wide modelling and GHG benchmarking case. The TG GHG is organizing an N₂O and CH₄ modelling workshop at the upcoming Watermatex Conference in San Sebastian. More on the TG GHG can be found on their website <http://www.iwataskgroupghg.com/>. Please do not hesitate to contact them for more information or for collaboration opportunities.

Work Group on Real-time Control of Urban Drainage Systems (RTCUDS)

Upcoming activities of the RTC WG

- Completion of the WG web sites including: an exhaustive literature review on RTC for UDS, links with different sites related to the domain, and news related to the main activities currently in progress in Worldwide.
- Organisation of the for the 8th RTC Workshop on Real Time Control of Sewer Systems. Various possibilities are currently explored, including ICUD in Porto Alegre (2011) and Watermatex in San Sebastian (2011). At this time, it seems that Porto Alegre would be a good platform to organize an RTC workshop or a special session on RTC for sewer systems. Watermatex would be a nice opportunity to organize a second joint workshop with the ICA SG.
- Survey to verify the level of interest among various potential clients, including municipalities, companies, and universities, on a course on Real Time Control for Urban Drainage System
- Organisation of a special issue on RTC for sewer systems in the Urban Water Journal
- Production of a newsletter for the Work Group so that all members of the RTC community have easy access to the latest news in the field.

More information

Chairman: Dr. Martin Pleau, BPR CSO, Quebec City, Canada;

Phone: 001-418-871-8151, Fax: 001-418-871-9569, E-mail: Martin.Pleau@bpr-cso.com.

Secretary: Dr. Dirk Muschalla, ITWH, Hanover, Germany;

FORTHCOMING ICA-RELATED CONFERENCES

Note: all the forthcoming IWA conferences are listed on the IWA website
http://www.iwahq.org/Home/Events/IWA_events/

Automation in Water Quality Monitoring Conference (AutMoNet2011), 18-21 September 2011, Querétaro, Mexico.

The Automation in Water Quality Monitoring (AutMoNet) Conference series is dedicated to the whole range of sensor and monitoring technologies and their applications on the whole water cycle, including sewers, wastewater treatment plants, drinking water plants and distribution networks.

The AutMoNet conferences have been held twice in Vienna, Austria (2002 and 2004), and a third time in Ghent, Belgium (2007). Now it will take place in the beautiful colonial city of Querétaro, Mexico (<http://www.queretaro.travel>), its first incursion outside Europe, right after the Independence Day festivities in Mexico, September 18-21, 2011.

The city of Santiago de Querétaro is the capital of the state of Querétaro, conveniently located in Mexico's geographical center, 200 km northwest of Mexico City. It is the fastest growing state in Mexico with respect to industrial and agricultural development, with over 13 large industrial parks near its capital city, leading the country in many economical aspects. This has a profound impact in the standard of living, being one of the safest and best located places to live in Mexico. Furthermore, it is also becoming a hub for science and technology, with several universities and centers doing top-level research on a wide variety of topics.

The conference will take place at the Juriquilla campus of the National University of Mexico (UNAM), the largest and top-ranked university in Latin America. Accommodation can be found nearby in a former hacienda and transportation to and from the conference will be provided.

During the conference, ample time will be given to oral presentations and keynote presentations, favouring fruitful discussions about the state of the art in instrumentation, sensor and monitoring technologies. Conference themes include leading-edge sensor technology, the design of monitoring systems, data to information transfer and successful end-user applications. It will include a technical exhibition and poster sessions. The conference considers also a technical visit to the place where the first vineyards were established in the Americas.

Paper submission for full papers has been closed.
Notification of acceptance: 31 May, 2011
Final paper submission: 4 July, 2011
Website: <http://eventos.iingen.unam.mx/AutMoNet2011>

Watermatex 2011, 8th IWA Symposium on Systems Analysis and Integrated Assessment, 20-22 June 2011, San Sebastian, Spain

The Watermatex symposium focuses on general approaches to solving a wide range of water-related problems within an interdisciplinary framework that relies very much on different types of models. While methodology-focused, the symposium's contributions of course extend to applications, but then are not restricted to any single discipline; it deals with problems in sewer systems and water treatment, surface and groundwater, technical and natural systems. Integrated Assessment aims at bringing all aspects of a problem together, and it is particularly concerned with such issues as the social and economic impacts of

solutions to these problems.

Watermatex aims at promoting the application of mathematical methods for modelling and simulation, data management and system identification within a wide spectrum. It targets people from research, consulting companies, institutions and operators to think along the use of models and computing tools to support the understanding, management and optimization of water systems.

The conference relies on 66 oral presentations and 60 poster presentations about different topics, being: Mathematical modelling, Numerical methods and software, Uncertainty analysis and risk assessment, Automatic control, Environmental impact and LCA, System identification, System analysis and optimisation, Time series analysis and forecasting, Signal processing, Integrated assessment and Model-based benchmarking.

In the context of the Watermatex 2011, 3 workshops and special sessions will be held:

- *Modelling Issues for Integrated Assessment and Water Resources Management of River Basins*. Organised by Geoff Podger, Stefano Marsili-Libelli, Suzanne Pierce and Tony Jakeman.
- *The Use of Water Quality and Process Models for Minimising Wastewater Utility Greenhouse Gas Footprints*. Organised by the IWA Task Group on Greenhouse Gases.
- *The Role of Calibration and Validation in Wastewater Modelling*. Organised by the IWA Task Group on Good Modelling Practice – Guidelines for Use of Activated Sludge Models (GMP).

Abstract submission has been closed.

Final paper submission: 15 May 2011

Website: <http://www.watermatex2011.org/>

LET 2011, 8th IWA Leading-Edge Conference on Water and Wastewater Technologies, 6 - 10 June 2011, Amsterdam, The Netherlands

The annual leading-edge conference on water and wastewater technologies is focused specifically on advances and development in water and wastewater technologies.

The plenary sessions with invited speakers on day one of the conference will focus on:

- International Perspective on Sustainable Urban Water: Emerging Challenges and Opportunities
- Leading Science and Technologies for the Cities of Tomorrow

The platform presentations on day two and three fit within the following topics:

- Novel Materials and Emerging Approaches for Water Purification and Reuse
 - Water and Wastewater Treatment Technologies for Developing Countries
 - Emerging Opportunities for Ion-Exchange
 - Technologies in Alternative Water Sources
 - Desalination Biological Treatment of Drinking Water
- Opportunities and challenges in wastewater treatment technology
 - Water, Energy & Climate Change
 - Innovative Wastewater Treatment Technologies
 - Micro-Algal Systems
 - Emerging Contaminants - Which Ones Truly Emerged?

Website: <http://let2011.org/>

18th IFAC world congress, 28 August – 2 September 2011, Milano, Italy

The World Congress of the International Federation of Automatic Control (IFAC) is the forum of excellence for the exploration of the frontiers in control science and technology, attended by a worldwide audience of scientists and engineers from academy and industry. It offers the most updated and complete view of control techniques, with the widest coverage of application fields.

Website: <http://www.ifac2011.org/index.html>

Conference on Design, Operation and Economics of Large Wastewater Treatment Plants, 04-08 September 2011, Budapest, Hungary

This conference will focus on:

1. Overall case studies of large treatment plants
2. Design of (large) treatment plants, including
 - simulation and modelling for process optimisation
3. Operation of (large) treatment plants, including
 - simulation and modelling for process optimisation
 - instrumentation, control and automation
4. Sludge handling and its effect on wastewater treatment
5. Costs and economics
6. Advanced technologies for wastewater treatment

Additionally workshop or workshops are planned to be part of the programme.

Paper submission has been closed.

Deadline for early registration: 20 June 2011

Website: www.lwwtp2011.org

4th specialized conference on odours and VOCs, 17-21 October 2011, Victoria, Brazil

The IWA Conference on Odours and VOCs brings together experts, researchers and professionals from universities and industrial and agricultural sectors around the world. Volatile organic carbons (VOC's) include many of the odorants that can cause odour annoyance around sewerage systems and wastewater treatment facilities. Controlling odour emissions is in many cases essential in view of continued usage of a facility, in terms of citizen acceptance. Topics dealt with at this conference include measurement, regulation and control techniques for odours and VOCs.

The last IWA Conference on Odour and VOCs took place in Barcelona from 7th to 10th October 2008. This conference of the IWA Specialist Group on Odour and Volatile Emissions followed the Conferences held in Sydney 2001 and in Singapore 2003, More than 220 professionals and specialists from all over the world involved in the characterization and management of odours and VOCs attended the last conference in Barcelona. With more than 60 papers and more than 30 posters, the conference focussed on odour measurement using olfactometry methods, evaluation of odour control additives, odour management, control techniques for treatment and abatement of odorous emissions, odour characterisation using field panels and odour dispersion modelling, sampling, VOC and odorant measurement, and others. Several papers have been published in IWA Journals (WST, WPT). 32 contributions are published in issue 31 of the book series of the Department of Sanitary and Environmental Engineering (DESEE), University of Kassel, Germany, see www.uni-kassel.de/fb14/siwawi, where this issue can be read online. Contact: Prof. Franz-Bernd Frechen, DESEE, frechen@uni-kassel.de (full contact details see above webpage), Chair of the IWA SG on Odours and Volatile Emissions.

In 2011, Victoria, Brazil, will host the fourth edition of this conference.

The submission site has been closed on 8 March 2011

Notification of acceptance: 8 July 2011

Submission of revised full papers: 1 August 2011

Website: www.iwa2011odour.com

IWA Urban Water Solutions Congress: Pioneering innovation for development 21 Nov - 24 Nov 2011, Kuala Lumpur, Malaysia

Low and middle income countries face un-precedented challenges to supply water and sanitation services to their citizens and manage urban waters wisely. Yet, tackling these challenges also provides them with significant opportunities to innovate, strengthen service provision and create new businesses.

The Urban Water Solutions Congress aims to accelerate the uptake of these innovations to have impact at scale. It does so by bringing together utilities, NGOs, technology suppliers, decision makers, scientists and engineers to share, debate and learn about pioneering solutions to urban water challenges.

For more information, please visit www.iwa2011kl.org.

Registrations will open in mid-May.

**WWTmod 2012, 3rd IWA/WEF Wastewater Treatment Modelling Seminar,
25 March – 27 March 2012, Mont-Sainte-Anne, Quebec, Canada**

The third in this highly successful series of modelling seminars will again be held in Mont-Sainte-Anne, Quebec, Canada. This seminar brings together the world leaders in the application and development of wastewater treatment process models to help guide the directions of where model capability is being developed, and how these models are being applied in practice.

Contact Bruce Johnson (bruce.johnson2@ch2m.com) for further information

World Water Congress, 16-21 September 2012, Busan, Korea

The IWA World Water Congress & Exhibition is a high-profile international event that attracts 5,000 water professionals, companies and institutions from across the globe. It is the only truly global event of its kind and covers every aspect of the water cycle. The event presents global best practice, innovative research and policy developments in the global water sector and provides direction and solutions to challenges faced by water professionals worldwide. It also engages with the dynamics of the water sector and its interfaces, including urbanisation, climate change and energy. The key themes and topics that will be discussed are the following:

- Science and application of water management
- Water, climate and energy
- Cities of the future
- Managing utilities and their assets
- Securing new and traditional water resources for the future
- Water, ecosystems and catchments
- Water and health

Website: www.iwa2012busan.org

REPORTS OF PAST ICA-RELATED CONFERENCES

DIPCON 2010, 14th IWA Conference on Diffuse Pollution and Eutrophication, 12-17 September 2010, Québec, Canada

In September 2010 the Diffuse Pollution Specialist Group organised the 14th International Conference on Diffuse Pollution and Eutrophication (DIPCON) in Mont-Sainte-Anne, Quebec, Canada. More than 200 delegates from 32 countries participated in the conference with approximately 200 scientific presentations published in the Book of Abstracts. The sessions covered major diffuse pollution issues in agriculture, nutrients and ecological targets, urban and roads, integrated watershed management, economics, modelling and monitoring, and ground- and surface water interactions. Keynote and invited speakers presented and discussed their insights in plenary sessions and open workshops.



Figure 1. During the DIPCON 2010 technical tour, the diffuse pollution group visited constructed wetlands designed to filter waste waters from a dairy farm, buffer strips and sediments retention ponds developed to mitigate agricultural pollution in a small watershed.



Figure 2. The DIPCON 2010 delegates canoeing on the Saint-Charles River and boating on the Lake Saint-Pierre world biosphere marshes, in the famous Saint-Lawrence River Basin between Quebec and Montreal.

Conference outline papers and proceedings are available on the conference website <http://www.dipcon2010.org>. The DIPCON 2010 Technical Committee is currently editing science content and discussion summaries of the Conference Program and an Editorial Committee is selecting, reviewing and editing full articles submitted by keynote/invited and program speakers for an OECD-CRP sponsored Proceedings Book to be published in 2011. Six workshop summaries will be published in Water21 in the future.

A representative of the Diffuse Pollution Specialist Group has been invited to present lessons learned from diffuse pollution policy issues in agriculture at the open forum organised by the OECD Co-operative Research Programme in Paris on December 3rd, 2010.

The next DIPCON conference will held be 18 – 23 September 2011 in Rotorua, New Zealand.

ICA PEOPLE ON THE MOVE – OPEN POSITIONS

Are you looking for an ICA professional in your company or institute? Feel free to send these vacancies to the Newsletter editor for announcement in the next issue of our Newsletter.

Ph.D. THESES DEALING WITH ICA

All PhD students and their supervisors around the world are invited to contribute to this section of our next Newsletter by sending an abstract of maximum one page and, if possible, details on how to get hold of a copy of the thesis.

Anaerobic digestion modelling by a thermodynamic approach.

Juan-Rodrigo Bastidas-Oyanedel

Place and date of defence: INRA-LBE, 24 February 2011

Main supervisor: Dr. Jean-Philippe Steyer

Involved researchers: Dr. Damien Batstone (UQ Australia), Dr. Robbert Kleerebezem (TUD - The Netherlands) and Dr. Gonzalo Ruiz (PUV - Chile)

This thesis deals with thermodynamic based modelling of metabolic shifts during acidogenic fermentation. Acidogenic fermentation is an anaerobic process of double purpose: while treating organic residues, it produces chemical compounds, such as hydrogen, ethanol and organic acids. Therefore, acidogenic fermentation arises as an attractive biotechnology process towards the biorefinery concept. Moreover, this process does not need sterile operating conditions and works under a wide range of pH.

Changes of operating conditions produce metabolic shifts, inducing variability on acidogenic product yields. In order to study these metabolic shifts, an experiment design was based on reactor headspace N₂-flushing (gas phase) and pH step changes (liquid phase). A major result was the hydrogen yield increase from 1 to 3.2 (mol_{H₂}·mol_{glucose}⁻¹) at pH 4.5 and N₂-flushing of 58.4 (L·d⁻¹). This yield is close to the theoretical acidogenic value (4 mol_{H₂}·mol_{glucose}⁻¹).

The thermodynamic model, based on the assumption that acidogenic fermentation is characterised by limited energy available for biological process, allowed to explain the mechanisms that govern hydrogen metabolic shifts, showing that the synthesis of extra hydrogen, *i.e.* yield of 3.2 (mol_{H₂}·mol_{glucose}⁻¹), was due to reverse H₂/NAD⁺ redox reaction, which is thermodynamically feasible at low hydrogen partial pressures (*e.g.* 0.02 bar). Moreover, low hydrogen yields were explained by the action of homoacetogenesis hydrogen consuming reaction. However, the model was not capable to explain the metabolic shifts of acetate, butyrate and ethanol on acidogenic glucose fermentation.

ASM-type Biokinetic activated sludge models:

Theoretical and functional analysis, towards a default parameter set

Hélène Hauduc (helene.hauduc@gmail.com)

Supervisors: Dr. Sylvie Gillot (Sylvie.gillot@cemagref.fr) and Prof. Peter Vanrolleghem (peter.vanrolleghem@gci.ulaval.ca)

Place and date of defense: Université Laval (Québec, Canada), 2 November 2010.

Download: <http://cemadoc.cemagref.fr/cemoa/PUB00031093>

Mathematical modelling of activated sludge systems has become a widely accepted tool and is used in particular for optimization and upgrading of existing plants and for new facilities design, either by engineering and consulting companies, or university and research centres. Ensuring the adequate quality of modelling results is therefore essential. However, an international survey conducted among 96 potential users of activated sludge models (ASM) pointing to two main obstacles to the use of modelling: the selection of the model to use among the available models and the model calibration. The objective of this work was to provide elements to overcome these obstacles and to promote the wider use of biokinetic models for activated sludge systems. It focused on seven published models: (1) ASM1, (2) ASM2d, (3) ASM3, (4) ASM3+BioP, (5) ASM2d+TUD, (6) Barker & Dold and (7) UCTPHO+.

First, an analysis of **practical knowledge** on the models was performed to improve the transfer of modelling knowledge. A database of practical modelling applications from published case studies and from the answers of a questionnaire sent to model users was created. This database enables to establish ranges of parameter values commonly used for the ASM1 and ASM2d.

Then the **theoretical knowledge** on ASMs was analysed to help users to better understand the seven studied models and to select the model most appropriate to their project. The studied models were first verified and typing errors and inconsistencies have been corrected. The modelling concepts were compared to each other through a new graphical representation, and confronted with knowledge about the biology of activated sludge, in order to highlight the theoretical limits of each model.

Finally, a methodology has been developed to obtain **default parameter values** that could be used as initial values for model calibration. To this end, an automated calibration procedure that allows calibration on multiple data sets was proposed. Then, the quality criteria used in environmental

sciences have been synthesised. These criteria are required to determine the best set of parameters based on the goodness-of-fit of the model and to compare results from different models.

Integrated dynamic modelling of the fate of organic priority pollutants in the urban wastewater system

Veerle Gevaert (Veerle.Gevaert@biomath.ugent.be)

Place and date of defence: Ghent University, (Ghent, Belgium) 2nd of July 2010

Supervisors: Prof. dr. Bernard De Baets and dr. ir. Frederik Verdonck

Download: <http://biomath.ugent.be/~vgevaert/drukker/>

The presented work is situated within the context of the Water Framework Directive (WFD). This EU legislation, adopted in 2000, has the objective of a catchment-oriented water quality protection for all European waters with the purpose of achieving a good status by the year 2015. For surface water, this means that both the ecological and chemical quality status must be at least 'good'. To that end, necessary measures should be identified and implemented, with the aim of progressively reducing pollution from priority substances (PSs), and ceasing or phasing out emissions, discharges and losses of priority hazardous substances.

An integrated, dynamic model of the urban wastewater system was developed, with which different emission reduction strategies can be tested before they are implemented in practice. The presented model was designed to be capable of predicting simultaneously the fate of traditional pollutants (nutrients, suspended solids, etc.) and organic priority pollutants (PPs). The term 'priority pollutants' was defined within the EU project ScorePP, and covers the priority substances (WFD), the eight emerging pollutants (Directive 86/280/EEC), some metal derivatives, and some substances with a unique CAS number but no unique number on the EU lists. The integrated urban wastewater system (IUWS) is composed of different coupled entities, i.e. sources, urban catchment surface (run-off/infiltration), sewer system, stormwater treatment unit, wastewater treatment plant (WWTP) including sludge handling, and receiving surface water (river).

The first step in the construction of an integrated, dynamic model was the development of unit fate models, each representing a part of the IUWS. Several dynamic models are available in literature. However, they are mainly focusing on the removal of traditional pollutants. To be able to simulate simultaneously the fate of traditional and organic priority pollutants, these models had to be extended with an organic pollutant fate sub-model. The implementation of the unit fate models was done in the simulation platform WEST (MOSTforWATER nv., Kortrijk, Belgium). This dissertation focused on the following IUWS components: physical (rapid downow sandfilter) and chemical (phosphorous precipitation) treatment units (of WWTP); sludge treatment options (gravity thickener; mesophilic anaerobic digester; and belt filter press, solid bowl centrifuge and air drying beds); and receiving surface water (river). For each of them, state-of-the-art dynamic models were selected from literature and then extended with an organic pollutant fate sub-model. The development of the organic pollutant fate sub-models required the identification of the relevant organic PP fate processes in each IUWS component. The mathematical equations for those processes were implemented in the relevant unit fate models.

Secondly, connector models (so-called transformers) were developed to facilitate the linking between the state variables of the different unit fate models.

Furthermore, an integrated, dynamic model needs dynamic input data comprising of rainfall measurements; time series for the quantity of organic priority pollutant on the urban surface, in the dry weather flow and direct river discharges; dry weather flow time series for water and traditional pollutants, etc. A stand-alone application was built, which is capable of generating time series for releases towards different receiving compartments (sewer system, urban surface, river, etc.) according to pre-defined release pattern vectors, based on phenomenological modelling of a number of emission

generating events and optionally incorporating stochasticity. Each release pattern vector is composed of four sub-patterns, representing daily, weekly, yearly and multiyearly variation in the release profile.

Finally, the aforementioned developments (dynamic model input generator, unit fate models and connector models) were used to construct an integrated, dynamic model of a semi-hypothetical case study. For each IUWS sub-system, unit fate models were selected which were coded into the model base of WEST. The linking between them was possible by selecting the right connector model from the model base. The organic priority pollutant, DEHP, was selected as modelling compound, for which dynamic release profiles were generated with the dynamic model input generator.

This model was then used to predict the fate of DEHP in each IUWS sub-system. As such, the performance of the IUWS could be assessed based on the river water quality status. The simulation results also allowed to evaluate the importance of each fate process in the IUWS sub-systems by performing a model process sensitivity analysis. A technique facilitating such analysis was developed within this dissertation. Furthermore, the model was used to test eight scenarios. The simulation results revealed that avoiding pollution from PP releasing sources was the most effective measure in terms of river water quality improvement for DEHP (annual average and spikiness reduction) and PP concentration in the disposed WWTP sludge.

It can be concluded that dynamic modelling tools are very useful in the WFD context, as they allow to check compliance of the priority pollutants' river concentrations with both types of environmental quality standards (the maximum allowable concentration, MAC-EQS, and the annual average value, AA-EQS). Furthermore, these models can be used to test different emission reduction strategies. Subsequently, the river water quality status can be studied (annual average and spikiness of the concentration profile) and evaluated by comparison with the existing situation. Testing different measures before their actual implementation in real life can help to make better choices in terms of resources, and as such costs can be saved.

PUBLICATIONS (BOOKS – REPORTS)

- Vanrolleghem P.A. (2010) *Integrated Assessment for WFD implementation: Data, economic and human dimension - Volume 2*. IWA Publishing, London, UK. ISBN 9781843393269.

Titles already described in previous editions of this Newsletter

- Updated Nutrient Control Design Manual for municipal wastewater treatment facilities. U.S. Environmental Protection Agency (EPA). Publication date: August 2010. Direct download link: <http://www.epa.gov/nrmrl/pubs/600r10100/600r10100.pdf>
- Biological Wastewater Treatment – Principles, Modelling and Design. M. Henze, M. C. M. van Loosdrecht, G.A. Ekama and D. Brdjanovic (Editors). Publication Date: 02 Sep 2008 • ISBN: 9781843391883, Pages: 528 • Hardback
- Advanced Environmental Monitoring. Kim, Young J.; Platt, Ulrich (Eds.) 2007, XXII, 422 p. ISBN: 978-1-4020-6363-3.
- Automation and Control Solutions in the European Water and Waste Water Sector. Frost & Sullivan, January 2007, Pages: 117
- European Pumps in the Water and Waste Water Markets. Frost & Sullivan, September 2006
- A New Standard for: Specification and Testing of Online Sensors/Analysers. The standard is available at www.iso.org or possibly at national standardization organizations.
- Instrumentation, Control and Automation in Wastewater Systems. IWA Scientific & Technical Report No. 15. G. Olsson, M. Nielsen, Z. Yuan, A. Lynggaard Jensen and J.-P. Steyer (2005). IWA Publishing. ISBN: 1 900222 833. Pages: 246. Paperback. Publication Type: Books.
- Role of ICT in future operation of wastewater treatment plants Foundation for Applied Water Research (Stowa), Report 2003-03. ISBN: 90.5773.206.8. (In Dutch.)
- Dynamical Modelling & Estimation in Wastewater Treatment Processes. ISBN: 1 900222 507. D.

Dochain and P. Vanrolleghem (2001) Publication Date: December 2001. Pages: 360. Hardback. Publication Type: Books.

MULTI-NATIONAL PROJECTS

Ongoing projects

- ADD-CONTROL project (7th Framework programme, June 2009 to 2011).
More information: Eduardo Ayesa Iturrate, Director of Environmental Engineering Department, CEIT - IK4 Research Alliance, Paseo de Manuel Lardizabal, 15, 20018 San Sebastián, SPAIN, Tel: +34 943 212800 (Ext. 2215), Fax: +34 943 213076,
<http://www.ceit.es> or <http://www2.mostforwater.com/addcontrol/>
- AquaFit4use (7th Framework programme, June 2008 – May 2012).
Coordinator of the Project: Willy van Tongeren (willy.vantongeren@tno.nl), TNO, The Netherlands.
Coordinator of the Working Package 2 “Modeling, monitoring and automation in industrial water systems”: Dr. Paloma Grau (pgrau@ceit.es), CEIT, Spain.
http://www.aquafit4use.eu/mainmenu/about_aquafit4use.html
- NOVEDAR_Consolider (November 2007 -).
Coordinator of the Project: Prof Juan Lema (jmlema@usc.es), University of Santiago de Compostela, Spain. Webpage: <http://www.novedar.com/en/default.asp>. Coordinator of the Working Package 6 “Integrated Modelling and Control”: Dr. Eduardo Ayesa (eayesa@ceit.es), CEIT, Spain.

FEATURED ARTICLE

Readers are invited to contribute to this section of our next Newsletter by sending an article of about 2 pages. This featured article is typically of a practical nature.

The following article has been published in the Water & Sewerage Journal, 2010(4), 33-35 and is reproduced here with kind permission of the publisher:

More info on the Water & Sewerage Journal: <http://www.waterjournal.co.uk/ebook/>

Instrumentation, control and automation in urban water management – state-of-the-art and future perspectives

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ABSTRACT

Providing safe and sufficient water to the public is a major and also international challenge. To tackle this challenge and to operate our urban water infrastructure in the most efficient way, instrumentation, control and automation (ICA) is a key aspect of process operation and design. In this editorial, the ICA Specialist Group of the International Water Association (IWA) sheds some light on the current practice and limitations of ICA in different sub-domains of the urban water system, followed by some personal perspectives.

CURRENT STATUS OF ICA

Instrumentation, control and automation (ICA) is nowadays a recognised area of technology in urban water management. The progress made over the last decades has been made possible by advances in instrumentation technology (sensors and actuators) and the development of advanced mathematical models and their implementation in commercial simulators, accompanied by an exponential increase in the available computing power (Olsson et al., 2005).

Starting from hydraulic sewer models and a focus on the activated sludge processes at WWTPs, the model boundaries are more and more expanded from unit processes to system-wide perspectives: Sewer models now include water quality parameters, WWT whole plant models (such as the Benchmark Simulation Model No. 2 (BSM2), see Gernaey et al., in press) are used in daily engineering practice (Rieger et al., 2010) and river water quality modelling is finding its way into practice as well. This trend will allow an integrated view at the whole urban water cycle and will certainly lead to a better understanding of these systems and consequently to a more efficient use of public infrastructure.

Wastewater treatment plants (WWTPs)

The degree to which ICA is installed at current WWTPs depends on the geographic region, effluent requirements, the complexity of plant design, and the size of the plant. The increased research interest for controlling WWTPs in the last 20 years, as reflected by the number of related publications and citations found in Web Of Science (Fig. 1) has resulted in an increasing amount of control implementations in practice. It can reasonably be expected that the need for ICA will further increase in the near future as i) the effluent standards become more stringent and ii) the pressure on public budgets makes it necessary to make our infrastructure more efficient.

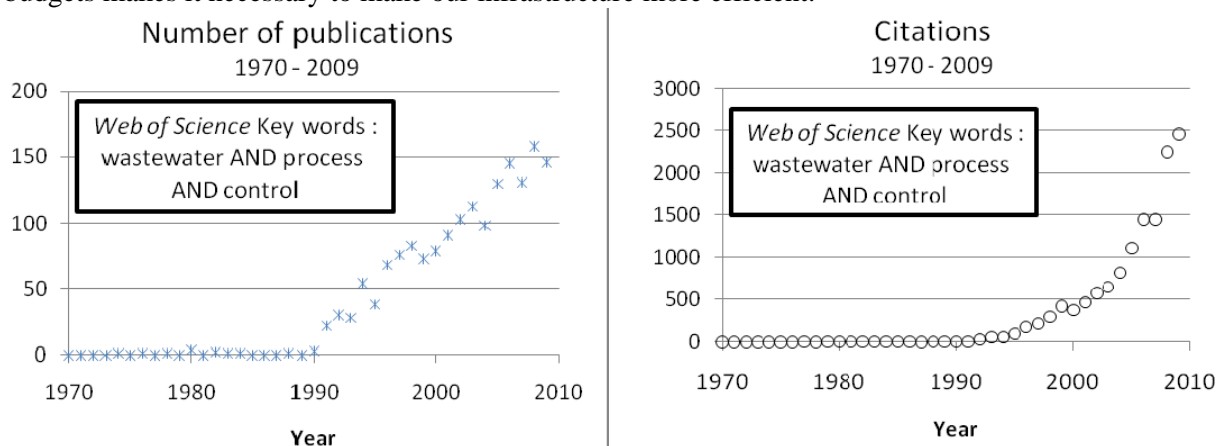


Figure 1: Evolution of research interest for process control in wastewater treatment over the last 30 years

An overview of current sensor techniques, related to their application for monitoring and control in WWTPs, is given in Table 1. The most powerful control handle at WWTPs is aeration, which contributes for up to 60% to the total energy consumption of a plant. Whereas a worldwide majority of plants are still operated with no control (fixed airflow), most plants in Europe apply at least basic DO control. A clear trend is seen towards multi-DO probe control systems or even cascade control configurations in which the airflow is adjusted based on ammonia or nitrate probes.

Table 1: Objectives of control versus measuring principles for WWTPs (adapted from NEPTUNE, 2010)

Objective	Ex-situ (on-line, via bypass loop)					In-situ (on-line, directly in media)					
	Ammonia Colorimetric, IC, GS Electrode	Nitrate, nitrite Colorimetric, IC, UV	Ortho-Phosphate Colorimetric, IC	P-total Thermal chemical oxidation + colorimetric	TOC, DOC, COD, BOD	Dissolved oxygen membrane or optical electrode	Turbidity, TSS, Sludge blanket level in sec. clarifier	pH, redox, conductivity	Ammonia Ion sensitive electrode (ISE)	Nitrate, nitrite UV, Ion sensitive electrode (ISE)	Organic compounds UV/VIS
Inf	Load monitoring				X		X	X	X		X
	Equalization of load										
1ary eff	Load monitoring				X		X	X	X		X
	Aeration control					X			X	X	
AS	RAS, internal recycle	X	X							X	
	WAS control/monitoring						X				
	P precipitation			X							
	Dosage of carbon source		X							X	X
Eff	Monitoring	X	X	X	X	X	X	X	X	X	X
	Control of P precipitation			X	X						

GS: Gas Sensitive, IC: Ion Chromatography, UV/VIS: Ultraviolet-visible optical measurement, TSS: Total Suspended Solids, Inf: Raw influent, 1ary eff: Effluent of primary clarifier, AS: Activated Sludge reactor, Eff: Effluent.

Despite a wide range of monitoring techniques, related to multiple control variables, current WWTPs still suffer from limited controllability. This is caused by (i) static design for maximum load and worst case conditions or (ii) through a lack of actuators (valves, pumps or compressors) with sufficient control power. Another topic still unresolved is the monitoring of the data quality. Automatic data evaluation is a prerequisite for robust and fault tolerant control and is getting more and more attention in research.

Sewers – storm tanks

ICA in sewer systems is often confronted with difficult conditions caused by a high variability in flow rate and pollutant concentrations, a corrosive atmosphere, explosion risk, deposition and erosion of sediments and a general problem of accessibility. All this puts high demands on the used sensors and actuators, the applied control algorithm and the required strategy to avoid control disasters caused by sensor failure.

In contrast to WWTPs, ICA in sewer systems predominantly deals with flow rates and water levels so far. Although still limitations exist to provide robust and reliable online measurements that can be used for more advanced control, new sensor technologies and measurement methods seem able to overcome these constraints. For example, newly presented flow meters can deal with a high variability of flow rates and with different flow conditions. For pollutant-based control, temperature and conductivity are promising indicators for the dilution process of wastewater that occurs after the onset of a storm event. A new application is to use online probes such as UV-VIS (Fig. 2; Gruber et al., 2006) for pollution-based control. One possibility is to use online TSS-measurements to decide whether storm-water can be discharged into the next receiving water body or should be directed to the WWTP. In developed countries, a trend is the integrated control of sewer system and treatment plant, which is an effective approach for the optimal utilization of existing infrastructure. First implementations can be found e.g. in Denmark and Germany. Besides, to protect the sewer infrastructure, the control of hydrogen

sulphide (H_2S) formation in sewer systems to prevent corrosion of the concrete is currently gaining a lot of attention. In developing countries, where infrastructure still needs to be built up in the future, control is only one approach beside others that should be taken into consideration weaved into an integrated water resources management.



Figure 2. UV/VIS s::can® spectrometer installed in swimming pontoon in a combined sewer overflow structure in Graz. The sensor is always located in the top water layer and subsequently measures the water quality, which is discharged at the overflow weir during storm flow conditions. Measured parameters are COD_{eq} , $T(D)OC_{eq}$, TSS and NO_3-N_{eq} . Picture shows probe after storm-water event. © G. Gruber, TU Graz

CONCLUSIONS AND PERSPECTIVES

The accuracy and reliability of on-line sensors improved dramatically over the last decade and the trend to in-situ probes has triggered more and more implementations of process control strategies. However, sensors still represent a main limitation for further spread of real-time control. Automatic data quality evaluation algorithms are under development but were tested unreliable so far (NEPTUNE, 2010; Corominas et al., in press). However, data quality evaluation and quantification of the uncertainty (Nopens et al., 2007) are key aspects for robust control. Challenges for the future consist in the development and implementation of fault-tolerant control, where the control strategy is selected based on availability and quality of measurements.

While the current focus is typically on controlling unit processes, the future clearly lies in considering the wastewater treatment plant or even the integrated urban wastewater system as a whole. Hydraulic controls in sewers, serving as a buffer for the subsequent WWTPs and allowing for flexible maximum inflow rates to the WWTPs demonstrates this evolution. Future control objectives to achieve lower nutrient effluent standards and the removal of micro-pollutants, and moreover a paradigm shift from effluent standards to water-quality oriented criteria are expected to drive the evolution towards integrated control.

ACKNOWLEDGEMENTS

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Olsson G., Nielsen M. K., Yuan Z., Lynggaard-Jensen A. and Steyer J. (2005). Instrumentation, Control and Automation in Wastewater Systems. IWA Scientific and Technical Report no. 15. IWA Publishing, London, U.K, 246 p.

Rieger L., Takacs I., Shaw A., Winkler S., Ohtsuki T., Langergraber G. and Gillot S. (2010). Editorial: Status and future of wastewater treatment modelling. Water Science & Technology, 61(4), 821–823.

ICA-RELATED URLs

Associations

<http://web.tiscali.it/RTCUSD>

<http://www.atv-dvbk.de>

<http://www.ercim.org/telemac>

<http://www.instrument.org>

<http://www.ftns.wau.nl/mt/iawqstrproject/index.htm>

<http://www.ifac-control.org>

<http://www.isa.org>

<http://www.iwahq.org.uk>

<http://www.swig.org.uk>

<http://www.wef.org>

Modelling software companies

<http://www.envirosim.com>

<http://simba.ifak.eu/>

Instrumentation and Control Companies

<http://www.anaerocontrol.com>

<http://www.applitek.com>

<http://www.danfoss.com>

<http://www.conducta.endress.com>

<http://www.endress.com>

<http://www.envirotech-online.com>

<http://www.hach.com>

<http://www.kruger.dk>

<http://www.microlan.nl>

<http://www.onlinemonitoring.nl/>

<http://www.product-search.co.uk>

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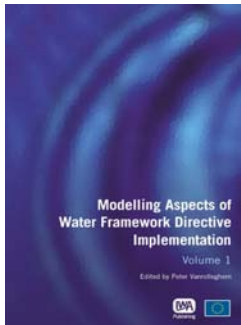
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Zoran Vojinovic and Michael B. Abbott

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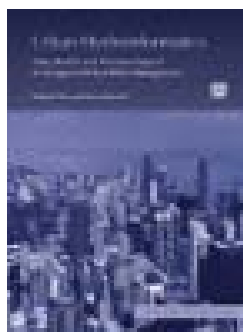
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Urban Hydroinformatics: Flood Risk Mitigation is the second book in a series of **Urban Hydroinformatics** books and it is concerned with the transformation of urban flood management culture from a 'techno-economic' one to a 'socio-technical' one, that is, one that extends the technical aspects into their more general social environments. The book examines different drivers of urban flood risks and it focuses on the way in which social and technical aspects are understood and introduced, from the planning and design stages of urban drainage assets, through their construction, operation and rehabilitation, to early warning and disaster risk management. It covers the flow of information that starts from the acquisition and analyses of various kinds of data, passes through the instantiation of numerical models and analyses of hazards and vulnerabilities, and ends within the decision making processes in which the current more traditional technical environments are transformed into more complete sociotechnical environments, with increasingly active stakeholder involvements that have the capacity, if properly executed, to provide states of social justice.

Although this book has been written mainly as a text book for post-graduate students who have a strong interest in Hydroinformatics as applied to urban flood risk management, it will also appeal to practising engineers and researchers who are involved in the processes of design, modelling and decision support, who will find it useful as a reference.

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Roland Price and Zoran Vojinovic

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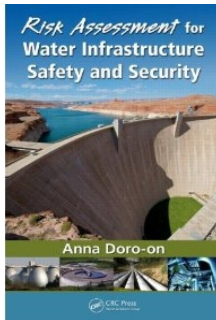
Urban Hydroinformatics: Data, Models and Decision Support for Integrated Urban Water Management is an introduction to hydroinformatics applied to urban water management. It shows how to make the best use of information and communication technologies for manipulating information to manage water in the urban environment.

The book covers the acquisition and analysis of data from urban water systems to instantiate mathematical models or calculations, which describe identified physical processes. The models are operated within prescribed management procedures to inform decision makers, who are responsible

to recognized stakeholders.

The application is to the major components of the urban water environment, namely water supply, treatment and distribution, wastewater and storm water collection, treatment and impact on receiving waters, and groundwater and urban flooding.

Risk Assessment for Water Infrastructure Safety and Security



Anna Doro-on

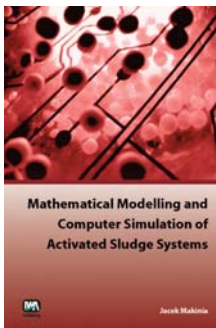
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Jacek Makinia

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