Watermatex 2023

the international water association

SCIENTIFIC PROGRAMME

OF THE 11TH IWA SYMPOSIUM ON

MODELLING AND INTEGRATED ASSESSMENT

23 - 27 SEPTEMBER 2023
QUEBEC CITY, CANADA

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PROGRAMME OVERVIEW

SATURDAY, 23 SEPTEMBER		
08:00-10:00	**Registration**	
Young Water Professionals Workshop **How Do Availability And Quality Of The Data Impact The Way We Model Water Systems? Challenges And Good Practice** **YWP Steering Committee:** Saba Daneshgar (Ghent University, Belgium), Hanna Molin (Lund University, Sweden), Fanlin Meng (Tsinghua University, China), Helieh Abasi (INRS, Canada), Kester McCullough (Cornell University, USA)		
Time	**Topic**	**Presenter/*Moderator***
09:00-09:45	Welcome & Ice breaker activity Introduction to MIA Specialist Group	*S. Daneshgar*
09:45-10:15	Keynote: "Setting the scene"	J.D. Therrien
10:15-10:45	**Coffee break**	
10:45-11:30	Part I: What is "good" data and what can you do with it? Mechanistic modelling perspective Data-driven modelling perspective Hybrid modelling perspective	*H. Molin* B. Elduayen-Echave M. Khalil M. Schneider
11:30-12:00	Q&A and Discussion	
12:00-13:30	**Lunch break**	
13:30-14:45	Part II: Group works on the case studies *Participants work together in groups to find solutions to one of the case studies* Group 1: Case study 1 - Wastewater application Group 2: Case study 2 - Drinking water application Group 3: Case study 3 - Stormwater application	*K. McCullough*
14:45-15:15	Wrap-up	
15:15-15:45	**Coffee break**	
15:45-16:45	Reports on case studies & General discussion	*Organisers*
16:45-17:00	Wrap-up and closing	*S. Daneshgar*
17:00-19:00	**YWP Social Activity**	

PROGRAMME OVERVIEW

SUNDAY, 24 SEPTEMBER	
08:00-10:00	**Registration**
09:00-12:30	**Workshop 1 (Room A)** **How Can Hybrid Modelling Be Used For Model Complexity Reduction?** **Chair/Co-Chair:** E. Torfs, D. Fernandes del Pozo **Contributors:** A. Froemelt, S. Borzooei, S. Daneshgar, C.C. Gómez Cortéz, R. Saagi, J. Sparks, X. Zou, K. Villez, M.Y. Schneider
09:00-17:00	**Workshop 2 (Room B)** **Shedding Light – How Can We Improve Mathematical Models To Promote And Optimize Phototrophic Systems For Water Remediation And Resource Recovery?** **Chair/Co-Chair:** B. Valverde-Pérez, F. Casagli **Contributors:** B.G. Plósz, O. Bernard, J.-P. Steyer, G. Capson-Tojo, J. Laurent, S. Rossi, A. Turolla, E. Ficara, T. Lorenz, U. Theilen, J. García, E. González Flo, D. Batstone
12:00-17:15	**Workshop 3 (Room C)** **How Can Mathematical Modelling Integrate With Wastewater-Based Epidemiology To Enhance Public Health Protection?** **Chair/Co-Chair:** S. Tik, Ll. Corominas **Contributors:** C. Jobin, C. Ort, D. McCarthy, J.-D. Therrien, M.-D. Rioux, M. Wade, P.A. Vanrolleghem, S. Dorner, S. Nourbakhsh, S.C. Aydin, T. Maere, W. Yusuf, W. Rauch
13:30-17:00	**Workshop 4 (Room A)** **From Integrated Modelling To Holistic Decision Frameworks For The Water Sector, What Are The Needs And Challenges For Interoperability?** **Chair/Co-Chair:** S. Daneshgar, E. Torfs **Contributors:** P. Bach, C. Vaneeckhaute, J. Alferes Castano, P. Seuntjens, I. Nopens
17:00-18:00	**Registration** Musée National des Beaux-Arts du Québec (179 Grande Allée Ouest, Québec)
17:30	**Opening Reception and Keynote** **Location:** Musée National des Beaux-Arts du Québec (179 Grande Allée Ouest, Québec) ***Climate Change Drives Market For Urine-Separating Toilets*** **Bruce Beck** (FASresearch and International Institute for Applied Systems Analysis, Austria)

PROGRAMME OVERVIEW

MONDAY, 25 SEPTEMBER			
08:00-10:00	**Registration**		
08:30-10:00	**Opening Session and Plenary Keynote** ***Community Engagement For Water Management Under Uncertainty*** **Elmira Hassanzadeh** (Polytechnique Montréal, Canada) ***Modelling "Palettes" - A New Dawn Of Integrated Assessment To Support Water Management's Role Towards Climate-Adaptive Cities*** **Peter Marcus Bach** (Eastern Switzerland University of Applied Sciences, Switzerland)		
10:00-10:30	**Coffee break**		
	Room A	**Room B**	**Room C**
10:30-12:00	**SESSION 1** **DATA ANALYSIS**	**SESSION 2** **PARTICLES/FLOCS**	**SESSION 3** **FULL-SCALE DIGITAL TWINS**
	1.1. Multivariate Monitoring For Surveillance Networks Of SARS-CoV-2 In Sewage *Ll. Bosch, J. Pueyo,* ***Ll. Corominas***	2.1. Simulating Floc Size Distribution In Coagulation-Flocculation Processes Through Mass-Based Population Balance Models For Integral Modelling of Drinking Water Treatment Plants ***B. Elduayen-Echave****, E. Ayesa*	3.1. Full Scale Digital Twin With Integrated Hybrid Model Predictive Controller For Ammonia Based Aeration Control ***J.A. Sparks****, P.A. Vanrolleghem, C.B. Bott*
	1.2. Water Quality Sensor Data Processing In Applications For Water Management ***N. Desmet****, F. Van Bauwel, L. Brosens, R. Vandeputte, J. Dehaspe, P. Seuntjens*	2.2. Application Of Computer Vision For Microscopy Images: A Revolutionary Approach In Predicting Activated Sludge Settling Characteristics *S. Borzooei, L. Scabini, G. Miranda, S. Daneshgar, L. Deblieck, R. Cornelissen, E. Van Den Broeck, P. De Langhe, O. Bruno, B. De Baets, I. Nopens,* ***E. Torfs***	3.2. MSD's Data Driven Digital Transformation Journey Over 20 Years *D. Tao, O. Fradet,* ***S. Shishegar****, W. Miller, S. Laughlin*
	1.3. Wastewater Generation Model To Predict Impacts Of Urine Separation On Wastewater Treatment Plants ***J. Kleckers****, A. Abadi, K. Brandherm, J. Haberkamp*	2.3. Impact Of Sludge Settling On Oxygen And N_2O Gas Mass Transfer *Y. Qiu, V. Bakos, N. Stewart-Campbell,* ***B.G. Plósz***	3.3. Full-Scale Soft-Sensor Implementations Enable WRRF Hybrid Digital-Twins ***B.R. Johnson****, C. Yang, K. Lesnik, J. Registe, T. Johnson, A. Menniti, J. Kenyon*
12:00-13:30	**Lunch**		

PROGRAMME OVERVIEW

	SESSION 4 PLANT-WIDE	SESSION 5 COMPUTATIONAL FLUID DYNAMICS/ COMPARTMENTAL MODELLING	SESSION 6 RIVER SYSTEMS
13:30-15:30	4.1. Re-thinking Industrial Wastewater Treatment Using Advanced Mathematical Modelling ***X. Flores-Alsina**, V. Monje, E. Ramin, P. Ramin, J. Abildskov, K.V. Gernaey, A. Mitic, L. Lardon, L. Wolmarans, I. Coremans*	5.1. A Dynamic Compartmental Model Of A Sequencing Batch Reactor (SBR) For Biological Phosphorus Removal ***S. Daneshgar**, S. Borzooei, L. Debliek, E.Van Den Broeck, R. Cornelissen, P. de Langhe, C. Piacezzi, M. Daza, S. Duchi, U. Rehman, I. Nopens, E. Torfs*	6.1. Drinking Water Production Oriented Surface Water Quality Assessment Based On A Purification Resistance Index ***J. Jiang**, M. Zhu, X. Zhang, M. Luo, Y. Yan, H. Song, S. Chang*
	4.2. A Comprehensive Modelling Framework For Integral Simulation Of Drinking Water Treatment Plants ***B. Elduayen-Echave**, E. Ayesa*	5.2. Development And Validation Of A New Combined Hydraulic And Biological Model For Trickling Filters In A Real WWTP ***K. Olaciregui-Arizmendi**, S. Jaray-Valdehierro, T. Fernández-Arévalo, A. López, J. Gómez, B. Elduayen-Echave, E. Ayesa*	6.2. How To Evaluate WRRF Pollutant Discharge Regulations For Protecting The Quality Of Receiving Waters: A Mechanistic And Artificial Intelligence Model-Based Methodology ***D.A. Mendoza Grubert**, T. Maere, F. Li, C. Boisvert, P.A. Vanrolleghem*
	4.3. Plant-wide Modelling Of Digestate Up-Cycling: The Case Of Microalgae Cultivation ***D. Carecci**, S. Rossi, A. Catenacci, G. Ferretti, E. Ficara*	5.3. A Compartmental Model Approach For Dynamic Combined Simulation Of Hydraulics And Biochemistry In WRRFs ***A. Romay-Gainza**, B. Elduayen-Echave, B. Hernández, R. Arnau, J. Climent, E. Ayesa*	6.3. The Influence Of Discharge Permits On Economic And Emission Performance Of Industrial Enterprises: An Agent-Based Perspective ***Z. Wei**, M. Gong, F. Meng, Y. Liu*
	4.4. Evaluating Monitoring Strategies In Wastewater Treatment Plants Using Benchmark Simulation Model No. 2-M ***P. Ramin**, E. Ramin, S.O.N. Topalian, U. Jeppsson, K.V. Gernaey, X. Flores-Alsina*	5.4. Compartmental Model Study Of A Pilot-Scale Activated Sludge Reactor ***D. Fernandes del Pozo**, S. Daneshgar, I. Nopens*	6.4. Water-Smart Strategies To Support Decision Making For Water Resource Management In The Industrial Context *J. Alferes, **N. Desmet**, S. Kempeneers, S. Latte, I. Hitsov, C. Jayaweera, K. De Neve, J. Wauman, R. Bosch, S. Van Ermen, P. Seuntjens, I. Genné*
15:30-17:30	**Poster Cocktail Session**		

PROGRAMME OVERVIEW

15:30-17:30	**Poster Cocktail Session – List of Posters**
	1 Optimal Placement Of Sensors For Networkwide Calibration Using Pressure Dependent Modelling ***A.G. Seyoum**, S. Tait, J. Boxall, A.N.A. Schellart*
	2 Life Cycle Analysis Of Water Resource Recovery Facilities Based On Algae-Bacteria Processes *D. Penaranda, F. Casagli, F. Beline, **O. Bernard***
	3 Effect Of System Nonlinearity On The Resilience Of Water Resource Recovery Facilities ***A.S. Laino**, O. Wani, S. Soudjani, R.J. Davenport*
	4 An Energy Use Accounting Method For WWTPs Based On A Process Unit Balance And Its Application ***L. Yao**, C. Wang, Y. Liu*
	5 Estimation And Analysis Of Embodied Energy Conversion In Community Septic Tank *Y. Yan, C. Wang, Y. Liu, X. Dong, Y. Liu, **L. Yao***
	6 Exploring The Effects Of Faults And Disturbances On The Performance Of A Biological Wastewater Treatment Process ***H.L. Ivan**, V. Zaccaria*
	7 Model Predictive Control For The Elimination Of Contaminants Of Emerging Concern By UV Based Advanced Oxidation Process ***T.-M. Hwang**, J. Lee, S.-H. Nam, E. Kim*
	8 Model Predictive Control For The Elimination Of Micropollutant During Bromide-Rich Wastewater Ozonation *E. Kim, H. Kye, S.-H. Nam, T.-M. Hwang*
	9 State Estimation In Water Distribution Networks Using The Saint-Venant Equations With Extended Kalman Filtering ***M. Bartos**, M. Thomas, M. Frankel, M.-G. Kim, L. Sela*
	10 Application Of Pre-Processing And Noise Reduction Methods To Improve Generalization Performance Of The Leakage Detection Model ***M.A. Caronge**, Y. Arai, K. Ito, T. Kunizane, A. Koizumi, B. Bakri*
	11 Smart Management Of Wastewater Treatment Based On Total Nitrogen Prediction Applying Long Short -Term Memory (LSTM) neural network ***Y. Lee**, H.-W. Kim*
	12 Deterioration Assessment Model Of Urban Drinking Water Distribution Pipes Using A Machine Learning Algorithm And Geographic Information System ***J. Lee**, S.-H. Nam, E. Kim, T.-M. Hwang*
	13 Fluorescence Excitation-Emission Matrix Spectroscopy Coupled With PARAFAC Modeling To Determine Of Chlorine Decay Constants In Metropolitan Water-Distribution Systems ***J. Lee**, S.-H. Nam, E. Kim, T.-M. Hwang*
	14 Residential Water And Energy Consumption Prediction At Hourly Resolution Based On A Hybrid Machine Learning Approach ***C. Wang**, X. Ni, Z. Li, W. Shi, J. Zhang, J. Bian, Y. Liu*
	15 Enhancing The Explanation of Household Water Consumption Through The Water-Energy Nexus Concept: A Case In Beijing, China ***Z. Li**, C. Wang, Y. Liu, J. Wang*

PROGRAMME OVERVIEW

15:30-17:30	**Poster Cocktail Session – List of Posters**
	16 A Flexible Mesh Model For Simulation Of Coastal Hydrodynamics And Water Quality In Hong Kong ***K.T.M. Wong**, Q. Ye, S.N. Chan, H.S. Lee, A.Y.W. Chiu*
	17 Model Development For Cooling Towers And Optimization Of Their Fan And Pump Operation Strategy ***C.D. Jayaweera**, J. Wauman, A. Verliefde, I. Nopens, I. Hitsov*
	18 Myths And Reality Of The Advantages And Drawbacks Of Algae-Bacteria Processes ***F. Casagli**, O. Bernard*
	19 Modelling Heterotrophic Microalgae Cultivation For Nutrient Recovery From Industrial By-Products And Wastewaters ***S. Rossi**, D. Carecci, E. Ficara*
	20 Why Knowledge Management Systems Need To Overcome Organisational Inertia To Manage Uncertainty: A Case Study Analysis ***K. Sritharan**, B.S. McIntosh, P.A. Vanrolleghem*
	21 An Interactive Real-Time Control Tool To Support Urban Drainage Operators ***J. Schmidt**, A. Roy, B. Kerkez*
	22 Mechanistic Modelling Framework To Develop Digital Twins For Water And Wastewater Technologies ***G. Bellandi**, R. Muoio, E. Guerrero, W. Audenaert, U. Rehman*
	23 Optimal Design Module For Watershed Water Quality Monitoring Network As A GIS Toolbox *W. Meng, **M. Luo**, Q. Liang, J. Jiang*
	24 Sludge Age Predictive Modeling In Full Scale Wastewater Treatment Plant Using Recurrent Neural Network ***M. Djeddou**, P. Wongburi, A. Bachiri, J.K. Park*
	25 A Dynamic Model For Ion Exchange And Resin Regeneration: Model Calibration And Global Sensitivity Analysis ***D.I. González**, I.P. Hitsov, B. Claessens, J.P. Gallo Molina, I. Nopens, E. Torfs*

PROGRAMME OVERVIEW

TUESDAY, 26 SEPTEMBER			
08:00-08:30	**Registration**		
08:30-10:00	**Plenary Panel Discussion** ***Plenty Of Modelling Methodologies, Which Ones Really Support Systems Thinking?*** **Panelists: Branko Kerkez** (University of Michigan, USA), **Kate Newhart** (West Point, USA), **Simon Duchi** (AM-Team, Belgium), **Jiping Jiang** (Southern University of Science and Technology, China)		
10:00-10:30	**Coffee break**		
	Room A	**Room B**	**Room C**
10:30-12:00	**SESSION 7** **SOFT SENSORS**	**SESSION 8** **URBAN HYDRAULICS**	**SESSION 9** **DIGITAL TWINS DEVELOPMENT**
	7.1. Transforming Biosolids: Linear Multimodal Modelling For Improved Fourier Transform Infrared Based Soft Sensors ***S.O.N. Topalian**, P.C. Keymer, X. Flores-Alsina, K.V. Gernaey, D.J. Batstone*	8.1. Capacity Of 2D Shallow Water Models To Represent Unsteady Flow Characteristics In Urban Area ***L. Guiot**, G. Dellinger, F. Lawnicak*	9.1. A Novel Contaminant Transport Model For Natural And Urban Drainage Networks With Real-Time Data Assimilation ***M.-G. Kim**, M. Bartos*
	7.2. Modeling Phosphorus Recovery Within MagPrex: Lessons From A Statistical And Machine Learning-Based Analysis ***J. Lybik**, N.G. Love, R. Maltos, B. Wisdom, K. Newhart*	8.2. Flood4CastRTF: A Novel Flood Modelling Tool ***M. Craninx**, K. Hilgersom, G. Vaes, T. Danckaert, J. Bronders*	9.2. Forecasting Influent Water Quality Parameters And Flow Of WRRFs Using Weather Data ***A. Hykkerud**, A. Nair, H. Ratnaweera*
	7.3. Predicting Total Solids Using Non-Contact Acoustic Sensors: Systematic Feature Reduction For Robust Model Performance ***G. Kittleson**, B. Bhattarai, K.N. Ngo, H. Nguyen, T. Nguyen, H. De Clippeleir, N. Love, B. Kerkez*	8.3. Integrated Modeling Of Urban Mobility, Flood Inundation, And Sewer Hydrodynamic Processes For Resilience Assessment Of Urban Drainage Systems ***L. Wang**, X. Dong, R. Li*	9.3. Automatic (Re)Calibration Of Water Resource Recovery Facility Models To Ensure Continuous Model Performance ***C. Gómez**, S. Daneshgar, K. Solon, S. Borzooei, I. Nopens, E. Torfs*
12:00-13:30	**Lunch**		

PROGRAMME OVERVIEW

	SESSION 10 SOFT SENSORS II	SESSION 11 SEWER AND CATCHMENT	SESSION 12 N_2O
13:30-15:00	10.1. Soft Sensor For Substrate Characterization Through The Reverse Application Of The ADM1 Model For Anaerobic Digestion Plant Operations *A. Donoso-Bravo, M.C. Sadino-Riquelme,* ***F. Zorrilla****, E. Valdebenito-Rolack, D. Gómez, F. Hansen*	11.1. A Model-Based Assessment Of In-Sewer Heat Recovery Potentials ***D. Muschalla****, W. Sprung, S. Reinstaller, F. Kretschmer*	12.1. Pattern Recognition Of Operational States Leading To N_2O Emissions In Full-Scale Biological Wastewater Treatment ***A. Froemelt****, L. Zueger, W. Gruber*
	10.2. Adaptive Sampling For The Calibration Of Soft Sensors ***M. Tobias****, B. Kerkez*	11.2. Swift Physics-Informed Model For Hydraulic Characteristics In Sewer Networks ***J. Li****, K. Sharma, Z. Yuan*	12.2. Using Artificial Intelligence For Online Prediction Of N_2O Emissions In WRRFs ***M. Khalil****, A. AlSayed, P.A. Vanrolleghem, Y. Liu*
	10.3. Using Machine Learning To Predict The Total Solids Concentration In Thickened Primary Sludge At Henriksdal WRRF ***H. Molin****, E. Bröndum, S. Nilsson, R. Saagi, E. Lindblom, B. Carlsson, U. Jeppsson*	11.3. Rainfall Driven E.coli Dynamics In Inland Rivers ***V. Suslovaite****, V. Speight, J.D. Shucksmith*	12.3. General Framework For Effective Assessment, Mitigation, And Reporting Of N_2O Emissions *G. Bellandi,* ***S. Duchi****,* ***T. Weijtmans****, R. Muoio, W. Audenaert, U. Rehman*
15:00-15:30	**Coffee break**		
15:30-16:30	**Problems, Ideas and Challenges Session *(submit your contribution!)***		
16:30-17:30	**MIA Specialist Group Open Group Meeting**		
18:30	**Surprise Conference Dinner**		

PROGRAMME OVERVIEW

WEDNESDAY, 27 SEPTEMBER			
08:00-08:30	**Registration**		
08:30-10:00	**Poster Breakfast**	**Hybrid Modelling Challenge** Organized by the Hybrid Modelling Working Group	
	Room A	**Room B**	**Room C**
10:00-12:00	**SESSION 13** **HYBRID MODELS**	**SESSION 14** **PROCESS MODELS**	**SESSION 15** **DECISION SUPPORT SYSTEM DESIGN**
	13.1. Automatically Generating Hydrologic Process Models From Sensor Data ***T.A. Dantzer**, B. Kerkez*	14.1. A Quantified Nitrogen Metabolic Network Based On Reaction Kinetics And Mathematical Model In Treating Low COD/TN Wastewater ***J. Meng**, Z. Sun, J. Li*	15.1. Life Cycle Cost Based Critical Curves For Selecting Optimal Mode Of Rural Sewage Treatment Under Village-Level Resolution *X. Hu, **J. Jiang**, X. Xia, W. Wang, R. He, Y. Gu, R. Yang, Y. Zheng*
	13.2. Hybridization Of A First-Principles Biofilter Model With A Data-Driven Model To Improve Performance Of A Hybrid MPC Controller Of Methanol Dosing For N-Removal In A Denitrifying Biofilter ***M. Serrao**, V. Jauzein, S. Daneshgar, S. Azimi, V. Rocher, B. Tassin, P.A. Vanrolleghem*	14.2. Model Based Analysis Of Trace Metal Speciation Effects In An Anaerobic Digestion System Under Different Modes Of Operation ***S. George**, M.R. Mattei, L. Fruzo, G. Esposito, E.D. van Hullebusch, F.G. Fermoso*	15.2. Sustainability Assessment Framework Of Integrated Desalination And Resource Recovery: A Participatory Approach ***R. Ktori**, M.P. Parada, M. Rodriguez-Pascual, M.C.M. van Loosdrecht, D. Xevgenos*
	13.3. Balancing Calibration Efforts In Parallel Hybrid Modelling Of Wastewater Treatment Processes ***L. Verhaeghe**, P.A. Vanrolleghem, S. Daneshgar, G. Kirim, E. Torfs*	14.3. Detailed Modelling Of Radiation Transfer In Photobioreactors For Purple Phototrophic Bacteria Mixed Cultures And Integration With Biokinetics *A. Amini, E. Porciatti, M. Greco, S. Rossi, E. Ficara, **A. Turolla***	15.3. Adaptation Pathways Modelling Of Urban Wastewater Systems Under Deep Uncertainty And Urban Expansion *D. Zhang, **X. Dong**, S. Zeng*
	13.4. Hybrid Machine Learning-Mechanistic Modeling Of Algae-Bacteria Processes Under Various Climatologies ***F. Casagli**, M. Scalabrino, J.I.F. Ulloa, O. Bernard*	14.4. Development Of A New Combined Hydraulic And Biological Model For Aerobic Granular Sludge Reactors ***K. Olaciregui-Arizmendi**, S. Jaray-Valdehierro, T. Fernández-Arévalo, B. Elduayen-Echave, E. Ayesa*	15.4. Development Of An Agile Benchmarking Framework For The Evaluation Of Emerging Wastewater Treatment And Resource Recovery Technologies In QSDsan *X. Zhang, S. Rai, Y. Li, B.D. Shoener, P.A. Vanrolleghem, R.D. Cusick, **J.S. Guest***
12:00-13:30	**Lunch**		

PROGRAMME OVERVIEW

	SESSION 16 CALIBRATION AND OPTIMAL EXPERIMENTAL DESIGN	SESSION 17 CONTROL	SESSION 18 GREEN/GREY INFRASTRUCTURE
13:30-15:00	16.1. Moving Sensor Deployment For Network-Wide Pipe Roughness Calibration ***A.G. Seyoum**, S. Tait, J. Boxall, A.N.A. Schellart, W. Shepherd*	17.1. Evaluating The Interpretability Of Deep Reinforcement Learning In Urban Drainage System Operation ***W. Tian**, G. Fu, K. Xin, Z. Zhang, Z. Liao*	18.1. A Flood Impact Matrix To Support Sustainable, Targeted Blue-Green-Grey Stormwater Management Solutions *S. Li, J.P. Leitao, Z. Wang, **P.M. Bach***
	16.2. Model Parameter Estimation With Imprecise Information ***W. Rauch***	17.2. Integrated Real-Time Control Of Urban Drainage Systems For Water Quality Using Reinforcement Learning ***Y. Wang**, X. Dong, Z. Huang*	18.2. Applying MCDA For NBS Planning: A Comparison Between A Canadian, French, And Australian Case Studies ***M. Bousquet**, R. Lavoie, F. Bichai, P.A. Vanrolleghem*
	16.3. Mass-Balance-Based Approach In Planning A Measurement Campaign For Energy Factory Tilburg *D. Ysebaert, Q. Le, **P. Carrera**, R. Schemen, S. Weijers, E.I.P. Volcke*	17.3. Long-Term Assessment Of Multi-Objective Model Predictive Control Of WRRFs *P.A. Stentoft, C.L. Holmboe, **B. Valverde-Pérez**, L. Vezzaro*	18.3. Operation Strategy Of A Sewer System And Green Infrastructure Layout Based On Vulnerable Facilities ***C. Shen**, X. Dong, X. Wang*
15:00-15:30	**Coffee break**		
15:30-17:00	**Closing Session and Closing Keynote** ***An Integrated Computer Control System (IC2S) for Wastewater Treatment Plant Operation – A Digital Twin "Avant la lettre!"*** **Gilles Patry** (University of Ottawa, Canada)		