11th IWA Symposium on Modelling and Integrated Assessment

Watermatex 2023

Quebec City, Canada
23-27 September 2023

SCIENTIFIC PROGRAMME

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Saturday, 23 September 2023

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 (ULaval)
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 (CEIT) M. Khalil (UAlberta) M. Schneider (UGent)
11:30 - 12:00	**Q&A and Discussion**	*F. Meng*
12:00 - 13:30	**Lunch break**	
13:30 - 14:45	**Part II: Group works on case studies** Participants work together in groups to find solutions to one of the case studies	*K. McCullough*
14:45 - 15:15	**Wrap-up**	
15:15 - 15:45	**Coffee break**	
15:45 - 16:45	**Reports on case studies & General discussion**	*H. Abasi*
16:45 - 17:00	**Wrap-up and closing**	*S. Daneshgar*
17:00 - 19:00	**YWP Social activity**	

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Sunday, 24 September 2023: workshops			
	Room A	**Room B**	**Room C**
08:30-12:00	**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, X. Zou, M.Y. Schneider, J. Sparks*	**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*	
12:00-13:00	**Lunch**		
13:00-17:00	**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, J. Alferes Castano, P. Seuntjens, I. Nopens, C. Vaneeckhaute*	**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*	**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*
17:30	**Opening Reception and keynote** **Location**: Musée National des Beaux-Arts du Québec (179 Grande Allée Ouest, Québec) **Bruce Beck:** “Climate Change Drives Market for Urine-Separating Toilets”		

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Monday, 25 September 2023

	Registration		
08:30-10:00	**Opening session and plenary keynote** **Elmira Hassanzadeh (Polytechnique Montréal):** Community Engagement for Water Management Under Uncertainty **Peter Marcus Bach (Eastern Switzerland University on Applied Sciences):** Modelling "Palettes" - A new Dawn of Integrated Assessment to Support Water Management's Role Towards Climate-Adaptive Cities		
10:00-10:30	**Coffee break**		
	Room A	**Room B**	**Room C**
10:30-12:00	**Session 1. Smart monitoring and data processing**	**Session 2. Flocculation and settling**	**Session 3. Digital twin case-studies**
	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. Sparks, P.A. Vanrolleghem, C. Bott*
	1.2. Water Quality Sensor Data Processing In Applications For Water Management *N. Desmet, F. Van Bauwel, L. Brosens, R. Vandeputte, J. Dehaspe Joni, 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**		
13:30-15:30	**Session 4. Plant-wide models**	**Session 5. Compartmental models**	**Session 6. System approach to surface water**
	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, 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 Firms: An Agent-based Perspective *Z. Wei, M. Gong, F. Meng, Y. Liu, K. Ewe*

	4.4. Evaluating Plant-Wide Monitoring Strategies In Wastewater Treatment Plants Using Benchmark Simulation Model No. 2-LT *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. Late, I. Hitsov, C. Jayaweera, K. De Neve, J. Wauman, R. Bosch, S. Van Ermen, P. Seuntjens, I. Genné*
15:30-17:30	**Poster cocktail**		

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Tuesday, 26 September 2023			
08:30-10:00	**Plenary panel discussion** **Plenty of modelling methodologies, which ones really support systems thinking?** **Panelists:** Branko Kerkez (UMichigan), Kate Newhart (WestPoint), Simon Duchi (AM-team), Jiping Jiang (SusTech)		
10:00-10:30	**Coffee break**		
	Room A	**Room B**	**Room C**
10:30-12:00	**Session 7. Hybrid models**	**Session 8. Urban hydraulics**	**Session 9. Digital twin developments**
	7.1. Hybrid Machine Learning-Mechanistic Modeling Of Algae-bacteria Processes Under Various Climatologies *F. Casagli, J.I.F. Ulloa, O. Bernard*	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. Balancing Calibration Efforts In Parallel Hybrid Modelling Of Wastewater Treatment Processes *L. Verhaeghe, P.A. Vanrolleghem, S. Daneshgar, G. Kirim, E. Torfs*	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. Automatically Generating Hydrologic Process Models From Sensor Data *T. Dantzer, 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**		
13:30-15:00	**Session 10. Soft sensors II**	**Session 11. Sewer and catchment**	**Session 12. N_2O modelling and mitigation**
	10.1. Transforming Biosolids: Linear Multimodal Modelling For Improved FTIR Based Soft Sensors *S.O.N. Topalian, P. Keymer, X. Flores-Alsina, K.V. Gernaey, D.J. Batstone*	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. 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*	11.2. 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, R. Muoio, S. Duchi, E. Guerrero, 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**		

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Wednesday, 27 September 2023			
09:00-10:00	**Poster breakfast**		**Hybrid modelling challenge** Organized by the hybrid modelling working group
	Room A	**Room B**	**Room C**
10:00-12:00	**Session 13. Process control**	**Session 14. Process models**	**Session 15. Decision support systems for design**
	13.1. Long-term Assessment Of Multi-objective Model Predictive Control Of WRRFs *P.A. Stentoft, C.L. Holmboe, B. Valverde-Pérez, L. Vezzaro*	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, 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. Integrated Real-time Control Of Urban Drainage Systems For Water Quality Using Reinforcement Learning *Y. Wang, X. Dong, Z. Huang*	14.3. Detailed Modelling Of Radiation Transfer In Photobioreactors For Purple Phototrophic Bacteria Mixer 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. Evaluating The Interpretability Of Deep Reinforcement Learning In Urban Drainage System Operation *W. Tian, G. Fu, K. Xin, Z. Zhang, Z. Liao*	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 *S. Rai, X. Zhang, B.D. Shoener, P.A. Vanrolleghem, R.D. Cusick, J.S. Guest*
12:00-13:30	**Lunch**		
13:30-15:00	**Session 16. Calibration and optimal experimental design**	**Session 17. Soft Sensors II**	**Session 18. Green/grey infrastructure**
	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. 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*	18.1. Impact Matrix To Support Urban Stormwater Management: Blue-green, Grey, And Hybrid Solutions *S. Li, J.P. Leitao, Z. Wang, P.M. Bach*
	16.2. Model Parameter Estimation With Imprecise Information *W. Rauch*	17.2. Adaptive Sampling For The Calibration Of Soft Sensors *M. Tobias, B. Kerkez*	18.2. MCDA Models For NBS Planning: The Impact Of The Socio-politics And Geographic Context *M. Bousquet, R. Lavoie, F. Bichai, P.A. Vanrolleghem*

	16.3. Mass-balance-based Approach In Planning A Measurement Campaign For Energy Factory Tilburg *Q. Le, D. Ysebaert, S. Weijers, R. Schemen, E. Volcke*	17.3. 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*	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** **Gilles Patry (UOttawa) -** An Integrated Computer Control System (IC2S) for wastewater treatment plant operation – A Digital Twin*"Avant la lettre!"*		

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 Logic-Based Robustness For Resilience Of Water Resource Recovery Facilities
A.S. Laino, B. Wooding, S. Soudjani, R.J. Davenport

4 Managing Water Losses Economically
D. Rogers

5 An Energy Use Accounting Method And Application For WWTPs Based On A Process Unit Balance
L. Yao, C. Wang, Y. Liu

6 SIMPO - An Open-Minded SaaS Platform For Wastewater Treatment Process Simulation And Evaluation
J. Wang, K. Wu, Z.-W. Huang, Y.-F. Shi, F. Jiang

7 Estimation And Analysis Of Embodied Energy Conversion In Community Septic Tank
Y.-j. Yan, C.-y. Wang, Y. Liu, X. Dong, Y.-c. Liu, L.-j. Yao

8 Exploring The Effects Of Faults And Disturbances On The Performance Of A Biological Wastewater Treatment Process
H.L. Ivan, V. Zaccaria

9 Model-based Development Of Strategies For Effective Enrichment And Application Of Comammox Bacteria In Floccular Sludge
X. Chen, B.-J. Ni

10 Watomizer: A New Open-source Spreadsheet Optimization Tool For Optimum Pump Scheduling In Water Distribution Systems
M. Abdallah, K. Al-Zaabi, M. Nabil, M. Hamouda

11 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, K. Lee

12 Model Predictive Control For The Elimination Of Micropollutant During Bromide-rich Wastewater Ozonation
E. Kim, H. Kye, S.-H. Nam, K. Lee., Tae-Mun Hwang

13 State Estimation In Water Distribution Networks Using The Saint-Venant Equations With Extended Kalman Filtering
M. Bartos, M. Frankel, M.-G. Kim, L. Sela

14 Numerical Modeling Of An Exceptional Case Wetland Catchment: Challenges In Calibration And Validation
B.-e.E.A. Rahim, S.M.E. Taha, I. Yusoff

15 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

16 Numerical Investigation Of Confluence Flow With Various Discharge Ratios And Junction Angles
J. Kim, V.T. Nguyen

17 Smart management of wastewater treatment based on total nitrogen prediction applying Long Short -Term Memory (LSTM) neural networks
Y. Lee, H.-W. Kim

18 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

19 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

20 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. Liu1

21 Enhancing Household Water Consumption Prediction By The Water-energy Nexus Concept: A Case Of Beijing, China
Z. Li, C. Wang, Y. Liu, J. Wang

22 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

23 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

24 Benchmarking Two Algae-bacteria Models On Yearly Outdoor Data Sets
R. Nordio, F. Casagli, E. Rodriguez-Miranda, A. Sanchez-Zurano, J.L. Guzman, O. Bernard, F.G. Acien

25 Myths And Reality Of The Advantages And Drawbacks Of Algae-bacteria Processes
F. Casagli, O. Bernard

26 Modelling Heterotrophic Microalgae Cultivation For Nutrient Recovery From Industrial By-products And Wastewaters
S. Rossi, D. Carecci, E. Ficara

27 An Organizational Capability Maturity Framework To The Uptake Of Uncertainty Planning Approaches In Water Utilities
K. Sritharan, B.S. McIntosh, P.A. Vanrolleghem

28 Mathematical Modeling Of The Long-term Dynamics Of A Sulfate-reducing UASB Bioreactor From Methanogenic To Sulfidogenic Conditions
E. Valdés Martín, D. González, G. Munz, D. Gabriel

29 An Interactive Real-time Control Tool To Support Urban Drainage Operators
J. Schmidt, A. Roy, B. Kerkez

30 Mechanistic Modelling Framework To Develop Digital Twins For Water And Wastewater Technologies
G. Bellandi, R. Muoio, E. Guerrero, W. Audenaert, U. Rehman

31 Optimal Design Module For Watershed Water Quality Monitoring Network As A GIS Toolbox
W. Meng, M. Luo, Q. Liang, J. Jiang

32 Sludge Age Predictive Modeling In Full Scale Wastewater Treatment Plant Using Recurrent Neural Network
M. Djeddou, P. Wongburi, A. Bachiri, J.K. Park

33 A Dynamic Model For Ion Exchange And Resin Regeneration: Model Calibration And Global Sensitivity Analysis
D.I. González1, I.P. Hitsov, B. Claessens, J.P. Gallo Molina, I. Nopens, E. Torfs