Saturday – June 10

8:30 – 17:00  Workshop: Spectrophotometry for monitoring of the urban water cycle  
Chair: Kris Villez

8:45 – 17:00  Young Water Professional workshop  
Chairs: Elena Torfs and Kelly Martin

Spectrophotometry workshop program

This workshop brings together manufacturers, researchers, and users of spectrophotometric devices for monitoring of the urban water cycle. The main goal of the workshop is to share the latest experiences in development, installation, deployment, and maintenance of on-line spectrophotometric devices in the urban water cycle. People willing to present a discussion starter should contact kris.villez@eawag.ch. The following themes are envisioned:

1. Current challenges in applying on-line spectrophotometric sensors
2. The latest in on-line spectrophotometric sensors: what to expect on the market in the near future
3. Spectrophotometry everywhere and any time: New uses of spectrophotometric data
4. Unboxing your sensor: Plug-and-play or endless calibration?
5. Maintaining data quality: How to check and maintain your sensor and its internal model?

Registration for the Spectrophotometry workshop:

1. Attendance will be limited to 20 attendees of the ICA2017 conference on a first-come first-serve basis.
2. To register and present a discussion starter, please write an email to kris.villez@eawag.ch with ICA2017 Spectrophotometry Contributor in the subject line by April 30th, 2017 at the latest.
3. To register as an attendee, please write an email to kris.villez@eawag.ch with ICA2017 Spectrophotometry Participant.
YWP workshop: *ICA today: exploring advances, challenges and synergies from multiple perspectives*
Laval University, Pavillon Desjardins – Le cercle

8:45 – 9:15 Welcome and ice breaker

9:15 – 10:00 Keynote: “Instrumentation, Control and Automation in the Global Water Industry: trends and challenges”
Eveline Volcke, Ghent University, Chair of the IWA specialist group on ICA

10:00 - 10:30 Coffee break

10:30 – 12:15 Discussion sessions: “Emerging challenges and technologies in ICA domain”

10:30 – 10:35 Introduction
10:35 – 11:25 Session 1 (topic choice 1)
11:25 – 12:15 Session 2 (topic choice 2)

Topic 1: Sensors and instrumentation - Thomas Maere and Cyril Garneau, Laval University
Topic 2: Data Treatment - Janelcy Alferes, Suez Environment
Topic 3: Machine Learning - Stephanie Klaus and Ali Gagnon, Hampton Roads Sanitation District
Topic 4: University of Laval Pilot Plant Visit

12:15 – 13:45 Lunch

13:45 – 15:30 ICA Case-studies
Participants work together in small groups to find solutions to one out of three different case-studies.

13:45 – 14:00 Introduction
14:00 – 15:00 Discussion
15:00 – 15:30 Wrap-up

Case Study 1: Reducing Non-Revenue Water Loss
Facilitator: Ken Thompson, CH2M

Case Study 2: Energy Reduction at a WRRF
Facilitator: Lina Belia, Primodal

Case Study 3: BNR Stability at a WRRF
Facilitator: Adrienne Menniti, Clean Water Services

15:30-16:00 Coffee

16:00-17:00 Expert panel: Opportunities and Outlooks in ICA (questions prepared by YWPs)
(Lina Belia – Primodal, Adrienne Menniti – Clean Water Services, Gustaf Olsson – Lund University, Rob Smith - YSI, Ken Thompson - CH2M)
### Monday – June 12

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8:30</td>
<td><strong>Opening Session – Keynote</strong> “ICA and optimization in sewer, WRRF and river at Waterschap De Dommel – A strategic decision with impact on several fronts” from Stefan Weijers</td>
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<td>10:00</td>
<td><strong>Coffee break</strong></td>
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<tr>
<td>10:30</td>
<td><strong>Method - Fault Detection I</strong></td>
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<td>Experimental design for data validation by application of linear data reconciliation to wwtp data.</td>
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<td><em>Le Quan, Ghent University, Belgium</em></td>
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<td>10:30</td>
<td><strong>WRR - Control of Anaerobic Treatment</strong></td>
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<td>Adaptive feedback linearizing control of the anaerobic digestion process.</td>
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<td><em>Núñez Pintado Lenin, Universidad de Piura, Peru</em></td>
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<tr>
<td>10:30</td>
<td><strong>Monitoring of fouled DO sensors with active fault detection.</strong></td>
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<td><em>Samuelsson Oscar, IVL Swedish Environmental Research Institute, Sweden</em></td>
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<td><strong>ICA applied to membrane anaerobic co-digester for wastewater nutrient and biogas recovery.</strong></td>
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<td><em>Mora Juan Francisco, Universitat Politècnica de València - IIAMA, Spain</em></td>
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<td>12:00</td>
<td><strong>Lunch</strong></td>
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<td>13:30</td>
<td><strong>Method - Data Analytics</strong></td>
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<td>datEAUbase: Water quality database for raw and validated data with emphasis on structured metadata.</td>
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<td><em>Plana Puig Queralt, Université Laval, Canada</em></td>
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<td>13:30</td>
<td><strong>WRR - Control to Mitigate GHG Emissions</strong></td>
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<td>Simple control strategies for mitigating N₂O emissions in phase isolated full-scale WWTPs.</td>
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<td><em>Valverde-Pérez Borja, DTU, Denmark</em></td>
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<td>13:30</td>
<td><strong>Data cleaning, warehouse and mining for operation optimization in wastewater treatment plants in China.</strong></td>
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<td><em>Qiu Yong, Tsinghua University, China</em></td>
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<td>13:30</td>
<td><strong>On line monitoring, control and mitigation of greenhouse gases emissions in WWTPs.</strong></td>
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<td><em>Baeza Juan, Universitat Autonoma Barcelona, Spain</em></td>
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<td>13:30</td>
<td><strong>Using a unified data platform and analytics toolbox for data management and process optimization at Kansas River WWTP.</strong></td>
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<td><em>Martin Kelly, Black &amp; Veatch, United States</em></td>
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<td>15:00</td>
<td><strong>Continuous aeration control in a full-scale DEMON™ reactor to reduce N₂O emissions.</strong></td>
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<td><strong>Coffee break</strong></td>
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<td>15:30</td>
<td><strong>Forum Reports and Discussions</strong></td>
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<td>- Manufacturer Forum Summary</td>
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<td>- Utility Forum Summary</td>
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<td>- Academic Forum Summary</td>
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<td>- Consultant Forum Summary</td>
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<td>17:00</td>
<td><strong>Poster Session I</strong></td>
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<td>18:30</td>
<td><strong>Evening free</strong></td>
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<td>Time</td>
<td>Session 1</td>
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<td>8:30</td>
<td><strong>Method - Soft Sensors</strong></td>
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<td>Soft-sensing nitrite in a urine nitrification system for resource recovery. <em>Villez Kris, Eawag, Switzerland</em></td>
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<td>Predicting influent PO$_4$ using a multivariate soft sensor. <em>Miletic Ivan, inCTRL Solutions Inc., Canada</em></td>
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<td>Advanced on-line odour monitoring at wastewater treatment plants: Coupling e-nose technology and modelling techniques. <em>Alferes Janelcy, Cirsee - Suez, France</em></td>
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<td><strong>Method - Process Monitoring</strong></td>
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<td>Development and validation of a novel monitoring system for batch flocculant solids settling process. <em>Valverde-Pérez Borja, DTU, Denmark</em></td>
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<td>A simplified approach for activity monitoring in complex wastewater treatment processes. <em>Mauricio-Iglesias Miguel, Universidade de Santiago de Compostela, Spain</em></td>
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<td>Prediction of performances and optimization of anaerobic digesters through near infrared spectroscopy and modeling. <em>Steyer Jean-Philippe, INRA, France</em></td>
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<td><strong>Lunch</strong></td>
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<td><strong>Method - Fault detection II</strong></td>
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<td>Failure prediction of multimedia filters by using a hybrid clustering method. <em>Bagheri Behrad, University of Cincinnati, United States</em></td>
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<td>Data validation and gross error detection in monitoring wastewater treatment process – application to a SHARON reactor. <em>Le Quan, Ghent University, Belgium</em></td>
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<td>15:00</td>
<td><strong>Coffee break</strong></td>
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<td>15:50</td>
<td><strong>Method - Data replacement</strong></td>
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<td>A stochastic method to manage delay and missing values for in-situ sensors in an alternating activated sludge process. <em>Stentoft Peter, DTU, Denmark</em></td>
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<td>16:30</td>
<td><strong>YWP Report – Short wrap up – Poster session II</strong></td>
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<td>18:30</td>
<td><strong>Evening free</strong></td>
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<tr>
<td>8:30</td>
<td><strong>WRR - Models for Aeration Control</strong></td>
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|        | Control strategies using dynamic alpha factors for oxygen transfer optimization in WRRFs.  
        | Rosso Diego, University of California, Irvine, United States              |
|        | **Sewer - Monitoring**                                                  |
|        | Highly distributed long-term monitoring of in-sewer dynamics using low-power radio technology.  
        | Blumensaat Frank, Institute of Environmental Engineering, ETH Zurich / Swiss Federal Institute of Aquatic Science and Technology, Eawag, Switzerland |
|        | Exploring the potential of dynamic aeration models to evaluate control strategies: the experience at the Girona WRRF.  
        | Juan-García Pau, Atkins UK, United Kingdom                              |
|        | A preliminary study of real-time monitoring and control of biofilters for stormwater harvesting.  
        | Shen Pengfei, Monash University, Australia                              |
|        | Advanced control system based on pH, ORP and DO sensors for optimisation of full-scale WWTPs.  
        | Robles Ángel, Universitat de València, Spain                            |
|        | Identifying industrial wastewaters discharged to sewers from UV-Vis spectroscopy data.  
        | Liu Yanchen, State Key Joint Laboratory of Environment Simulation and Pollution Control, School of Environment, Tsinghua University, China |
| 10:00  | **Coffee break**                                                        |
| 10:30  | **Instrumentation – Principles**                                         |
|        | Nitric oxide production interferes with aqueous dissolved oxygen sensors.  
        | Klaus Stephanie, Virginia Tech, United States                          |
|        | Online control of chemical dosing in sewers for sulfide abatement.       
        | Jiang Guangming, The University of Queensland, Australia                 |
|        | Challenges with acoustic soft sensors in wastewater treatment – results from pilot studies.  
        | Åmand Linda, IVL Swedish Environmental Research Institute, Sweden        |
|        | Reinforcement learning-based control of storm water networks.            
        | Mullapudi Abhiram, University of Michigan, United States                 |
|        | Inline VFA monitoring using a mid-infrared spectroscopy based sensor: Validation in lab-scale and full-scale AD reactors.  
        | Zhang Xuedong, Delft University of Technology, Netherlands              |
|        | Water system overflow modeling for model predictive control.             
        | Halvgaard Rasmus, DHI, Denmark                                          |
| 12:00  | **Lunch**                                                               |
| 13:30  | **Instrumentation – Operation**                                          |
|        | Instrumentation at Swedish WWTPs – a survey and interview study.         
        | Åmand Linda, IVL Swedish Environmental Research Institute, Sweden        |
|        | Local water-level-driven the discrete control for sewer-WWTP integrated optimization operation.  
        | Liu Yanchen, State Key Joint Laboratory of Environment Simulation and Pollution Control, School of Environment, Tsinghua University, China |
|        | One utility's approach to evaluating new instrumentation and ongoing maintenance and validation.  
        | Menniti Adrienne, Clean Water Services, United States                   |
|        | Coordinated control of collection systems using market-based optimization to maximize performance.  
        | McDonnell Bryant, EmNet LLC, United States                              |
|        | Sensor location in WRRFs: easy change, big win.                         
        | De Mulder Chaim, Ghent University, Belgium                               |
|        | Using dynamic volume in sewer network to optimise the waste water treatment plant and sewer network.  
        | Poulsen Troels, Kruger A/S, Denmark                                      |
| 15:00  | **Coffee break**                                                        |
| 15:30  | **Closing session – Keynote “Dealing with full-scale monitoring and control issues” from Maureen O’Shaugnessy** |
| 17:30  | **Conference Dinner**                                                   |
WEF Stormwater Seminar
Thursday – June 15

Training Day Schedule: 8:30 am – 4:30 pm

The first day of the event consists of presentations on Canadian and American programs/projects and discussion opportunities.

Presentation Topics (To Be Confirmed):

1. Lessons Learned from Using Continuous Monitoring in Stormwater Research
2. Utilizing Real-Time Automated Controls to Minimize Cost and Maximize Performance of a Flood Control BMP
3. Intelligent Platforms for Stormwater Management
4. Green Infrastructure and Management of Assets
5. Using Technology to Improve Stormwater Data Management
6. Triple Bottom Line Analysis of Green Infrastructure Approaches to Urban Stormwater Management
7. Pervious Concrete Characterization using Computer Tomography
9. Historical BMP Monitoring Lesson Learned Impacting the Role Big Data in the Stormwater Sector
10. Use of Monitoring and Control, Advanced Communications Networks, and the Internet to Provide Installation Information, Systems Adjustments, and Improved Efficiency

Presenter Organizations (To Be Confirmed): Capital Region Watershed District, Minnesota; MWH/Stantec; Oklahoma State University; University of Michigan; CDM Smith; Herrera Environmental Consultants; Xylem

Friday – June 16

Training Day Schedule: 8:30 am – 2:15 pm

The second day of the seminar will focus on overcoming social and technical barriers for the broad adoption of smart stormwater systems. The program will consist of presentations, guided discussion, break-out sessions, and a final summary session.

Facilitator: Branko Kerkez, Assistant Professor, University of Michigan, Civil and Environmental Engineering

- Presentation
  - State of the Art Stormwater Sensor and Control Solutions Summary
- Guided Discussion
  - What do you see as the major benefits and barriers in the adoption of smart stormwater systems?
- Breakout Topic 1
  - What are the social and management barriers to adoption to smart stormwater systems?
  - How do the public and managers perceive the safety, relevance, and investment into “smart” water systems?
- Breakout Topic 2
  - Develop a set of case studies that can be used to vet the future efficacy of smart stormwater systems.
- Summary Breakout:
  - Define the research horizon. What are the key technical challenges that must be addressed before smart stormwater systems become reality?
Poster presentation

Instrumentation, monitoring and network

Concrete sewer corrosion prediction by artificial neural network. 

*Amirkanany Mina, Tehran Water and Wastewater Company, Iran.*

Cofactor F430 in AnMBRs: a potential biomarker for methanogenic activity? 

*Smets Ilse, KU Leuven, Belgium.*

On-line filterability measurements in anaerobic membrane bioreactors. 

*Lousada-Ferreira Maria, Delft University of Technology, Netherlands.*

Long-term behavior of fibre optic sodium optodes with a comparison with sodium electrodes. 

*Caron Serge, INO, Canada.*

On-line monitoring of a microbial electrolysis cell using a simple electrical equivalent circuit model. 

*Tartakovsky Boris, National Research Council, Canada.*

Soft sensor application for real-time monitoring of a Norwegian wastewater treatment plant. 

*Wang Xiaodong, Norwegian University of Life Sciences, Norway.*


*Winkelbauer Andreas, TU Wien, Austria.*

Online chlorine and bi-sulfite analyzer for wastewater effluent chlorination and dechlorination control. 

*Zhang Wei, ASA Analytics, United States.*

Data-driven status diagnosis of sewerage system operation. 

*Liu Yanchen, Tsinghua University, China.*

Evaluation of rainfall-derived inflow and infiltration based on wastewater quality and quantity in sewerage system. 

*Liu Yanchen, State Key Joint Laboratory of Environment Simulation and Pollution Control, School of Environment, Tsinghua University, China.*

Novel, non-intrusive microwave sensors for water analysis. 

*Koutsospyrou Vasiliki, Loughborough University, United Kingdom.*

Turning passive data into knowledge - a review of wastewater treatment monitoring methods. 

*Corominas Lluís, ICRA, Spain.*

Flow prediction for urban drainage system real time control using artificial neural network: A case in Kunming City. 

*Dong Xin, Tsinghua University, China.*

In-situ UV-Vis probe to monitor algal photobioreactors treating municipal wastewater. 

*Valverde-Pérez Borja, DTU, Denmark.*

Hybrid linear observer for an activated sludge process with alternate phases. 

*Feudjio Christian, Université de Mons, Belgium.*

Crossflow filtering of fluids is a must for enhanced use of spectrometers. 

*Lopata Vincent, Aquatic Life Limited, Canada.*

Spectral sensors shine light on nutrient accumulation. 

*Smith Robert, YSI / Xylem, United States.*

Observability issues and unknown inputs in microalgae cultures. 

*Feudjio Christian, Université de Mons, Belgium.*

Modelling for control

Non-linear modelling of the dissolved oxygen to ammonium dynamics in a nitrifying activated sludge process. 

*Carlsson Bengt, Uppsala University, Sweden.*

Modelling ammonia based aeration control in real time with online instrumentation. 

*Dabkowski Bob, Hach, United States.*

Experience from implementing automatic dosage of coagulant at four drinking water plants. 

*Hallgren Fredrik, IVL Swedish Environmental Research Institute, Sweden.*

Utilizing dynamic simulation to optimize controls and reduce risk. 

*Nading Tyler, CH2M, United States.*

Benchmarking of control strategies implemented in a dedicated control platform for wastewater treatment processes. 

*Ruano Maria Victoria, Universitat de València, Spain.*

The META-ASM model: validation in full-scale WWTPs and performance comparison with ASM2d, Santos Jorge, Universidade NOVA de Lisboa, Portugal.

The integrated stormwater runoff management system for the first flush runoff management for urban rivers. 

*Seo Dongil, Chungnam National University, Korea, Republic of.*

Model-based evaluation of nutrient and energy recovery control strategies in wastewater treatment systems. 

*Solon Kimberly, Lund University, Sweden.*

Conceptual quality modelling and integrated control of combined urban drainage system. 

*Sun Congcong, Institut de Robòtica i Informàtica, Spain.*

Towards a domain-based framework for use of rainfall forecasts in control of integrated urban wastewater systems. 

*Vezzaro Luca, DTU, Denmark.*
Control and optimisation
Simulation of alternative temperature control structures of a biogas reactor in a wastewater treatment plant. Attar Shadi, University College of Southeast Norway, Norway.
Controlling biogas desulfurization in aerobic biotrickling filters through trickling liquid velocity regulation. Baeza Juan, Universitat Autonoma Barcelona, Spain.
Robustness evaluation of control strategy for activated sludge system with simultaneous nitrogen and phosphorus removal. Dong Xin, Tsinghua University, China.
Optimization of the microbiological population using precise sludge age (srt) control. Ekster Alexander, Ekster and Associates, United States.
MPC and PI control of the level of the inlet basin of a wastewater treatment plant. Haugen Finn, University College of Southeast Norway, Norway.
Advanced process control - meet the future treatment needs in existing SBRs. Henriksson Åsa, Xylem Inc, Sweden.
Developing real-time decision support systems for improved control of stormwater and wastewater infrastructure. Kertesz Ruben, EmNet, LLC, United States.
Obtaining nitrogen discharge using online control for mainstream deammonification coupled with partial denitrification. Le Tri, The Catholic University of America, United States.
Simplified control of rotating disks and effluent weir in Orbal ditch by feedforward-feedback strategy. Qiu Yong, Tsinghua University, China.
ICA of an anaerobic MBR (AnMBR) industrial prototype plant for urban wastewater treatment. Robles Ángel, Universitat de València, Spain.
Full scale experience with standby control of continuous activated sludge lines for energy savings. Thomsen Henrik, Krüger A/S, Denmark.
PHA production from wastewater using simple process control. Vargas Alejandro, Universidad Nacional Autonoma de Mexico, Mexico.
Selecting locations for real-time control in urban stormwater systems. Wong Brandon, University of Michigan Ann Arbor, United States.
Plant-wide control for enhancing nutrient removal, GHG emission and CH4 production under varying influent loadings. Yoo ChangKyoo, Kyung Hee University, Korea, Republic of.
Optimization of aeration strategy for full scale sludge bio-drying through pile temperature by CFD and IRI. Yu Dawei, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, China.

Fault detection and early warning
Assessment and interpretation of fouling progress in MBR plants using functional machine learning technique. Yoo ChangKyoo, Kyung Hee University, Korea, Republic of.

Diagnosis and decision support
Deep learning-based fouling diagnosis of a pilot-scale MBR. Yoo ChangKyoo, Kyung Hee University, Korea, Republic of.

Cybersecurity
Water/wastewater process control systems data security governance in the cloud. Novkovic Goran, City of Toronto, Canada.

Big data
How big data impacts water utilities. Wong Gary, OSIsoft, United States.

Automation, communication and data handling