IAHR International Association for Hydro-Environment Engineering and Research

Supported by Spain Water and IWHR, China

hece Université de Liège ulg

4th IAHR Europe Congress

Sustainable hydraulics in the era of global change

Liège, Belgium

27-29 July 2016

Main sponsors

MET-FLOW

HydroVision
Acoustic Flow Meters

Co-sponsors

LAVISION
FOCUS ON IMAGING

SOFICO
SOCIETE WALLONNE DE FINANCEMENT COMPLEMENTAIRE DES INFRASTRUCTURES

INNEAUTECH

NORTEK B.V.

Institutional Support

IAHR AIRH
Supported by Spain Water and IWHR, China

IAHS AISH

SHF

hece Université de Liège ulg

fnrs
LA LIBERTÉ DE CHERCHER

Contents

Committees

Local Organizing Committee

Chair: Prof. Benjamin Dewals

Prof. Benjamin Dewals (University of Liege), Chair
Dr Pierre Archambeau (University of Liege)
Prof. Daniel Bung (Aachen University of Applied Sciences)
Ms. Laurence Defrère (University of Liege)
Ms. Nadia Elgara (University of Liege), Conference secretary
Dr Sébastien Erpicum (University of Liege)
Prof. Patrick Hendrick (Université Libre de Bruxelles)
Prof. Michel Pirotton (University of Liege)
Prof. Holger Schüttrumpf (RWTH Aachen University)
Prof. Peter Troch (Ghent University)

International Scientific Committee

Chair: Prof. Sébastien Erpicum

Jochen Aberle (Norway)
Claudia Adduce (Italy)
Mehmet Ali Kokpinar (Turkey)
Pierre Archambeau (Belgium)
Markus Aufleger (Germany)
Francesco Ballio (Italy)
Koen Blanckaert (Switzerland)
Bettina Bockelmann-Evans (United Kingdom)
Didier Bousmar (Belgium)
Daniel Bung (Germany)
Benoît Camenen (France)
Antonio Cardoso (Portugal)
Jean-Paul Chabard (France)
Hubert Chanson (Australia)
Alessandra Crosato (The Netherlands)
Christophe Cudennec (France, IAHS)
Alain Dassargues (Belgium)
Tom De Mulder (Belgium)
Benjamin Dewals (Belgium)
Andreas Dittrich (Germany)
Dejana Djordjevic (Serbia)
Rui Ferreira (Portugal)
Corrado Gisonni (Italy)
Manuel Gomez Valentin (Spain)
Philippe Gourbesville (France)
Massimo Greco (Italy)
Ian Guymer (United Kingdom)

Patrick Hendrick (Belgium)
Robert Janssen (Australia)
Juha Jarvela (Finland)
Katinka Koll (Germany)
Elpida Kolokytha (Greece)
Ana Maria da Silva (Canada)
Jorge Matos (Portugal)
Patrick Meire (Belgium)
Jaak Monbaliu (Belgium)
Michele Mossa (Italy)
Vladimir Nikora (United Kingdom)
Mario Oertel (Germany)
Stefano Pagliara (Italy)
André Paquier (France)
Gareth Pender (United Kingdom)
Fernando Pereira (Belgium)
Michael Pfister (Switzerland)
Francisco Pinto (Portugal)
Michel Pirotton (Belgium)
Sebastien Proust (France)
Mark Rieder (Czech Republic)
Jaromir Riha (Czech Republic)
Maria Rita de Carvalho (Portugal)
Nicolas Riviere (France)
Pawel Rowinski (Poland)
Nils Rüther (Norway)
Paul Samuels (United Kingdom)
Hubert H. G. Savenije (The Netherlands, IAHS)
Anton Schleiss (Switzerland)
Holger Schüttrumpf (Germany)
Koji Shiono (United Kingdom)
Sandra Soarez-Frazao (Belgium)
Thorsten Stoesser (United Kingdom)
Mutlu Sumer (Danmark)
James Sutherland (United Kingdom)
Simon Tait (United Kingdom)
Erik Toorman (Belgium)
Peter Troch (Belgium)
Blake Tullis (United States)
Wim Uijttewaall (The Netherlands)
Pierre-Louis Viollet (France)
Patrick Willems (Belgium)
Wiming Wu (United States)
Gerald Zenz (Austria)

Keynote Speakers

Brett Sanders

Brett Sanders is Professor and Chair of the Department of Civil and Environmental Engineering at the University of California, Irvine. His group is interested in model efficiency for the simulation of hydrodynamics and water quality in rivers, estuaries, and coastal waters. His keynote lecture, "Co-development of coastal flood models: making the leap from expert analysis to decision-support", will unveil new findings of a major ongoing project, FloodRISE, which aims at evaluating the potential of parcel-scale geospatial data to enhance flood-resilience of urbanized coastal areas. The project supports the co-development of flood knowledge and tools with community stakeholders and multidisciplinary experts, planners, economics, hydrologists and engineers.

Plenary Keynote 1: B. Sanders
"Co-development of coastal flood models: making the leap from expert analysis to decision-support"
Chairman: Prof. B. Dewals - Room 050 – July 27, 09:15

Pangiotis Balabanis

Panagiotis Balabanis is a Deputy Head of Unit with the European Commission, Directorate-General for Research and Innovation. He has been involved in the definition and implementation of successive research programs in the field of environment and sustainable development. In his keynote lecture, he will shed light on upcoming "Challenges and opportunities for research and technological innovation in the water sector throughout Europe". This keynote will offer the IAHR community a unique chance

for reflecting on its possible contributions towards achieving major EU and global water-related objectives, as well as positioning Europe as a leader in water-related innovative solutions. Hydro-environment research and engineering is also a cornerstone for supporting a range of other EU policies, initiatives and commitments.

Plenary Keynote 2: P. Balabanis
"Challenges and opportunities for research and technological innovation in the water sector throughout Europe"
Chairman: Prof. A. Schleiss - Room 050 – July 27, 13:30

Laurent Mouvet

Laurent Mouvet is the recently elected President of the Swiss Committee on Dams. He has served in ICOLD technical committees and is a lecturer at Ecole Polytechnique Fédérale de Lausanne (EPFL). He is currently CEO of Hydro Operation International SA, a Swiss-based independent consultancy company offering services in the field of hydropower plant rehabilitation, operation and maintenance. Laurent Mouvet chairs the expert committee on the Grand Inga project, the world's largest hydropower scheme. As such, he will deliver an inspiring keynote lecture on "Hydro projects in a changing environment".

Plenary Keynote 3: L. Mouvet
"Hydro projects in a changing environment"
Chairman: Dr S. Erpicum – Room 050 – July 28, 10:30

Presenter guidelines for oral and poster presentations

Oral presentations

Oral presentations are organized in sessions scheduled in specific lecture rooms, indicated in the program together with the time of presentation of each contribution including discussion and change-over.

Your presentation should last 20 minutes maximum including time for questions and discussion. You are recommended to prepare a 15-minute talk which will be followed by a 5 minutes of discussion. For Authors of poster presentations, a 3 minute oral presentation (1 slide) is offered.

The oral presentations are organized centrally. Therefore, the authors are kindly asked to upload their presentations for the day before the oral presentation on the Google Drive of the conference (personal link available on the webpage of the paper - "Google Drive link" field). If your presentation is not uploaded in this way, you are asked to upload the presentation 30 minutes prior to the time block of the session. If you need help, a lecture room assistant will be available.

If you know that your presentation will not be presented, you are asked to withdraw your contribution as soon as possible.

Ensure that all images in presentations are attributed, including those from Wikipedia. Please note that it is not permitted to take photographs or videos without the explicit permission of the authors.

Wifi access will be provided to each participant. ULg is also connected to eduroam (Education Roaming). In this sense, you can log on to the WLAN using the same credentials (username and password) as if you were at your home institution.

Lecture room equipment

Video projector with standard 4:3 resolution
PC with Internet connection
Laser pointer
Wireless network

Lecture room software

The PC in each room is equipped with the following software:

Windows 7 or Windows 10
PowerPoint 2013
Adobe Reader
Windows Media Player
VLC media player

If you want to play any videos, make sure that you use standard codecs.

For Powerpoint files, you can test their compatibility here.

Poster presentations

Display time

Posters should be displayed in the exhibition hall from Wednesday 27th July (08:30) to Thursday 28th July (18:00). Posters setup can be done on Tuesday 26th from 18:30 to 19:30 or on Wednesday 27th from 08:00 to 08:30. Authors are responsible for their poster dismantling.

Participants to the 4th IAHR Europe congress will be able to view posters during coffee breaks and lunch breaks.

Poster oral presentations

A 3 minute oral presentation (1 slide) is offered to poster authors according to the schedule available on the congress website (see detailed instructions above).

Poster boards

Poster boards are in portrait format. Portrait A0 posters fit perfectly. All the material necessary for attaching the poster to the poster board will be available in the poster area. In addition, help can be provided to authors to put up or take down their posters.

Poster preparation

Place the title of your paper clearly at the top of the poster to allow viewers to easily identify your paper. Indicate the authors' names and address information in order to allow interested viewers to contact you for more information.

Prepare all diagrams or charts neatly and legibly beforehand, in a size sufficient to be read at a distance of 1.5 to 2.0 meters.

Organize the poster in a way that it is clear, orderly, and self-explanatory. The poster must cover the same content as your abstract / paper.

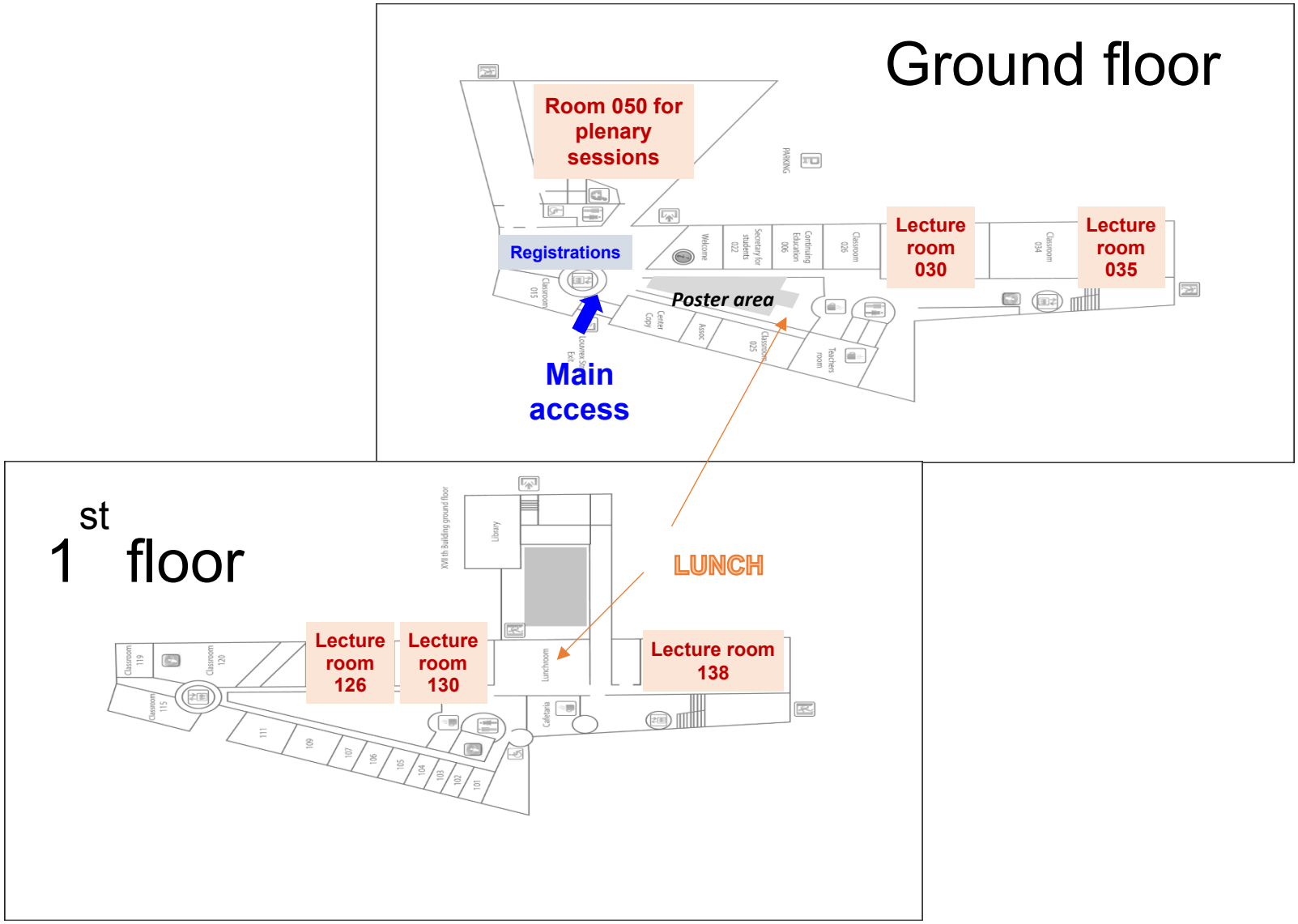
No print service will be provided by the congress organization.

Program at a glance

	Tuesday 26 JULY	Wednesday 27 JULY		Thursday 28 JULY		Friday 29 JULY	
08:30 - 10:00		**Opening ceremony** ***Plenary Keynote 1*** B. Sanders	Posters & technical exhibition	Parallel sessions	Posters & technical exhibition	Half day technical tours	Full day technical tours
10:00 10:30		Coffee break		Coffee break			
10:30 - 12:30		Parallel sessions		***Plenary Keynote 3*** L. Mouvet Parallel sessions			
12:30 13:30		Lunch break / **YPN** Open meeting		Lunch break / **YPN** Short course			
13:30 - 15:30		***Plenary Keynote 2*** P. Balabanis Parallel sessions		Parallel sessions			
15:30 16:00		Coffee break		Coffee break			
16:00 - 18:00		Parallel sessions		Parallel sessions **IAHR European Division open meeting**, followed by **Closing ceremony**			
18:30 19:30	Registrations	Welcome Drink at the Prince-Bishops' Palace (Liège)		**Conference Dinner at "La Cité Miroir"**			
19:30 - 21:30	Liege by night - Ice-breaking city tour for Young Professionals						
21:30 - 23:30							

On Wednesday 27th and Thursday 28th, the registrations desks are opened from 08:00 until 16:00

Rooms


Ground floor
Room 050 for plenary sessions
Registrations
Poster area
Lecture room 030
Lecture room 035
Main access
1st floor
LUNCH
Lecture room 126
Lecture room 130
Lecture room 138

Detailed Program

Tuesday 26th July 2016

17:00 - 19:30	**Registration**
19:30 - 21:30	**Liege by night Ice-breaking city tour for Young Professionals**

A city tour “by night” is organized for and by Young Professionals on Tuesday 26th July.

The tour departure will be at 19:30 from the congress venue (Rue Louvrex, 14 in Liege city center).

We will be happy to make you discover some of the most beautiful places in Liege during an approximate 1h30 walk.

Wednesday 27th July 2016

08:30	***Opening ceremony*** *Room 050*
09:15	***Plenary Keynote 1: B. Sanders*** ***"Co-development of coastal flood models: making the leap from expert analysis to decision-support"*** *Chairman: Prof. B. Dewals - Room 050*

10:00 - 10:30 : *Coffee break*

10:30 - 12:30 : Parallel sessions

Rooms:
- **030** Technical session A1: Advanced models in hydro-environment and eco-hydraulics
- **050** Technical session D1: Hydraulic structures (1)
- **035** Thematic workshop S1: Adaptation of European hydropower infrastructures in view of climate and market changes
- **138** Technical session E1: Uncertainty and risk assessment methods

	Technical session A1		**Advanced models in hydro-environment and eco-hydraulics**
	Chairman: Prof. R. Ferreira		**Room 030**
10:30	**p.14**	Valero	Turbulent dispersion in bounded horizontal jets. RANS capabilities and physical modelling comparison
10:50	**p.40**	Peltier	Numerical modelling of meandering jets in shallow rectangular reservoir using two different turbulent closures
11:10	**p.7**	Violeau	Tsunami seismic generation and propagation: validity of the Shallow Water Equations
11:30	**p.15**	Lino	Modelling methane emissions from Vilar reservoir (Portugal)
11:50	**p.12**	Klein	Analysis of Dotation Discharge Impact at a Fishway Entrance via Numerical 3D CFD Simulation
12:10	**p.13**	Rivière	Characterization of flow resistance in a floodplain for varying building density

	Technical session D1		**Hydraulic structures (1)**
	Chairman: Prof. C. Gisonni		**Room 050**
10:30	**p.103**	Crispino	Shock wave patterns in supercritical junction manholes with inlet bottom offsets
10:50	**p.105**	Vercruysse	Stilling basin design for inlet sluice with vertical drop structure: scale model results vs. literature formulae
11:10	**p.112**	Boettcher	Experimental study of head loss through an angled fish protection system

11:30	**p.111**	Nóbrega	Relation between free surface profiles and pressure profiles with respective fluctuations in hydraulic jumps
11:50	**p.113**	Tastan	Scale effects for air-entraining vortices at intake structures
12:10	**p.101**	Calamak	Seepage characteristics in embankments subject to variable water storages on both sides

	Thematic workshop S1		**Adaptation of European hydropower infrastructures in view of climate and market changes**
	Chairman: Dr. P. Manso - Co-Chairman: Prof. M. Marence		**Room 035**
10:30	**p. 168**	Tucciarelli	Banki-Michell micro-turbines for energy production in water distribution networks
10:50	**p. 167**	Samora	Feasibility assessment of micro-hydropower for energy recovery in the water supply network of the city of Fribourg
11:10	**p. 56**	Michaux	Coupling of water expansion and production of energy on public water distribution network
11:30	**p. 47**	Popa	New concepts in small hydropower plants schemes in Romania
11:50	**p.170**	Marence	Integration of Hydropower Plant within an Existing Weir - "a Hidden Treasure"
12:10	**p.165**	Adam	Experimental assessment of head losses through elliptical and sharp-edged orifices

	Technical session E1		**Uncertainty and risk assessment methods**
	Chairman: Prof. E. Duviella		**Room 138**
10:30	**p.151**	Meert	Uncertainty assessment of river water levels on energy head loss through hydraulic control structures
10:50	**p.152**	Arrighi	Floods and cultural heritage: a risk assessment for the city of Florence, Italy
11:10	**p.153**	Collet	Assessing the impact of Climate Change on extreme flows across Great Britain
11:30	**p.154**	Pourreza-Bilondi	Continuous hydrologic modeling of coastal plain watershed using HEC-HMS
11:50	**p.156**	Goormans	Estimating probability of dike failure by means of a Monte Carlo approach

12:30 - 13:30 :
Lunch
YPN Open meeting – Room 138

13:30	***Plenary Keynote 2: P. Balabanis*** ***"Challenges and opportunities for research and technological innovation in the water sector throughout Europe"*** *Chairman: Prof. A. Schleiss - Room 050*

14:15 - 15:30 : Parallel sessions

Rooms:
- **030** Technical session A2: Fluids mechanics for hydro-environment and eco-hydraulics
- **050** Technical session D2: Hydraulic structures (2)
- **035** Technical session C1: Coastal risks
- **138** Technical session E2: Climate change impacts on hydraulic schemes and water resources management

	Technical session A2		**Fluids mechanics for hydro-environment and eco-hydraulics**
	Chairman: Prof. M. Holzner		**Room 030**
14:15	**p.41**	Nichols	Turbulent momentum exchange over a natural gravel bed.
14:35	**p.10**	Ferreira	Vorticity fluxes on the wake of cylinders within random arrays
14:55	**p.8**	Romdhane	Free surface flow for homogeneous bottom roughness
15:15	**Poster presentations (3 min - 1 slide per poster)**		
	p.92	Duma	Influence of non-uniform flow conditions on riverbed stability: the case of smooth-to-rough transitions
	p.29	Bombar	Effect of emergent vegetation distribution on energy loss
	p.81	Mabrouka	Flow modelling in vegetated rivers

	Technical session D2		**Hydraulic structures (2)**
	Chairwoman: Prof. S. Soarez-Frazão		**Room 050**
14:15	**p.106**	Rivière	Supercritical flow around an emerged obstacle: hydraulic jump or wall-jet-like bow-wave?
14:35	**p.109**	Savary	Field measurements at the new lock of Lanaye (Belgium) before the opening to navigation
14:55	**p.110**	Verelst	Experimental investigation of the influence of breaking logs on the flow patterns induced by lock filling with gate openings
15:15	**Poster presentations (3 min - 1 slide per poster)**		
	p.78	Zare	Using ANN and ANFIS Models for simulating and predicting groundwater level fluctuations in the Miandarband Plain, Iran
	p.104	Buldgen	Investigation of the hydrodynamic pressures on lock gates during earthquakes
	p.115	Nekooie	Determination of discharge coefficient of triangular labyrinth side weirs with one and two cycles using the nonlinear PLS method
	p.116	Nekooie	Discharge capacity of conventional side weirs in supercritical conditions

	Technical session C1		**Coastal risks**
	Chairman: Prof. P. Rowinski		**Room 035**
14:15	**p.68**	Nicolai	Safety standards for the coastal dunes in The Netherlands
14:35	**p.72**	Kentel	Coastal Tsunami-Hazard Mapping
14:55	**p.70**	Violeau	A database of validation cases for tsunami numerical modelling
15:15	**Poster presentations (3 min - 1 slide per poster)**		
	p.69	Yannie	Impact of the sea level rise on low lying areas of coastal zone: case of Batu Pahat

	Technical session E2		**Climate change impacts on hydraulic schemes and water resources management**
	Chairman: Prof. B. Sanders		**Room 138**
14:15	**p.158**	Grelier	An alternate approach for assessing impacts of climate change on water resources: combining hazard likelihood and catchment sensitivity
14:35	**p.159**	Duviella	Efficient Management of Inland Navigation Reaches Equipped with Lift Pumps in a Climate Change Context
14:55	**p.161**	Koppe	Main Impacts of Climate Change on Seaport Construction and Operation
15:15	**Poster presentations (3 min - 1 slide per poster)**		
	p.135	Khan	Accuracy assessment of ISI-MIP and FAO hydrological modelling results in the Upper Indus Basin
	p.138	Khashei Suiki	Presenting an empirical model for determining the sugar beet evapotranspiration by GDD parameter (Case study: Torbat-Jam, Iran)
	p.139	Ennaje	Impact of rainfall variability on the sewerage system of Casablanca city, Morocco
	p.143	Holzbecher	Flash Flood Prediction, Case Study: Oman
	p.160	Ilinich	Evaluation of changes storm precipitations during century for the modelling of floods

15:30 - 16:00 : *Coffee break*

16:00 - 18:00 : Parallel sessions

Rooms:

030	Technical session A3: Experimental techniques in hydro-environment and eco-hydraulics
050	Technical session D3: Advances in computational hydraulics (1)
035	Technical session D4: Scour and erosion
138	Technical session E3: Extreme hydrological events

	Technical session A3		**Experimental techniques in hydro-environment and eco-hydraulics**
	Chairman: Dr Y. Peltier		**Room 030**
16:00	**p.32**	Bung	Image processing techniques for velocity estimation in highly aerated flows: Bubble Image Velocimetry vs. Optical Flow
16:20	**p.39**	Koca	Field-deployable Particle Image Velocimetry with a Consumer-Grade Digital Camera
16:40	**p.37**	Nichols	Low-cost 3D mapping of turbulent flow surfaces
17:00	**p.34**	Bercovitz	LS-PIV procedure applied to a plunging water jet issuing from an overflow nappe
17:20	**p.38**	Thant	Sediment transport measurements in the Schelde-estuary: how do acoustic backscatter, optical transmission and direct sampling compare?
17:40	**p.33**	Loboda	Biomechanical tests of aquatic plant stems: techniques and methodology

	Technical session D3		**Advances in computational hydraulics 1**
	Chairman: Dr D. Violeau		**Room 050**
16:00	**p.119**	Ghaïtanellis	A two-fluid SPH model for landslides
16:20	**p.124**	Zugliani	A new Osher Riemann solver for shallow water flow over fixed or mobile bed
16:40	**p.125**	Bellos	Grid coarsening and uncertainty in 2D hydrodynamic modelling
17:00	**p.127**	Christelis	Employing surrogate modelling for the calibration of a 2D flood simulation model
17:20	**p.128**	Guymer	Estimating stem-scale mixing coefficients in low velocity flows
17:40	**p.129**	Deleersnijder	SLIM: a model for the land-sea continuum and beyond

	Technical session D4		**Scour and erosion**
	Chairman: Prof. M. Greco		**Room 035**
16:00	**p. 96**	Fazeres-Ferradosa	Design of Scour Protections and Structural Reliability Techniques
16:20	**p. 93**	Alhasan	The probabilistic solution of dike breaching due to overtopping
16:40	**p. 95**	Carrillo	Experimental and numerical study of scour downstream Toachi Dam
17:00	**p. 97**	Rifai	Failure of fluvial dikes: how does the flow in the main channel influence the breach development?
17:20	**p. 98**	Van Hoestenberghe	Continuous grid monitoring to support sediment management techniques
17:40	**p. 82**	Bombar	Comparison of methods to calculate the shear velocity in unsteady flows

	Technical session E3		**Extreme hydrological events**
	Chairman: Prof. P. Prinos		**Room 138**
16:00	**p.133**	del Jesus	Hybrid downscaling and conditioning for characterizing multivariate flooding extremes
16:20	**p.136**	Andrés-Doménech	A Gaussian design-storm for Mediterranean convective events
16:40	**p.137**	Leščešen	Extreme hydrological situations on Danube River – Case study Bezdan hydrological station (Serbia)
17:00	**p.140**	Hegnauer	Implications of CMIP5 derived climate scenarios for discharge extremes of the Rhine
17:20	**p.142**	Vermuyten	Influence of model uncertainty on real-time flood control performance
17:40	**p.145**	Jin	Reservoir operation applying a discrete hedging rule with ensemble streamflow prediction to cope with droughts

18:30 - 19:30 Welcome Drink at the Prince-Bishops' Palace (Liège)

Thursday 28th July 2016

08:30 - 10:10 : Parallel sessions:

Rooms:
- **030** Technical session A4: Sustainable river engineering and water management
- **138** Technical session B1: Innovation in hydro energy storage concepts
- **130** Technical session C2: Coastal physical and numerical modelling
- **050** Technical session D5: Advances in computational hydraulics 2

	Technical session A4:		**Sustainable river engineering and water management**
	Chairman: Prof. C. Farias - Co-Chairman: Prof. C. Evangelides		**Room 030**
08:30	**p.24**	Joseph	Flow modelling and investigation of flood scenarios on the Cavaillon River, Haiti
08:50	**p.26**	Zare	Integrating Spatial Multi Criteria Decision Making (SMCDM) with Geographic Information Systems (GIS) for determining the most suitable areas for artificial groundwater recharge
09:10	**p.25**	He	Simulating runoff generation and consumption for rehabilitation of downstream ecosystems in arid northwest China
09:30	**p.28**	Louis	Hydraulic analysis of an irrigation headworks complex in the Artibonite department (Haïti)
09:50	**p.30**	Farias	Monthly reservoir operating rules generated by implicit stochastic optimization and self-organizing maps

	Technical session B1		**Innovation in hydro energy storage concepts**
	Chairman: Prof. P. Hendrick		**Room 138**
08:30	**p.166**	Niemann	Integrated Assessment of Underground Pumped-Storage Facilities using Existing Coal Mine Infrastructure
08:50	**p.169**	Bodeux	How groundwater interactions can influence UPSH (Underground Pumping Storage Hydroelectricity) operations
09:10	**p.51**	Morabito	Pumped hydroelectric energy storage: a comparison of turbomachinery configurations
09:30	**p.52**	Steimes	Cost and revenue breakdown for a pumped hydroelectric energy storage installation in Belgium
09:50	**p.53**	Lichtenberg	Numerical Investigations of a Water Vortex Power Plant Implemented as a Fish Ladder - Part I: The Water Vortex

	Technical session C2		**Coastal physical and numerical modelling**
	Chairman: Prof. A. Balzano		**Room 0130**
08:30	**p.62**	Ventroni	Online coupling of SWAN and SWASH for nearshore applications
08:50	**p.64**	Viero	Renewal time scales in tidal basins: climbing the Tower of Babel
09:10	**p.65**	Silva	Morphodynamic processes at Mariakerke: numerical model implementation
09:30	**p.60**	Karagiannis	Numerical simulation of scour in front of a breakwater using OpenFoam

09:50	**p.66**	Rauwoens	Design features of the upcoming Coastal and Ocean Basin in Ostend, Belgium

	Technical session D5		**Advances in computational hydraulics 2**
	Chairman: Prof. T. de Mulder		**Room 050**
08:30	**p.121**	Đorđević	Estimation of 1D-confluence model parameters in right-angled discordant beds' confluences using 3D numerical mode
08:50	**p.122**	Rotimi	Practical application of numerical modelling to overbank flows in a compound river channel
09:10	**p.123**	Carraro	Comparison between different methods to compute the numerical fluctuations in path-conservative schemes for SWE-Exner model
09:30	**p.83**	Goffin	Non-linear optimization of a 1-D shallow water model and integration into Simulink for operational use
09:50	**p.100**	Torlak	Comparative use of FVM and integral approach for computation of water flow in a coiled pipe and a surge tank

10:10 – 10:30 : *Coffee break*

10:30	***Plenary Keynote 3: L. Mouvet*** ***"Hydro projects in a changing environment"*** *Chairman: Dr S. Erpicum – Room 050*

11:15 – 12:35 : Parallel sessions:

Rooms:
- **030** Technical session A5: Water quality
- **138** Technical session C3: Waves
- **050** Technical session D6: Hydraulic structures: physical modelling
- **130** Thematic workshop S2: Management of hydraulic systems by means of fuzzy logic

	Technical session A5		**Water quality**
	Chairman: Prof. M. Oertel		**Room 030**
11:15	**p.16**	Julínek	The impact of stormwater overflows on stream water quality
11:35	**p.19**	Carbonnel	Building water and chemicals budgets over a complex hydrographic network
11:55	**p.17**	Hassen	Groundwater quality of Feriana-Skhirat in Central Tunisia and its sustainability for agriculture and drinking purposes
12:15	**p.18**	Bakar	Modelling the transport and decay of microbial tracers in a macro-tidal estuary

	Technical session C3		**Waves**
	Chairman: Prof. P. Rosa Santos		**Room 138**
11:15	**p.71**	Zimmermann	Wave force calculations due to wave run-up on buildings: a comparison of formulas applied in a real case
11:35	**p.73**	Schleiss	Waves generated by ship convoy: Comparison of physical and numerical 19odelling with in-situ measurements
11:55	**p.74**	Wüthrich	Example of wave impact on a residential house
12:15	**p.67**	Boelens	Idealized model study on tidal wave propagation in prismatic and converging basins with tidal flats

	Technical session D6		**Hydraulic structures: physical modelling**
	Chairman: Prof. M. Calamak		**Room 050**
11:15	**p.102**	Lodomez	Characterization of Nappe Vibration on a Weir
11:35	**p.107**	Swartenbroekx	Monsin movable dam in Belgium: a case study
11:55	**p.31**	Carrillo	Comparison of PIV measurements and CFD simulations of the velocity field over bottom racks
12:15	**p.36**	Gutierrez	Physical model tests for the construction stages of large breakwaters. Case studies to the ports of Barcelon and Cruña (Spain)

	Thematic workshop S2		**Management of hydraulic systems by means of fuzzy logic**
	Chairman: Prof. V. Hrissanthou - Co-Chairman: Dr M. Spiliotis		**Room 130**
11:15	**p.186**	Hrissanthou	Fuzzy regression analysis between sediment transport rates and stream discharge in the case of two basins in northeastern Greece
11:35	**p.187**	Evangelides	Rainfall data regression model using fuzzy set logic
11:55	**p.185**	Spiliotis	Assessment of annual hydrological drought based on fuzzy estimators
12:15	**p.189**	Ellina	Fuzzy logic uses on eutrophication and water quality predictions
12:35	**p.188**	Sidiropoulos	Optimal spatial allocation of groundwater under fuzzy hydraulic parameters

12:35 - 13:30

Lunch

YPN Short course – Room 138

13:30 - 15:50 : Parallel sessions:

Rooms:
138 Technical session B2: Water as a renewable energy
050 Technical session D7: Sediment transport and fluvial processes
030 Technical session E4: Hazard assessment and management
130 Thematic workshop S3: Buoyancy-driven flows

	Technical session B2		**Water as a renewable energy**
	Chairman: Prof. T. Tucciarelli - Co-Chairman: Dr Muris Torlak		**Room 138**
13:30	**p.45**	Oertel	Planning a small hydro-power plant in Lübeck (Germany) - Who owns the water?
13:50	**p.46**	O'Keefe	Effect of changes in flow velocity on the phytobenthic biofilm below a small scale low head hydropower scheme
14:10	**p.54**	Cleynen	Performance mapping of ducted free-stream hydropower devices
14:30	**p.48**	Rutschmann	Fish Behavioral and Mortality Study at Intake and Turbine
14:50	**p.55**	Goormans	In-situ scale testing of current energy converters in the Sea Scheldt, Flanders, Belgium
15:10	**p.49**	Lavidas	Long-Term Evaluation of the Wave Climate and Energy Potential in the Mediterranean Sea
15:30	**p.50**	Rosa-Santos	Numerical simulation and validation of CECO wave energy converter

	Technical session D7		**Sediment transport and fluvial processes**
	Chairman: Prof. R. Bialik - Co-Chairman: Prof. G. Oliveto		**Room 050**
13:30	**p.85**	Oliveto	Preliminary experiments on the evolution of river dunes
13:50	**p.86**	Pereira	A conceptual sediment transport simulator based on the particle size distribution
14:10	**p.87**	Mahesh	Effect of seepage on the friction factor in an alluvial channel
14:30	**p.88**	Thomas	Experimental sediment transport in a tidal bore generated in a flume
14:50	**p.89**	Mhashhash	Effect of hydrodynamics factors on flocculation processes in estuaries
15:10	**p.90**	Rossi	Lack of scale separation in granular flows driven by gravity
15:30	**p.91**	Plancke	Sediment transport in the Schelde-estuary: a comparison between measurements, transport formula and numerical models

	Technical session E4		**Hazard assessment and management**
	Chairman: Prof. N. Rivière		**Room 030**
13:30	**p.144**	Rosatti	Equipping the TRENT2D model with a WebGIS infrastructure: a smart tool for hazard management in mountain regions

13:50	**p.146**	Kemper	Determination of the interaction between surface flow and drainage discharge
14:10	**p.147**	Arrighi	Effects of flow orientation on the onset of motion of flooded vehicles
14:30	**p.148**	Wolfs	Development of a computationally efficient urban flood modelling approach
14:50	**p.149**	Bermudez	Rapid flood inundation modelling in a coastal urban area using a surrogate model of the 2D shallow water equations
15:10	**p.150**	Mustafa	Impacts of urban expansion on future flood damage: a case study in the River Meuse basin, Belgium
15:30	**p.141**	Tabari	How will be future rainfall IDF curves in the context of climate change?

	Thematic workshop S3		**Buoyancy-driven flows**
	Chairman: Dr M. Franca - Co-Chairman: Prof. C. Adduce		**Room 130**
13:30	**p.179**	Holzner	Turbulent entrainment in a gravity current (invited lecture)
14:00	**p.178**	Adduce	Density currents flowing up a slope
14:20	**p.176**	Stancanelli	Interfacial instabilities of gravity currents in the presence of surface waves
14:40	**p.173**	Prinos	Numerical simulation of periodically forced convective currents in aquatic canopies
15:00	**p.177**	Kranenburg	Unraveling salt fluxes: a tool to determine flux components and dispersion rates from 3D models

15:50 - 16:15 : *Coffee break*

16:15 - 18:15 : Parallel sessions

Rooms:
- **030** Technical session A6: Environmental management of water systems
- **050** Technical session D8: Hydraulic structures: weirs
- **138** Technical session D9: Surface and groundwater hydraulics and hydrology
- **130** Thematic workshop S3: Buoyancy-driven flows

	Technical session A6		**Environmental management of water systems**
	Chairman: Prof. B. Koppe		**Room 030**
16:15	**p.126**	Banda	Migration characteristics of a meandering river: the Madhumati river, Bangladesh
16:35	**p.21**	Glas	Spatio-temporal interaction of morphological variability with hydrodynamic parameters in the scope of integrative measures at the river Danube
16:55	**p.22**	Niemann	Analysis of contributions and uncertainties of fish population models for the development of river continuity concepts in the river basin Ruhr, Germany

17:15	**p.23**	Mohammadighavam	Hydrologic and hydraulic design to reduce diffuse pollution from drained peatlands

	Technical session D8		**Hydraulic structures: weirs**
	Chairman: Prof. D. Bung		**Room 050**
16:15	**p.108**	Altan-Sakarya	Numerical Modelling of Contracted Sharp Crested Weirs
16:35	**p.114**	Oertel	Analysis of various Piano Key Weir geometries concerning discharge coefficient development
16:55	**p.117**	Nekooie	Discharge coefficient of oblique labyrinth side weirs
17:15	**p.118**	Soares-Frazão	Reconstruction of a stage-discharge relation for a damaged weir on the Cavaillon river, Haïti

	Technical session D9		**Surface and groundwater hydraulics and hydrology**
	Chairman: Prof. G. Rosatti		**Room 138**
16:15	**p.77**	Akay	Estimation of rainfall-runoff relation using HEC-HMS for a basin in Turkey
16:35	**p.79**	Korkmaz	A numerical groundwater flow model of Bursa Basköy aquifer
16:55	**p.80**	El Azhari	Groundwater management and potential climate change impacts on Oum Er Rbia basin, Morocco
17:15	**p.84**	Westhoff	Limitation of self-organization within a confined aquifer

	Thematic workshop S3		**Buoyancy-driven flows**
	Chairman: Prof. C. Adduce - Co-Chairman: Dr M. Franca		**Room 130**
16:15	**p.174**	Zitti	Experiments on the impact of snow avalanches into water (invited lecture)
16:45	**p.181**	Decrop	A Comparison of Simple Buoyant Jet Models with CFD Analysis of overflow Dredging Plumes
17:05	**p.180**	Benincasa	Remote sensing of fluvial plumes in the Mediterranean area: review of current approaches and future perspectives

17:35	***Closing ceremony*** *Room 050*

18:30 - 23:30 Conference Dinner at "La Cité Miroir"

Workshop on Hydrological modelling of the Meuse basin

Thursday 28 July 2016

Room 035

Time	Speaker	Title
09:00	Benjamin Dewals (University de Liège) and Bernhard Becker (Deltares)	Welcome and opening
Hydrological modelling of the Meuse basin: extremes		
09:10	**Patrick Willems** (KU Leuven)	Session opening
09:20	Jan De Niel & Patrick Willems (KU Leuven)	Extreme value analysis for extrapolation of Meuse river high flows and validation based on exceptional historical events (past 500 years)
09:40	Tjitske J. Geertsema (Wageningen University)	Simultaneous occurrence of discharge peaks in a large river and its lowland tributaries
10:00	Mark Hegnauer, Frederiek Sperna Weiland (Deltares)	The GRADE rainfall generator for extreme events applied to the Meuse
10:20	*Coffee break*	
Hydrological models for the Meuse basin		
10:50	**Hubert Savenije** (TU Delft)	Session opening
11:00	TBA	TBA
11:20	Guillaume Thirel, Vazken Andréassian and Charles Perrin (IRSTEA) - **Winner of the 2016 Tison Award**	Lessons learnt from a common testing experiment on hydrological modelling on changing catchments
11:40	Tanja de Boer-Euser (TU Delft), Laurène Bouaziz (Deltares)	The joint modelling exercise for the Ourthe catchment
12:30	*Lunch break*	

Model users and stakeholders in the Meuse basin		
13:30	**Bernhard Becker** (Deltares)	Session opening
13:35	Christiane Pyka (RWTH Aachen University) and Cor Jacobs	The Rur-Meuse-Linkage project
13:55	Aleksandra Jaskula (Rijkswaterstaat)	Low flows and droughts
14:15	Niels van Steenbergen (nv De Scheepvaart)	Usage of hydrological models in the daily practice
14:40	*Coffee break*	

Hydraulic models		
15:10	**Guillaume Thirel** (IRSTEA)	Session opening
15:20	Rolien van der Mark (Deltares)	Effects of drought in the Meuse flow basin on the navigation sector
15:40	Alain Dassargues (Université de Liège), Pascal Goderniaux, Philippe Orban, Samuel Wildemeersch, Serge Brouyère	Groundwater flow and transport modelling at regional scale: lessons learned from different applications in the Walloon Meuse basin
16:00	Fernando Pereira (Flanders Hydraulic Research)	Operation of locks in the Albertkanaal
16:20	**Bernhard Becker** (Deltares) Benjamin Dewals (University de Liège) Hubert Savenije (TU Delft) Guillaume Thirel (IRSTEA) Patrick Willems (KU Leuven)	Workshop conclusions

Friday 29th July

Technical visits

Four technical tours will be organized on the last day of the Congress (Friday 29 July 2016):

- Coo pump-storage plant, East Belgium
- Boat lifts of Canal du Centre (UNESCO World Heritage), including a boat cruise (extra cost: 30 EUR), Centre Belgium
- Rur dams and reservoirs, West Germany
- Brown coal open pit mining, involving large scale groundwater influences and river diversion, West Germany

TOUR 1 - Coo pump-storage plant

Organized with the support of Electrabel GDF SUEZ

The Coo pump-storage plant was built between 1971 and 1979 support the Tihange nuclear power plant located next to river Meuse. Its total power is 1,164 MW. Two upper reservoirs, with a storage capacity of 8.5 million m³, are situated 279 m above the lower one. This tour will include a presentation of ENGIE power plants as well as the visit of the cave where the 6 pump-turbine groups are located. Nowadays, this East-Belgian power plant is a key component of the overall power production system in which intermittent renewable energy sources play a growing part.

Half day tour. Departure from Liege: 29/07/2016 8:15 AM.

TOUR 2 - Boat lifts of Canal du Centre (UNESCO World Heritage)

Organized with the support of SPW Service public de Wallonie

This technical tour includes a visit of the historical lifts (UNESCO World Heritage) on the old Canal du Centre. This series of four 16 m high boat lifts consist of two caissons hydraulically linked for counterbalancing their weight. Remarkably, they are entirely operated by hydraulic forces, without any external input of energy. In 2002, these four lifts as well as two locks were replaced by the 73-m high Strépy-Thieu boat lift, which permits the traffic of boats up to 1350 t. This tour includes a boat cruise with crossing of the 73 m high chute by means of the Strépy-Thieu boat lift, as well as the visit of the machine rooms.

Full day tour. Departure from Liege: 29/07/2016 7:45 AM.

On the way back, the bus will drop interested delegates directly at Charleroi Airport (Brussels South).

TOUR 3 - Rur dams and reservoirs (Germany)

Organized with the support of

The Rur River flows through portions of Belgium, Germany and the Netherlands. Two dams built on the Rur will be visited: the Rur and Urft dams. The Rur dam, built in 1939, is a 77 m high earth-fill dam. The reservoir formed by this dam is the second largest in Germany with more than 200 million m³. Upstream, the Urft dam, a 58 m high masonry dam built in 1905, creates the Urft reservoir which is 2.1 km² in area. This tour will include an introductive presentation, a visit of the inspection galleries and of the Urft dam's stepped spillway. The bottom outlet of Rur dam will be operated during the visit.

Full day tour. Departure from Liege: 29/07/2016 8:15 AM.

TOUR 4 - Brown coal open pit mining (Germany)

Organized with the support of

The Rhineland open pit mine extends over roughly 300 km² in West Germany. A production of 100 Mt of brown coal per year is expected to be reached in the near future. This intensive mining has huge impacts on society and environment such as, groundwater table lowering, resettlement of villages or the displacement of rivers. In 2005, a 5 km long reach of the River Inde was artificially deviated. The new 12 km long reach is acclaimed by the RWE designer as more environmentally friendly than the original one. This tour will include a field trip in the open pit mine and a visit of the rehabilitated reach of the River Inde.

Half day tour. Departure from Liege: 29/07/2016 7:45 AM.

General information

The venue

The congress will take place in the premises of the Management School of the University of Liege: HEC-ULg, 14 rue Louvrex, 4000 Liege

Be careful: Liege is translated by "Luik" in Dutch, and by "Lüttich" in German.
GPS coordinates: 5° 33' 47''/E - 50° 38' 13''/N

See also: http://www.hec.ulg.ac.be/en/contact_en

Wireless network:
In order to connect to the ULg wireless guest network, you will receive a personal username and password, both valid for the duration of the conference.

The town

As a cosmopolitan town with a rich history, Liege definitely deserves its reputation as a «land of hospitality»: the first image that Liege and its province gives to tourists is one of a welcoming, animated region with a rich historical and architectural heritage. It is also intimately connected with the river Meuse, which has given the city its shape and moulded the character of its citizens. Take your time to discover this multi-faced city and its many neighbourhoods, which are like so many small villages. On Sunday mornings go and stroll through the longest market in Europe, all along the river.

Just 1-hour away from Brussels by train, Liege is the birthplace of the Emperor Charlemagne, the writer Georges Simenon and the inventor Zénobe Gramme. Situated at the crossroads of an important motorway network linking Paris, Amsterdam and Cologne, it is only a few miles away from Maastricht, Holland and Aachen, Germany.

Liege is a student town with university located in the centre of the city. Its nightlife is busy and lively. Evenings in the downtown streets called «le Carré» are unique. This part of the city has a double life: luxury shopping by day, and «joie de vivre» by night.

Welcome Drink – 27th July 2016 - The Prince-Bishops' Palace (Liège)

The Welcome Drink is planned on 27th July 2016, 18:30, at the Prince-Bishops' Palace.

The Prince-Bishop's Palace ("Le Palais des Princes Evêques") is located Place Saint-Lambert 18, 4000 Liège.

The closest car park is "Saint-Lambert"

Conference Dinner – 28th July 2016 – La Cité Miroir

The Conference Dinner, scheduled on 28th July 2016, 18:30, will take place at "La Cité

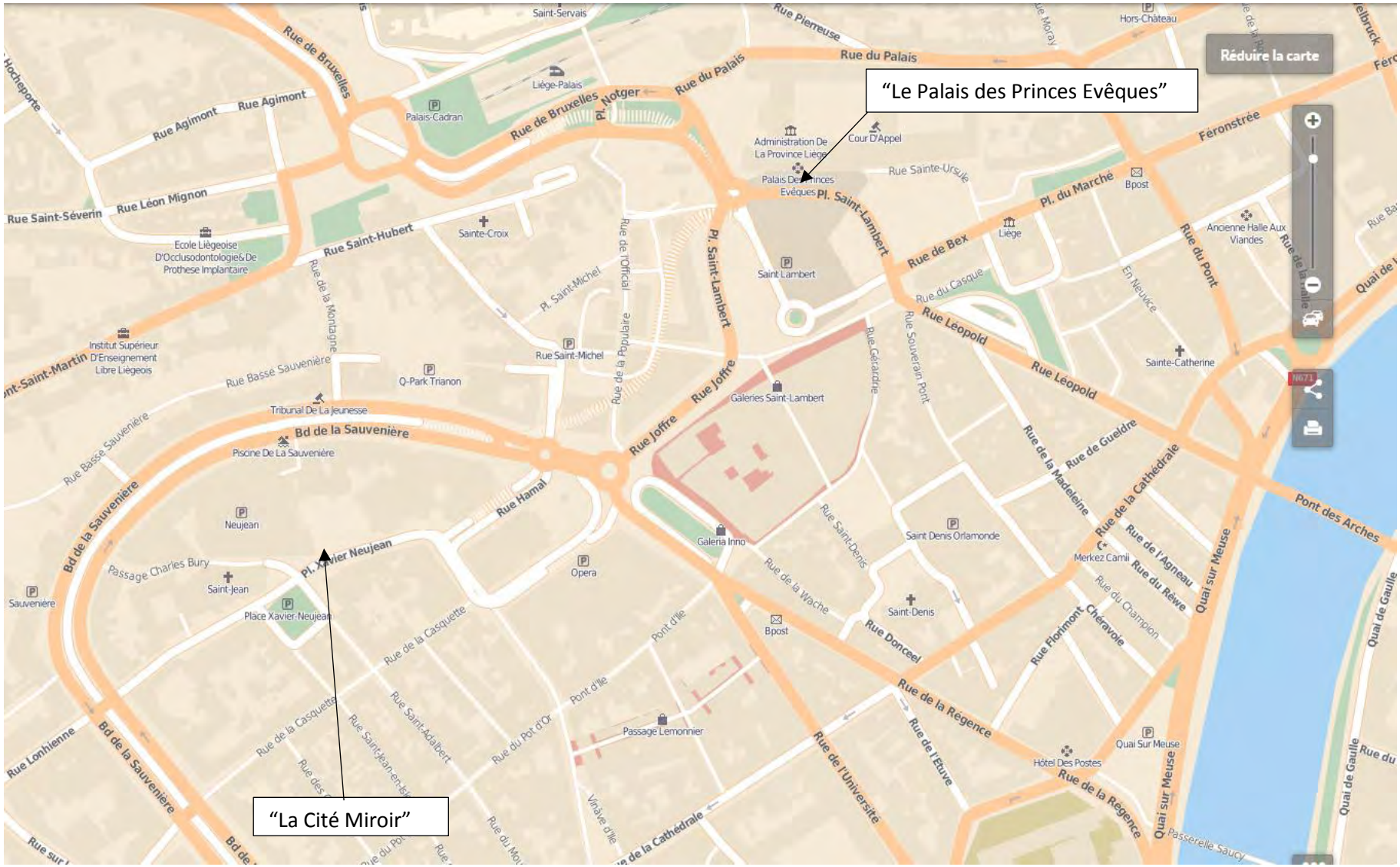
Miroir".

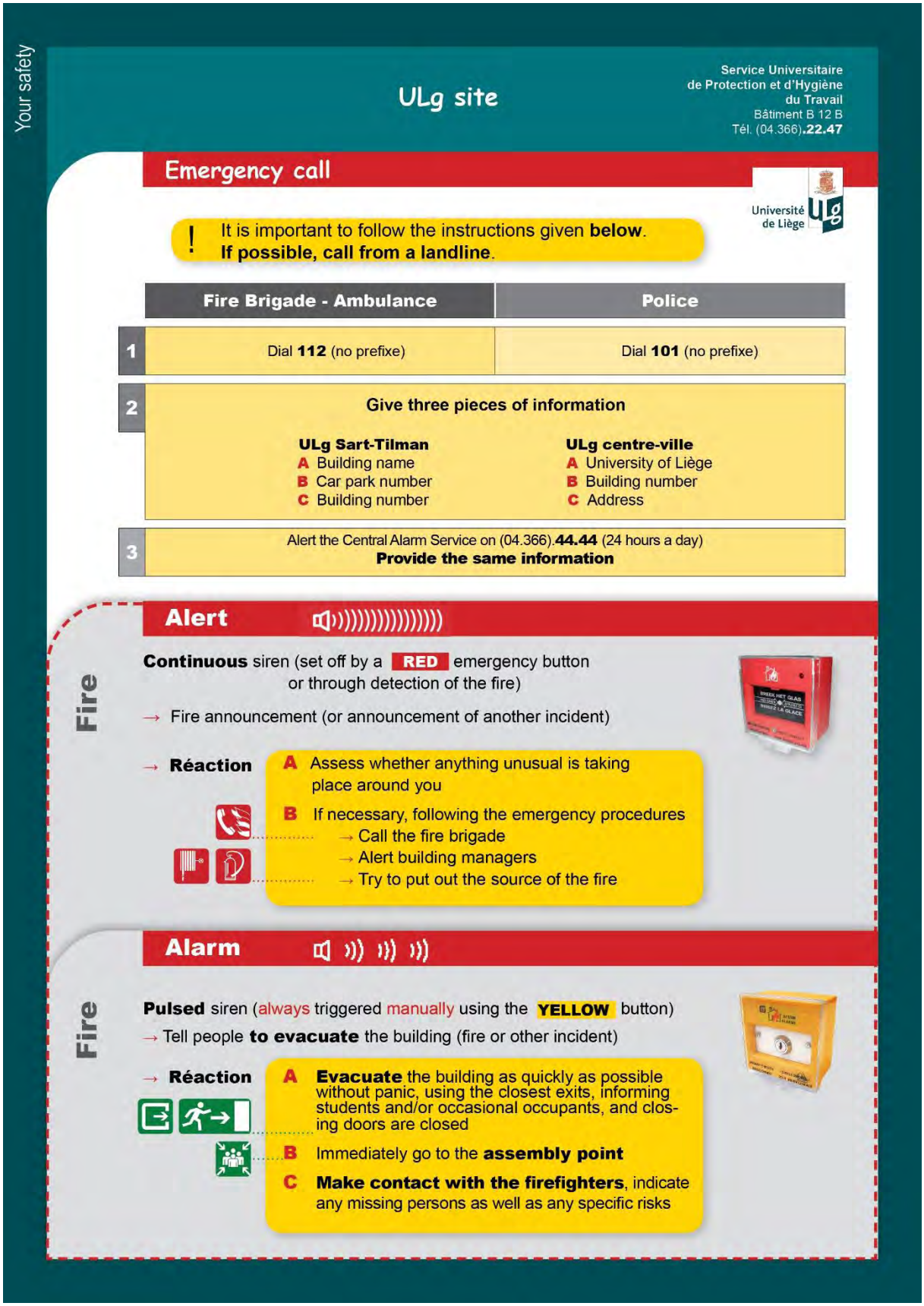
"La Cité Miroir" is located: Place Xavier-Neujean 22, 4000 Liège. It is right behind the Opera House.

If you come by car, the two closest car parks are:

Neujean
It is right next door to "La Cité Miroir" but its low capacity makes it full really quickly.

Opéra
It is a little foot distance from "La CitéMiroir" but offers more parking spots than "Neujean".


"Le Palais des Princes Evêques"
"La Cité Miroir"
Réduire la carte
Rue de Bruxelles
Rue du Palais
Pl. Notger
Rue Agimont
Rue Léon Mignon
Rue Saint-Séverin
Rue Saint-Hubert
Pl. Saint-Lambert
Rue de Bex
Pl. du Marché
Féronstrée
Rue du Pont
Rue Léopold
Rue Joffre
Bd de la Sauvenière
Rue Hamal
Rue de la Madeleine
Rue de Gueldre
Rue de la Cathédrale
Pont des Arches
Quai sur Meuse
Rue Donceel
Rue de la Régence
Rue de l'Université
Rue de l'Etuve
Rue Florimont
Rue de l'Agneau
Rue du Rêwe
Rue Lonhienne
Rue de la Casquette
Rue Saint-Adalbert
Rue du Pot d'Or
Pont d'Ile
Rue de la Wache
Rue Saint-Denis
Rue du Champion
Quai de Gaulle
Passerelle Saucy
Rue Basse Sauvenière
Rue de la Montagne
Rue de l'Official
Rue de la Populaire
Rue Saint-Michel
Rue du Casque
Rue Souverain Pont
Rue Gérardrie
Rue Sainte-Ursule
Rue Pierreuse
Rue du Mayeur
Hors-Château
Saint-Servais
Liège-Palais
Palais-Cadran
Administration De La Province Liège
Cour D'Appel
Palais Des Princes Evêques
Bpost
Liège
Ancienne Halle Aux Viandes
Ecole Liégeoise D'Occlusodontologie& De Prothese Implantaire
Sainte-Croix
Saint Lambert
Institut Supérieur D'Enseignement Libre Liégeois
Q-Park Trianon
Rue Saint-Michel
Galeries Saint-Lambert
Sainte-Catherine
Tribunal De La Jeunesse
Piscine De La Sauvenière
Neujean
Place Xavier-Neujean
Saint-Jean
Opera
Galeria Inno
Saint Denis Orlamonde
Merkez Camii
Saint-Denis
Passage Lemonnier
Hôtel Des Postes
Quai Sur Meuse
Passage Charles Bury
Sauvenière


Your safety
ULg site
Service Universitaire
de Protection et d'Hygiène
du Travail
Bâtiment B 12 B
Tél. (04.366).22.47
Emergency call
Université de Liège
! It is important to follow the instructions given below.
If possible, call from a landline.
Fire Brigade - Ambulance
Police
1
Dial 112 (no prefixe)
Dial 101 (no prefixe)
2
Give three pieces of information
ULg Sart-Tilman
A Building name
B Car park number
C Building number
ULg centre-ville
A University of Liège
B Building number
C Address
3
Alert the Central Alarm Service on (04.366).44.44 (24 hours a day)
Provide the same information
Fire
Alert
Continuous siren (set off by a RED emergency button
or through detection of the fire)
→ Fire announcement (or announcement of another incident)
→ Réaction
A Assess whether anything unusual is taking place around you
B If necessary, following the emergency procedures
→ Call the fire brigade
→ Alert building managers
→ Try to put out the source of the fire
Fire
Alarm
Pulsed siren (always triggered manually using the YELLOW button)
→ Tell people to evacuate the building (fire or other incident)
→ Réaction
A Evacuate the building as quickly as possible without panic, using the closest exits, informing students and/or occasional occupants, and closing doors are closed
B Immediately go to the assembly point
C Make contact with the firefighters, indicate any missing persons as well as any specific risks

Main sponsors

MET-FLOW

HydroVision
Acoustic Flow Meters

Co-sponsors

LAVISION
FOCUS ON IMAGING

SOFICO
SOCIETE WALLONNE DE FINANCEMENT COMPLEMENTAIRE DES INFRASTRUCTURES

INNEAUTECH

NORTEK B.V.

Institutional Support

IAHR AIRH
Supported by Spain Water and IWHR, China

IAHS AISH

SHF

hece Université de Liège ulg

fnrs
LA LIBERTÉ DE CHERCHER