

2. The digital river

Theme	Subtheme	Session
2. The digital river	2.1 Monitoring	2.1.1 Monitoring - Data analysis (2.1) 2.1.2 Monitoring - Monitoring techniques (2.2)
	2.2 Numerical modelling	2.2.1 Numerical modelling - Numerical techniques (2.3) 2.2.2 Numerical modelling - Floods and morphodynamics (2.4) 2.2.3 Numerical modelling - Applications (2.5)
	2.3 Advanced methods in turbulence modelling of fluvial systems (Special Session)	2.3.1 Advanced methods in turbulence modelling of fluvial systems (Special Session) - Advanced methods in turbulence modelling of fluvial systems A (2.6) 2.3.2 Advanced methods in turbulence modelling of fluvial systems (Special Session) - Advanced methods in turbulence modelling of fluvial systems B (2.7)
	2.4 The future of river modelling (Special Session)	2.4.1 The future of river modelling (Special Session) - The future of river modelling A (2.8) 2.4.2 The future of river modelling (Special Session) - The future of river modelling B (2.9)

2.1 2.1.1 Monitoring - Data analysis

1. GIS and remote sensing for tracking morphological changes and vegetation coverage at the reach scale: the Po River case study, *Michael Nones, Massimo Guerrero*.
2. Detecting and quantifying morphological change in tropical rivers using Google Earth Engine and image analysis techniques, *Richard Boothroyd, Richard Williams, Xiao Yang, Trevor Hoey, Brian Barrett, Pamela Tolentino, John Edward Perez, Esmael Guardian, Carlos Primo David*.
3. Thirty-year analysis of a changing river system using Bayesian rating curves, *Koen Berends, Matthijs R.A. Gensen, Jord J. Warmink, Suzanne J.M.H. Hulscher*.
4. Application of Convolutional Neural Network Method to Measure Free Surface Velocity in Open Channel Flow, *Ting-Yu CHEN, Howard H-C HO*.
5. Unified framework for drought monitoring and assessment in a transboundary river basin, *Ronnie Javier Araneda Cabrera, María Bermúdez Pita, Jerónimo Puertas Agudo, Rodrigo Maia*.

2.2 2.1.2 Monitoring - Monitoring techniques

1. Remote gauging of open channel flow: Estimation of depth averaged velocity from surface velocity and turbulence, *Graeme Smart, Hamish Biggs*.
2. Determining image-based grain size distribution with suboptimal conditioned photos, *Martin Detert, Volker Weitbrecht*.
3. Video-based hydrometry: a Bayesian camera calibration method for uncertainty analysis, *Jérôme Le Coz, Benjamin Renard, Vincent Vansuyt, Magali Jodeau, Alexandre Hauet*.
4. Monocular 3D reconstruction for image-based velocity estimation, *Lionel Pénard, Musaab Khalid, Étienne Mémin*.
5. Empirical vs. analytical methods for modelling the uncertainty of ADCP discharge measurements, *Aurélien Desparx, Jérôme Le Coz, Dave Mueller, Grégoire Naudet, Gilles Pierrefeu, Karine Delamarre, Stéphanie Moore, Elizabeth Jamieson*.
6. Flow measurement in step-pool mountain streams, *Sruthi Thazhathe Kalathil, Venu Chandra*.

2.3 2.2.1 Numerical modelling - Numerical techniques

1. New approaches to solving the Saint-Venant equations, *Ben R. Hodges, Frank Liu, Cheng-Wei Yu*.
2. Simulation of resonant gravity waves in shallow water flows using a depth-averaged URANS model, *Adrian Navas-Montilla, Carmelo Juez, Mario Franca, Javier Murillo*.
3. A high-order augmented Riemann solver for the treatment of bottom steps and porosity discontinuities in the Shallow Water Equations with porosity, *Alessia Ferrari, Renato Vacondio, Paolo Mignosa*.
4. Discontinuous Galerkin method for 1D river flows, *Insaf Draoui, Jonathan Lambrechts, Vincent Legat, Sandra Soares-Frazao, Ton Hoitink, Eric Deleersnijder*.
5. Control theory-based update of water levels in 1D hydrodynamic models, *Miloš Milašinovic, Dušan Prodanovic, Budo Zindovic, Nikola Rosic, Nikola Milivojevic*.
6. Numerical modelling of flow dynamics in the Tonle Sap by means of a discontinuous Galerkin finite-element model, *Jonathan Lambrechts, Sigrun Ortleb, Nicolas Gratiot, Eric Deleersnijder, Sandra Soares-Frazao, Hoang Anh Le*.

7. Large Eddy Simulation for flows through emerged or slightly submerged square obstacles, *Marina OUKACINE, Rajae RTIMI, Nicole GOUTAL, Vincent LOIZEAU, Sofiane BENHAMADOUCHE, Frédérique LARRARTE, Sébastien PROUST.*
8. Eliminating Grid Alignment Sensitivity in Fixed Grid Solvers, *Duncan Kitts, Greg Collicutt, Shuang Gao, Phillip Ryan, Bill Syme.*
9. Breakthrough-curve analysis for identification of contaminant source characteristics using machine learning, *Si Yoon Kwon, Il Won Seo, Hyoseob Noh.*

2.4 2.2.2 Numerical modelling - Floods and morphodynamics

1. Flood simulation in urban areas obtained by GPU-accelerated 2D shallow water model with internal boundary conditions, *Susanna Dazzi, Renato Vacondio, Alessia Ferrari, Marco D'Oria, Paolo Mignosa.*
2. Depth averaged numerical simulation of non-cohesive river dike breaching due to overtopping flows, *Lydia KHELOUI, Ismail RIFAI, Kamal EL KADI ABDERREZZAK, Benjamin DEWALS, Riadh ATA.*
3. Fine sediment deposits in gravel bed rivers: sensitivity analysis to particle properties using a 2D hydrodynamic and sediment model, *Hanna Haddad, Magali Jodeau, Nicolas Claude, Germain Antoine, Cédric Legoût.*
4. A 2D Shallow water model with depth-dependant porosity applied to the Severn River, *Vita Ayoub, Carole Delenne, Renaud Hostache, Patrick Matgen.*
5. Simulation of hydro-sedimentary processes during a dam flushing event using three 1D numerical software, *Emilio Corrales Lalinde, Violaine Dugué, Thierry Fretaud, Matthieu Secher, Eric Valette, Jean-Baptiste Faure, Benoît Camenen.*
6. Automated quantification of river morphodynamics from satellite imagery for large multithreaded rivers, *Joep Rawee, Freek Huthoff, Denie Augustijn, Carolien Wegman, Mattijn van Hoek.*
7. Reconstructing the Aznalcóllar mine accident 20 year later. Numerical modelling of the flood, *Marcos Sanz-Ramos, Ernest Bladé, Josep Dolz.*

2.5 2.2.3 Numerical modelling - Applications

1. Improved floodplain vegetation roughness for 1D hydraulic models, *Alessandra Crosato, James Zulfan, Andrés Vargas-Luna.*
2. Current trends in the optimization of hydraulic flood simulations in ungauged steep rivers, *Adina Moraru, Nils Rüter, Oddbjørn Bruland.*
3. A quantitative assessment of hydrodynamic impacts due to variable discharges on the backwater deposits of Durgapur Barrage over River Damodar in India using MIKE 11, *Sayak Nandy, Manas Kumar Das, Bibhas Chandra Barman, Ramendu Bikas Sahu.*
4. A new strategy for the estimation of friction parameters in hydrodynamic modelling: implementation to an ephemeral river, *Vasilis Bellos, Ioannis Nalbantis, George Tsakiris.*
5. Bank erosion in regulated navigable rivers: towards a process-based model of bank retreat, *Alessandra Crosato, Wim Uijttewaal, Gonzalo Duró.*
6. Assessment of river embankments security: a case study, *Angelo LEOPARDI, Giovanni de Marinis, Cristiana Di Cristo, Massimo Greco, Giuseppe Del Giudice, Stefano Sarracini, Annalaura Gabriele, Nicola Cifù.*
7. Numerical modelling approaches for flow near groynes - comparison with experiments, *Lindert Ambagts, Frank Platzek, Mohamed Yossef, Manuela Baron.*

2.6 2.3.1 Advanced methods in turbulence modelling of fluvial systems (Special Session) - Advanced methods in turbulence modelling of fluvial systems A

1. Effect of active filtering on flow around a partially submerged freshwater mussel, *Hao Wu, George Constantinescu, Jie Zheng.*
2. Mass and momentum exchange in lateral bank cavities with increasing aspect ratio using large-eddy simulation, *Pablo Ouro, Carmelo Juez, Mario Franca.*
3. Eddy-resolving Simulation of Flows over Macro-roughness, *Federico Zabaleta, Fabián A. Bombardelli, Juan Pablo Toro.*
4. Large-eddy simulation of turbulent free surface flows past a surface-piercing circular cylinder, *Zhihua Xie, Thorsten Stoesser, Junqiang Xia.*
5. Investigation of water surface treatments in DES simulations and their effects on outer bank cell production in river bends, *H. K. Schreiner, Colin Rennie, A. Mohammadian.*

2.7 2.3.2 Advanced methods in turbulence modelling of fluvial systems (Special Session) - Advanced methods in turbulence modelling of fluvial systems B

1. High-fidelity three-phase flow simulation of flash and riverine floods in real-life waterways, *Ali Khosronejad, Kevin Flora, Seokkoo Kang.*
2. Hydrodynamic modelling of leaky barriers with OpenFOAM, *Shannon Leakey, Caspar Hewett, Vassilis Glenis, Paul Quinn.*
3. Numerical study of the flow and passive scalar transport in an open-channel confluence with a flat and a degraded fixed bed, *Tian Jin, Pedro Xavier Ramos, Laurent Schindfessel, Tom De Mulder.*
4. Boat induced sediment resuspension and water quality in shallow flows, *Sergio Valbuena, Fabián Bombardelli, Geoffrey Schladow.*
5. Mesh-Size Insensitive Turbulence Modelling for the 2D Shallow Water Equations, *Greg Collicutt, Shuang Gao, Bill Syme.*
6. The Lateral Mixing by Waves in Steep River Channel, *Shooka Karimpour, Vincent Chu.*

2.8 2.4.1 The future of river modelling (Special Session) - The future of river modelling A

1. Automating flood-safe ecological river modelling and design, *Sebastian Schwindt, Gregory Pasternack.*
2. Combination of Machine-learning Method and Sediment Transport Model to Forecast Sediment Budget in Watershed, *Shu-Hao Chang, Howard H-C HO.*
3. Two-dimensional modelling of hydro-morphodynamic processes in a gravel-bed river: new insights from in situ measurement progress and interoperability applications, *Coraline Bel, Magali Jodeau, Nicolas Claude, Pablo TASSI.*
4. Numerical simulation of non-uniform bed load transport using Lagrangian method and probabilistic Exner equation, *Kazuyuki Ota, Takahiro Sato.*
5. Exploring contributions of citizens' data to improvements in modelling of an urbanized catchment: a case study in Kifissos catchment, *Thaine H. Assumpção, Ioana Popescu, Andreja Jonoski, Dimitri P. Solomatine.*

2.9 2.4.2 The future of river modelling (Special Session) - The future of river modelling B

1. Inundation hazard analysis using open data from the web: application to the Rio Muaguide in Mozambique, *Davide Biotto, Giorgio Cancelliere, Benedetta Corti, Anna Giovannini, Alessio Radice, Sara Rrokaj.*
2. Physical and numerical model studies of the Martigny bend as part of 3rd correction of the Rhone River, *Azin Amini, Jean-Noël Saugy, Stephanie André, Khalid Essyad, Tony Arborino, Giovanni de Cesare.*
3. The application of hydrogeomorphological tools to improve agricultural watershed management in Quebec (Canada), *Nicolas Stämpfli.*
4. High Performance Computing in river modelling: a novel two-dimensional software for river hydro- and morphodynamic simulations, *David F. Vetsch, Annunziato Siviglia, Davide Vanzo, Matthias Bürgler, Manuel Weberndorfer, Paola Bacigaluppi, Daniel A. S. Conde, Robert M. Boes.*
5. Flood risk analysis and communication using digital twins of urban areas, *Torsten Heyer, Juergen Stamm.*