

World Association for Sedimentation & Erosion Research – WASER

NEWSLETTER

Reporting WASER news to you regularly

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NEWS

Vice President of WASER, Prof. Weiming Wu, visited IRTCES and presented a seminar

On December 25, Vice President of WASER, Prof. Weiming Wu from Clarkson University, USA, visited the International Research and Training Center on Erosion and Sedimentation (IRTCES). During his visit, he was invited to give a seminar on "Advances in Sediment Transport Dynamics – Sediment Entrainment" at IRTCES. Experts and graduate students from IRTCES and the China Institute of Water Resources and Hydropower Research (IWHR) attended this seminar.



Prof. Qingbin Pan, Deputy Director of IRTCES, hosted the seminar. He expressed his gratitude to Prof. Weiming Wu for his long-term support for the development of WASER and for joining hands with IWHR to promote international cooperation and talent cultivation in the field of sedimentation research.



During the seminar, Prof. Wu systematically reviewed the classical theory of sediment incipient motion and its development. He introduced the threshold conditions for individual particle entrainment, evaluated the applicability of different sediment entrainment formulas, summarized the

different modified expressions of the Shields Diagram, analyzed the incipient motion of nonuniform sediment with hiding and exposure correction factors, and explored the effects of exposure height, bed roughness, particle shape, shallow submergence, turbulence, and impulse duration on incipient motion.

Following his presentation, Prof. Wu had an energetic discussion with the attendees about how engineering-oriented sediment research can promote basic sediment theory research, and the differences in sediment research between China and other countries.



Locals at the mouth of the Amazon River get a salty taste of climate change

Highlights:

- Ocean rise and changes in the Amazon River are ruining the way of life in an archipelago close to where the Amazon River runs into the Atlantic.
- In Bailique, locals are experiencing longer periods of salty water, a natural phenomenon that is becoming more usual due to climate change.
- Açai berries, the prime economic drive of the community, are becoming saltier, and palm trees are being eaten by the erosion caused by changes in the Amazon River's flow.
- Part of the population has already left the region, as others struggle to adapt to the new landscape.

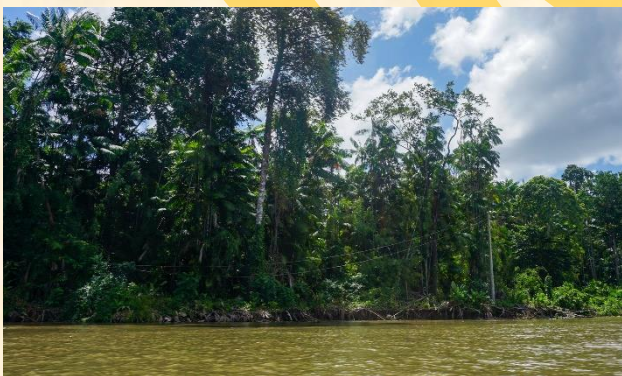
Bailique, Brazil — from the balcony of his two-story wooden house, Aurélio Marques gazes out over the Amazon River, flowing like a mere thread. The middle-aged boat pilot calculates how long it will take for the tide from the Atlantic Ocean to reach the riverbed, increasing the water level and allowing him to navigate to a nearby community with his boat.

“It seems that nature is revolting, angry with us,” Marques told Mongabay. “I’ve been reading nature since I was a child, but I am no longer able to decipher it.” Climate change, coupled with man-made actions in the Bailique Archipelago, a group of islands at the mouth of the Amazon River in the Brazilian Amazon, has changed the water cycle and made life increasingly arduous over the past four years. Natural phenomena are becoming more aggressive and unpredictable, and Bailique’s residents, struggling to adapt to a new environment, are living now what people from other parts of the world will likely face in the future.

To the south of the archipelago, buffalo ranches and hydroelectric dams far away from the islands gradually diverted the course of creeks and tributaries to the Amazon River. An enhanced river current is accelerating house-engulfing landslides on its riverbanks. It is also affecting the north, where the Amazon River and its tributaries are becoming weaker, silting up in part by the land being washed and dragged away from the south and leaving residents sometimes stranded.

As a result, water from the Atlantic Ocean, which itself is increasing its level, is infiltrating the islands from the north for a progressively longer period of the year, making the available water saline.

Broader changes in the Amazon are also playing a role. In past rainforest rainy seasons, temperatures were higher than usual, and the Amazon had one of the most severe dry seasons in 2023, enabling the worst drought ever registered on the Amazon River, helping the ocean to push back the mighty river farther into the continent.



Erosion is shrinking different parts of Bailique Archipelago islands: an electricity pole about to fall due to erosion. Rudja Santos.

The main economic crop of the archipelago, açai berries, is becoming salty due to the brackish water, and açai palm trees on the banks of the Amazon River are being devoured by fast-paced landslides.

Meanwhile, the Amapá state government and the municipality of Macapá, the state’s capital that manages Bailique, are unable to mitigate the

effects of the environmental changes, which have driven part of the population out of the archipelago.



Map of Amazon River's outlet

Saltwater intrusion is happening all along the mouth of the Amazon River, as is coastal erosion. Both have to do with rising sea levels and changes in the Amazon River Basin. If the discharge of water at the mouth decreases, the sea advances further. If sediment loads increase along the rivers due to deforestation, for example, more dirt is carried to the Amazon’s mouth, which in turn increases siltation.

The deforestation of the Amazon, the general temperature rise in the region and the warming of the oceans have made the cycle of floods and droughts of the world’s largest river increasingly extreme.

But Amapá’s Water and Sewage Company, responsible for Bailique water supply management, started dealing with the periodic salinization of the archipelago only in 2023 when it provided desalination plants in the archipelago’s main community of Vila Progresso. Developed for a different environment, it didn’t work due to the level of saltiness and sediments of Bailique’s water, greater than the machines were able to filter.



Residents of Vila Progresso village walks on a wooden walkway about to get eaten by erosion of the Amazon riverbank. Image by Rudja Santos.

According to the company, a study is being carried out to measure the current level of salinization and residues. New plants, more suited to the local conditions, are expected to be placed in several communities by the end of the year.

Meanwhile, Macapá City Hall spent the second half of 2023 sending drinking water from the capital city in boatloads or in plastic bottles after declaring a state of emergency in the archipelago — which enables public officials to acquire services and goods with less bureaucracy and spending-proving control, among other things.

Some institutes and universities in the region are trying to monitor the phenomenon, but there are few studies about the scale of what is happening in Bailique. A 2018 report from IEPA calculated that in some communities, erosion ate 10 m (32.8 ft) of land from the riverbank that year. Santos estimates that the yearly landslide in his plot is now four times larger.



Abandoned houses at the south of the archipelago about to fall due to the erosion of the Amazon River. Residents first take out parts of the houses so they can be reused to build a new house. Image by Rudja Santos.

The greater the erosion, the faster the houses on the riverbank are falling down. Açaí farmer Erielson, for example, has already lost four houses in the last decade. A resident of the main village of Vila Progresso, with more than a thousand residents, said he has been living in his sixth house in the last eight years.

As the land falls, residents move what they can of their wooden houses farther into the islands, but many communities are starting to get cornered by private-owned buffalo ranches. Some villages are disappearing.

(Source: <https://news.mongabay.com/2024/02/locals-at-the-mouth-of-the-amazon-river-get-a-salty-taste-of-climate-change/>)

Law and progress: millions of trees planted to stop soil erosion along the Yellow River in Shaanxi Province

Around 700 kilometers of the Yellow River flows through Shaanxi Province, and the vast Loess Plateau in northwest China. China's government has made it a priority to address severe soil and water loss in the region, and protect the river environment. One of the most common measures to control land degradation in cities across Shaanxi Province is planting trees.



Local people planting trees

Planting trees on the West Bank of the Yellow River is no easy task. The slope is steep, but what's more challenging is the widespread bush with sharp and long thorns. People can easily get hurt while passing through those, not to mention planting trees.



Steep slope on the west bank of the Yellow River

One of these trees weighs five kilograms. Each one has to be carried up the bare river bank to areas that can only be accessed on foot. The stones carried by these workers are used to contain the soil in which the trees are planted.

More new trees have been planted across 3,000 hectares of land along the river bank since the Yellow River protection law came into effect nearly one year ago.

The law has encouraged people a lot in further protecting the river. The central government also has offered the fund for more projects of Yellow River protection, so the local people can spend it in planting more trees.

Official data show that two decades ago, around 800 million tons of soil was washed into the Yellow River in Shaanxi Province every year, increasing sediment levels. Now, it's less than 300 million tons. The Yellow River protection law is also helping

raise environmental awareness in local communities.

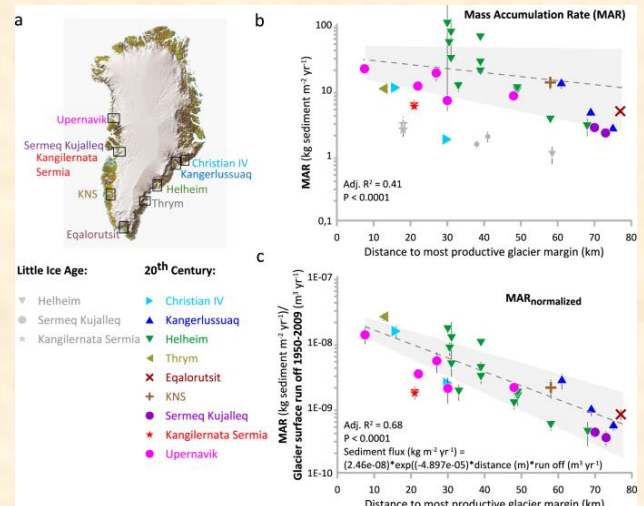
Lan Fang, the Director of the Center for Yellow River Studies in Shaanxi Normal University said, "Whether for entrepreneurs or individuals, their awareness of protecting the river has been raised. We also have found that in the procuratorate or court system, cases related to ecological protection in the Yellow River are increasing. Judicial authorities are providing a better legal guideline to regulate people's behaviors, which is a very good legal framework."

Shaanxi Province has also introduced an environmental protection law for the Weihe River, the biggest tributary of the Yellow River in the province. It's yet another milestone in efforts to protect one of the world's longest river systems.

(Source: <https://news.cgtn.com/news/>)

Sediment discharge from Greenland's marine-terminating glaciers is linked with surface melt

Abstract: Sediment discharged from the Greenland Ice Sheet delivers nutrients to marine ecosystems around Greenland and shapes seafloor habitats. Current estimates of the total sediment flux are constrained by observations from land-terminating glaciers only. Addressing this gap, our study presents a budget derived from observations at 30 marine-margin locations. Analyzing sediment cores from nine glaciated fjords, we assess spatial deposition since 1950. A significant correlation is established between mass accumulation rates, normalized by surface runoff, and distance down-fjord. This enables calculating annual sediment flux at any fjord point based on nearby marine-terminating outlet glacier melt data. Findings reveal a total annual sediment flux of 1.324 ± 0.79 Gt/yr over the period 2010-2020 from all marine-terminating glaciers to the fjords. These estimates are valuable for studies aiming to understand the basal ice sheet conditions and for studies predicting ecosystem changes in Greenland's fjords and offshore areas as the ice sheet melts and sediment discharge increases.

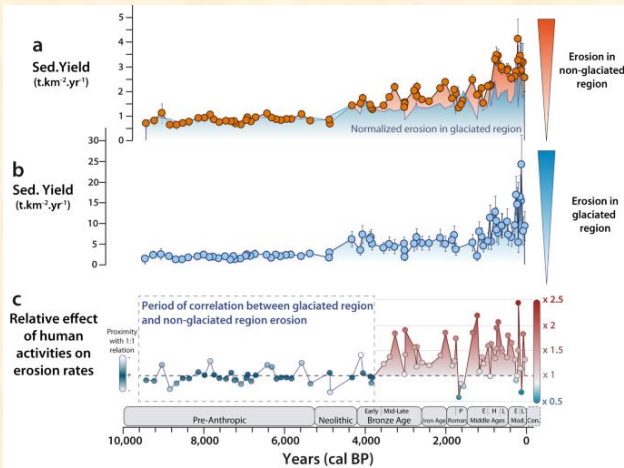


Sediment flux from Greenland's marine-terminating glaciers, as inferred from the mass accumulation rate within fjords adjacent to these glaciers, exhibits a clear connection with surface melt processes.

(Source: Andresen, C.S., Karlsson, N.B., Straneo, F. et al. (2024). Sediment discharge from Greenland's marine-terminating glaciers is linked with surface melt. *Nature Communications*, 15, 1332. <https://doi.org/10.1038/s41467-024-45694-1>)

Human-triggered magnification of erosion rates in European Alps since the Bronze Age

Abstract: A major feature of the Anthropocene is the drastic increase in global soil erosion. Soil erosion is threatening Earth habitability not only as soils are an essential component of the Earth system but also because societies depend on soils. However, proper quantification of the impact of human activities on erosion over thousands of years is still lacking. This is particularly crucial in mountainous areas, where the highest erosion rates are recorded. Here we use the Lake Bourget catchment, one of the largest in the European Alps, to estimate quantitatively the impact of human activities on erosion. Based on a multi-proxy, source-to-sink approach relying on isotopic geochemistry, we differentiate the effects of climate fluctuations from those of human activities on erosion over the last 10,000 years. We demonstrate that until 3800 years ago, climate is the only driver of erosion. From that time on, climate alone cannot explain the measured rates of erosion. Thanks to an unprecedented regional paleoenvironmental reconstruction, we highlight that the development of pastoralism at high altitudes from the Bronze Age onwards and the extension of agriculture starting in the Middle Ages were key factors in the drastic increase in erosion observed in the Alps.



Erosion signals for non-glaciated and glaciated regions and the relative effect of human activities on erosion rates in Lake Bourget catchment

(Source: Rapuc, W., Giguet-Covex, C., Bouchez, J. et al. (2024). Human-triggered magnification of erosion rates in European Alps since the Bronze Age. *Nature Communications*, 15, 1246. <https://doi.org/10.1038/s41467-024-45123-3>)

Review of methods of sediment detection in reservoirs

Abstract: As reservoir sedimentation is rapidly progressing on a global scale, intensified and better adapted monitoring of sediment accumulation is needed to design optimal counter measures. In the current study, different methods on how to assess the siltation status of different reservoir types are represented by including the availability of previous data. Four different techniques are described by means of detailed case studies, including topographic differencing as the most widely used method. Examples of sub-bottom profiling, dynamic free-fall penetrometer measurements, and long sediment coring also are presented. The methods are explained through the application of each technique under varying conditions. The aim of the current study was to assess the advantages and disadvantages of each method and to discuss each methods applicability, depending on the reservoir type, sediment characteristics, and sediment thickness. Based on the case studies and literature an overview table of available techniques for sediment detection was created including a qualitative estimation of the strengths and weaknesses. Additionally, a decision path is presented to choose the most promising technique dependent on the individual situation of a reservoir. With this review, sediment-related decisions are supported for dam operators and authorities as well as dredging companies.

(Source: Hilgert S., Sotiri, K., Fuchs, S. (2024). Review of methods of sediment detection in reservoirs. *International Journal of Sediment*

PUBLICATIONS

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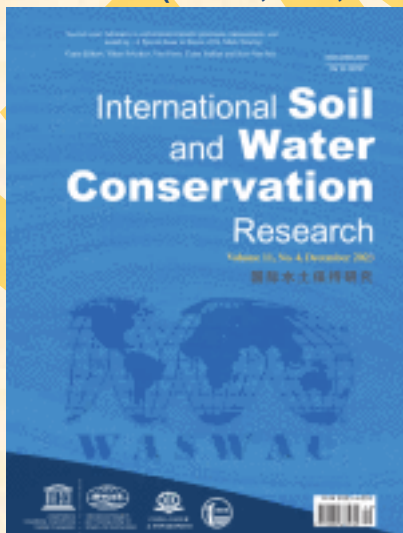
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Full papers are available at ScienceDirect:
<https://www.sciencedirect.com/journal/international-journal-of-sediment-research> with free access.

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Free full papers and open access are available at ScienceDirect :
<https://www.sciencedirect.com/journal/international-soil-and-water-conservation-research>.

COMING EVENTS

9th Conference on Physical Modelling in Coastal Engineering - Coastlab24 (The Netherlands, May 13-26, 2024)

Date: May 13-16, 2024

Venue: Delft, the Netherlands

Summary: The 9th Conference on Physical Modelling in Coastal Engineering - Coastlab24 will be held in May 13-16, 2024. Welcome to join in! The following is the detailed introduction: CoastLab is a conference whose focus is on Physical Modelling in Coastal Engineering and Science. CoastLab is organized under the auspices of and in collaboration with the Coastal and Maritime Hydraulics Committee of the International Association of Hydro-Environment Engineering and Research (IAHR). Coastlab24 builds on the success of previous conferences in Porto (2006), Bari (2008), Barcelona (2010), Ghent (2012), Varna (2014), Ottawa (2016), Santander (2018) and Zhoushan (2020).

Theme and Topics: In the coastal zone, many developments are taking place, with much attention to themes like:

- Climate change impacts, adaptation, mitigation
- Multifunctional and nature-inclusive designs
- Development of ports and marine terminals
- Wave, wind and tidal energy
- Industrial outfalls

To cater for these developments continuous development in modelling capabilities is required, in topics such as:

- Coastal hydrodynamics, coastal processes
- Coastal flooding, flood prevention, shore protection
- Coastal and ocean structures, breakwaters, revetments
- Scour, sediment transport, morphology
- Wave-structure interactions, loading, response
- Wave run-up and overtopping
- Laboratory technologies, measurement systems
- Synoptic measurement systems (e.g. laser scanning, imaging, motion tracking, Particle Image Velocimetry)
- Coastal field measurement and monitoring
- Wave synthesis, generation, and analysis
- Scale effects and uncertainty analysis
- Composite modelling and validation (physical, numerical, field, and AI)
- Extreme events – assessment and mitigation
- Tsunami hydrodynamics, impacts, and mitigation
- Mixing, water quality
- Physical modelling case studies
- Navigation, ship motions

Presentations will be given, and discussions will be held about these topics. The programme includes PhD workshops, welcome reception, technical tour plus banquet, and optional post conference tour. Moreover, an exhibition with companies and suppliers will be present.

Key dates:

Early-bird registration deadline 15 January 2024

Abstract submission deadline 1 September 2023

Notification acceptance 15 October 2023

Full paper submission deadline 15 December 2023

Conference 13-16 May 2024

URL: <https://coastlab24.dryfta.com/>

Centennial Celebration and Congress of the International Union of Soil Sciences (Italy, May 19-21, 2024)

Date: May 19-21, 2024

Venue: Florence, Italy

Summary: The custodian of soil science will celebrate its centennial contribute to the nature and human wellbeing in 2024.

The event will also empower the linkages with different disciplines, policy makers, stakeholders, institutions, and associations to effectively address civil society needs within agriculture, forestry, environment, urban planning, energy, education, and other societal issues.

The celebration will occur on May 19 and will be followed by two intense days of congress, with plenary and parallel scientific sessions. Both soil scientists and specialists from other disciplines will participate to each session, focusing on past achievements and future challenges.

The congress will be followed by technical/scientific excursions that will range from short local to long trips, spanning from Alps to Sicily.

A pre-congress visit to Villa Lubin in Rome, the historical place where the IUSS was founded, is scheduled on May 18th.

Sessions:

1. Equity, diversity, and inclusivity in soil sciences
2. Soil and humanity
3. Soil Governance
4. Soil health in achieving the Sustainable Development Goals
5. Soil in the circular economy
6. Soil in the digital era
7. Soil sciences impact on basic knowledge
8. Other

URL: <https://centennialiu2024.org/>

Contacts:

Organizing secretariat

Email: centennialiu2024@aimgroup.eu

The 15th International Conference on Hydroinformatics (Beijing, China, May 27-31, 2024)

Date: May 27-31, 2024

Venue: Beijing, China

Organizer: Ministry of Water Resources (MWR) of People's Republic of China & China Institute of Water Resources and Hydropower Research (IWHR)

Invitation: Ministry of Water Resources (MWR) of People's Republic of China and China Institute of Water Resources and Hydropower Research (IWHR) are pleased to invite the international Hydroinformatics community to the 15th International Conference on Hydroinformatics – HIC 2024, held in Beijing, China, on 27 – 31 May 2024. Hydroinformatics is defined as the study of the flow of information and the generation of knowledge related to the dynamics of water in the real world, through the integration of modelling, information technologies and artificial intelligence considering sustainability and social implications for decision support and smart management of water-based systems. International Conference on Hydroinformatics (HIC) has a long tradition, dating back to 1994 for its first edition. The next 15th HIC 2024 will celebrate its 30th anniversary and the development of a vivid Hydroinformatics community. The conference will serve as a perfect venue and platform for practitioners, engineers, researchers, scientists, managers and decision makers from Europe, Oceania, and Americas to meet their Asian counterparts to exchange the most recent

developments in the Hydroinformatics field and the urgent water related issues.

Theme and Topics: From Nature to Digital Water: Challenges and Opportunities

List of main topics:

- Technologies for water management and monitoring
- Big-data, knowledge, and water data management
- Emerging solutions in modelling methods (AI, high performance computing, cloud computing).
- Digital transformation of urban water systems
- Hydraulic and hydrological modeling
- Climate change impacts
- Environmental and coastal hydroinformatics
- Complex water systems, remote sensing and control
- COVID-19 pandemic reflected in hydroinformatics
- Water – Energy – Food nexus
- Innovation in education and training in hydroinformatics

URL: <https://hic2024.scimeeting.cn/>

Contacts: Ms. Jenny LU

Address: A-1 Fuxing Road, Haidian District, Beijing, China

Tel: +86 10 68781345

E-mail: contact@hic2024.org

The 10th International Symposium on Environmental Hydraulics (Scotland, June 25-27, 2024)

Date: June 25 – 27 2024

Venue: Aberdeen, Scotland

Invitation:

We are pleased to announce that the 10th International Symposium on Environmental Hydraulics (ISEH) will be held in Aberdeen, Scotland on 25 – 27 June 2024. Sponsored by the International Association of Hydro-Environment Engineering and Research (IAHR), the 10th ISEH will build on the success of previous ISEH symposia in bringing together international experts to present and discuss new research, technical innovations and case studies relating to the symposium's theme "environmental hydraulics for a sustainable and resilient future". The Fluid Mechanics Research Group at the University of Aberdeen are proud to host the event, bringing the symposium to the UK for the first time in its history, and to Europe for the first time since the 6th ISEH held in Athens in 2010. It will be held within the University's historic Old Aberdeen campus, providing an ideal setting in which to share knowledge and to meet old and new friends. We very much look forward to extending a warm Scottish welcome to you in June 2024.

URL: <https://abdn.eventsair.com/iseh2024/>

Contacts:

For general enquiries please contact the event administrators, CPD & Events Services

Research and Innovation, Room 28,

University Office,

King's College,

Aberdeen, AB24 3FX,

Scotland

Call Us: +44(0)1224 272523

Email: iseh2024@abdn.ac.uk

8th International Conference on Estuaries and Coasts (Canada, August 27-29, 2024)

Date: August 27-29, 2024

Venue: Quebec City, Canada

Organizers: Hydraulic and Environmental Research Groups of INRS (Canada); Clarkson University (USA)

Sponsors: International Research and Training Center on Erosion and Sedimentation (IRTCES); World Association for Erosion and Sediment Research (WASER)

Co-sponsors: International Association for Hydro-Environment Engineering and Research (IAHR)

Secretariat: Hydraulic and Environmental Research Groups of INRS (Canada)

Summary: The International Conference on Estuaries and Coasts (ICEC) is a triennial event initiated by the International Research and Training Center on Erosion and Sedimentation (IRTCES). Seven such conferences were held in Hangzhou and Guangzhou, China; Sendai, Japan; Hanoi, Vietnam; Muscat, Oman; Caen, France; and Shanghai, China in 2003, 2006, 2009, 2012, 2015, 2018 and 2021, respectively. With support from related international associations, and with the participation of experts and scholars worldwide, the ICEC has attracted wide attention and has become an important and popular event. The ICEC provides an opportunity for scientists, engineers, researchers and decision-makers to exchange ideas, research results and advanced techniques, and develop collaboration and friendships. The 8th International Conference on Estuaries and Coasts (ICEC 2024) will be held in Quebec City, Canada during August 27-29, 2024. The ICEC 2024 will provide a venue for intellectual and enlightening discussions of ideas. The conference program will be broad with topics. The local program and advisory committees are working to prepare an exciting and outstanding conference. Academics, government organizations, industrial partners and interested citizens are invited to attend this conference. We look forward to welcoming you in the beautiful city of Quebec! -The ICEC organizing committee

Theme:

Resilient Estuaries and Coastal Zones under Global Challenges

Topics of the Conference:

1. Saline intrusion and sea level rise: measurements, modelling and forecasting;
2. Waves, storm surges and tsunami: measurements, modelling, forecasting and warning systems;
3. Estuarine and coastal flows and their evolution by climate change;
4. Sediment transport and morphological change in estuaries and coastal zones;
5. Megacity developments under the threat of sea level rise and climate change;
6. Environment and ecosystem changes in estuaries and coastal zones;
7. Integrated coastal zone management for sustainable developments in the context of global change;
8. Impacts of watershed developments on estuaries and coastal zones;
9. Shoreline protection and beach nourishment;
10. Interactions between estuarine and coastal systems;
11. Resilient engineering solutions in estuaries and coastal zones.

URL: <https://icec2024.org/en>

Contacts:

Quebec Conference Secretariat

Conferium2828 Laurier Blvd.

Quebec City, Quebec

G1V 0B9

Canada

Phone: +1 418 522 8182

Toll free (Canada and U.S.): +1 800 618 8182

Monday to Friday - 09:00 to 16:00 U.S. / Canadian Eastern Time

Email: icec2024@conferium.com

River Flow 2024 (UK, Sep. 2-6, 2024)

Date: September 2-6 2024

Venue: Liverpool, UK

Summary: The 12th Conference on Fluvial Hydraulics under the auspices of IAHR, River Flow 2020, will be held in September 2-6 2024 at Liverpool, UK. Organized since 2002 under the auspices of the Fluvial Hydraulics Committee of the International Association for Hydro-Environment Engineering and Research (IAHR), the River Flow Conference Series has become one of the main international forum for dissemination of research and industrial practice on fluvial hydraulics and river engineering. Following on the tradition and success of previous editions of River Flow conferences, River Flow 2024 will feature a day devoted to Master Classes for young researchers, daily keynote lectures, ample time for the presentation and discussion of accepted contributions (full papers and extended abstracts), and the presentation of the Stephen E. Coleman Award distinguishing the best paper first authored by a young researcher.

Topics:

The conference will as well cover issues related, but not limited to:

1. River morphodynamics and management
2. Hydraulic structures and impacts on local and catchment sediment transport, flow regime and ecology
3. Sediment, pollutant and microplastic dynamics in rivers
4. Fluid Mechanics, numerical modelling and two-phase flow
5. Climate change and adaptation
6. Monitoring techniques and AI?

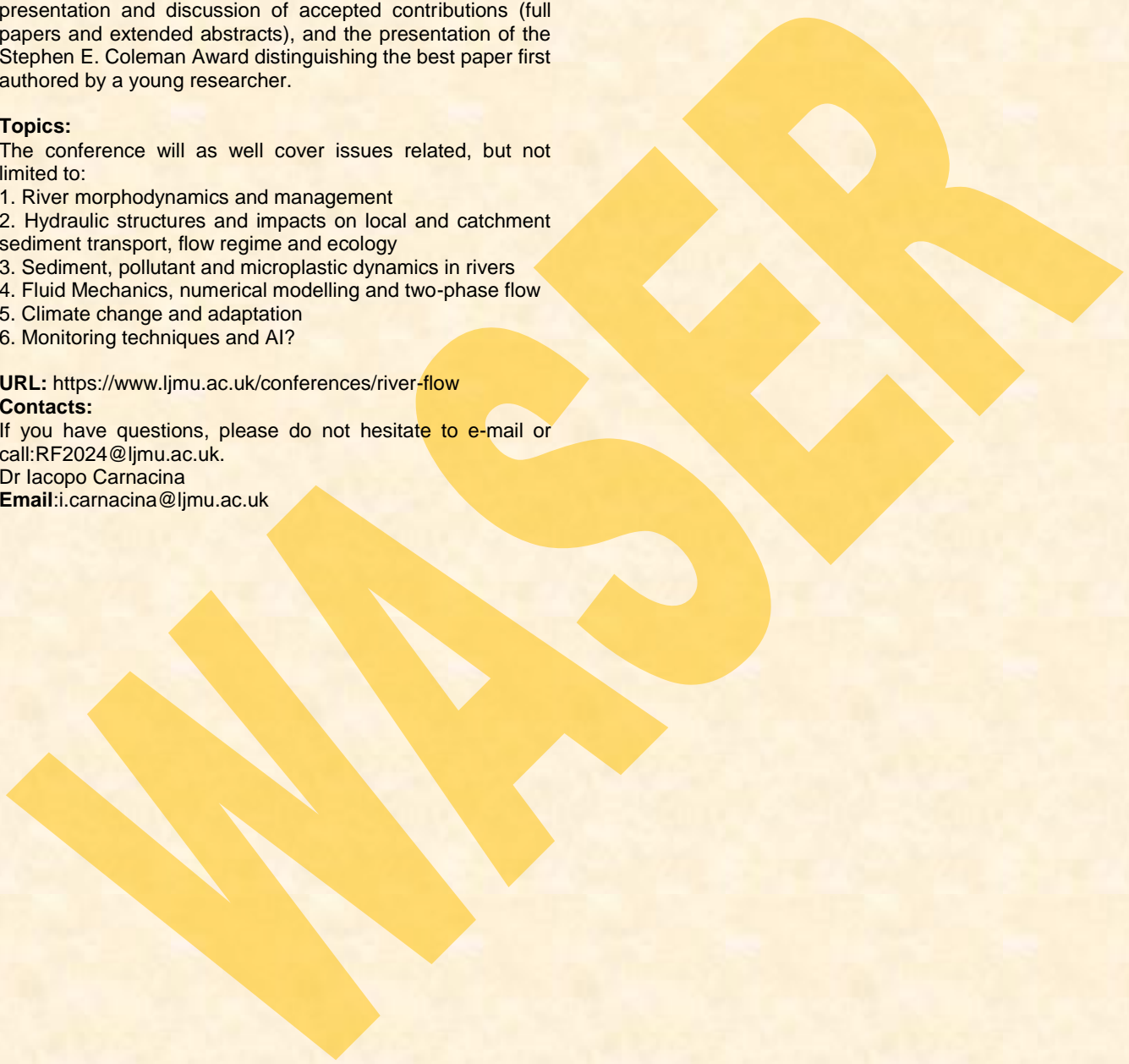
URL: <https://www.ljmu.ac.uk/conferences/river-flow>

Contacts:

If you have questions, please do not hesitate to e-mail or call: RF2024@ljmu.ac.uk.

Dr Iacopo Carnacina

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World Association for Sedimentation & Erosion Research

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