

International Association of Hydrological Sciences -IAHS

Activities' Report - Year 2023

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1. Introduction

The Italian research activity referring to the International Association of Hydrological Sciences (IAHS) has been carried out by the scientific community that refers to hydrological sciences, hydraulics and hydraulic works. In this context, the most relevant initiative carried out in 2023 can be identified by the activities of:

- a) *International Commission on Water Resource (ICWR/IAHS)*, <https://iahs.info/Commissions--W-Groups/ICWRS-Water-Resources-Systems.do>. ICWR/IAHS is aimed to promote research development on the integration of all phases of water resource protection, planning, design, management, operation and utilization. Alberto Viglione (Politecnico di Torino) is secretary. Alberto Montanari is past-past president.
- b) *International Commission for Ground Water (ICGW)*, <https://iahs.info/Commissions--W-Groups/ICGW-Groundwater.do>, chaired by Prof Aldo Fiori (Università Roma Tre) from 2015 to 2021, past President till 2023, addressed to the advancement of the science of groundwater hydrology, including the scientific basis for groundwater resource assessment and groundwater management. It is also responsible for helping to bridge the gap between science and practice. Antonio Zarlunga (University of Roma Tre) is secretary.
- c) *International Commission on Statistical Hydrology (ICSH/IAHS)*, <https://iahs.info/Commissions--W-Groups/ICSH-Statistical-Hydrology.do>, where Prof. Elena Volpi is the past-secretary and since July 2021 she acts as President of the Commission. The activities of the commission are focused on the development of new statistical methods and tools for hydrological applications.
- d) *MOXXI Working Group (Measurements & Observations in XXI Century)*, <https://iahs.info/Commissions--W-Groups/Working-Groups/MOXXI.do>, chaired by Prof. Salvatore Manfreda (Università degli Studi di Napoli Federico II), with the task to promote the advancement of novel observational techniques that leads to new sources of information to help better understand the hydrological cycle.
- e) *International Commission on Continental Erosion/International Association of Hydrological Sciences (ICCE/IAHS)*, <https://iahs.info/Commissions--W-Groups/ICCE-Continental-Erosion.do>, chaired by Prof. Paolo Porto (University Mediterranea of Reggio Calabria, Italy). The activity of the Commission deals with problems related to soil erosion and deposition at both hillslope and catchment scale, fingerprinting techniques, sediment transport and the use of tracers techniques to establish the sediment budget of large areas.
- f) *Citizen AND HYdrology Working Group (CandHy WG)*, <https://iahs.info/Commissions--W-Groups/Working-Groups/Candhy.do>, presided by Dr. Fernando Nardi (till July 2023, then substituted by Dr. Wouter Buytaert), aims to stimulate discussion, sharing of knowledge, information, data, ideas fostering scientific and professional exchange of academic, institutional and citizen communities interested in the "Citizen AND HYdrology" topic. CandHy seeks to discover the potential of citizen involvement and crowd sourced data for advancing hydrologic research in water resource and risk management, hydro-climatic risk mitigation and disaster preparedness.
- g) *IAHS Academy*, <https://iahs.info/Initiatives/iahs-academy/>. The IAHS Academy's mission is to organise summer/winter short schools, training and educational programs to advance and promote hydrological sciences globally. The IAHS Academy events will also serve IAHS's mission in: Engaging, training and valuing the next generation of hydrologists; Supporting young water scientists in achieving an academic or business career supported by state of the art hydrological data, knowledge and tools; Foster transdisciplinarity and diversity merging efforts and capacities of the hydrological community with other disciplines both from earth and environmental sciences as well as from social sciences and humanities; Promote open

science, open data, gender dimension, international cooperation and capacity building across diverse hydro-climate, social, economic and geographic regions of the world.

- h) *Società Idrologica Italiana (SII)*, www.sii-ihs.it, belonging to the international network of IAHS's scientific associations, <https://iahs.info/Links/National-and-Regional-Hydrological-Associations.do>, Chaired by Dr. Tommaso Moramarco (alternate National IAHS Representative), SII aims to advance knowledge in scientific and applied aspects of hydrology and foster members involvement in relevant national and international professional activities.
- i) Young Hydrological Society-IT (YHS-IT), founded by SII, aims to stimulate the interaction and active participation of young hydrologists within the Italian hydrological community, fostering the synergy between research grant holders, PhD students and postdocs and professionals working in the private and public sector.
- j) *President-elect of IAHS*. During the IUGG General Assembly, held in Berlin in July 2023, Prof. Salvatore Grimaldi, Università degli Studi della Tuscia, has been elected as President of IAHS. His mandate will be in the quadrennium 2025-2029, in the meanwhile he will serve as President-elect.
- k) IUGG Union Commission on Mathematical Geophysics (CMG). Prof. Salvatore Grimaldi, Università degli Studi della Tuscia is the Commission member for the IAHS.
- l) IUGG Union Commission on Climatic and Environmental Change (CCEC), of which Alberto Montanari is a member. It is tasked to promote the advancement of scientific understanding of climatic and environmental change.
- m) *REHYDRATE (REtrieve historical HYDRologic dATa and Estimates)*. Working group of the IAHS Science for Solutions Scientific Decade 2023-2032 HELPING (Hydrology Engaging Local People IN one Global world), coordinated by Paola Mazzoglio and Miriam Bertola.

Finally, there has been a very relevant research activity carried out by Italian institutions within IAHS and in particular within IAHS research initiatives, including an active participation in the preparation of the IAHS Science for Solutions Scientific Decade 2023-2032 HELPING (Hydrology Engaging Local People IN one Global world). The Italian community is also playing an important role in the writing of the synthesis book of the IAHS Decade 2013-2022 “Panta Rhei – Everything Flows”.

2. Main activities carried on by IAHS during 2023 relevant for Italy and for CNR

The most relevant activity developed during 2023 is related to the activities mentioned in section 1. Specifically, the main actions can be identified as follows.

2.1 Organization of conferences, workshops 2023

- 2023 EGU General Assembly HS7.8, Spatial extremes in the hydro- and atmosphere: understanding and modelling Co-organized by AS1/NH1, Convener: Manuela Irene Brunner | Co-conveners: András Bárdossy, Philippe Naveau, Simon Michael Papalexiou, Elena Volpi
- 2023 IUGG Scientific Assembly, Berlin, Germany | 10-20 July 2023. ICSH has (co-)organized the following sessions: H03 Floods: Processes, Forecasts, Probabilities, Impact Assessments and Management; H11 Stochastic Hydrology With Contributions on Methodologies and Applications, for Modeling, Forecasting, Change Assessment, and Uncertainty Quantification; H12 Extremes in Hydroclimatic Systems. Co-convener Elena Volpi
- 2023 IUGG Scientific Assembly, Berlin, Germany | 10-20 July 2023. CANDY has (co-)organized the following session: JH05a - Citizen Science, Crowdsourcing and Innovative Monitoring for Advancing Geo-Sciences (IAHS, IASPEI, IAGA, IACS, IAMAS), co-convener Fernando Nardi
- 2023 IUGG Scientific Assembly, Berlin, Germany | 10-20 July 2023. ICCE has organised the workshop H08 - A Familiar Paradigm – Climate Change and the Soil-Sediment Continuum - Resilience, Thresholds, and Adjustments. Convener(s): Adrian Collins (ICCE, UK) Allen Gellis (ICCE, USA). Co-Convener(s): Paolo Porto (ICCE, Italy) Sergey Chalov (ICCE, Russia) Anatoly Tsyplenkov (ICCE, Russia) Yuri Jacques da Silva (ICCE, Brazil)

- ICSH-STAHY Workshop, Boston, USA | 8th - 10th November 2023 at The Institute for Experiential AI, Northeastern University in Boston, Massachusetts (local organizer Stacey Archfield)
- The Hydrology Days of the Italian Hydrological Society (SII-IHS) 2023 were held in Matera, Italy, Sept. 13-15, with the participation of about 130 members. The main theme of the Hydrology Days 2023 was "Complexity of hydrological phenomena in natural and man-made environment." In addition to the keynote lecture, delivered by Prof. Andrea Rinaldo (2023 Stockholm Water Prize) on the topics of "Complexity and River Networks," 30 oral contributions and 47 posters were presented. The book of abstracts with summaries of all presentations is available on the zenodo repository with the following DOI: <https://doi.org/10.5281/zenodo.10200499>. The round table, titled "Hydrological Research for Water Management in Complex Systems - Meeting between the Scientific Community and Local Stakeholders" was attended by representatives of reclamation consortia and water utilities, river basins authorities, as well as representatives of the IHS and YHS-IT (Young Hydrological Society-Italy) and the University of Basilicata. A specific workshop dedicated to young researchers belonging to YHS-IT was also organized during the event (morning and lunch on the 13th).

2.2 Organization of scientific initiatives 2023

- Florisa Melone Prize 2023 awarded by the Italian Hydrological Society to a collaborative research project proposed by young Italian researchers (up to 35 years old). The Prize is dedicated to the memory of Florisa Melone, CNR Head Researcher of the the Research Institute for Geo-Hydrological Protection. The Prize consists of a sum of €5,000 and was awarded by the appointed committee to the project FLORES – “FLOod Regulating AgroEcosystem Services – assessment to improve flash flood management in small agricultural river basins”, proposed by Dr. Marco Lompi (Università di Firenze) and by Dr. Nikolas Galli (Politecnico di Milano).
- CANDHY working group activities has developed since its 2017 July inception by increased participation and involvement in thematic conferences and workshops involving experts through person-to-person invitations (currently, CANDHY includes 60+ “friends” from more than 10 countries).
- STAHY Best Paper Award 2023 attributed to Wouter J. M. Knoben, University of Saskatchewan, CANADA, Jim Freer, University of Saskatchewan, CANADA, Ross A. Woods, University of Bristol, UK for the paper: Knoben, W.J.M., Freer, J.E., & Woods, R.A. (2019). Inherent benchmark or not? Comparing Nash–Sutcliffe and Kling–Gupta efficiency scores. *Hydrology and Earth System Sciences*, 23(10), 4323-4331. The STAHY Best Paper Award 2023 was assigned during the STAHY'23 Workshop – Boston, MA, USA, 9-10 November 2023

2.3 Editorial Board Participation and editorial awards

IAHS *Hydrological Sciences Journal*

- Attilio Castellarin: Editor in Chief dal 2017 (Co-Editor dal 2015), Università di Bologna
- Aldo Fiori, Co-Editor, Università Roma Tre
- Brunella Bonaccorso, Università di Messina
- Alessio Domeneghetti, Associate Editor, Università di Bologna
- Daniele Penna, Università di Firenze
- Simone Persiano: Associate Editor, UnipolSAI, Bologna
- Andrea Petroselli: Associate Editor, University of Tuscia
- Ilaria Prosdocimi: Associate Editor, Università Cà Foscari, Venezia
- Maria Cristina Rulli: Associate Editor, Politecnico di Milano
- Flavia Tauro: Associate Editor, University of Tuscia
- Elena Volpi: Associate Editor, Università Roma Tre

Journal of Soil and Sediments (Springer)

- Paolo Porto: Associate Editor since 2019

Awards, Editorial Awards and special mentions

- *Hydrological Sciences Journal* papers labelled as “Featured Articles” in 2022 with Italian authors:
 - River runoff estimation with satellite rainfall in Morocco - Yves Tramblay, El Mahdi El Khalki, **Luca Ciabatta**, **Stefania Camici**, Lahoucine Hanich, Mohamed El Mehdi Saidi, Abdellatif Ezzahouani, Lahcen Benaabidate, Gil Mahé & **Luca Brocca**, *Hydrological Sciences Journal*, 68(3), 2023
 - Design flood hydrographs: a regional analysis based on flood reduction functions - **Daniele Ganora**, **Giulia Evangelista**, **Silvia Cordero** & **Pierluigi Claps**, *Hydrological Sciences Journal*, 68(2), 2023
 - ISWCR Outstanding Paper Award for the 10th anniversary (2013-2023) presented to **Paolo Porto** for the paper entitled ‘Upscaling the use of fallout radionuclides in soil erosion and sediment budget investigations: Addressing the challenge’ that was published in the *Journal of International Soil and Water Conservation Research* Vol 2 Issue 3 in 2014.
 - International Hydrology Prize – Dooge Medal: **Aldo Fiori** (Università Roma Tre)

2.4 Goals, priorities and plans for future Scientific Initiative

For 2024 the plan is to continue to actively participate to IAHS initiatives through targeted activities. To date, various initiatives are being planned, among which:

- Conferences:
 - 14-19 April, 2024, at the EGU General Assembly. HS7.8 Spatio-temporal extremes in the hydro- and atmosphere: understanding and modelling, Co-organized by AS1/NH1 Convener: Elena Volpi| Co-conveners: András Bárdossy, Raphael Huser, Simon Michael Papalexiou, Manuela Irene Brunner
 - The fourteenth edition of the STAHY International Workshop, STAHY 2024, will be organized by Pedro Chaffé (Federal University of Santa Catarina) in Florianópolis (Brazil), November 2024. It will be a joint workshop together with the International Commission of Water Resources Systems (ICWRS) and the International Commission of Groundwater (ICGW) of IAHS.
 - 20-27, July, 2024. IAHS Academy, Egypt, Cairo. Questa prima edizione è organizzata da IAHS, UNESCO (IHP), WMO e Centro Nazionale Ricerca sull'Acqua dell'Egitto (NWRC) e Centro Panafricano per l'Adattamento ai Cambiamenti Climatici (PACWA) dell'Egitto, e altri sostenuto da organizzazioni internazionali (IWMI, GWP) ed egiziane.
 - 17-20 September, 2024, at 19th Biennial ERB Conference, Mallorca. Organization of a MOXXI session: Advancing Catchment Hydrology for a Sustainable Future!
 - Hydrology days of the Italian Hydrological Society, 24-26 giugno 2024, Udine. Local organizer University of Udine
 - Workshop “Eventi naturali potenzialmente pericolosi: modelli, incertezze, comunicazione”, Sala Marconi of the Headquarters of the National Research Council (CNR), September 25-26, organised by the National IUGG Commission of CNR.
- Editorial initiatives:
 - Organization of a special issue in *Hydrological Processes* on “New observational techniques for testing hypotheses about hydrological processes”
 - Submission to *Hydrological Sciences Journal* of a Community paper on statistical hydrology.

2.5 Scientific Publications (peer-reviewed papers)

1. Bertola, M., Blöschl, G., Bohac, M., Borga, M., Castellarin, A., Chirico, G. B., ... & Zivkovic, N. (2023). Megafloods in Europe can be anticipated from observations in hydrologically similar catchments. *Nature geoscience*, 16(11), 982-988.
2. Bertola, M., Blöschl, G., Bohac, M., Borga, M., Castellarin, A., Chirico, G.B., Claps, P., et al. Megafloods in Europe can be anticipated from observations in hydrologically similar catchments. *Nature Geosciences* 16, 982–988 (2023). <https://doi.org/10.1038/s41561-023-01300-5>
3. Cao, W., Liu, J., Ceola, S., Mao, G., Macklin, M. G., Montanari, A., ... & Tarolli, P. (2023). Landform-driven human reliance on rivers in imperial China. *Journal of Hydrology*, 620, 129353.
4. Claps P., Evangelista G., Ganora D., Mazzoglio P., Monforte I. (2024). FOCA: a new quality-controlled database of floods and catchment descriptors in Italy. *Earth System Science Data*, 16, 1503–1522. <https://doi.org/10.5194/essd-16-1503-2024>.
5. Evangelista G., Ganora D., Mazzoglio P., Pianigiani F., Claps P. (2023). Flood attenuation potential of Italian Dams: sensitivity on geomorphic and climatological factors. *Water Resources Management*. <https://doi.org/10.1007/s11269-023-03649-z>.
6. Evangelista G., Woods R., Claps P. (2023). Dimensional analysis of literature formulas to estimate the characteristic flood response time in ungauged basins: a velocity-based approach. *Journal of Hydrology*, Volume 627, DOI: 10.1016/j.jhydrol.2023.130409.
7. Ganora, D., Evangelista, G., Cordero, S., Claps, P., Design flood hydrographs: a regional analysis based on flood reduction functions. *Hydrological Sciences Journal*. vol. 68, pp. 325-340. ISSN 0262-6667, 2023.
8. Guo, R., & Montanari, A. (2023). Historical rainfall data in northern Italy predict larger meteorological drought hazard than climate projections. *Hydrology and Earth System Sciences*, 27(15), 2847-2863.
9. Manfreda, S.; Miglino, D.; Saggi, K., C.; Jomaa, S.; Eltner, A.; Perks, M.; Peña-Haro, S.; Bogaard, T.; van Emmerik, T.; Mariani, S.; Maddock, I.; Tauro, F.; Grimaldi, S.; Zeng, Y.; Gonçalves, G.; Strelnikova, D.; Bussettini, M.; Marchetti, G.; Lastoria, B.; Su, B.; Rode, M., Advancing hydrological monitoring using image-based techniques: challenges and opportunities, 2024, (accepted and in print on *Hydrological Sciences Journal*).
10. Magnini, A., Lombardi, M., Bujari, A., Mattivi, P., Shustikova, I., Persiano, S., Patella, M., Bitelli, G., Bellavista, P., Lo Conti, F., Tirri, A., Bagli, S., Mazzoli, P., Castellarin, A., (2023), Geomorphic flood hazard mapping: from floodplain delineation to flood hazard characterization, *Hydrological Sciences Journal*, 68(16), 10.1080/02626667.2023.2269909
11. Mazzoglio P., Butera I., Claps P. (2023). A local regression approach to analyze the orographic effect on the spatial variability of sub-daily rainfall annual maxima. *Geomatics, Natural Hazards and Risk*, 14(1), 2205000, <https://doi.org/10.1080/19475705.2023.2205000>.
12. Mazzoglio, P., Butera, I., and Claps, P.: Rainfall data augmentation in Northern Italy through daily extremes and the Hershfield factor, *Proc. IAHS*, 385, 147–153, <https://doi.org/10.5194/piahs-385-147-2024>, 2024.
13. Meusburger K., Porto P., Kobler Waldis J., Alewell C. (2023). Validating Plutonium-239+240 as novel soil redistribution tracer - a comparison to measured sediment yield. *SOIL (EGU)* 9(2), 399–409.
14. Montanari, A., Nguyen, H., Rubinetti, S., Ceola, S., Galelli, S., Rubino, A., & Zanchettin, D. (2023). Why the 2022 Po River drought is the worst in the past two centuries. *Science Advances*, 9(32), eadg8304.
15. Montanari, A., Merz, B., & Blöschl, G. (2023). HESS Opinions: The Sword of Damocles of the Impossible Flood. *EGUsphere*, 2023, 1-20.
16. Porto, P., Callegari, G. (2023). Relating ¹³⁷Cs and sediment yield from uncultivated catchments: the role of particle size composition of soil and sediment in calculating soil erosion rates at the catchment scale. *Journal of Soils and Sediments*, 23(10), 3689–3705.

17. Porto P. (2023). Combining plot observations and ^{137}Cs measurements to provide estimates of soil erosion rate during the last six decades: results from a cultivated area in Southern Italy. *Journal of Soils and Sediments*, 23(12), 4223-4234.

3. Scientific activities carried on during 2022 and impact on the Italian scientific community

The activity can be identified, first, in the dissemination among Italian Universities and Research Institutions of the IAHS/IUGG programs. Moreover, it has been promoting a direct cooperation between IAHS and the Hydrological Sciences Division of the European Geosciences Union (EGU) so that the Italian community may benefit of exchange of information and possible joint activities concerning educational opportunities, student programs, and professional services for members of both organizations. In addition, through the Italian Hydrological Society, initiatives are addressed to foster the synergy among the Italian scientific community, the national authorities and firms for activities linked to water resources management and natural hazards. Details of activities are summarized as follows.

- Participation to the CNR-IUGG Commission.
- Participation as a member at the Nomination Committee of the IUGG for the elections of the Union governance for the 2023-2027 term.
- Dissemination of activities of IUGG among Italian Universities and Research Institutions for the meetings participation and IUGG Research Grant applications.
- Coordination of the activities related to the Florisa Melone award of the Italian Hydrological Society.

4. Evaluation of the participation in terms of benefits and membership cost

The benefits of the participation in the Union are certainly relevant for the Italian Scientific Community both for the resources made available by IUGG for the various initiatives promoted and which foster the attendance to Congresses and Research Grant applications and for the activities developed by the various groups operating in IAHS/IUGG and chaired by Italian researchers, as can be also inferred from the Section 2 of the document.

5. Evaluation of Italians' attendance and how to improve interest and involvement

The participation of Italian scientists to initiatives organized under the IAHS umbrella is already significant as proved from different Courses, Conference and Meetings organized by the Groups/Commissions led by Italian scientists. However, the interest towards the IAHS activities can be improved if more financial resources are made available from IUGG, and it would be great from CNR as well, for international activities in the field of hydrological sciences, involving Italian scientist and in particular the youngest ones.

6. Italian experts with important roles within the Union or within related Commissions and Programs

- Dr. Tommaso Moramarco. Alternate National Representative IAHS/IUGG and President of Italian Hydrological Society.
- Prof. Alberto Montanari. National Representative IAHS/IUGG, member of the CNR/IUGG Commission.
- Prof. Attilio Castellarin. Editor in Chief of IAHS Hydrological Sciences Journal . Member of the IAHS Management Team.
- Prof. Aldo Fiori. Past-President International Commission for Ground Water (ICGW), CoEditor of the Hydrological Sciences Journal.
- Prof. Salvatore Grimaldi. President-elect of IAHS.
- Dr. Fernando Nardi. Chair Citizen AND Hydrology Working Group (CandHy WG)
- Prof. Paolo Porto. President of the International Commission on Continental Erosion/International Association of Hydrological Sciences (ICCE/IAHS). Vice-President of IASWS (International Association for Sediment Water Science) from 2022.

- Prof. Salvatore Manfreda. Chair MOXXI Working Group (Measurements & Observations in XXI Century);
- Prof. Elena Toth, Vice President of the Italian Hydrological Society.
- Prof. Elena Volpi. President of the International Commission on Statistical Hydrology of (ICSH/IAHS)
- Prof. Alberto Viglione, President of the Division on Hydrological Sciences (HS) – EGU
- Dr. Eleonora Dallon. Vice-president of the International Commission on Statistical Hydrology of (ICSH/IAHS)
- Prof. A. Zarlenga, Secretary of ICGW/IAHS.
- Prof. Alberto Montanari, member of the IUGG Union Commission on Climatic and Environmental Change (CCEC).
- Prof. Alberto Montanari, member of the nomination committee of IUGG.

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IAHS National Representative
Prof. Alberto Montanari

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