

International Association of Hydrological Sciences -IAHS

Activities' Report - Year 2022

Alberto Montanari

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 2022 can be identified by the activities of:

- a) *International Commission on Water Resource (ICWR/IAHS)*, <https://iahs.info/Commissions--W-Groups/ICWR-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 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 (now past President), 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 Zarlenga (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 Dr. Flavia Tauro (University of Tuscia), 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, 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) *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.

- h) 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.
- i) *Vice-President of IAHS*. Prof. Salvatore Grimaldi, Università degli Studi della Tuscia, is the Vice-President of IAHS and his activities are strictly connected to the MOXXI and CANDHY Working Groups e to the ICSH Commission.
- j) IUGG Union Commission on Mathematical Geophysics (CMG). Prof. Salvatore Grimaldi, Università degli Studi della Tuscia is the Commission member for the IAHS.
- k) 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.

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 role within many WGs of the “Panta Rhei – Everything Flows” one. 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 2022 relevant for Italy and for CNR

The most relevant activity developed during 2022 is related to the activities mentioned in section 1. Specifically, the main actions can be identified as follows.

2.1 Organization of conferences, workshops 2022

- 2022 EGU General Assembly: HS8.2.7. Subsurface flow and contaminant transport in heterogeneous media: concepts, modelling, observations and challenges in applications such as risk assessment and remediation. Convener: Alraune Zech | Co-conveners: Felipe de Barros, Antonio Zarlenga, Marco Dentz, Aldo Fiori.
- 2022 EGU General Assembly HS7.7, Spatial extremes in the hydro- and atmosphere: understanding and modelling, Co-organized by NH1, Convener: Manuela Irene Brunner | Co-conveners: Andrés Bárdossy, Philippe Naveau, Simon Michael Papalexiou, Elena Volpi
- ICSH-STAHY Workshop, Chia Sardinia, Italy | 16-17 September, 2022, organized by Prof., Roberto Deidda from Università degli Studi di Cagliari
- 2022 Innovation Workshop WMO HydroHub Phase II Innovation Roadmap, MOXXI has co-organized together with the WMO HydroHub two webinars on February 2nd and 4th on the most recent advancements in techniques for hydrological monitoring. More than 120 experts participated in the meetings. Recordings as well as the meeting report, presentations, and posters are available at the link: <https://hydrohub.wmo.int/en/innovation-workshop-wmo-hydrohub-phase-ii-innovation-roadmap>.
- 2022 IAHS Scientific Assembly: MOXXI co-organized three sessions (session 19, 20, S15) on novel observational techniques in hydrology and citizen science, and for exploring groundwater processes.
- Frontiers in Hydrology Meeting 2022 - AGU Conference in Porto Rico. CANDHY participated with a contribution sharing research and outcomes from DELFT CONFERENCE ON SOCIOHYDROLOGY titled "Addressing societal interactions amidst water systems through the lens of socio-hydrology"
- IAHS 2022 XIth SCIENTIFIC ASSEMBLY. CANDHY co-convened a session titled "Hydrology, new tools and innovative measurements and citizen science in Africa (Conveners: Gil Mahé, Marloes Mul, Hubert Savenije, Harald Kunstmann, Flavia Tauro, Fernando Nardi, Anil Mishra, Ernest Amoussou, Mohamed Meddi, Jean-Marie Kileshye Onema, Dominique Bérod)
- IAHS 2022 XIth SCIENTIFIC ASSEMBLY. CANDHY co-convened a session titled "Innovation and citizen engagement to sense the Hydrological Cycle" (Conveners: Flavia Tauro, Fernando Nardi, Salvatore Grimaldi, David Hannah, Jérôme le Coz, Dominique Bérod)
- Hydrology Days 2022. The Italian Hydrological Society (SII) organized the 2022 Hydrology Days in Genoa 9-11 November. The topic was: *The hydrology of the future: new paradigms to respond to climate, technological and social changes* The conference took place at the Salone al Piano Nobile Villa Cambiaso of the University of Genoa and more than 120 Members attended. There was

an extensive discussion in Sessions addressing the main topic of hydrological phenomena in terms of **eco-hydrology, sustainable management of water resources and modeling of hydrological and hydro-morphological processes as well as the mitigation of geo-hydrological risks in a context of global changes**. During the Hydrology Days, the Executive Board of SII was elected by Members and the new President in charge from January 1st 2023 is Elena Toth, Professor at Alma Mater Sudiorum University of Bologna.

- ICCE 2022 International stand-alone Symposium on: River sediment quality and quantity: environmental, geochemical and ecological perspectives - (<https://icce2022.ukw.edu.pl/jednostka/icce2000>). The conference was held in October 17-21, 2022 in Bydgoszcz, Poland.
- 2022 3rd Online Young Scientist School (YSS) MEGAPOLIS held during the period December 1-6, 2022. Prof. Paolo Porto was involved in teaching activities. Frontiers in Hydrology Meeting 2022 - AGU Conference in Porto Rico. CANDHY participated with a contribution sharing research and outcomes from DELFT CONFERENCE ON SOCIOHYDROLOGY titled "Addressing societal interactions amidst water systems through the lens of socio-hydrology"
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2.2 Organization of scientific initiatives 2022

- Florisa Melone Award 2022 promoted by the Italian Hydrological Society to a research project developed by young Italian researchers. The Award is dedicated to the memory of Florisa Melone, CNR Head Researcher of the Research Institute for Geo-Hydrological Protection. The award consists of 5,000 € and Dr. Davide Danilo Chiarelli and Dr. Giuseppe Cipolla were bestowed for the project "INTEGRATE -INnovaTivE aGRiculturAl TEchniques for water saving and climate change impacts mitigation: a case study in Sicily".
- 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). The first CANDHY community paper was published on IAHS Hydrological Sciences Journal led by CANDHY Chair Fernando Nardi
- Attribution of the STAHY Best Paper Award 2022 a Simon Michael Papalexou, University of Calgary, per l'articolo: Papalexou, S. M. (2018). Unified theory for stochastic modelling of hydroclimatic processes: Preserving marginal distributions, correlation structures, and intermittency. *Advances in Water Resources*, 115, pp. 234-252.

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
- Andrea Petroselli: Associate Editor, University of Tuscia
- Ilaria Prosdocimi: Associate Editor, Università Cà Foscari, Venezia
- Flavia Tauro: Associate Editor, University of Tuscia
- Elena Volpi: Associate Editor, Università Roma Tre
- Fernando Nardi: Guest Editor of the Special Issue "Virtual Special Issue: Advancing socio-hydrology: a synthesis of coupled human–water systems across disciplines" focusing on the theme "Big data/citizen science".

Journal of Soil and Sediments (Springer)
- Paolo Porto: Associate Editor since 2019

Pedosphere (Elsevier)
- Paolo Porto: Editorial Board Member Participation since 2015

Editorial awards and special mentions

- *Hydrological Sciences Journal* papers labelled as “Featured Articles” in 2022 with Italian authors:
 - The regionalizing of the entropy parameter over the north Algerian watersheds: a discharge measurement approach for ungauged river sites - Abdelhadi Ammari, Farhad Bahmanpouri, Mohamed El Amine Khelfi & **Tommaso Moramarco**, *Hydrological Sciences Journal*, (67), 11
- *Hydrological Sciences Journal* Associate Editor Award 2022:
 - Ilaria Prosdocimi, Università Cà Foscari, Venezia
- *Hydrological Sciences Journal* Reviewer Awards 2022 (4 awardees per year):
Ciro Apollonio, Università degli Studi della Tuscia, Viterbo

2.4 Goals, priorities and plans for future Scientific Initiative

For 2023 the plan is to continue to actively participate to IAHS initiatives through targeted activities. To date, various initiatives are being planned, among which:

- Conferences:
 - 11-20 may July, 2023, IAHS IUGG General Assembly, Berlin
 - H03 Floods: Processes, Forecasts, Probabilities, Impact Assessments and Management Convener(s): Svenja Fischer (ICSH, Germany) Co-Convener(s): Andreas Schumann (ICWRS, Germany) Günter Blöschl (IAGS PP, Austria) Elena Volpi (ICSH, Italy) Christopher J. White (ICCLAS, UK)
 - H11 Stochastic Hydrology With Contributions on Methodologies and Applications, for Modeling, Forecasting, Change Assessment, and Uncertainty Quantification Convener(s): Ashish Sharma (ICHS, Australia) Co-Convener(s): Elena Volpi (ICSH, Italy) Simon Papalexou (Canada) Antonio Zarlenga (ICGW, Italy) Alberto Viglione (ICWRS, Italy)
 - H12 Extremes in Hydroclimatic Systems Convener(s): Krzysztof Kochanek (ICSH, Poland) Co-Convener(s): Ilaria Prosdocimi (ICSH, Italy) Salvatore Grimaldi (IAHS VP, Italy) Marco Marani (Italy)
 - IUGG 2023 – 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)
 - 23-27 April, 2023, at the EGU General Assembly
 - HS7.8 EDI Spatial extremes in the hydro- and atmosphere: understanding and modelling Co-organized by AS1/NH1 Convener: Manuela Irene BrunnerECS | Co-conveners: András Bárdossy, Raphael Huser, Simon Michael Papalexou, Elena Volpi
 - ICSH-STAHY Workshop 2023. Next edition of the STAHY International Workshop, STAHY 2023 is under preparation from Stacey Archfield (USGS); as in the past edition there will be a EXS Short Course and the attribution of the STAHY Best Paper Award 2023, whose evaluation will start soon.
 - 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. Ammari, A., Bahmanpouri, F., Khelfi, M.E.A., Moramarco, T. (2022). The regionalizing of the entropy parameter over the north Algerian watersheds: a discharge measurement approach for ungauged river sites. *Hydrological Sciences Journal*, 10.1080/02626667.2022.2099744
2. Bahmanpouri F., Eltner A., Barbetta S., Bertalan L., Moramarco T. (2022). Estimating the Average River Cross-Section Velocity by Observing Only One Surface Velocity Value and Calibrating the Entropic Parameter, *Water Resources Research*, <https://doi.org/10.1029/2021WR031821>
3. Bahmanpouri, F., Barbetta, S., Gualtieri, C., Ianniruberto, M., Filizola, N., Termini, D., & Moramarco, T. (2022). Prediction of river discharges at confluences based on Entropy theory and surface-velocity measurements. *Journal of Hydrology*, 606, 127404. <https://doi.org/10.1016/j.jhydrol.2021.127404>
4. Blauhut V.; Stoelzle M.; Ahopelto L.; Brunner M.I.; Teutschbein C.; Wendt D.E.; Akstinas V.; Bakke S.J.; Barker L.J.; Bartosova L.; Briede A.; Cammalleri C.; Kalin K.C.; De Stefano L.; Fendekova M.; Finger D.C.; Huysmans M.; Ivanov M.; Jaagus J.; Jakubinsky J.; Krakovska S.; Laaha G.; Lakatos M.; Manevski K.; Neumann Andersen M.; Nikolova N.; Osuch M.; Van Oel P.; Radeva K.; Romanowicz R.J.; Toth E.; Trnka M.; Urosev M.; Urquijo Reguera J.; Sauquet E.; Stevkov A.; Tallaksen L.M.; Trofimova I.; Van Loon A.F.; Van Vliet M.T.H.; Vidal J.-P.; Wanders N.; Werner M.; Willems P.; Zivkovic N., Lessons from the 2018-2019 European droughts: a collective need for unifying drought risk management, *Natural Hazards And Earth System Sciences*, 2022, 22, 2201 - 2217.
5. Cappelli, F., Tauro, F., Apollonio, C., Petroselli, A., Borgonovo, E., Grimaldi, S. Feature importance measures to dissect the role of sub-basins in shaping the catchment hydrological response: a proof of concept (2022) *Stochastic Environmental Research and Risk Assessment*.
6. Grimaldi, S., Volpi, E., Langousis, A., Michael Papalexiou, S., De Luca, D.L., Piscopia, R., Nerantzaki, S.D., Papacharalampous, G., Petroselli, A. Continuous hydrologic modelling for small and ungauged basins: A comparison of eight rainfall models for sub-daily runoff simulations (2022) *Journal of Hydrology*, 610, art. no. 127866.
7. Hempel, L.A., Malenda, H.F., Fulton, J.W., Henneberg, M.F., Cederberg, J.R., Moramarco, T. (2022), The Applicability of Time-Integrated Unit Stream Power for Estimating Bridge Pier Scour Using Noncontact Methods in a Gravel-Bed River, *Remote Sensing*, 10.3390/rs14091978
8. Magnini A., Lombardi M., Persiano S., Tirri A., Lo Conti F., Castellarin A. (2022). Machine-learning blends of geomorphic descriptors: value and limitations for flood hazard assessment across large floodplains, *Natural Hazards And Earth System Sciences*, 22, 1469–1486
9. Mediero L., Soriano E., Oria P., Bagli S., Castellarin A., Garrote L., Mazzoli P., Mysiak J., Pasetti S., Persiano S., Santillan D., Schroter K. (2022). Pluvial flooding: high-resolution stochastic hazard mapping in urban areas by using fast-processing dem-based algorithms, *Journal of Hydrology*, 608, article number: 127649, 1–21
10. Neri M.; Coulibaly P.; Toth E., Similarity of catchment dynamics based on the interaction between streamflow and forcing time series: Use of a transfer entropy signature, *Journal of Hydrology*, 2022, 614, 128555, pp. 1 - 14.
11. Papacharalampous, G., Tyrallis, H., Pechlivanidis, I.G., Grimaldi, S., Volpi, E. Massive feature extraction for explaining and foretelling hydroclimatic time series forecastability at the global scale (2022) *Geoscience Frontiers*, 13 (3), art. no. 101349.
12. Persiano S., Pugliese A., Aloe A., Skoien J.O., Castellarin A., Pistocchi A. (2022). streamflow data availability in Europe: a detailed dataset of interpolated flow-duration curves, *Earth System Science Data*, 14, 4435–4443
13. Porto, P., Callegari, G. (2022). Comparing long-term observations of sediment yield with estimates of soil erosion rate based on recent ¹³⁷Cs measurements. Results from an experimental catchment in Southern Italy, *Hydrological Processes* 36(9), e14663.
14. Porto, P., Bacchi, M., Preiti, G., Romeo M., Monti M. (2022) Combining plot measurements and a calibrated RUSLE model to investigate recent changes in soil erosion in upland areas in Southern Italy. *J Soils Sediments* 22:1010-1022.

15. Preiti, G., Calvi, A., Porto, P., Romeo, M., Monti, M., Bacchi, M. (2022). Long-term effects of different arable cropping systems on surface erosion processes and C-factor in hilly Mediterranean environment, *Soil and Tillage Research* 223, 105480.
16. Romeo, F., Porto, P., Mallamaci, C., Muscolo, A. (2022). The relationships between selected soil properties and caesium-137 identify organic carbon, nitrogen and water soluble phenols as indicators of soil erosion processes in different forest stands, *Journal of Forestry Research* 32(6), 2589-2598.
17. Tayfur, G., Moramarco, T. (2022). Kinematic reverse flood routing in natural rivers using stage data, *Applied Water Science*. 10.1007/s13201-022-01707-2
 Van Loon A.F.; Rangelcroft S.; Coxon G.; Werner M.; Wanders N.; Di Baldassarre G.; Tjeldeman E.; Bosman M.; Gleeson T.; Nauditt A.; Aghakouchak A.; Brena-Naranjo J.A.; Cenobio-Cruz O.; Costa A.C.; Fendekova M.; Jewitt G.; Kingston D.G.; Loft J.; Mager S.M.; Mallakpour I.; Masih I.; Maureira-Cortes H.; Toth E.; Van Oel P.; Van Ogtrop F.; Verbist K.; Vidal J.-P.; Wen L.; Yu M.; Yuan X.; Zhang M.; Van Lanen H.A.J., Streamflow droughts aggravated by human activities despite management, *Environmental Research Letters*, 2022, 17, 044059, 1 - 17.

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 positive 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 Section2 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.

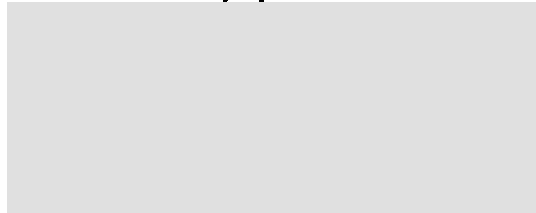
6 Italian experts with important roles within the Union or within related Commissions and Programs

- 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
- Prof. Aldo Fiori. Past-President International Commission for Ground Water (ICGW), CoEditor of the Hydrological Sciences Journal.
- Prof. Salvatore Grimaldi. Vice-President 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.
- Dr. Flavia Tauro. 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. Ilaria Prodocimi. Secretary 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.

Acknowledgments

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IAHS National Representative



Bologna, May 15, 2023