

International Association of Hydrological Sciences -IAHS

Activities' Report - Year 2021

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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 2021 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 Montanari is past president of the Commission.
- b) *International Commission for Ground Water (ICGW)*, <https://iahs.info/Commissions--W-Groups/ICGW-Groundwater.do>, chaired by Prof Aldo Fiori (Università Roma Tre), 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
- c) *International Commission on Statistical Hydrology (ICSH/IAHS)*, <https://iahs.info/Commissions--W-Groups/ICSH-Statistical-Hydrology.do>, and past-secretary Prof. Elena Volpi. In July 2019 the Prof. Elena Volpi has been elected president-elect and Dr. Ilaria Prosdocimi (University of Venice Ca' Foscari) has been elected Secretary; since July 2021 Prof. Elena Volpi 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. 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) *International Commission on Surface Hydrology (ICSW)*, <https://iahs.info/Commissions--W-Groups/ICSW-Surface-Water.do>. The activities of the commission are focused at promoting research into surface hydrology and its interaction with other aspects of the hydrological cycle."
- g) *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.
- 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) *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.
- k) *IUGG Union Commission on Mathematical Geophysics (CMG)*. Prof. Salvatore Grimaldi, Università degli Studi della Tuscia is the Commission member for the IAHS.

Finally, there has been a very relevant research activity carried out by Italian institutions within IAHS and in particular within IAHS research initiatives. 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 2021 relevant for Italy and for CNR

The most relevant activity developed during 2021 is related to the activities mentioned in section 1. Specifically, the main actions can be identified as follows.

2.1 Organization of conferences, workshops 2021

- 2021 EGU General Assembly: HS8.1.4. 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: Fritjof Fagerlund, Felipe de Barros, Antonio Zarlenga, Marco Dentz, Aldo Fiori, Tissa Illangasekare.
- 2021 EGU General Assembly HS7.7 | PICO – Hydrometeorologic stochasticity for hydrologic applications: extremes, scales, probabilities, Co-organized by NH1, co-sponsored by ICSH-IAHS. Convener: Hannes Müller-Thomy (ECS) | Co-conveners: Marco Borga, Auguste Gires, Jose Luis Salinas Illarena (ECS), Alberto Viglione
- 2021 EGU General Assembly HS7.8 – Spatial extremes in the hydro- and atmosphere: understanding and modelling, Co-organized by AS4/NH1, co-sponsored by ICSH-STAHY (IAHS) Convener: Manuela Irene Brunner (ECS) | Co-conveners: A.B. Bardossy, Philippe Naveau, Simon Michael Papalexiou (ECS), Elena Volpi
- ICSH-STAHY Workshop 2021, Universitat Politècnica de València, Spain | Online Edition 16-17 September, 2021
- Early Career Short Course STAHY 2021, Universitat Politècnica de València, Spain | Online Edition 15 September, 2021
- 2021 IDRA2021web, Session 11, Tecniche di misura al suolo e da sensori remoti per il monitoraggio e modellazione dei processi idrologici, Co-organized by MOXXI. Conveners: Flavia Tauro, Silvia Barbetta, Giovanni Ravazzani.
- 2021 Metroagrifor, Special Session 12: Sensing hydrological processes at different spatial and temporal scales for sustainable use of water resources, Trento-Bolzano, Italy (November 3–5), Co-organized by MOXXI. Conveners: Gabriele Baroni and Flavia Tauro.
- Hydrology Days 2021. The Italian Hydrological Society (SII) organized the 2021 Hydrology Days in Naples from 29 September to 1 October. The conference took place at the Complex of SS. Marcellino and Festo of the University of Naples Federico II and more than 90 Members attended. There was an extensive discussion in the several Sessions addressing the main topic of hydrological phenomena in the water resource management and mitigation of geo-hydrological risks in a context of global changes. One session was dedicated to Prof. Fabio Rossi, entitled Hydrological Dimensioning Methods and Perspectives - remembering Fabio Rossi. The Round Table on "the role of hydrology for the protection and safeguarding of the territory" saw also the participation of Prof. Guenter Bloeschl, now a member of the Italian Hydrological Society, and recently awarded the Honorary Degree of the University of Bologna in "Environmental and Territory Engineering”.

2.2 Organization of scientific initiatives 2021

- Summer School “Principles, Applications and New Frontiers In Isotope Geochemistry”, 14-18 June 2021, Lake Como School of Advanced Studies, Italy (<https://paig.lakecomoschool.org/>). The school deals with isotopes in multiple worlds of geochemistry. One of the topics is environmental isotopes in hydrology. The school is organized by ICGW/IAHS Vice President Daniele Pedretti.
- Florisa Melone Award 2021 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. Elena Cristiano and Dr. Antonio Annis were bestowed for the project " SMART-UP: Sustainable Multilayer Climate-Adaptive Roofs To Support Urban Drainage Planning ".
- 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 40+ “friends” from more than 10 countries). The first CANHDY community paper was published on IAHS Hydrological Sciences Journal led by CANDHY Chair Fernando Nardi
- Attribution of the STAHY Best Paper Award 2020 to Serinaldi, F., Kilsby, C.G, Lombardo, F. (2018). Untenable nonstationarity: An assessment of the fitness for purpose of trend tests in hydrology. *Advances in Water Resources* 111: 132-155, doi: 10.1016/j.advwatres.2017.10.015
- Attribution of the STAHY Best Paper Award 2021 to McInerney, D., Thyer, M., Kavetski, D., Lerat, J., & Kuczera, G. (2017). Improving probabilistic prediction of daily streamflow by identifying Pareto optimal approaches for modeling heteroscedastic residual errors. *Water Resources Research*, 53(3), 2199-2239, 10.1002/2016WR019168

2.3 Editorial Board Participation

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
- Marco Borga, Guest Editor, Università di Padova
- Alessio Domeneghetti, Associate Editor, Università di Bologna
- Daniele Penna, Università di Firenze
- Andrea Petroselli: Associate Editor, University of Tuscia
- Ilaria Prosdocimi: Associate Editor, Università di Padova
- 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

Papers of HSJ labelled as “Featured Articles” in 2021 with Italian authors:

- Daniela De Filippo, Elías Sanz Casado, Francesca Berteni, Francesca Barisani, Nuria Bautista Puig & Giovanna Grossi, Assessing citizen science methods in IWRM for a new science shop: a bibliometric approach, <https://doi.org/10.1080/02626667.2020.1851691>
- Anam Amin, Giulia Zuecco, Chiara Marchina, Michael Engel, Daniele Penna, Jeffrey J. McDonnell & Marco Borga, No evidence of isotopic fractionation in olive trees

2.4 Goals, priorities and plans for future Scientific Initiative

For 2022 the plan is to continue to actively participate to IAHS initiatives through targeted activities. To date, various initiatives are being planned, among which:

- Conferences:
 - 29 may – june 3, 2022, IAHS Assembly, Montpellier
 - Groundwater sustainability in a changing climate: modeling and experimental analyses from urban, agricultural and ecological contexts. Organizers: ICGW (Daniele Pedretti, Michelle Newcomer), ICWRS (Barry Croke, barry.croke@anu.edu.au), ICRS (Amir Aghakouchak)
 - Advancements on understanding and modeling of the fluxes of groundwater across boundaries. Organizers: ICGW (Alraune Zech, Antonio Zarlenga), ICSW (Gil Mahe), MOXXI (Flavia Tauro)
 - Dealing with subsurface contamination and risks: technical solutions and practical applications, from shallow to deep geological environments. Organizers: ICGW (Felipe de Barros, Roseanna Neupauer), ICWQ (Wouter Buytaert), ICT (Christine Stump), ICSH (Elena Volpi)
 - Extremes in hydroclimatic systems, Convener: Krzysztof Kochanek, Co-Conveners: Ilaria Prosdocimi, Salvatore Grimaldi, Ernest Amoussou, Alberto Viglione
 - Innovation and citizen engagement to sense the Hydrological Cycle. Co-organized by MOXXI and CANDHY. Conveners: Flavia Tauro, Fernando Nardi, Salvatore Grimaldi, David Hannah, Jérôme Le Coz, Dominique Bérod
 - 23-27 May, 2022, at the EGU General Assembly
 - HS7.7, Spatial extremes in the hydro- and atmosphere: understanding and modelling, Co-organized by NH1, Convener: Manuela Irene BrunnerECS | Co-conveners: András Bárdossy, Philippe Naveau, Simon Michael Papalexou, Elena Volpi
 - 2022 STAHY Workshop September, 17-20, 2022, Chia, Sardegna Italia (local organizer Roberto Deidda); come per la precedente edizione è previsto uno Short Course per gli Early Career Scientists e l'attribuzione del STAHY Best Paper Award 2022, la cui valutazione è in progress, e 2021, la cui valutazione è in progress.
 - 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 originally planned to be held at Bydgoszcz, Poland in October 17-21, 2022. Unfortunately, due to the recent Ucraina conflict, the Local Organizing Committee asked for a change in location (<https://icce2022.ukw.edu.pl/jednostka/icce2000/news-and-updates/66542/change-of-conference-location>). The new location was established by the ICCE Bureau (Villa Grumello, Como, Italy) and a new Local Organizing Committee was nominated (Prof. Michael Maerker, Università di Pavia). The conference will take place in Italy during the period October 19-21, 2022 (to be confirmed).
 - 2022 Innovation Workshop “WMO HydroHub Phase II Innovation Roadmap”, Co-organized by MOXXI. Flavia Tauro served as Convener on February 2nd, online webinar (February 2 and 4)
- Submission to Hydrological Sciences Journal of a Community paper on statistical hydrology.

2.5 Scientific Publications (*peer-reviewed papers*)

1. Abdolvandi, A.F., Ziaei, A.N., Moramarco, T., Singh, V.P. (2021). New approach to computing mean velocity and discharge. *Hydrological Sciences Journal*, 66(2), pp. 347–353
2. Domeneghetti, A., Molari, G., Tourian, M.J., Moramarco T., Brath, A. (2021). Testing the use of single- and multi-mission satellite altimetry for the calibration of hydraulic models. *Advances in Water Resources*. 151, 103887

3. Galloway, G. E., Seminara, G., Blöschl, G., García, M. H., Montanari, A., & Solari, L. (2020). Reducing the flood risk of art cities: the case of Florence. *Journal of Hydraulic Engineering*, 146(5), 02520001.
4. Gharibreza, M., Bahrami Samani, A., Arabkhedri, M., Zaman, M., Porto, P., Kamali, K., Sobh-Zahedi, S. (2021). Investigation of on-site implications of tea plantations on soil erosion in Iran using ^{137}Cs method and RUSLE. *Environmental Earth Sciences*, 2021, 80(1), 34.
5. Grimaldi, S., Nardi, F., Piscopia, R., Petroselli, A., Apollonio, C. Continuous hydrologic modelling for design simulation in small and ungauged basins: A step forward and some tests for its practical use (2021) *Journal of Hydrology*, 595, art. no. 125664.
6. Kastali, A., Zeroual, A., Remaoun, M., Serrano-Notivoli, R., Moramarco, T. (2021). Design Flood and Flood-Prone Areas under Rating Curve Uncertainty: Area of Vieux-Ténès, Algeria. *Journal of Hydrologic Engineering* 26(3), 05020054
7. Ouadja, A., Benfetta, H., Porto, P., Flanagan, D.C., Mihoubi, M.K., Omeir, M.R., Graia, M., Ghosal, K., Talchabhadel, R. (2021). Mapping potential soil erosion using RUSLE, Remote Sensing, and GIS: a case study in the watershed of Oued El Ardjem, Northwest Algeria *Arabian Journal of Geosciences*, 14(18), 1945.
8. Papacharalampous, G., Tyralis, H., Papalexiou, S.M., Langousis, A., Khatami, S., Volpi, E., Grimaldi, S. Global-scale massive feature extraction from monthly hydroclimatic time series: Statistical characterizations, spatial patterns and hydrological similarity (2021) *Science of the Total Environment*, 767, art. no. 144612,
9. Porto, P., Callegari, G. (2021). Using ^{137}Cs measurements to estimate soil erosion rates in forest stands affected by wildfires. Results from plot experiments *Applied Radiation and Isotopes*, 172, 109668.
10. Porto, P., Callegari, G. (2021). Using ^7Be measurements to explore the performance of the SEDD model to predict sediment yield at event scale *Catena*, 196, 104904.
11. Romeo, F., Porto, P., Mallamaci, C., Muscolo, A. (2021). 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.
12. Tarpanelli, A., Camici, S., Nielsen, K., ...Moramarco, T., Benveniste, J. (2021). Potentials and limitations of Sentinel-3 for river discharge assessment. *Advances in Space Research* 68(2), pp. 593–606
13. Vyas, J.K., Perumal, M., Moramarco, T. (2021). Entropy Based River Discharge Estimation Using One-Point Velocity Measurement at 0.6D. *Water Resources Research*, 57(8), e2021WR029825

3. Scientific activities carried on during 2021 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 in the sequel.

- Participation to the CNR-IUGG Commission.
- Dissemination of activities of IUGG among Italian Universities and Research Institutions for the meetings participation and IUGG Research Grant applications

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.

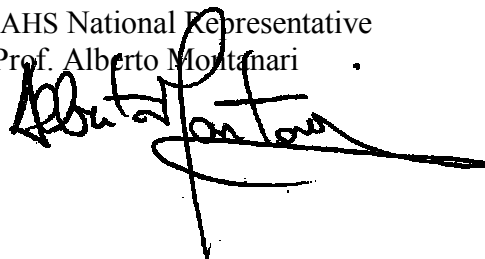
6. Italian experts with important roles within the Union or within related Commissions and Programs

- *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. Alberto Montanari is also president of EGU for the term 2019 – 2021 and was bestowed the Dooge Medal by IAHS in 2019.
- *Prof. Attilio Castellarin*. Editor in Chief of *IAHS Hydrological Sciences Journal*
- *Prof. Aldo Fiori*. President International Commission for Ground Water (ICGW)
- *Prof. Salvatore Grimaldi*. Vice-President of IAHS.
- *Dr. Fernando Nardi*. President Citizen AND Hydrology Working Group (CandHy WG)
- *Prof. Paolo Porto*. President-elect of the International Commission on Continental Erosion/International Association of Hydrological Sciences (ICCE/IAHS). Secretary of IASWS (International Association for Sediment Water Science) from 2017.
- *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 Prosdocimi*. Secretary of the International Commission on Statistical Hydrology of (ICSH/IAHS).
- *Prof. A. Zarlenga*, Secretary of ICGW/IAHS

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IAHS National Representative
Prof. Alberto Montanari



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