

PERUGIA (Italy)
January 28 - February 1, 2019
UNESCO WWAP headquarter
Villa La Colombella



International Winter School on Hydrology

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JOINTLY ORGANIZED BY

Interuniversity Consortium for Hydrology (CINID)
UNESCO World Water Assessment Program (WWAP)
University for Foreigners of Perugia (WARREDOC)

WITH THE PATRONAGE OF

Hydraulic Italian Group (GII)
Italian Hydrological Society (SII)

COORDINATING COMMITTEE

Fabio Castelli (UNIFI/CINID)
Stefan Uhlenbrook (WWAP)
Fernando Nardi (WARREDOC)

LOCAL ORGANIZING COMMITTEE

Fabrizio Focolari, Simona Farinelli, Paola Tricoli (WARREDOC)

2019 Edition Doctoral Winter School DATA RICH HYDROLOGY

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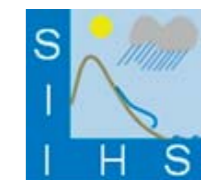
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DATA RICH HYDROLOGY

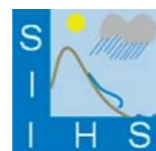
KEYNOTE LECTURE

Prof. Rafael L. Bras
Prof. Stefan Uhlenbrook

WITH THE SUPPORT AND PATRONAGE OF



The past century hydrological sciences developed, among the other Earth Sciences sectors, as a data poor scientific discipline. In the 70's, 80' and 90's hydrologists and water resource management professionals struggled with lack of data, data limitations due to the spatial and temporal scale and significant inaccuracies and data voids in hydrological time series and spatial layers. As a matter of fact, hydrologists developed geospatial and numerical interpolation, extrapolations and models to address water resource and risk management challenges and issues. At the end of the century, the situation abruptly changed with the Earth Observation (EO) of the water cycle and land morphology from space. Advanced data processing and distribution systems that were implemented at the beginning of the new century easily and freely provided continuous high-resolution topographical and environmental data. This was a turning point for hydrology, with the advent of terrain analysis and spatially distributed models that were finally fed by spatially continuous data on water morphology and hydrologic processes. In less than 20 years, remote sensing and ground monitoring systems have transformed the way hydrologists work with an exponential increase of data temporal, spatial scale and resolution. We now live in a data rich world, with public and private satellites, Lidar, drones and ground radars that provide unlimited opportunities and data to hydrologists for understanding, monitoring, modeling and interpreting watershed physical processes, features and water-human interactions in complex urban ecosystems. Moreover, Internet of Things (IoT), video cams and environmental low cost sensors are now increasingly available providing information not only on natural and urban hydrologic system dynamics, but also on human behavior, risk perception and societal dynamics related to human needs (i.e. water-food-energy nexus), natural disasters and water stress. Citizens are not only just passive users, but they dynamically interact, sending and receiving information in real time, becoming human sensors of the real world. As a result, while hydrology is transforming with "New data", Big Data and Data/Citizen science, it seems that it has become more and more important to make sure that the quest for hyper-resolution global water modeling, does not neglect the importance of proper understanding and representation of hydrological and meteorological processes in complex multi-disciplinary earth science research and projects. General goal of this Winter School is to guide participants in understanding and learning the theory, data, methods and tools by means of lectures and hands on for an extensive and immersive introduction to most recent findings of hydrological sciences. At the end of the School, students will catch the opportunities of the "Data Rich Hydrology" era we live in, while learning the importance of understanding the knowledge gaps and scientific advancements related to hydrological process mechanics and evolving watershed features.



MONDAY January 28th

Morning session

Institutional welcome remarks **Dianella Gambini** (Università per Stranieri di Perugia), **Lucio Caporizzi** (Regione Umbria), **Stefano Bigaroni** (Umbria Digitale), **Fabio Castelli** (CINiD) **Stefan Uhlenbrook** (UNESCO WWAP) chaired by **Fernando Nardi**

Pop-up short talks & Open Discussion on "**New Data in Hydrology**" chaired by **Fabio Castelli** with the contribution also of I. Becchi, P. Claps, R. Rosso, G. Roth, F. Siccardi, L. Ubertini

Rafael L. Bras, The Era of Data Rich Hydrology

Stefan Uhlenbrook, The WWDR and SDG 6 Synthesis Report

Afternoon session

Aldo Fiori, Groundwater hydrology and hydrological process mechanics

Marco Marani, Beyond traditional extreme value theory: lessons learned from rainfall and hurricane intensity

Maria Cristina Rulli, The water-food-energy nexus

TUESDAY January 29th

Morning session

Rafael L. Bras, The Era of Data Rich Hydrology

Stefan Uhlenbrook, The WWDR and SDG 6 Synthesis Report

Fabio Castelli, Remote sensing and data assimilation in hydrology

Afternoon session

Roberto Deidda, Modelling scaling properties of precipitation fields

Salvatore Grimaldi, Hydrologic measurements and novel observation technologies

-- Dinner & Social event --

WEDNESDAY January 30th

Morning session

Salvatore Manfreda, Drones in Hydrology (lecture & hands on)

Elena Volpi, Hydrological risk assessment: Return period and probability of failure

Afternoon session

Andrea Libertino, Advances in the space-time analysis of rainfall extremes

Riccardo Rigon, Hydrologic modelling in a data rich world

THURSDAY January 31st

Morning session

Daniele Ganora, Data poor vs. data rich cases for flood hazard (lecture & hands on)

Gabriele Freni, Distributed Data quality and urban flood modelling uncertainty

Afternoon session

Fernando Nardi, Citizen science and big data in hydrology

-- Computer Lab / Practice data and tools --

FRIDAY February 1st

Morning session

Tommaso Moramarco, Stream flow measurements: ground and satellite observations

Alessio Domeneghetti, Remote sensing data and tools to foster inland water monitoring and flood modeling

Q & A session - Open Discussion – Closing remarks

Coffee breaks are organized at mid mornings and afternoons close to the workshop room. Lunch breaks are organized in the Villa La Colombella cafeteria.