We are pleased to present the contributions collected to celebrate the 50th anniversary of *Water Resources Research*. These include critical discussions of the legacy and perspectives for the science of hydrology in the 21st century. The papers in this collection also highlight exciting pathways to the future of water sciences. New monitoring and modeling techniques and increasing opportunities for data and knowledge sharing from hydrological research will provide innovative means to improve water management and to ensure a sustainable development to society. We hope that this set of papers will provide valuable inspiration for future hydrologists, and will support the intensification of international cooperation among scientists.
The 50th Anniversary of Water Resources Research includes more than 60 peer-reviewed articles covering topics from the history and legacy of hydrology to global change, water resources, and past and future societal impacts, selected by the editors. This summary includes the preface and two overview articles and a full table of contents. The full issue is available here: http://bit.ly/AGUWRR50.

Aims and Scope. Water Resources Research is an interdisciplinary journal that publishes original research in the natural and social sciences of water. This includes the role of water in the physical, chemical, biological, and ecological sciences; public health, and related social and policy sciences. It encompasses methodological development of observational, experimental, theoretical, analytical, numerical, and data-driven approaches that advance the science of water and its management. Submissions are evaluated for their novelty, accuracy, significance, and broader implications of the findings.

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50 years of Water Resources Research:
The times are changing and so is WRR

Come gather 'round people
Wherever you roam
And admit that the waters
Around you have grown
And accept that soon
You'll be drenched to the bone.
If your time to you
Is worth savin'
Then you better start swimmin'
Or you'll sink like a stone
For the times they are a-changin'

The Times They Are A-Changin'
Bob Dylan (1964)

In the year 1965, more environmental acts were enacted by Congress than in any other year, such as the Land and Water Conservation Fund Act, the Water Quality Act, the Federal Water Project Recreation Act, and the Water Resources Planning Act, following the Water Resources Research Act of 1964. 1965 also marked a key moment in climate change history that few remember: the first presidential mention in a special message to Congress on the environmental risk of carbon dioxide pollution from fossil fuels (Lyndon B. Johnson, 1965, Public Papers of the Presidents of the United States, Volume I, entry 54, pp. 155–165). Rachel Carson’s Silent Spring (1962) and Udall’s The Quiet Crisis (1963) did the spadework for the environmental movement in the mid-60s leading to the Earth Day in 1970. 1965 was a special year for water and the environment, as well as for Water Resources Research (WRR), born in March 1965.

In the mid-60s, water scientists took a broad view of water science, and WRR embraced this view by being innovative, interdisciplinary, rigorous, and proactive. The breadth of topics published in its first few issues is stunning, e.g., by Arrow (1965), future Nobel Laureate in Economics, on water-related social investments; by Fox (1965) on the need to improve water management institutions, laws, and policies to solve our pressing water problems; by Yevjevich (1967) criticizing the concepts of Probable Maximum Flood used for design; by Smart (1967) developing subtle mathematics on Horton’s laws; by Lee (1967) on the hydrologic importance of leaf stomata, to mention only a very few. The rigor, the breadth, the depth, the breaking-new-ground mentality of WRR continued throughout its 50 years of history, making it the go-to journal for pioneering ideas, new mathematical theories and models, and state-of-the-art applications to real-world problems, as well as a place to review, criticize, and debate.

Since 1965, the world population has more than doubled, from 3.3 to 7.3 billion, and water challenges have become ever daunting compounded by climate change, the need for sustainable water, food, and energy, environmental consciousness on human rights and equity, and even exploration of life beyond our planet. As this anniversary issue attests, WRR has stood tall to face those emerging problems and has provided the bedrock of science advances and science-based solutions.

Who knows what the next 50 years will bring? But it is refreshing to think that the next generation of water scientists and engineers who will define the next 50 years of WRR will be passionate about their science and the world, rigorous, well educated in breadth and depth, and inspirational leaders who will bring about a collective growth and solutions hardly imaginable today.

This issue is dedicated to you next generation with our firm commitment to listen, mentor, and pave ways so you can achieve by 2065 what we cannot even imagine today.

Efi Foufoula-Georgiou
President, Hydrology section of the American Geophysical Union
University of Minnesota, September 7, 2015

The 50th Anniversary of Water Resources Research

Legacy and Perspectives for the Science of Hydrology

Alberto Montanari, Jean Bahr, Günter Blöschl, Ximing Cai, D. Scott Mackay, Anna M. Michalak, Harihar Rajaram, and Graham Sander

Fifty years of Water Resources Research: Legacy and perspectives for the science of hydrology
doi:10.1002/2015WR017998

The legacy of hydrological sciences
Harihar Rajaram, Jean Bahr, Günter Blöschl, Ximing Cai, D. Scott Mackay, Anna M. Michalak, Alberto Montanari, Xavier Sanchez-Villa, and Graham Sander
A reflection on the first 50 years of Water Resources Research
doi:10.1002/2015WR018089

Matthew Sturm
White water: Fifty years of snow research in WRR and the outlook for the future
doi:10.1002/2015WR017242

Claudio Paniconi and Mario Putti
Physically based modeling in catchment hydrology at 50: Survey and outlook
doi:10.1002/2015WR017780

Rafael L. Bras
Complexity and organization in hydrology: A personal view
doi:10.1002/2015WR016958

T. P. Burt and J. J. McDonnell
Whither field hydrology? The need for discovery science and outrageous hydrological hypotheses
doi:10.1002/2014WR016839

Martyn P. Clark, Ying Fan, David M. Lawrence, Jennifer C. Adam, Diogo Bolster, David J. Gochis, Richard P. Hooper, Mukesh Kumar, L. Ruby Leung, D. Scott Mackay, Reed M. Maxwell, Chaopeng Shen, Sean C. Swenson, and Xubin Zeng
Improving the representation of hydrologic processes in Earth System Models
doi:10.1002/2015WR017096

Andrew Binley, Susan S. Hubbard, Johan A. Huisman, André Revil, David A. Robinson, Kamini Singha, and Lee D. Slater
The emergence of hydrogeophysics for improved understanding of subsurface processes over multiple scales
doi:10.1002/2015WR017016

Hedeff I. Essaid, Barbara A. Bekins, and Isabelle M. Cozzarelli
Organic contaminant transport and fate in the subsurface: Evolution of knowledge and understanding
doi:10.1002/2015WR017121

Ian L. Molnar, William P. Johnson, Jason L. Gerhard, Clinton S. Willson, and Denis M. O’Carroll
Predicting colloid transport through saturated porous media: A critical review
doi:10.1002/2015WR017318

Peter K. Kitanidis
Persistent questions of heterogeneity, uncertainty, and scale in subsurface flow and transport
doi:10.1002/2015WR017639
M. Bayani Cardenas

**Hyporheic zone hydrologic science: A historical account of its emergence and a prospectus**
doi:10.1002/2015WR017028

Paul D. Brooks, Jon Chorover, Ying Fan, Sarah E. Godsey, Reed M. Maxwell, James P. McNamara, and Christina Tague

**Hydrological partitioning in the critical zone: Recent advances and opportunities for developing transferable understanding of water cycle dynamics**
doi:10.1002/2015WR017039

**Water processes monitoring, modeling and interpretation**
Jessica D. Lundquist, Nicholas E. Wayand, Adam Massmann, Martyn P. Clark, Fred Lott, and Nicoleta C. Cristea

**Diagnosis of insidious data disasters**
doi:10.1002/2014WR016585

Dennis P. Lettenmaier, Doug Alsdorf, Jeff Dozier, George J. Huffman, Ming Pan, and Eric F. Wood

**Inroads of remote sensing into hydrologic science during the WRR era**
doi:10.1002/2015WR017616

Peter A. Troch, Tim Lahmers, Antonio Meira, Rajarshi Mukherjee, Jonas W. Pedersen, Tirthankar Roy, and Rodrigo Valdés-Pineda

**Catchment coevolution: A useful framework for improving predictions of hydrological change?**
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Amilcare Porporato and Salvatore Calabrese

**On the probabilistic structure of water age**
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**Soil hydrology: Recent methodological advances, challenges, and perspectives**
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Laura E. Condon and Reed M. Maxwell

**Evaluating the relationship between topography and groundwater using outputs from a continental-scale integrated hydrology model**
doi:10.1002/2014WR016774

A. Fiori, A. Bellin, V. Cvetkovic, F. P. J. de Barros, and G. Dagan

**Stochastic modeling of solute transport in aquifers: From heterogeneity characterization to risk analysis**
doi:10.1002/2015WR017388

Valentina Ciriello, Yaniv Edery, Alberto Guadagnini, and Brian Berkowitz

**Multimodel framework for characterization of transport in porous media**
doi:10.1002/2015WR017047

Michael L. Roderick, Peter Greve, and Graham D. Farquhar

**On the assessment of aridity with changes in atmospheric CO2**
doi:10.1002/2015WR017031

Marc F. P. Bierkens

**Global hydrology 2015: State, trends, and directions**
doi:10.1002/2015WR017173
Matthew R. Hipsey, David P. Hamilton, Paul C. Hanson, Cayelan C. Carey, Janaine Z. Coletti, Jordan S. Read, Bas W. Ibelings, Fiona J. Valesini, and Justin D. Brookes
Predicting the resilience and recovery of aquatic systems: A framework for model evolution within environmental observatories
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Robert L. Runkel
On the use of rhodamine WT for the characterization of stream hydrodynamics and transient storage
doi:10.1002/2015WR017201

M. Church and R. I. Ferguson
Morphodynamics: Rivers beyond steady state
doi:10.1002/2014WR016862

Hubert H. G. Savenije
Prediction in ungauged estuaries: An integrated theory
doi:10.1002/2015WR016936

Enrico Bertuzzo, Ignacio Rodriguez-Iturbe, and Andrea Rinaldo
Metapopulation capacity of evolving fluvial landscapes
doi:10.1002/2015WR016946

Christopher J. Keylock
Flow resistance in natural, turbulent channel flows: The need for a fluvial fluid mechanics
doi:10.1002/2015WR016989

Jud Harvey and Michael Gooseff
River corridor science: Hydrologic exchange and ecological consequences from bedforms to basins
doi:10.1002/2015WR017617

Ying Fan
Groundwater in the Earth’s critical zone: Relevance to large-scale patterns and processes
doi:10.1002/2015WR017037

Diane M. McKnight, Karen Cozzetto, James D. S. Cullis, Michael N. Gooseff, Christopher Jaros, Joshua C. Koch, W. Berry Lyons, Roseanna Neupauer, and Adam Wlostowski
Potential for real-time understanding of coupled hydrologic and biogeochemical processes in stream ecosystems: Future integration of telemetered data with process models for glacial meltwater streams
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Manuel del Jesus, Andrea Rinaldo, and Ignacio Rodríguez-Iturbe
Point rainfall statistics for ecohydrological analyses derived from satellite integrated rainfall measurements
doi:10.1002/2015WR016935

Water resources, society and water threats
Richard M. Vogel, Upmanu Lall, Ximing Cai, Balaji Rajagopal, Peter K. Weiskel, Richard P. Hooper, and Nicholas C. Matalas
Hydrology: The interdisciplinary science of water
doi:10.1002/2015WR017049

Murugesu Sivapalan and Günter Blöschl
Time scale interactions and the coevolution of humans and water
doi:10.1002/2015WR017896

B. Merz, S. Vorogushyn, U. Lall, A. Viglione, and G. Blöschl
Charting unknown waters—On the role of surprise in flood risk assessment and management
doi:10.1002/2015WR017464
George M. Hornberger, David J. Hess, and Jonathan Gilligan
Water conservation and hydrological transitions in cities in the United States
doi:10.1002/2015WR016943

William J. Cosgrove and Daniel P. Loucks
Water management: Current and future challenges and research directions
doi:10.1002/2014WR016869

Howard S. Wheater and Patricia Gober
Water security and the science agenda
doi:10.1002/2015WR016892

Dennis McLaughlin and Wolfgang Kinzelbach
Food security and sustainable resource management
doi:10.1002/2015WR017053

The future of water resources systems analysis: Toward a scientific framework for sustainable water management
doi:10.1002/2015WR017114

Praveen Kumar
Hydrocomplexity: Addressing water security and emergent environmental risks
doi:10.1002/2015WR017342

Jay R. Lund
Integrating social and physical sciences in water management
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Giuseppe Gambolati and Pietro Teatini
Geomechanics of subsurface water withdrawal and injection
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Daniel T. Birdsell, Harihar Rajaram, David Dempsey, and Hari S. Viswanathan
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Steven M. Gorelick and Chunmiao Zheng
Global change and the groundwater management challenge
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Alexandra S. Richey, Brian F. Thomas, Min-Hui Lo, John T. Reager, James S. Famiglietti, Katalyn Voss, Sean Swenson, and Matthew Rodell
Quantifying renewable groundwater stress with GRACE
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M. A. Celia, S. Bachu, J. M. Nordbotten, and K. W. Bandilla
Status of CO₂ storage in deep saline aquifers with emphasis on modeling approaches and practical simulations
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Shmuel Assouline, David Russo, Avner Silber, and Dani Or
Balancing water scarcity and quality for sustainable irrigated agriculture
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Serena Ceola, Francesco Laio, and Alberto Montanari
Human-impacted waters: New perspectives from global high-resolution monitoring
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Theophile Mande, Natalie C. Ceperley, Gabriel G. Katul, Scott W. Tyler, Hamma Yacouba, and Marc B. Parlange

Suppressed convective rainfall by agricultural expansion in southeastern Burkina Faso
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Chin-Fu Tsang, Ivars Neretnieks, and Yvonne Tsang

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Ellen Wohl, Stuart N. Lane, and Andrew C. Wilcox

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Martin W. Doyle, Jai Singh, Rebecca Lave, and Morgan M. Robertson

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Ecohydrological modeling in agroecosystems: Examples and challenges
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Efi Foufoula-Georgiou, Zeinab Takbiri, Jonathan A. Czuba, and Jon Schwenk

The change of nature and the nature of change in agricultural landscapes: Hydrologic regime shifts modulate ecological transitions
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