INTERNATIONAL ASSOCIATION FOR HYDRO-ENVIRONMENT ENGINEERING AND RESEARCH

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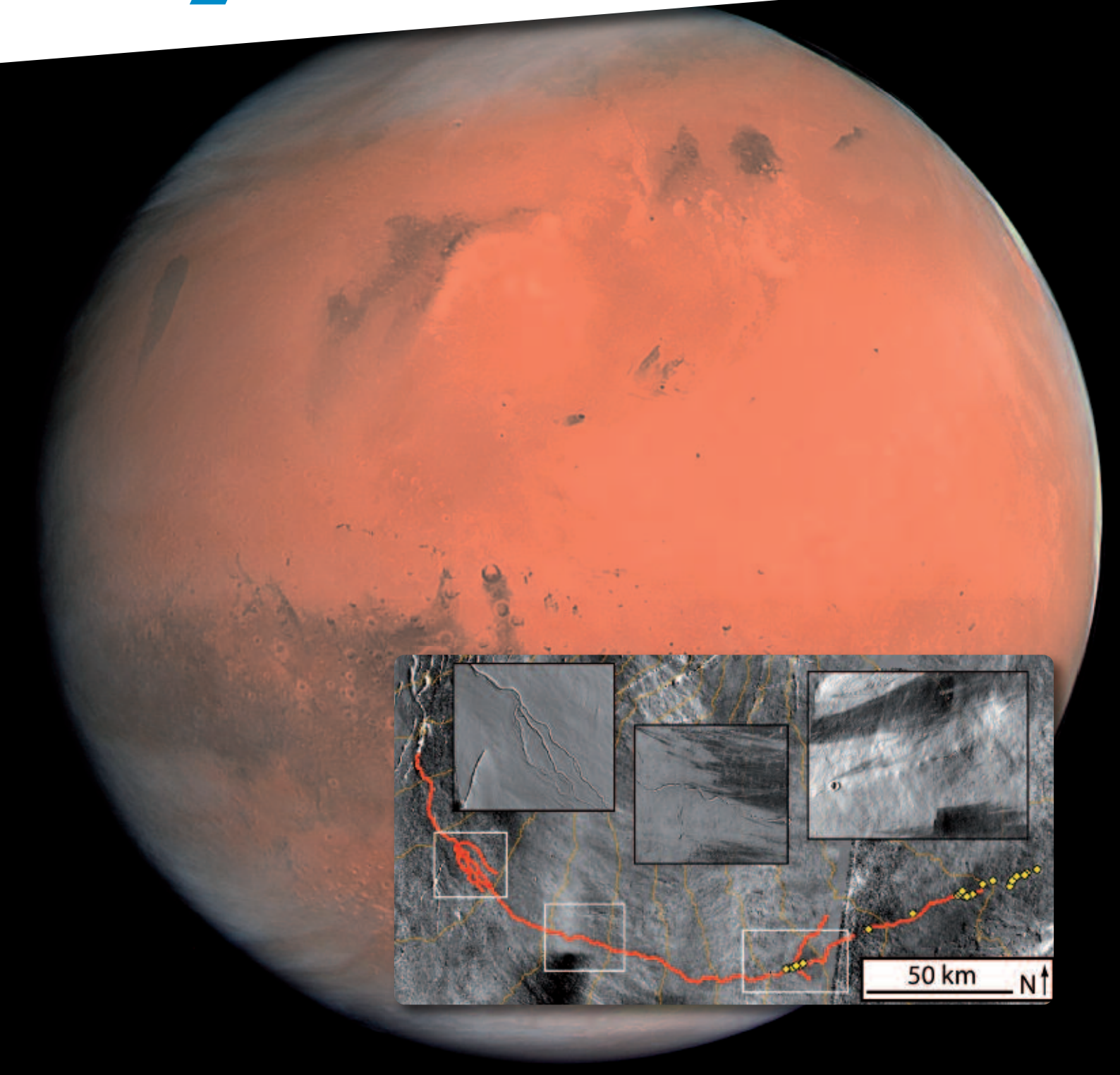

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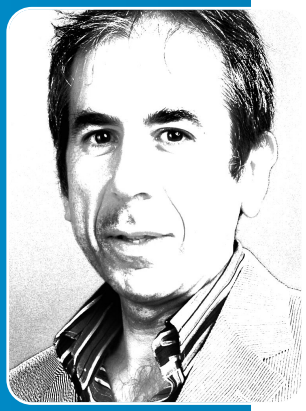
Editorial by **Michele Mossa**



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The explosive mixture of water and the spirit of discovery

Everybody knows that water is a chemical compound with the molecular formula H_20, where two atoms of hydrogen are linked with one atom of oxygen. This compound is as simple as it is important for our lives. In fact, all living beings on Earth commonly use carbon for basic structural and metabolic functions, water as a solvent and DNA or RNA to define and control their form. Theoretically, it is possible that undiscovered life forms could exist which differ radically in their basic structures and biochemistry from those known to science, but, at the moment, this is only conjecture. Therefore, we can conclude that water is essential for humanity and every ecosystem.

Now, let's try "to mix" this conclusion with the natural human instinct to explore new limits. What results could be obtained from the "mixture" of water and the human spirit of discovery?

What is the spirit of discovery? History is full of great explorers, such as Marco Polo, who in 1271 embarked on an epic journey to Asia with his father and uncle, Vasco da Gama, the explorer who sailed to India, or Christopher Columbus, who discovered America in 1492, or Amerigo Vespucci, the explorer, navigator and cartographer who at the beginning of the XVI century explored the Atlantic coast of South America, understanding that it was not Asia but a new continent that, in his honor, was called America. We should also not forget Ferdinand Magellan, who became the first to sail from the Atlantic Ocean into the Pacific Ocean in 1519-1522, or James Cook, who made three voyages to the Pacific Ocean, where he was the first European to reach the eastern coastline of Australia and the Hawaiian Islands. More recently, on 6 April 1909 the American Robert Edwin Peary reached the North Pole and on 14 December 1911 the Norwegian Roald Amundsen arrived at the South Pole. Surely there are many other explorers who could be added to this list and who also embody the spirit of discovery.
Nowadays, all that remains to be discovered of the Earth are the depths of its oceans and below the crust. In fact, since the sixties the new real frontier has been space, with the Soviet cosmonaut Yuri Gagarin who was the first human being to journey into outer space on 12 April 1961, or Neil Armstrong, who was the first person to set foot on the Moon with Buzz Aldrin in 1969.
We may conclude that humanity has always tried to find new worlds and frontiers trying to enlarge its own boundaries. Also in the classics the heroic deeds of explorers and sailors were proclaimed, like those of Jason, the late ancient Greek mythological hero, famous as the leader of the Argonauts, and their journey and quest for the Golden Fleece.
I would like to think that this inborn aim could also be considered as a big possibility to remove any contrast between nations on their boundaries and resources. Why fight for a small resource on Earth, water included, when we could direct our efforts towards new and possibly huge riches and lands on other planets?

Surely the decision to put an end to the Shuttle program and doubt over the future of further missions into space is not positive news. In any case, the Shuttle, which has been the icon of America's space program for a generation, will be missed, and the future task is to delegate to the private sector the transportation of people and equipment to low-Earth orbit. It could be that, liberated from the burden of having to service the ISS (International Space Station), NASA will be free to concentrate on bigger goals. American President Obama outlined his ideas, somewhat vaguely, for a manned trip to a near-Earth asteroid, to be followed at some specified date in the 2030s by the ultimate space-cadet dream, i.e. a manned mission to Mars. To this end, NASA will spend billions of dollars developing new engines, propellants, life-support systems and so on.

But why should we go to Mars? As the past has taught us, a similar journey is very much in the spirit of discovery. It has been observed that in 1989 NASA estimated that a people-to-Mars program would cost $400 billion, which inflates to $600 billion today. The Hoover Dam cost $700 million in today's money, meaning that sending people to Mars might cost as much as building about 800 new Hoover Dams. A Mars mission may be the single most expensive non-wartime undertaking in history. In other words, the fact that a destination is tantalizing does not mean the journey makes sense, even considering the human calling to explore. And Mars as a destination for people makes absolutely no sense with current technology. But the thought of travelling to Mars is a sort of inborn challenge for humanity, no different from the challenges of those great explorers mentioned previously, who also risked their lives to make journeys which seemed equally nonsensical at that time.
The hope is to find water on Mars in order to make this planet friendlier. In other words the "mixture" between the possibility of finding water on Mars with the inborn human spirit of discovery could lead to the possibility that someday men and women will walk on this planet, and, if so, surely they will make wondrous discoveries about geology and the history of the solar system, perhaps even about the very origin of life. But, as previously written, to make this possible there must be water on Mars.

This is why this issue of Hydrolink deals with a topic very different from previous issues, and why we have published two articles on the planet Mars and the possibility of finding water on it. The first article is by dr. Raffaele Mugnuolo of the Italian Space Agency, and dr. Elizabeth Zubritsky of the NASA Goddard Space Flight Center wrote the second.

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Cover picture:
The Ascraeus Channel on Mars.
NASA Goddard Space Flight Center

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Is there water on Mars?

Written by:
Dr. Raffaele Mugnuolo
Italian Space Agency

Dr. Raffaele Mugnuolo joined Italian Space Agency on 1987, initially in space robotics development programme for ISS and planetary exploration applications. He was the ASI program manager for the Italian Sample Drill and Distribution system development, on board the Lander of the Rosetta Mission. Currently, he is the ASI program manager for the Italian scientific contribution to ExoMars Mission. In addition he is ASI responsible for the scientific participation to other solar system exploration missions, such as DAWN Mission, Venus Express and Bepi Colombo Mission.

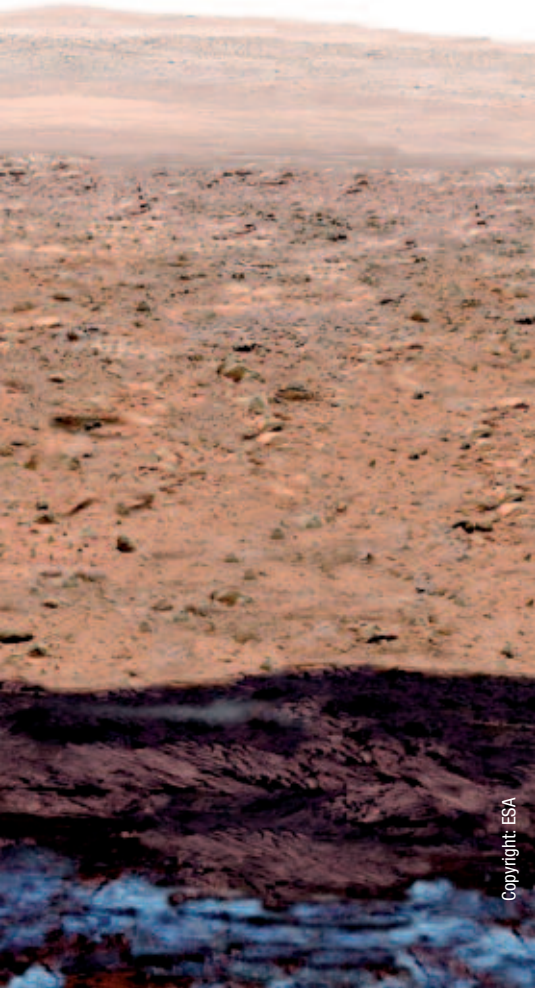
Exploring the red planet

Let's step back in to the past, to the end of 19th century. The *"canali"* (*channels*) observed by Giovanni Virginio Schiapparelli (an Italian Astronomer) referred to natural features on the Mars surface. A mistranslation of "*canali*" into *canals* gave rise to hypotheses and speculations about life on Mars. *Canals,* in fact, refers to artificial constructions, and this led many scientists to prove the existence of intelligent life on Mars.

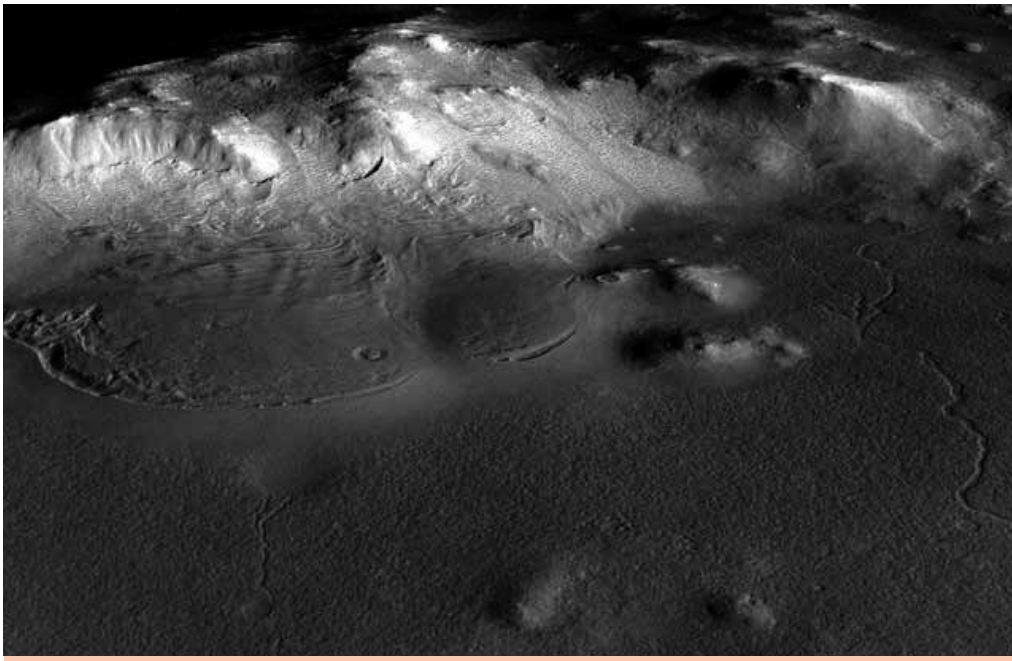
To determine wether life ever developed on Mars means to determine whether the Martian environment was ever suitable for life. On Earth, all forms of life need water to survive. It is likely, though not certain, that if life ever evolved on Mars, it did so in the presence of a long-standing supply of water.

Therefore, during the last decades Mars exploration programmes (Mars Global Surveyor, 2001 Mars Odyssey) have addressed the search for evidence of life in areas where liquid water was once stable, and below the surface where it still might exist today. Recent data suggest that liquid water may exist deep below the Martian surface as well as the ice water is present at the Martian poles. Further analysis of the great amount of data available will allow scientists to confirm those results.

Currently, an attention is focused on the ExoMars joint ESA/NASA Programme. ExoMars (Exo-biology on Mars) is in advanced design status and consists of two distinct missions. The first named "Trace Gas Orbiter Mission, will launched in 2016 and will carry also a demonstration lander. The Orbiter will conduct a survey of trace gases in the Mars atmosphere, in order to understand the nature of subsurface sources that produce gases, such as methane. The second mission, named ExoMars 2018, will be launched in 2018 (arriving in Mars 8 months later) and will release a rover vehicle on the Mars surface, equipped with several subsystems and scientific instruments selected to analyse the surface and sub-surface (up to 2 meters deep) samples. The rover will also collect and seal samples in canisters for future possible sample return mission.



ESA's ExoMars Rover provides key mission capabilities: surface mobility, subsurface drilling and automatic sample collection, processing, and distribution to instruments. It hosts a suite of instruments, known as the Pasteur payload, dedicated to exobiology and geochemistry research.
Depicts: ESA's ExoMars Rover



In this perspective view looking at the inside rim of Lyot Crater on Mars, a broad lobate debris apron (left) (thought to be a debris-covered glacier) is found amongst water-carved channels. The authors argue that these ice-rich units underwent melting in the relatively high-pressure environment provided by Lyot Crater, the deepest point in the northern hemisphere of Mars.

CREDIT: NASA/JPL/GSFC/Malin Space Science Systems

Follow the water

The exploration strategy adopted by NASA, and consequently by all the Agencies involved in Mars Exploration activities, can be summarised in the term "Follow the water". This approach begins with an understanding of the Mars environment in terms of soil and atmosphere features and its evolution. During the last decade, missions to Mars were mainly aimed at observing sub-surface water reserves, ice at the polar caps and particular soil samples related to presence of water in the past. Geological and climate evolution are the key topics to be investigated.

Fly-by missions

Missions to Mars during the 60's, were essentially fly-by missions, aimed at remote observation of the planet surface. The mariner missions belong to this class. In particular the Mars surface images from the Mariner-4 mission in 1965, analysed with other environment conditions (pressure, temperature, magnetic field) depicted a well defined scenario: there is no liquid water on the surface of mars.

These first results lead scientists to look for indirect evidence of water presence in the past. This means to perform observation by mean of orbiters and surface vehicles, equipped with instrumentation designed to detect soil sample features amenable to water presence.

Orbiter missions

Missions such as Mariner 8 and 9, and the Mars Reconnaissance Orbiter, are missions capable to insert of placing a satellite into Mars orbit in order to perform long term remote observations to detect water presence on the surface and sub-surface.

The Mars Express mission launched by ESA on 2003, had the objective of detecting the presence of sub-surface water presence. Its scientific payload included MARSIS *(the Mars Advanced Radar for Subsurface and Ionosphere Sounding)* developed in a NASA-ASI cooperation (by Prof. G. Picardi from "Università La Sapienza – Rome" as the Principal Investigator; and J. Plaut from NASA/JPL and R. Orosei from INAF). This sounding radar detected the ice deep under Martian surface (up to 5 Km). Moreover, the PFS *(Planetary Fourier Spectrometer)* on Mars Express detected the presence of ice on Mars polar cap (Prof. V. Formisano from INAF/IFSI is the Principal Investigator).

Instruments such as MARSIS and PFS revealed the presence of minerals related to water presence in a remote epoch.

Lander & Rover missions

Viking 1 and 2, Pathfinder, Polar Lander, Mars Exploration Rovers, Phoenix Mars Lander, are part of the missions that have released landers and rovers on the Mars surface to perform *in-situ* environment analysis. Phoenix Mars Lander, equipped with a set of instruments like a chemistry lab, detected water in sub-surface samples, which vaporized after their exposure to the air for some days.

Rover vehicles offer surface mobility and this opened new wide exploration scenarios to scientists, interacting with them from Earth. For ex-

ample, we can look for particular rocks and select them from Earth before undertaking sample analysis.

The Mars Exloration Rover mission, for example, released two rovers on the Mars surface. Both rovers operated from 2004 up to 2010. In particular, *Spirit* detected trace of carbonate in soil samples: this is an evidence that water and carbon dioxide interacted, in the past.

The next step

The future of Mars exploration missions will be aimed at returning Mars samples back to Earth and to investigate the sub-surface looking for the presence of water.

Mars sample return missions represents the natural step forward the exploration of Mars in order to have available Mars soil and atmosphere samples in a laboratory on Earth.

Exploring the deep Mars sub-surface could help scientists to better understand the geology of the planet, as well as to look for water presence that could answer the main question: was Mars ever a suitable habitat for life?

Italian contribution to Mars Exploration

Italy is strongly involved in Mars Exploration activities since 1990. The Italian Space Agency (ASI) supportted participation in Mars Missions in terms of both scientific and engineering contributions. Currently, Italy is one of the major contributors to the ExoMars mission. Firms involved include Thales Alenia Space, Kayser Italia, and Selex Galileo. The scientific community involved in Mars Exploration Programme includes INAF (National Institute for Astro-Physics) with several university departments, University of Rome "La Sapienza", International Research School for Planetary Science, University of Padua/CISAS and several department from the National Council of Research.

Lava likely made river-like channel on Mars

"Whether channels on Mars were formed by water or by lava has been debated for years and the outcome is thought to influence the likelihood of finding life there"

Written by:
Dr. Elizabeth Zubritsky, NASA Goddard Space Flight Center
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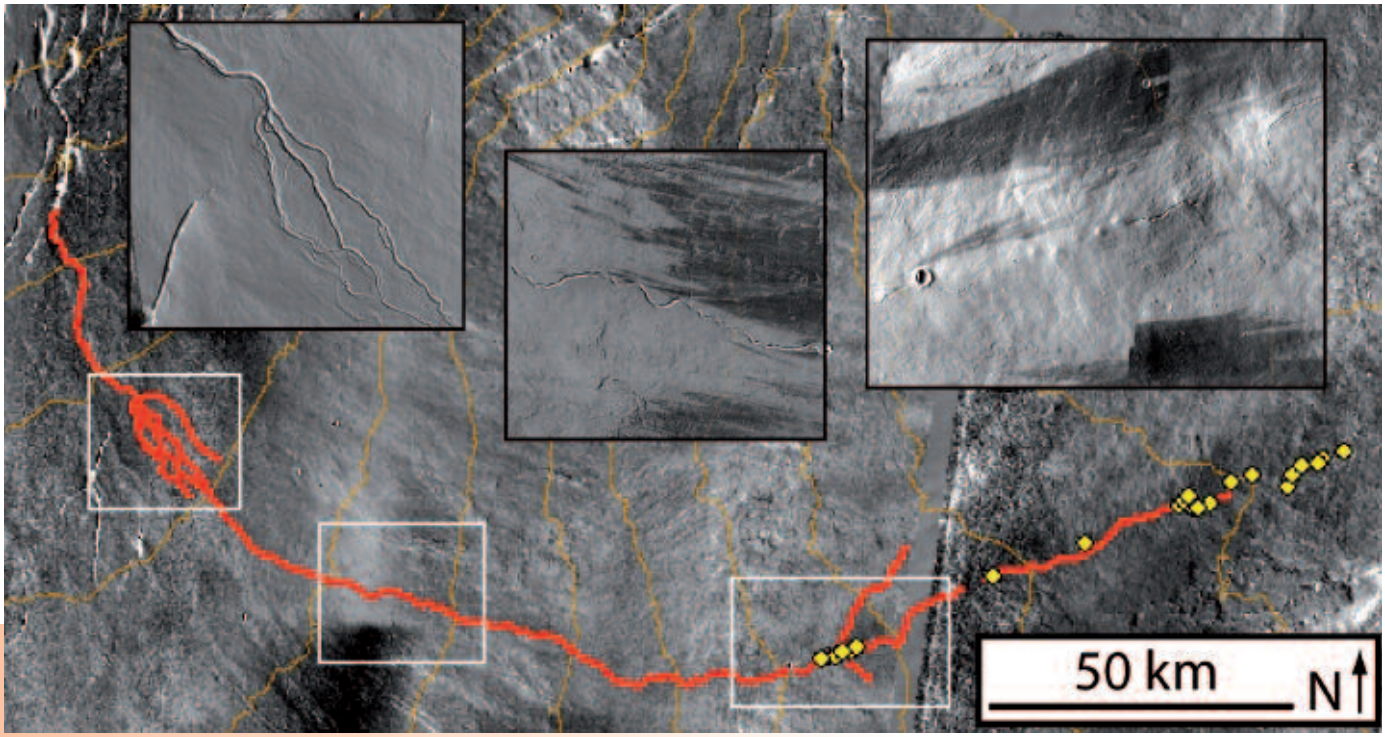
Dr. Elizabeth Zubritsky is a science writer working for ADNET Systems at NASA's Goddard Space Flight Center in Greenbelt, Maryland. An engineer and molecular biologist by training, her love of words led to her study journalism, as well. She has written and edited news about analytical chemistry, lab-on-a-chip systems, proteomics, and environmental science. At Goddard she specializes in planetary science, which ties together the elements of her wide-ranging background.

Flowing lava can carve or build paths very much like the riverbeds and canyons etched by water, and this probably explains at least one of the meandering channels on the surface of Mars. These results were presented this morning at the 41st Lunar and Planetary Science Conference by Jacob Bleacher at NASA's Goddard Space Flight Center, Greenbelt, Md. Whether channels on Mars were formed by water or by lava has been debated for years, and the outcome is thought to influence the likelihood of finding life there.

"To understand if life, as we know it, ever existed on Mars, we need to understand where water is or was," says Bleacher. Geologists think the water currently on the surface of Mars is either held in the soil or takes the form of ice at the planet's north and south poles. But some researchers contend that water flowed or pooled on the surface sometime in the past; water in this form is thought to increase the chance of some form of past or present life.

One of the lines of support for the idea that water once flowed on Mars comes from images that reveal details resembling the erosion of soil by water: terracing of channel walls, formation of small islands in a channel, hanging channels that dead-end and braided channels that branch off and then reconnect to the main branch. "These are thought to be clear evidence of fluvial [water-based] erosion on Mars," Bleacher says. Lava is generally not thought to be able to create such finely crafted features.

Bleacher and his colleagues carried out a careful study of a single channel on the southwest flank of Mars' Ascraeus Mons, one of the three Tharsis Montes volcanoes. The researchers relied on detailed images from three cameras: the Thermal Emission Imaging System (THEMIS), the Context Imager (CTX) and the High/Super Resolution Stereo Color (HRSC) imager, as well as earlier data from the Mars Orbiter Laser Altimeter (MOLA). From these images, the team pieced together more than



Details from the Ascraeus channel (red), meandering across the surface of Mars. The insets in the black boxes show close-ups of some of the structures that lava can form: (left) branched channels, (middle) a snaking channel and (right) rootless vents; the rootless vents are also marked by yellow spots on the main image. Credit: Jacob Bleacher, NASA Goddard Space Flight Center

270 kilometers (~168 miles) of the channel.

At the source of the channel, the visual clues seem to point to water. But at the channel's other end, an area not clearly seen before, Bleacher and colleagues, including Andy de Wet of Franklin & Marshall College, Lancaster, Penn., found a ridge that appears to have lava flows coming out of it. In some areas, "the channel is actually roofed over, as if it were a lava tube, and lined up along this, we see several rootless vents," or openings where lava is forced out of the tube and creates small structures, he explains. These types of features don't form in water-carved channels, he notes.

Bleacher argues that having one end of the channel formed by water and the other end by lava is an "exotic" combination. More likely, he says, the entire channel was formed by lava.

Evidence that lava can produce finely detailed features came from a survey by Bleacher, along with W. Brent Garry and Jim Zimbelman of the Smithsonian Institution in Washington, of the 51-kilometer (32 mile) lava flow from the 1859 eruption of Mauna Loa on Hawaii. Their main focus was an island nearly a kilometer long in the middle of the channel.

"We found terraced walls on the insides of these channels, channels that go out and just disappear, channels that cut back into the main one, and vertical walls 9 meters (~29 feet) high," Bleacher says. "So, right here, in something that we know was formed only by flowing lava, we found most of the features that were considered to be diagnostic of water-carved channels on Mars."

Further evidence came from the examination of a detailed image of the Mare Imbrium, a dark patch on the moon that is actually a large crater filled with ancient lava rock. Here, too, the researchers found channels with terraced walls and branching secondary channels.

Bleacher says the team's conclusions do not rule out the possibility of flowing water on Mars, nor of the existence of other channels carved by water. Even so, he adds, the findings have implications for the geological evolution of this volcanic region of Mars and could ultimately change our ideas about water's role in the geological evolution of Mars.

Philip Christensen of Arizona State University is the principal investigator for the THEMIS instrument on the Mars Odyssey orbiter, and Mike Malin of Malin Space Science Systems is the principal investigator for the CTX instrument aboard the Mars Reconnaissance Orbiter. Both missions are managed by NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif. MOLA was aboard the Mars Global Surveyor, built by JPL.

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2011 HONORARY MEMBER

Prof. Pierre-Louis Viollet
"In recognition of his outstanding achievements in the field of fluid mechanics,hydraulics, and the history of hydraulics, and his devoted service to IAHR"

BPierre-Louis Viollet was graduated in 1974 from Ecole Nationale des Ponts et Chaussées (Paris), and further prepared untill 1977 a doctoral thesis at Paris 6 University on the prevision of the length of cooling tower plumes. He has been working with EDF R&D since october 1977, first as a research engineer in charge of turbulence modelling for stratified flows, CFD development and studies in nuclear reactor thermal-hydraulics. He was group leader on industrial fluid mechanics, then head of the R&D Laboratory of EDF on Hydraulics and Fluid Mechanics in Chatou (LNH). He moved in 1994 to a managerial position as deputy director of the Generation Plants Department of EDF R&D, then as Director of the Power Systems Department. In 2001 he was nominated as Vice-President for R&D Laboratories, and from 2006 to 2010 has been acting as Vice-President for R&D Coordination and Partnership of EDF R&D. Since July 2010 he has been Vice-President in charge of International development and Partnership of EDF R&D. He has supervised the creation of 11 common laboratories involving EDF R&D and French academic partners, as well as a common institute with the University of Karslruhe (Germany) - the European Institute for Energy Research. P.-L. Viollet has been for many years, as a part-time occupation resigned in 2007, Professor of Applied Fluid Mechanics as Ecole Nationale des Ponts et Chaussées (Paris), where he has been nominated since 2008 as Honorary Professor, and Scientific Committee Member. He wrote three tutorial books in fluid mechanics as well as two books on the history of water and fluid technologies. He has been since the beginning of his carrier a member of IAHR, and he occupied the positions of Division chairman and Council member. P.-L. Viollet is chairman of the scientific committee of "Société Hydrotechnique de France". He has been for three years member of the Technical Committee of the Energy Technologies Institute (UK). He is a member of the Engineering and Physical Sciences Research Council of UK, and of the Energy Committee of the "Agence Nationale de la Recherche" (France).

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Prof. Giampaolo Di Silvio

"In recognition of his outstanding achievements in the field of fluvial hydraulics and sediment research, his devoted service to IAHR and, in particular, as Chair of the IAHR Biennial World Congress in Venice, 2007"

Full Professor of Hydraulics, University of Padua, Italy, since 1976, he has been Director of the Department of Hydraulic, Maritime, Environmental and Geotechnical Engineering (IMAGE) from 1996 till 2002.

Author of more than 100 papers, in the last years he has mostly worked in the field of fluvial and coastal hydraulics, with special emphasis on large-scale morphological effects of human interventions and climatic change.
Committee member of the Fluvial Hydraulics Section of the IAHR (Int. Ass. for Hydraulics Research), which has chaired from 1991 to 1995; he also chaired the IAHR's Division of Geophysical Hydraulics from 1995 to 1999. He has organized the 32nd Congress of IAHR in Venice in 2007.
Vice-president of the World Association for Sedimentation and Erosion Research (WASER) and then President since 2010.
Member of the Italian delegation in the UNESCO's International Hydrological Programme (IHP), he is a member of the Steering Committee of the Unesco's ISI (International Initiative on Sedimentation)
He has frequently served as referee for the Journal of Hydraulic Research, the International Journal of Sedimentation, the Journal of Hydraulic Engineering, the Continental Shelf Research and several other periodicals.
He has been lecturer and advisor for post-graduate students in Italy and other countries.
Consultant of engineering firms he has taken part in several projects of hydraulic works and water resources management in Italy, very often regarding the defence of Venice and its lagoon, and abroad. He has also consulted in various developing countries as Nigeria, Burkina Faso, Senegal, Somalia and Venezuela.

Prof. Ramón Fuentes

"In recognition of his outstanding achievements in many fields of hydraulics both in his own country and internationally, his devoted service to IAHR and, in particular, for his long-standing support to the Latin American Division of IAHR as Secretary"

Prof. Fuentes was Secretary of the Latin American Division of IAHR during the period 1978-2006. In this role he strongly influenced for three decades, Latin American researchers and engineers in participating and organising the regular Latin America Division biennial congresses -15 during his term - which in the most recent editions received more than 400 technical contributions and have attracted up to 500 delegates. He is a Civil Engineer, graduated from the Universidad de Chile (1964), Hydraulic Engineer (1967) and with a Doctor in Physics from the University of Grenoble (1969). He was a founder member of the Hydraulic Engineering Society of Chile and Member of the first Board of Directors. He was a researcher and Head of the Hydraulics Laboratory at Universidad de Chile (1964-1975), of the National Hydraulic Laboratory of Venezuela (1976-1988), and of the Fluid Dynamics group at the Center for Mining and Metallurgical Research in Chile (1971-1975). He has delivered lectures, training and postgraduate courses in Chile, Argentina, Uruguay, Venezuela, Costa Rica, Cuba, Peru, Brazil, Zaire, Niger and India. He has also been a consultant in problems related to the mining industry, and has carried out spillway investigations and fluvial hydraulics projects in several countries.

The scientific fields of hydraulic science where Prof. Fuentes made significant contributions (expressed in more than 150 published papers and several books) cover a wide spectrum from fundamental fluid mechanics, the physical and mathematical modeling of hydraulic phenomena, sediment transport and the application of hydraulics to the mining industry.

In addition to his long-standing position as Secretary of the IAHR LAD, his commitment to IAHR is more than evident, he served as Section Member of the Experimental Methods and Fluid Mechanics (1979-1985), Fluvial Hydraulics (1983-1987), Council Member (1980-1984) and, member of the Committee which led to changing the structure of the IAHR (1984-1987).

In 2000 he was awarded the Chilean Ministry of Mines Alexander Sutulov Award.

The merits of Prof. Fuentes are recognized by the whole community of our Association, as a brilliant researcher, an outstanding professor and a great promoter of IAHR-LAD activities over several decades. He has also been involved in the mentoring and career guidance of successful hydraulic researchers and engineers of most Latin American countries.

3rd M. SELIM YALIN LIFETIME ACHIEVEMENT AWARD

Prof. Ian Ruthven Wood

"For outstanding contributions in the field of hydraulic engineering and especially in the experimental research of hydraulic structures, as well as his special skills in the teaching and supervision of graduate students from around the world."

Prof. Wood is Emeritus Professor of Civil Engineering at the University of Canterbury. F.I.P.E. (NZ), F.R.S. (NZ) F.A.F.S. His first degree was BE Honours, University of New Zealand, (1954) followed by an ME in Hydrology, (1958) and PhD in Fluid Mechanics, (1966) from the University of New South Wales. Initially he worked for the Commonwealth Department of Works, Canberra, with a team engaged in the detailed hydrologic and hydraulic design of two dams but then became an academic with appointments at the University of New South Wales and at the University of Canterbury, New Zealand. He has had two study leaves at the Department of Applied Mathematics and Theoretical Physics and he had a leave to take up a one year research appointment as Mary Shepard Upson Distinguished Visiting Professor at Cornell University, U.S.A. He authored or co-authored with his students over 70 papers in International Journals and Conference Proceedings and he has contributed and edited two texts Air Entrainment in Free-Surface Flows – Hydraulic Structures Design Manual and Ocean Disposal of Wastewater. He has given many invited lectures and gave the American Society of Civil Engineers Hunter Rouse Hydraulic Engineering Lecture in Baltimore (August 1992).

At Canterbury he has been engaged as a Consultant by various firms in New Zealand and overseas. He has been an Expert Witness on a number of occasions and on several Water Rights Tribunals. interests of early-stage researchers in this way.

17th ARTHUR IPPEN AWARD

Prof. Xavier Sánchez-Vila
FDepartment of Geotechnical Engineering and Geosciences
Technical University of Catalonia
Spain

"For outstanding contributions in the field of groundwater flow and contaminant transport with application to flow modeling in heterogeneous porous media."

Prof. Xavier Sanchez-Vila was born in 1963 and was awarded his PhD in 1995. Since this date, he has established himself over the past 15 years as a leader in the field of groundwater flow and contaminant transport with more than 42 articles in highly-rated ISI journals and numerous conference proceedings and presentations. The impact of his research is evident through his H-Index of 12 and more than 500 citations to his work. A common theme to most of his research work is the application of advanced mathematical tools to groundwater problems. In one of his most important contribution to-date he proposes innovative approaches for the interpretation of pump tests (WRR, 34(5), 1998; WRR 35(4), 1999). In these paradigm-changing papers, he showed how conventional testing methods, devised for homogeneous aquifers, could be employed for heterogeneous media. He authored a highly-cited review paper on the topic (Rev. Geophy, 2006). He also developed novel approaches for the modeling of reactive transport in soils (WRR, 39(4), 2003; WRR, 43(7), 2007) and variable-density flows (JFM, 2006). He has won several awards in recognition of his outstanding research and teaching (such as the 2001 Water award) and numerous research grants from both EU and Spanish sources. He has been a guest speaker at a number of scientific meetings. The high level of his international collaborators and external partnerships further attests to the high quality of his research. His current outstanding achievements hold great promise for an equally successful future.
Prof. Sanchez-Vila has taught numerous courses both at the graduate and undergraduate level at the UPC and as a guest lecturer at European and South American Universities. He has successfully supervised more than 50 Master and undergraduate students and 10 PhD students, many of whom have become well-established names in the field. He is well-liked and respected by both students and colleagues as evidenced for example by his recent election as Director of the Department of Geotechnical Engineering and Geosciences at UPC which includes around 80 full-time faculty members and researchers. Prof. Sanchez-Vila is a respected authority in the field of groundwater resource management in Spain and has engaged in a number of professional and governmental debates. He has also served since 2007 as Director of the International Groundwater Hydrology Course (CIHS). The course, in the 45th edition, aims at giving sound theoretical and practical basis to the Spanish speaking professional community.

Prof. Sanchez-Vila is Vice-Chair of the IAHR Groundwater Hydraulics and Management Committee. He will assume the Chair position of the Committee LT starting in 2011. He is a regular contributor to the IAHR International Groundwater Symposium. He served as president of the IAH Spanish Group. He is/was also on the editorial board of several prestigious journals including: Applied Hydrogeology, Hydrogeology Journal, Mathematical Geology, Advances in Water Resources, and Water Resources Research.

17th HAROLD J. SCHOEMAKER AWARD

Umesh C. Kothyari, *Department of Civil Engineering, Indian Institute of Technology, Roorkee, India.*

Haruyuki Hashimoto, *Department of Civil Engineering, Kyushu University, Japan.*

Kenjirou Hayashi, *Department of Civil and Environmental Engineering, National Defense Academy of Japan, Yokosuka,Japan.*

For the most outstanding paper entitled "Effect of tall vegetation on sediment transport by channel flows" published in the Journal of Hydraulic Research during the period January 2009-December 2010

JOURNAL OF HYDRAULIC RESEARCH BEST REVIEWER AWARD

The Award for the period 2009-2010 was presented by JHR Editor Prof. Willi Hager to:

Prof. Fabian Bombardelli, *University of California Davis, USA*

Dr. Benoît Spinewine, *Université catholique de Louvain, Louvain-la-Neuve, Belgium*

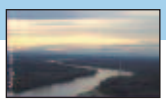
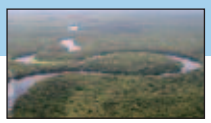
Dr. Michael Tritthart, *Universität BoKu, Vienna, Austria*

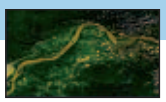
JOHN F. KENNEDY STUDENT PAPER COMPETITION

Fereshteh Bagherimiyab
For the paper entitled: Coherent structure and particle turbulence interaction in suspended sediment-laden laboratory open-channel flows

Peter Brady
For the paper entitled: A Novel ILES/VOF solver for the simulation of turbulent free surface flows

The "International Conference on the Status and Future of the World's Large Rivers", initiated and organised by Prof. Helmut Habersack from the University of Natural Resources and Life Sciences, Vienna Austria, and Prof. Des Walling from the University of Exeter, UK, took place from 11th to 14th of April 2011 at the Vienna Austria Center and gathered more than 450 scientists and practioneers from all over the world. Besides attractive scientific sessions, interesting technical tours and charming social events, the Vienna Declaration, which aims to further intensify research and cooperation on large rivers, has been adopted by the participants.




VIENNA DECLARATION
ON THE STATUS AND FUTURE OF THE WORLD'S LARGE RIVERS

Vienna, 13th of April, 2011

PREAMBLE

Rivers provide mankind with key benefits, such as water supply, food, hydropower, navigation, irrigation, ecosystem services and recreation. They are fundamental to life and frequently possess major cultural significance. However, they are currently threatened by unsustainable "overuse", increasing human pressure on their catchments and problems of increased floods and droughts driven by climate change, leading to changes in morphology, increased pollution, degradation of aquatic habitats, extinction of fish species etc. All these changes impact negatively on the many benefits of rivers to mankind and their continuing contribution to human needs.

To provide a scientific forum to discuss these benefits and threats, the first International Conference on the Status and Future of the World's Large Rivers (WLRs) was held in Vienna, Austria, from the 11th to the 14th of April 2011, supported by UNESCO, IAHR, IAHS, WASER and IAG. Over 450 conference participants, coming from 73 nations and representing all continents, large rivers and relevant thematic fields, contributed to the success of the event.

The following declaration was debated and adopted by the participants during the conference.

DECLARATION

The participants of the *International Conference on the Status and Future of the World's Large Rivers* declare the following:

Current Challenges

- The pressures and impacts on the WLRs, including their basins and tributaries, have increased greatly in recent years. As a consequence of their exploitation to meet human needs and the impact of global change, WLRs are severely endangered, and there is an urgent need for action.
- Large rivers are particularly exposed to the impacts of multiple use, often with conflicting aims, leading, for example, to disruption of the continuum of water and sediment transfer from source to mouth.
- At the global scale, there is currently no holistic assessment of the present status of WLRs, the conflicting demands on such rivers, their likely future response to climate change and other anthropogenic impacts and the potential for restoration.
- There is no existing international regulatory mechanism for protecting the few remaining near natural WLRs.

Future Needs

- Analysis of the current status, conflicting demands and the future development of WLRs, including the impact of medium and long-term climate change.
- Formation of a global forum to facilitate wide-ranging informed discussion of key issues related to research on, and management of, large rivers.
- Promoting the preservation of the remaining near natural WLRs ("red list") and the sustainable management or rehabilitation of impacted WLRs, including knowledge transfer to decision makers and the population.

http://worldslargerivers.boku.ac.at

Integrated Management of the World's Large Rivers and their basins

- Maintain or restore/rehabilitate (in a dynamic, spatial and temporal context) WLR basic functions, including biodiversity and ecosystem services, recognising the individuality of rivers.
- Avoid single□aim infrastructure development projects and strategies.
- Aim for win□win solutions combining ecological functionality (based on EIA) and economic use.
- Implement IWRM in a long□term context, taking account of the potential impact of climate change on WLRs.
- Integrate use, protection and restoration of WLRs (including upstream□downstream interactions).
- Sustain or improve river type□specific hydrological and hydraulic conditions.
- Preserve or restore the continuum of biota and sediment and sustain or improve sediment transport and fluvial morphodynamics, to achieve (close to) natural conditions.
- Establish and fulfil water quality objectives, recognising the individuality and specific conditions of each river.
- Collect and freely exchange data for transboundary rivers, based on common standards and accuracy.
- Assess future trends of river hydro□morpho□ecodynamics; develop and test mitigation strategies.

Action plan

Creation of a global overview of the status and future of WLRs

Based on the contributions to the conference, a UNESCO□led and internationally□funded (e.g. World Bank) medium□term project, undertaken in collaboration with UNEP, UNDP, FAO, WHO, ADB, etc., should assemble and analyse existing data (free access) and knowledge on the status and future of WLRs, including evaluation of potential future infrastructure projects, their impact on WLRs and possible mitigation strategies.

Closing of knowledge gaps, knowledge transfer and a Global Observatory of WLRs

In a concerted action, the research required to close knowledge gaps relating to WLRs should be identified and promoted. Particular attention should be given to knowledge transfer to next generation scientists, stakeholders, decision makers, children (education) and the general public. A global observatory should be formed to document changes (including climate change effects) occurring in WLRs.

Collaborative International Action Plan to focus on WLR research and management

In a joint memorandum, international scientific bodies and associations (e.g. UNESCO, IAHR, IAHS, WASER, IAG, etc.) should formulate an action plan on WLR research and management as well as sponsor future WLR conferences.

World River Forum, World Rivers Day and WLR Commission Meetings

A World River Forum should be established to bring together scientists, stakeholders and decision makers, in order to promote and improve integrated management of WLRs. The UN World Rivers Day should be scientifically supported. The WLR Commissions (responsible for sustainable river management) should meet regularly to exchange experiences, define common standards on integrated management and debate future needs.

Future Conferences on the World's Large Rivers

A Conference on the Status and Future of WLRs should be held every three years, with the aim of expanding and disseminating scientific knowledge relating to WLRs.

MOVING AHEAD

In order to improve the situation and reduce the threats to the World's Large Rivers the proposed actions should be implemented in the years 2011 to 2014, so that during the next WLR conference, to be held in Manaus, Amazonas, Brazil in 2014, ongoing activities can be evaluated and further initiatives planned.

The Vienna Declaration recommends that a collaborative and multidisciplinary international initiative is required to create the basis for a holistic, global scientific assessment of the status of the World's Large Rivers and to promote urgently needed improved, integrated and sustainable management of WLRs and their surrounding landscapes and basins.

http://worldslargerivers.boku.ac.at

Welcome to our new President!

Roger A. Falconer,
Halcrow Professor of Water Management
Cardiff School of Engineering, Cardiff University
FalconerRA@cf.ac.uk

I was delighted and honoured to have been elected President of IAHR at the recent 34th World Congress in Brisbane. I am grateful to all members who participated in the election process, and in particular, I pay tribute to Professor Aronne Armanini, who contested the election for president with dignity. Sadly, in any election, there can only be one successful candidate, but I would like to acknowledge Aronne's enormous contribution to IAHR over many years; in Council, the European Region and section committees. I hope that the Association can continue to benefit from his considerable experience in the future.

On behalf of IAHR, I would also like to express our appreciation for the enormous dedication to the Association of outgoing President, Professor Nobuyuki Tamai, and the two Vice Presidents, Professors Joseph Lee and Peter Goodwin. Professor Tamai has worked tirelessly for IAHR in his role as President and he is going to be a very difficult President to follow. IAHR has undergone many changes over the past four years under Professor Tamai's presidency and there is much to develop for the future. I would like to thank all the outgoing Council for their valuable contribution to the Association over the past two years, or more, and would like to take this opportunity to welcome the new incoming Executive and Committee members to the Council. I very much look forward to working with the new team in building on the future for IAHR in difficult times.

Finally, I would like to thank Professor Willi Hager for his work as Editor of the Journal of Hydraulic Research who retires after 5 years at the helm, culminating in the excellent recent news that the Impact Factor has exceeded 1 for 2010. I welcome Professor Vlad Nikora as the new Editor of JHR and I am confident that this augers well for the journal for the future. A special thanks also to Professor Paul Bates, who I know from personal experience working with him on the Journal of River Basin Management, has put an enormous amount of work into this journal for IAHR. I am confident that this journal will soon have ISI- recognition under the management of Taylor and Francis, thereby broadening the appeal of IAHR to a wider cohort of hydro-environment engineers and researchers.

With regard to aspects of my vision for IAHR, I believe that our Association faces some difficult times ahead; there are more specialist conferences than ever before and with the remains of the recession and international travel becoming more expensive and travel grants becoming more restrictive, there is likely to be increasing pressure in the future on members to attend more regional, rather than international, conferences etc. This may have been the reason why the otherwise successful Brisbane Congress, had less than 300 IAHR members amongst the more than 800 delegates believe that we need to maintain our flagship journal (JHR) as a highly specialist journal, and key member benefit; but at the same time we need to have an outlet for more applied water engineering and research papers etc., where interesting and informative case studies are published and where practitioners, consultants and government agencies have an opportunity to promote some of their excellent projects - albeit that the work published may not be in itself state-of-the-art. With this in mind I have already instigated discussions about a new journal, which will be aimed at attracting more case studies and applied projects, particularly of a shorter and more practical nature. I also believe that IAHR needs to link our research activities and themes as best we can to high profile"big picture" topics, such as Global Water Security. Angelos Fingikakis - one of our Council Members - and I will be writing articles on this topic in the next issue of Hydro-Link.

I look forward to my term of office as President of IAHR and see increased links with industry and practitioners, government agencies and other water stakeholder associations as being a prime goal of my presidency, as well as maintaining the high quality and reputation of our traditional research base.

New IAHR Vice-President Prof. Dr. Zhao-Yin Wang receives ASCE's Hans Albert Einstein Award

Professor Zhao-Yin Wang, from the Tsinghua University, Beijing, China, receives the 2011 Hans Albert Einstein Award of the American Society of Civil Engineers during the World Environmental and Water Resources Congress in Palm Springs on May 26, 2011.

The award citation to Dr. Zhao-yin Wang reads: "For his unique contributions to understanding of hyperconcentrated flows, debris flows, watershed vegetation-erosion dynamics, stream ecology and restorations, and integrated river basin management." In selecting Dr. Wang for this award the committee particularly noted his significant advances that are currently being used to address complex environmental erosion and sedimentation problems in China and all over the world. The Hans Albert Einstein Award is given to a scholar who has made a significant contribution to the engineering profession in the area of erosion control, sedimentation and/or waterway development either in teaching, research, planning, design or management.

New networking action in the Middle East and North Africa!

IAHR has established a new committee for the Middle East and North Africa to provide an important new impetus for scientific and engineering collaboration within the Middle-East North Africa region with the backing and credibility of IAHR and at the same time connect scientists and professionals from the region with their colleagues throughout the world! Quoting new Committee Chair Prof. Mahad Said Baawain from Oman "Many countries in this region are investing heavily in tertiary education and scientific innovation, and our new Committee will help co-ordinate our new activites. The Arabian Coast Conference which was held here in Sultan Qaboos University last November attracted over 200 scientists and engineers, and this committee will help in organising future events of this kind".

The Committee includes:

Chair

Prof. Mahad Said Baawain
msab@squ.edu.om
Sultan Qaboos University
Sultanate of Oman

Vice chair

Dr. Mohamed Al-Rashed
mrashed@kisr.edu.kw
KISR, Kuwait

More information:
https://sites.google.com/site/menacollaborationcommittee/

Secretary General

Dr. Khaled Al-Banaa
KISR, Kuwait

Members:

Prof. Farhad Yazdandoost
K.N. Toosi University of Technology
Iran

Dr. Abdin Saleh
Retired Chair of the UNESCO IHP
Sudan

Dr. Ahmed Al-Salaymeh
University of Jordan
Jordan

Dr. Waleed Al-Zubari
Arabian Gulf University
Bahrain

Dr. Abdulaziz Al-Turbak
King Saud University
Saudi Arabia

Dr. Dalila Loudyi
University Hassan II
Mohammedia - Casablanca
Morocco

Dr. Mutasem El-Fadel
Professor and Director, Water Resources Center
Dar Al-Handasah (Shair & Partners) Chair in Engineering
Department of Civil and Environmental Engineering
American University of Beirut
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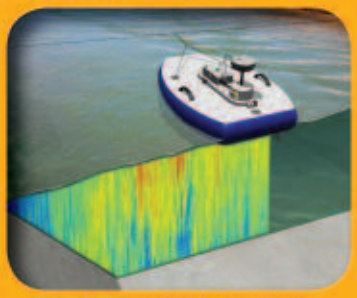

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