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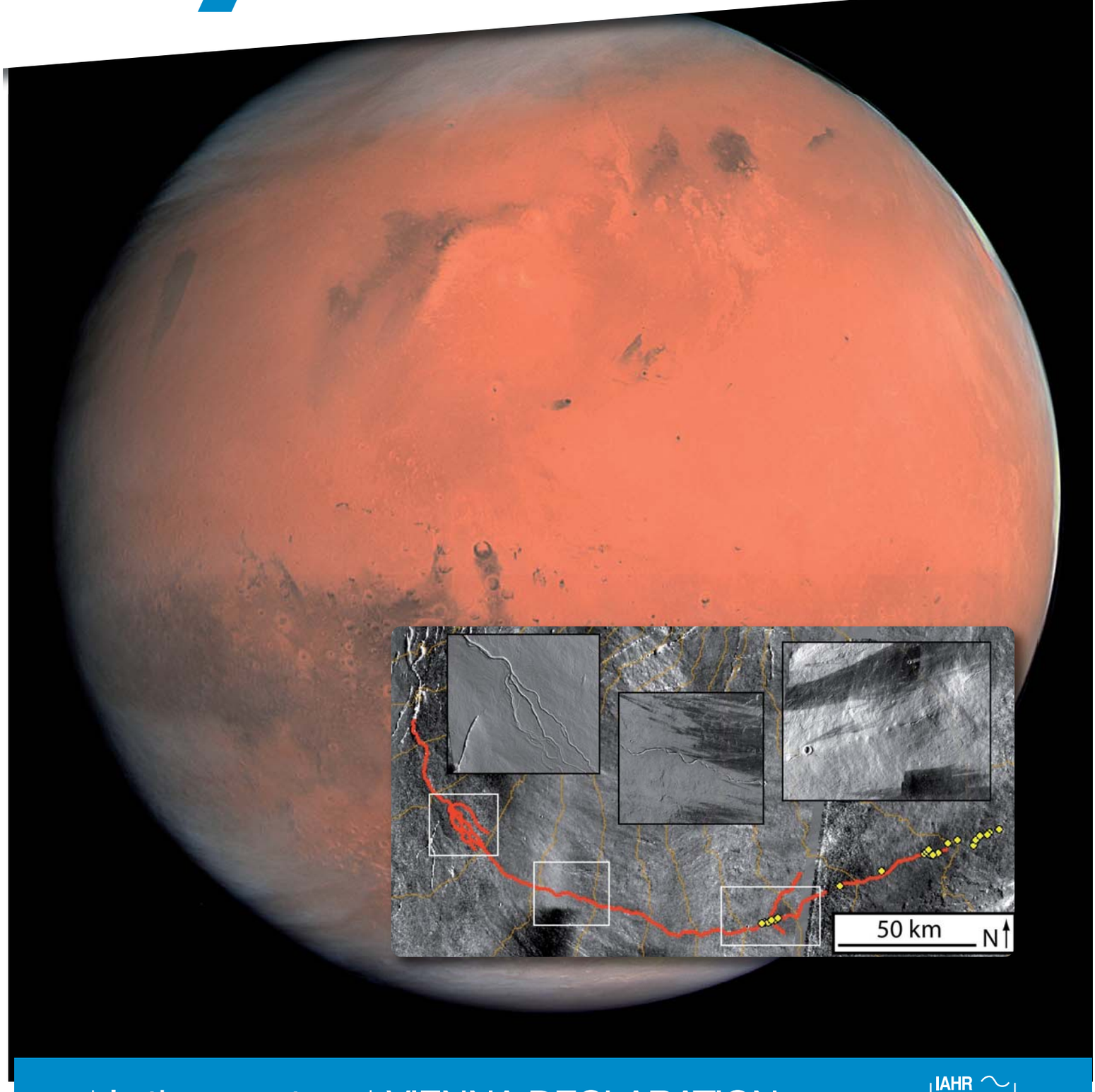

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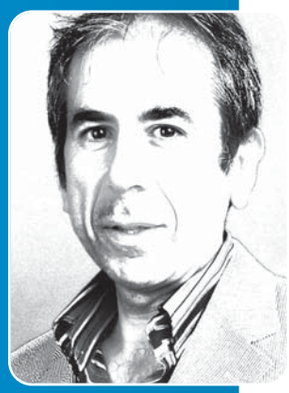

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The explosive mixture of water and the spirit of discovery

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.