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The Mars Beneath the Waves

By Robert B. Gagosian

As an oceanographer, I confess that when I want a break from the blitz of election reporting, I point my Web browser to NASA to check that, 35 million miles from any primary or caucus, Opportunity is still sending pictures from a peaceful, still world.

When I look at the rover's photographs of the Martian surface, I feel pride and awe at the engineering feat of visiting another world. I feel humbled by the sense of infinite time. And I feel the same excitement of discovery that I felt in dives in the submersible Alvin, when I saw at the bottom of the sea what no other human had ever seen before.

I also feel a nagging frustration -- like that of a father whose son has just decided to go to the Himalayas to "find himself" when he can't find his socks in his own dresser drawer. Not that he won't learn something in the mountains, but I wish he could see that frontiers at home are also worthy of his devotion. They are frontiers he will need to confront sooner or later.

Which brings me to oceanography. Except for the fact that one looks up and the other looks down, oceanographers are basically space explorers who get wet. Both work in terrifically hostile environments. Both go where no one has gone before. Both seek to understand nature and spin off technologies and discoveries that benefit society. Both get most of their support from public funds. The big difference is that oceanographers work where they live -- on a planet that is 70 percent water, which is the wellspring of our survival.

Why is oceanography a valuable pursuit?

Despite 100 years of ship-based ocean science, less than 5 percent of the ocean floor has been explored. Our biologists discover new species practically every time they go to sea. Our knowledge of the oceans is still characterized mainly by what we don't know. Today we have an unprecedented chance to change this.

Miniaturization of sensors and telemetry technology has created a new generation of ocean observatories that enable us to learn more at less cost. We needn't rely only on ships for exploration. Flotillas of battery- and solar-powered observatories, some as small as a soccer ball, can report back measurements 24 hours a day from anywhere on Earth, regardless of weather. Some are anchored in place or flow with ocean currents; some are autonomous robots that swim on a programmed path for months at a time; some are installed on the sea floor, some on the coast, some at the sea surface and some part way down in "mid water."

We are in a new age of oceanography, one in which giving the ocean its own instrumentation has become an economic and technical possibility.

The cost of building a network of hundreds of sensors to wire the oceans: about \$1 billion over 10 years, a little more than the cost of the two Mars rovers.

What's the payback?

The oceans affect climate and weather, and thus the human condition, around the world. Ocean observatories can reveal conditions that affect fisheries, shifts in weather and long-term climate change. They can illuminate the migratory patterns of marine mammals, the reasons for drought or floods, and the fate and long-term effects of pollutants. They can detect in real time tsunamis, undersea earthquakes, volcanoes and extreme weather at sea, improving prediction of their devastating effects at sea and ashore. Figures we have come up with show that better predictions of ocean conditions could produce \$1 billion in annual savings from better mitigation or prevention of damages.

When Henry David Thoreau wrote in "Walden" that "in wildness is the preservation of the world," he probably meant that we have a spiritual need for untamed territory. We also have a need to understand the unknown. Indeed, our survival may lie in the uncharted, watery frontiers of our own planet.

Oceanographers try to understand the water wilderness that covers most of our planet, which generates most of the oxygen on Earth, controls our climate and makes Earth habitable. They convey what they learn so that we all may help in the preservation of our world.

I encourage us to follow in the footsteps of Thoreau, a great homebody who realized that the answers to who we are and what we need to know are hidden in our own backyard.

The writer is president and director of the Woods Hole Oceanographic Institution.

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