

Curiosity Rover launches new wave of space exploration

By RICHARD ONG

Editor-in-Chief

On Aug. 6 2012, NASA's Curiosity rover landed at Gale Crater and began to take unprecedented data on the organic history of Mars. Two years later, the rover has reached its original target, Mount Sharp, an 18,000 ft peak in the center of the crater, and what was originally the focus of the mission.

Curiosity rover has taken data on the Red Planet like never before on its 5.5 mile, trek through the Martian foothills of Aeolis Mons. Curiosity has been redirected so many times its zigzagging path is as convoluted as the surface it rides on. The reason for this is to avoid damaging its tires on sharp rocks and to meander around the doldrums of loose sand that pockmark the planet's surface.

Now, NASA has evidence ancient freshwater lakes containing amino acids in what is now Yellowknife bay. Now, the most important and final data collection it will undergo is about to begin.

Mount Sharp is a unique geological feature. A peak as tall as Mt. McKinley, it was carved over millions of years, causing its cliffs to lay bare Mars' geological history.

With its three cameras, X-ray and laser spectrometers, rock sampler and easy bake over, the rover will take geological, biological and climatological data from the mountain, enriching humanity's view of Mars like never before.

This coincides with NASA's Mars Atmosphere

Volatile Evolution mission, nicknamed MAVEN, entering Martian orbit on Sept. 21, after \$671 million and 10 months of travelling. MAVEN examines the rate of light gases escaping the Martian atmosphere, allowing scientists to project backwards and build models of the ancient Martian atmosphere.

Not all is said and done however, because 50% of all Mars bound craft have malfunctioned. Space around Mars is becoming crowded, with NASA operating two orbiters, two rovers, and the European Space Agency already has one orbiter. But a new wave of nations and private investors will be challenging that statistic in the coming decades, because everybody who is anybody in the space game is looking to put robot probes on Mars.

The reasons for this are twofold. Firstly, to answer the question 'Could Mars ever have supported life?' and secondly, because the technology for the robotic exploration of space has become cheaper, easier and available to more countries.

So far the list of countries exploring Mars is an exclusive one, consisting U.S., Russia, and the European Space Agency. However India will be joining the list this September, by putting the Mars Orbiter Mission, or MOM, into orbit around Mars, for the price of \$73 million.

MOM was built entirely in India and will use its cameras, atmospheric gas sensors, and surface spectrometers to analyze the Martian

atmosphere.

This is the beginning of a new wave of Martian exploration, with NASA's Insight Lander and Europe's ExoMars Trace Gas orbiter arriving on the Red Planet in 2016. The Insight Lander is NASA's first attempt to study the thermoseismological data of Mars.

scientific instruments.

However, after 2020, Mars' orbit moves out of optimum sync with Earth's, astronomically increasing the energy required to fly there. This is leading space agencies to develop more brawny rockets, such as SpaceX's Falcon 9 and Dragon V2, the latter of which is the horse

Russia and China are both looking for heavy lifting rockets, such as the ones NASA recently contracted from SpaceX and Boeing. The two nations are on track to join the list of nations with Mars rovers by 2020. Japan looks to have a rover on Mars by 2030, making it one of the less ambitious nations.

America's future in space is a different story entirely.

Currently light years ahead of the rest of the world in space research, NASA is looking to send astronauts to Mars by 2030; as SpaceX CEO Elon Musk said "I'd like to die on Mars. Just not on impact."

But politics look to put a stop to that. Budget cuts have hit Mars research hard. But, this year both Houses of Congress allocated more money to planetary research than the White House bargained for, with them allocating .6% of the budget to NASA.

The next big leap for mankind is not to put a human boot on the planet, but the return of a sample of Mars to earth. The question America is asking itself currently is whether America will be driving the future of space travel of playing second fiddle to the superpowers of tomorrow.

Facts compiled from: National Geographic, Vox



Photo Courtesy of The Atlantic

The Curiosity rover landed on Mars two years ago using a Sky Crane. This new landing method, where rockets slow the descent of the rover, is expected to revolutionize robotic exploration.

The first un-American rover to land on Mars will be in 2018, when Europe and Russia set the ExoMars rover down to search for organic compounds in tandem with Curiosity. In 2020, Curiosity will be replaced by an unnamed NASA rover, which is essentially Curiosity with upgraded wheels and new

carrying Americans to space for the first time in ears.

The next big space leaps will come from India, China, Japan and Russia, as the Asian powers race among themselves towards Mars, achieving scientific discoveries and prestige along the way.

U.S., Russia revamp nuclear arsenals as tensions rise

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In Berlin last summer, President Obama called for a bold reduction in nuclear weapon stockpiles, stating he aimed for "a world without nuclear weapons." But his recent actions have proved the opposite is true, a policy shift that could only heighten global nuclear tensions.

Obama was referring to, in his Berlin speech, 200 American B61 tactical nukes in NATO countries in Europe and to Russia's European stockpile of 2,000 warheads. While last year a nuclear drawdown seemed likely, Russia's recent annexation of Crimea appears to have snuffed out those hopes and may encourage nuclear proliferation.

The B61 is America's last tactical nuke, delivering the equivalent of 700 million lbs. of TNT. Unlike most nuclear weapons, it is intended for battlefield use, meaning should Russia invade a NATO country, the B61 would be used against Russian troops. Nukes in

Europe have been there since the 1950s and have remained since the Cold War.

However, Hans Kristensen, a nuclear science expert at the Federation of American Scientists said "Their presence has not deterred Putin so far and their future presence is merely an echo from the

of removing American nukes from Europe, has allocated \$1 trillion to the expansion of the U.S. nuclear weapons program. These changes are budgeted to occur over the next 30 years.

With numerous geopolitical crises raging throughout the world, with Russia on a warpath, and ISIS devastating

staring contest with Moscow, largely because of escalated tensions over the conflict in the Ukraine.

The renewed nuclear weapons program aims to both improve and increase the U.S. arsenal. The only true threat to this program are budget cuts. In the coming decade it will cost \$355 billion to refurbish the American nukes. But the real costs will be later on, when bombers, submarines and missiles reach then end of their longevity.

Nuclear disarmament was a key part of Obama's campaign strategy and was one of the reasons behind the Nobel Committee's selection of him as the 2009 peace prize winner.

The new weapon enhancements will not necessarily violate the 2009 New Start treaty with Russia, where the two nations agreed to cut stockpiles by 30%, but it will test the peaceful spirit the words were penned. So far the program has already



Photo Courtesy of State Department

President Obama and Russian President Dimitri Medvedev sign the New Start treaty in 2009. The treaty was a key part of Obama's anti-nuclear agenda.

past," pointing to the aging mechanism inside these decades old bombs.

Obama evidently agrees with Kristensen, but instead

the Middle East, Obama's militaristic turn is a logical yet dangerous step.

Congress, so far, has backed up Obama in this

built a \$700 million facility for the refitting of nukes and looks to have more built in the coming years.

Russia is not taking these actions lying down. On Sept. 10, the Russian Federation announced it would develop nuclear weapons to counter NATO actions. However, the effort will be less profound than its American counterpart due to Russia's fragile economy.

Russia has recently tested the Bulva nuclear missile, a 12 meter long projectile that will be the cornerstone of its nuclear arsenal in the coming decades. Russia aims to create a guaranteed nuclear deterrent by creating an aerospace defense system and developing precise nuclear and conventional weapons.

With Russo-NATO relations at their lowest point since the Reagan administration, this reversal of nuclear policy is an expected yet dangerous reaction to the crisis in the Ukraine.

Facts compiled from: The New York Times; NPR, The LA Times