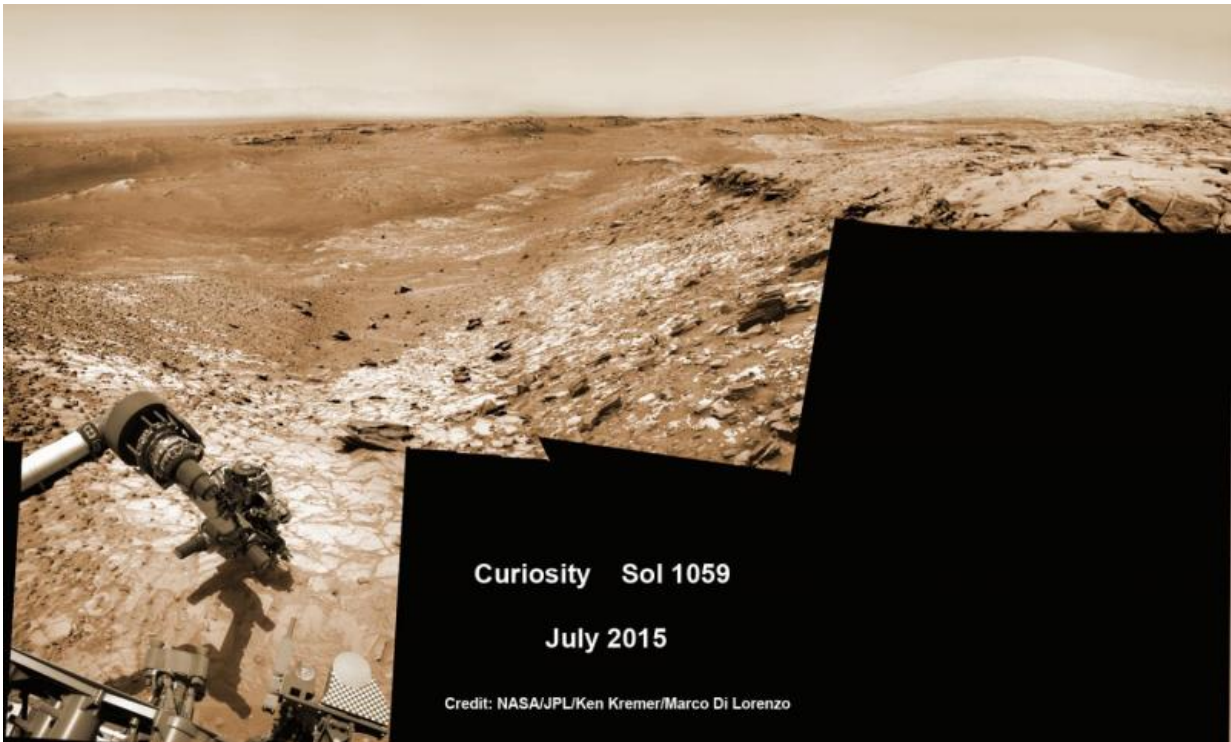


Curiosity discovers Mars rock like none before, sets drill campaign

August 3 2015, by Ken Kremer



Curiosity extends robotic arm and conducts test drill at “Buckskin” rock target at bright toned “Lion” outcrop on the lower region of Mount Sharp on Mars, seen at right. Gale Crater eroded rim seen in the distant background at left, in this composite multisol mosaic of navcam raw images taken to Sol 1059, July 30, 2015. Navcam camera raw images stitched and colorized. Credit: NASA/JPL-Caltech/Ken Kremer/kenkremer.com/Marco Di Lorenzo

On the eve of the 3rd anniversary since her nail biting touchdown inside Gale Crater, NASA's car sized Curiosity Mars Science Laboratory (MSL) rover has discovered a new type of Martian rock that's surprisingly rich in silica – and unlike any other targets found before.

Excited by this new science finding on Mars, Curiosity's handlers are now gearing the robot up for her next full drill campaign today, July 31 (Sol 1060) into a rock target called "Buckskin" – which lies at the base of Mount Sharp, the huge layered mountain that is the primary science target of this Mars rover mission.

"The team selected the "Buckskin" target to drill," says Lauren Edgar, Research Geologist at the USGS Astrogeology Science Center and an MSL science team member, in a mission update.

"It's another exciting day on Mars!"

See the rover at work reaching out with her robotic arm and drilling into Buckskin, as illustrated in our new mosaics of navcam camera images created by the image processing team of Ken Kremer and Marco Di Lorenzo (above and below).

For about the past two months, the six wheeled robot has been driving around and exploring a geological contact zone named "Marias Pass" – an area on lower Mount Sharp, by examining the rocks and outcrops with her suite of state-of-the-art science instruments.

The goal is to provide geologic context for her long term expedition up the mountains sedimentary layers to study the habitability of the Red Planet over eons of time.

Data from Curiosity's "laser-firing Chemistry & Camera (ChemCam) and Dynamic Albedo of Neutrons (DAN), show elevated amounts of

silicon and hydrogen, respectively," in certain local area rocks, according to the team.

Silica is a rock-forming compound containing silicon and oxygen, commonly found on Earth as quartz.

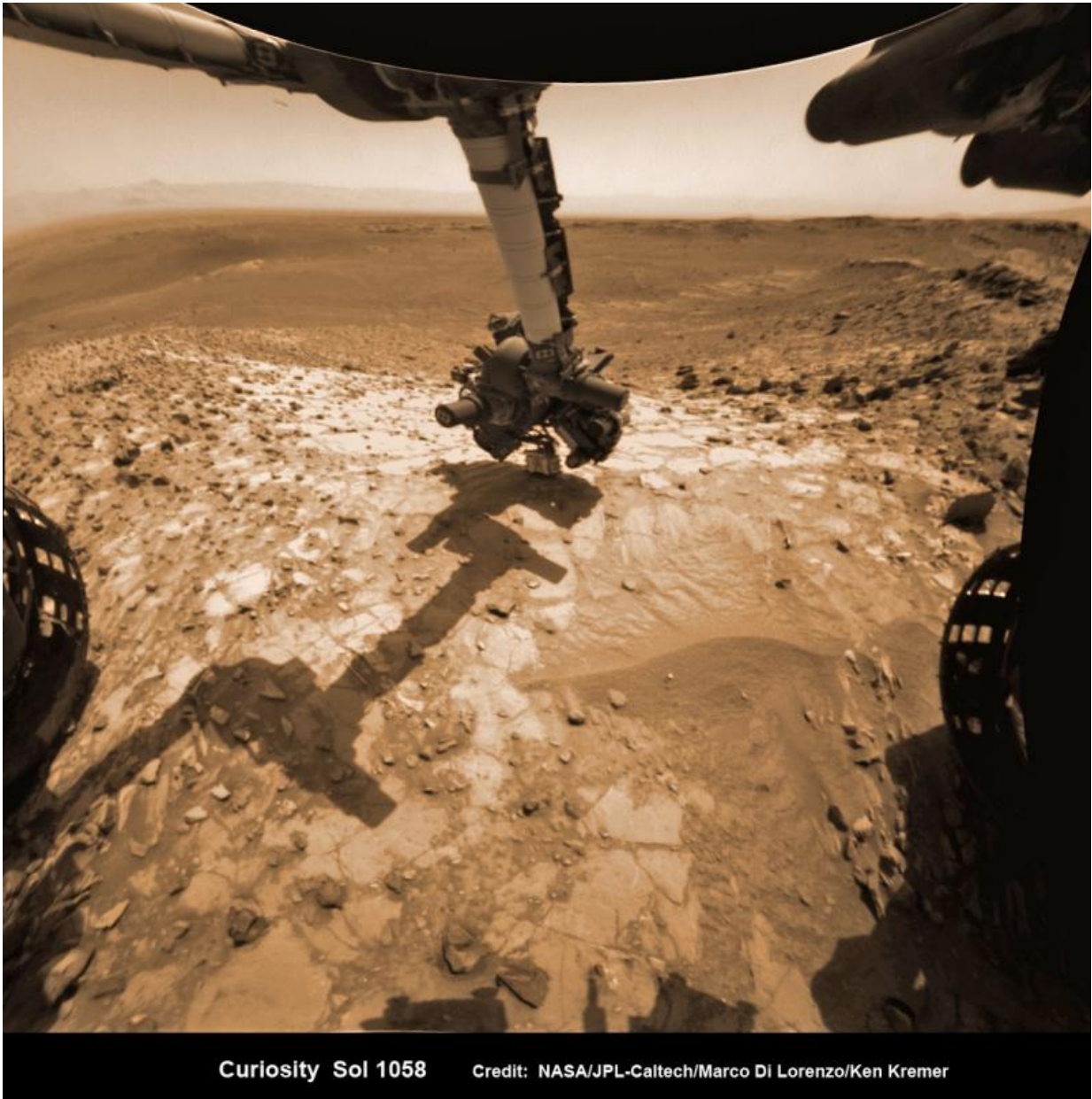
"High levels of silica could indicate ideal conditions for preserving ancient organic material, if present, so the science team wants to take a closer look."

Therefore the team scouted targets suitable for in depth analysis and sample drilling and chose "Buckskin".

"Buckskin" is located among some high-silica and hydrogen enriched targets at a bright outcrop named "Lion."

An initial test bore operation was conducted first to confirm whether that it was indeed safe to drill into "Buckskin" and cause no harm to the rover before committing to the entire operation.

The bore hole is about 1.6 cm (0.63 inch) in diameter.



NASA Curiosity rover inspects ‘Buckskin’ rock outcrop on Mars with APXS mineral spectrometer in this hazcam camera raw image taken on July 29, 2015 (Sol 1058), colorized and linearized. Credit: NASA/JPL-Caltech/Marco Di Lorenzo/Ken Kremer/kenkremer.com

"This test will drill a small hole in the rock to help determine whether it

is safe to go ahead with the full hole," elaborated Ryan Anderson, planetary scientist at the USGS Astrogeology Science Center and an MSL science team member.

So it was only after the team received back new high resolution imagery last night from the arm-mounted MAHLI camera which confirmed the success of the mini-drill operation, that the "GO" was given for a full depth drill campaign. MAHLI is short for Mars Hand Lens Imager.

"We successfully completed a mini drilling test yesterday (shown in the MAHLI image). That means that today we're going for the FULL drill hole" Edgar confirmed.

"GO for Drilling."

So it's a busy day ahead on the Red Planet, including lots of imaging along the way to document and confirm that the drilling operation proceeds safely and as planned.

"First we'll acquire MAHLI images of the intended drill site, then we'll drill, and then we'll acquire more MAHLI images after drilling," Edgar explains.

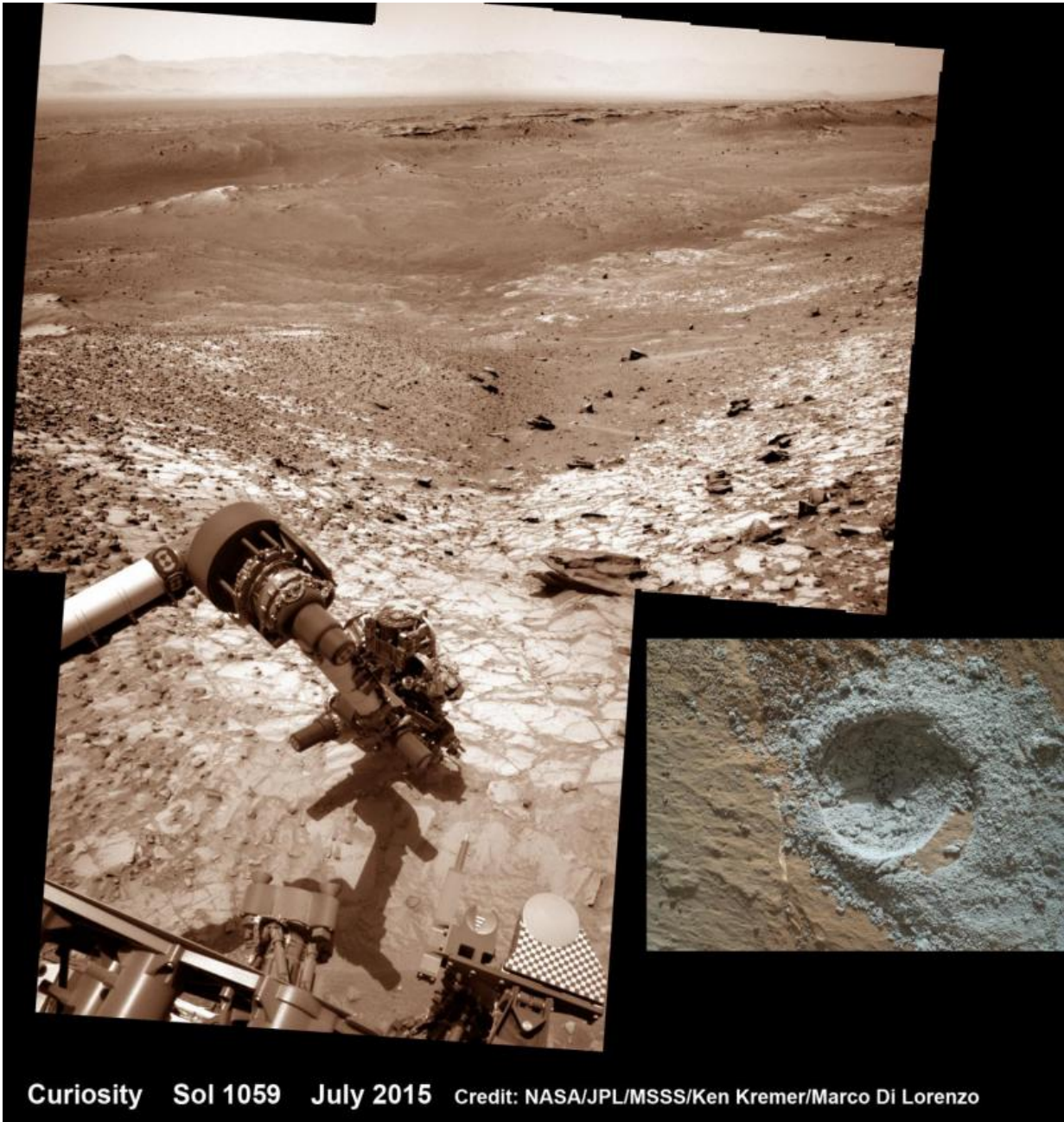
"The plan also includes Navcam imaging of the workspace, and Mastcam imaging of the target and drill bit. In addition to drilling, we're getting CheMin ready to receive sample in an upcoming plan. Fingers crossed!" Surface observations with the arm-mounted Alpha Particle X-ray Spectrometer (APXS) instrument are also planned.

If all goes well, the robot will process and pulverize the samples for eventual delivery to the onboard pair of miniaturized chemistry labs located inside her belly – SAM and CheMin. Tiny samples will be fed to the inlet ports on the rover deck through the sieved filters.

Meanwhile the team is studying a nearby rock outcrop called "Ch-paa-qn" which means "shining peak" in the native Salish language of northern Montana."

Anderson says the target is a bright patch on a nearby outcrop. Via active and passive observations with the mast-mounted ChemCam laser and Mastcam multispectral imager, the purpose is to determine if "Ch-paa-qn" is comprised of calcium sulfate like other white veins visible nearby, or perhaps it's something else entirely.

Before arriving by the "Lion" outcrop last week, Curiosity was investigating another outcrop area nearby, the high-silica target dubbed "Elk" with the ChemCam instrument, while scouting around the "Marias Pass" area in search of tasty science targets for in-depth analysis.



Curiosity extends robotic arm and conducts test drill at “Buckskin” rock target at bright toned “Lion” outcrop on the lower region of Mount Sharp on Mars. Gale crater rim seen in the distant background, in this composite mosaic of navcam raw images taken to Sol 1059, July 30, 2015. Inset: MAHLI camera up close image of test drill at “Buckskin” rock target. Navcam camera raw images stitched and colorized. Credit: NASA/JPL-Caltech/Ken Kremer/kenkremer.com/Marco Di Lorenzo Credit: NASA/JPL-Caltech/MSSS

Sometimes the data subsequently returned and analyzed is so extraordinary, that the team decides on a return trip to a spot previously departed. Such was the case with "Elk" and the rover was commanded to do a U-turn to acquire more precious data.

"One never knows what to expect on Mars, but the Elk target was interesting enough to go back and investigate," said Roger Wiens, the principal investigator of the ChemCam instrument from the Los Alamos National Laboratory in New Mexico.

Soon, ChemCam will have fired on its 1,000th target. Overall the laser blaster has been fired more than 260,000 times since Curiosity landed inside the nearly 100 mile wide Gale Crater on Mars on Aug. 6, 2012, alongside Mount Sharp.

"ChemCam acts like eyes and ears of the rover for nearby objects," said Wiens.

"Marias Pass" is a geological context zone where two rock types overlap – pale mudstone meets darker sandstone.

The rover spotted a very curious outcrop named "Missoula."



A rock outcrop dubbed “Missoula,” near Marias Pass on Mars, is seen in this image mosaic taken by the Mars Hand Lens Imager on NASA’s Curiosity rover. Pale mudstone (bottom of outcrop) meets coarser sandstone (top) in this geological contact zone, which has piqued the interest of Mars scientists. Credit: NASA/JPL-Caltech/MSSS

"We found an outcrop named Missoula where the two rock types came together, but it was quite small and close to the ground. We used the robotic arm to capture a dog's-eye view with the MAHLI camera, getting our nose right in there," said Ashwin Vasavada, the mission's project scientist at NASA's Jet Propulsion Laboratory in Pasadena, California.

White mineral veins, possibly comprised of calcium sulfate, filled the fractures by depositing the mineral from running groundwater.

"Such clues help scientists understand the possible timing of geological events," says the team.



A rock fragment dubbed “Lamoose” is shown in this picture taken by the Mars Hand Lens Imager (MAHLI) on NASA’s Curiosity rover. Like other nearby rocks in a portion of the “Marias Pass” area of Mt. Sharp, Mars, it has unusually high concentrations of silica. The high silica was first detected in the area by the Chemistry & Camera (ChemCam) laser spectrometer. This rock was targeted for follow-up study by the MAHLI and the arm-mounted Alpha Particle X-ray Spectrometer (APXS). Credits: NASA/JPL-Caltech/MSSS

As of today, Sol 1060, July 31, 2015, she has taken over 255,000 amazing images.

Curiosity recently celebrated 1000 Sols of exploration on Mars on May 31, 2015 – detailed here with our Sol 1000 mosaic also featured at Astronomy Picture of the Day on June 13, 2015.

Source: [Universe Today](#)

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