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Another new year dawns on Mars

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Arizona Daily Star

No champagne corks popped. No firecrackers cracked. No rusty red ball dropped for a cheering mob in Times Square.

The Martian New Year came and went almost as quietly on Earth as it did on Mars earlier this month, though the occasion did not go unnoticed by a few planetary scientists.

A small group of Mars researchers held a virtual get-together to mark the start of the new solar cycle on the red planet. The moment arrived at exactly 8:56 and six seconds, local time, on the morning of Nov. 12.

"We did do a countdown, and everyone did a toast with their available beverage - coffee for me," said Tim Titus, a research space scientist with the U.S. Geological Survey's Astrogeology Science Center in Flagstaff. "It was very

Though no standard calendar for Mars has been adopted, the most common system currently in use by scientists ties the Martian New Year to the spring equinox, when the sun shines equally on the red planet's northern and southern hemispheres.

"I don't think I would call it official, but this is how everybody does it," said planetary scientist and University of Arizona professor Shane Byrne. "The spring equinox: that's when people consider a Mars year to start."

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Mars

From B1

Numbered days

Nobody really started numbering the years on the red planet until 2000, when researchers at the Boulder, Colorado-based Space Science Institute decided to declare the Mars' spring equinox of April 11, 1955, as the start of Martian Year Number 1.

It was an arbitrary choice - the researchers admitted as much in their own paper - but the numbering convention soon caught on with other Mars scientists.

"For better or worse, that means this is Mars Year 38," Byrne said. "Maybe I should start giving my age in Mars years, because it sounds better."

The need for a standard numbering system has never been greater. Though earthlings have been sending space probes to the red planet since the early 1960s, the pace of science missions has increased dramatically in recent de-

There are now seven remote observatories orbiting Mars and two rovers -NASA's Perseverance and Curiosity - making tracks across its surface.

The fine detail and sheer volume of information beamed back by all those missions is allowing researchers to study changes

On Martian time

Are you mad because you missed out on the Martian New Year? With this handy conversion website, you'll always know what day and year it is on Mars: tucne.ws/1r8k.

to the planet's landscape and climate across time.

To do that, though, "we had a need to compare data between years," said Byrne, who co-authored a 2015 study that extended the numbering system back to the 17th century, when Galileo first observed Mars through a telescope. "We just need some way to compare one year to the next."

An average Martian day lasts 24 hours, 37 minutes and just under 23 seconds. so it's tempting to track time there the same way we do on Earth.

But Mars is roughly 50 million miles farther away from the Sun than we are, and it takes the planet roughly 23 months to complete an orbit. As a result, a Martian year lasts just under 687 Earth days (or 669 of Mars' slightly longer days, better known as sols).

For those wishing to celebrate the Martian New Year in the future, mark your calendars: The next one lands on Sept. 30, 2026, followed by Aug. 17, 2028; July 5, 2030; May 22, 2032; April 9, 2034; Feb. 25, 2036; Jan. 12, 2038; and so on.

Eye in the sky

Byrne has been studying the red planet since about Mars Year 25 (he co-authored his first study on the subject in 2001), and he has worked at the U of A since Mars Year 28 (specifically, he joined the university's prestigious Lunar and Planetary Laboratory in 2007).

Now, he serves as Mars official photographer of

In addition to his role as director of the Space Imagery Center, a regional NASA research collection housed at the U of A, Byrne is co-investigator for the cameras on two different spacecraft currently in orbit around Mars.

One is the Swiss-built Colour and Stereo Surface Imaging System, or CaSSIS, a high-resolution color stereo camera operating from an orbiter sent to Mars in 2016 by Russia and the European Space Agency.

The other is the U of A's own High Resolution Imaging Science Experiment, which ranks as the most powerful camera ever deployed for planetary re-

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Mars

search.

Known as HiRISE for short, the \$40 million instrument was launched onboard NASA's Mars Reconnaissance Orbiter in 2005 and arrived at the red planet in 2006 on a mission originally slated to last just a few years. Nearly two decades later, the Tucson-born camera is still going strong.

Byrne said HiRISE can see with greater resolution than any civilian satellite currently pointed at the Earth, capturing images of objects roughly the size of a large beach ball from more than 150 miles away.

The camera has been used to scout safe landing sites for Mars rovers and then track them as they touch down and move around the surface. HiRISE has also helped scientists observe the slow creep of sand dunes and record avalanches in progress along steep cliffs at the edge of ice cap.

"Looking for things that are changing over time has become a big part of what we do now," Byrne said.

He added that it's "entirely possible" that the last picture of Mars from Year 37 and the first picture of Mars from Year 38 were both taken by HiRISE and will be processed in the coming months right here at the U of A.

Seasons greeting

Stefano Nerozzi is a postdoctoral researcher at the Lunar and Planetary Laboratory who special izes in the study of surface materials and stratigraphy around the Martian north pole.

Though he regularly participates in the Mars teleconferences science that USGS researcher Tim Titus hosts every other week or so, he said he had to skip the Nov. 12 meeting because of a schedule conflict. You could tell he was disappointed about it, too.

"We have been chatting about this for a few months," Nerozzi said of the unusual New Year's observance. "We were kind of excited about it."

But even though he missed the actual countdown, the planetary scientist said he is still excited for what the coming Martian year might bring.

"There are specific processes that happen at different times (of year) on Mars," Nerozzi said.

Since the red planet is

tilted on its axis like the Earth is, it also experiences distinct seasons. Nerozzi said the start of the new year and the change in seasons it heralds is especially important to scientists like him who study the planet's polar regions.

Mars has two permanent ice caps made mostly of frozen water at each pole. During the colder, darker part of the year in the northern hemisphere, Nerozzi said, carbon dioxide condenses from the atmosphere to cover the cap there with a layer of dry ice as much as six feet thick.

Then, as the days grow gradually longer and sunlight returns to the north pole for the first time in seven or eight months, that dry ice turns back into vapor.

It's not a winter thaw so much as a springtime sublimation, Nerozzi said, and it can trigger ice falls, avalanches and other disturbances that alter the landscape and reveal fresh glimpses of what lies beneath the surface.

Select company

The seasonal cycle also quite literally sheds more light on the parts of the planet that Nerozzi and other polar researchers want to look at, "There are some observations we need to make that require some good solar illumination," he explained.

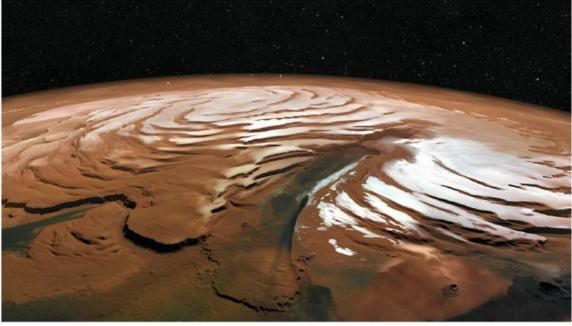
It's hard to say how many people on Earth even knew about the Martian New Year before it arrived on Nov. 12, but Nerozzi said you can probably count the 50 or so team members from the nine space missions currently operating at the red planet. Then there are the researchers like him who are studying Mars but are not directly affiliated with a particular spacecraft.

Byrne guessed that "everybody in Mars science" was at least vaguely aware of the date, though probably only about 150 polar scientists around the globe were actively tracking it as part of their research.

NASA, ESA and the Iapan Aerospace Exploration Agency have all announced plans to launch new robotic missions to the red planet by the next Martian New Year's in 2026 or the one after that in 2028.

No word on whether those payloads might include party favors, just in

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SA/DLR/FU BERLIN; NASA MGS MOLA SCIENCE TEAM

A new year dawned on Mars on Nov. 12, at least according to the system widely used by scientists to track such things. This vertically exaggerated view showing the red planet's north polar cap was generated using images from the European Space Agency's Mars Express spacecraft and elevation data from the Mars Orbiter Laser Altimeter on board NASA's Mars Global Surveyor.



A composite image shows alternating layers of ice and sand in an area where they are exposed on the surface of Mars. The photograph was taken with the HiRISE camera, which was developed at the University of Arizona for NASA's Mars Reconnaissance Orbiter.

NASA PHOTOS/JPL/UNI-VERSITY OF ARIZONA



A cloud of dust rolls out from an avalanche at the base of a cliff on Mars' north polar ice cap. The image was captured in 2010 by the University of Arizona's HiRISE camera onboard NASA's Mars Reconnaissance Orbiter.