Skynews

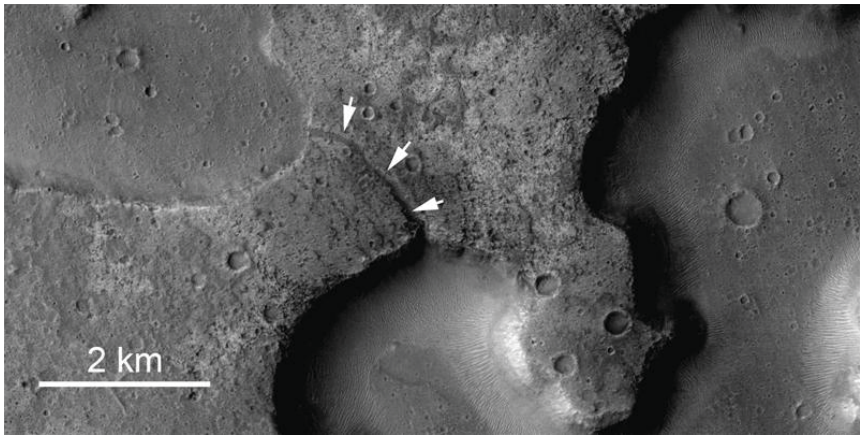
Royal Astronomical Society of Canada ✦ Victoria Centre

Ancient Mars Lakes Revealed

By Tariq Malik

Vast lakes of melted ice existed on Mars more recently than previously thought during a warm, wet spell on the red planet, new images suggest. The lakes might have been habitats for life, if there ever was life on Mars. So far, however, there is no firm evidence of any Martian biology, past or present.

The photographs, taken by NASA's Mars Reconnaissance Orbiter, reveal a network of winding channels linking together several depressions in the Martian surface. Researchers say those channels could only have been caused by Martian lake water running between the depressions about 3 billion years ago – which is 1 billion years more recent than earlier estimates.



This close-up view of Mars from Mars Reconnaissance Orbiter zooms in on Close-up channels connecting ancient depressions, suggesting that lakes once drained into each other about 3 billion years ago, researchers say. Credit: NASA/JPL/Imperial College of London

"Most of the research on Mars has focused on its early history and the recent past," said researcher Nicholas Warner, who led the study at the Imperial College of London. "Excitingly, our study now shows that this middle period in Mars' history was much more dynamic than we previously thought." The new images suggest lakes as large as 12 miles (20 km) wide once dotted the equatorial regions of Mars, researchers said.

on the cover

Rosette Nebula

by John McDonald
McDonald Backyard in Victoria, BC

Image of the Rosette Nebula (NGC 6888) in H-alpha enhanced color. The Rosette Nebula is a large, circular H II region located near one end of a giant molecular cloud in the Monoceros region of the Milky Way Galaxy.

Equipment - Williams 105mm refractor with modified Canon 350D on HEQ5 mount.
Exposure - 62 light and 30 dark frames at 60s and ISO 800 with 20 flat frames for calibration.
H-alpha frames - Date - 2009-12-24
Equipment - 105mm WO refractor with modified Canon T1i on HEQ5 mount.
Conditions - Clear and cold (1 deg C).
Exposures - 55 light and 20 dark at ISO 3200 for 120s each with 8 flats for calibration.
Processing - ImagesPlus and Photoshop.

Scientists already know that water ice exists today beneath the Martian surface based on data from landers, rovers and Mars images taken from orbit. But past studies have hinted that Mars was warm and wet enough to support liquid lakes around 4 billion years ago.

Using the images captured by the Mars Reconnaissance Orbiter, Warner and his colleagues concluded that Mars could have sustained lakes even later, in a period known as the Hesperian Epoch. “Scientists had largely overlooked the Hesperian Epoch as it was thought that Mars was then a frozen wasteland,” Warner said.
But Warner and his team found that during that epoch 3 billion years ago, Mars could have been warmed by volcanic activity, meteorite impacts or even orbital shifts. The result would be a temporary increase in planetary temperature as the gases created in those events thickened the Martian atmosphere.

Scientists previously thought the depressions were formed by a process called sublimation, when ice transitions directly into gas. That process

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address change? information incorrect

Contact the National Office

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observers group

RASC Victoria Centre and the NRC have signed a License to Use Land Agreement which gives members of Victoria Centre expanded access to NRC property on Observatory Hill.

If you are a member in good standing of Victoria Centre RASC, consider yourself an “active observer”, and wish to take advantage of this opportunity, please send an email to the 1st or 2nd Vice President. More information on this program see: http://victoria.rasc.ca

Sunglasses for a Solar Observatory

By Patrick Barry

In December 2006, an enormous solar flare erupted on the Sun’s surface. The blast hurled a billion-ton cloud of gas (a coronal mass ejection, or CME) toward Earth and sparked days of intense geomagnetic activity with Northern Lights appearing across much of the United States.

While sky watchers enjoyed the show from Earth’s surface, something ironic was happening in Earth orbit.

At the onset of the storm, the solar flare unleashed an intense pulse of X-rays. The flash blinded the Solar X-Ray Imager (SXI) on NOAA’s GOES-13 satellite, damaging several rows of pixels. SXI was designed to monitor solar flares, but it must also be able to protect itself in extreme cases.

That’s why NASA engineers gave the newest Geostationary Operational Environmental Satellite a new set of sophisticated “sunglasses.” The new GOES-14 launched June 27 and reached geosynchronous orbit July 8.

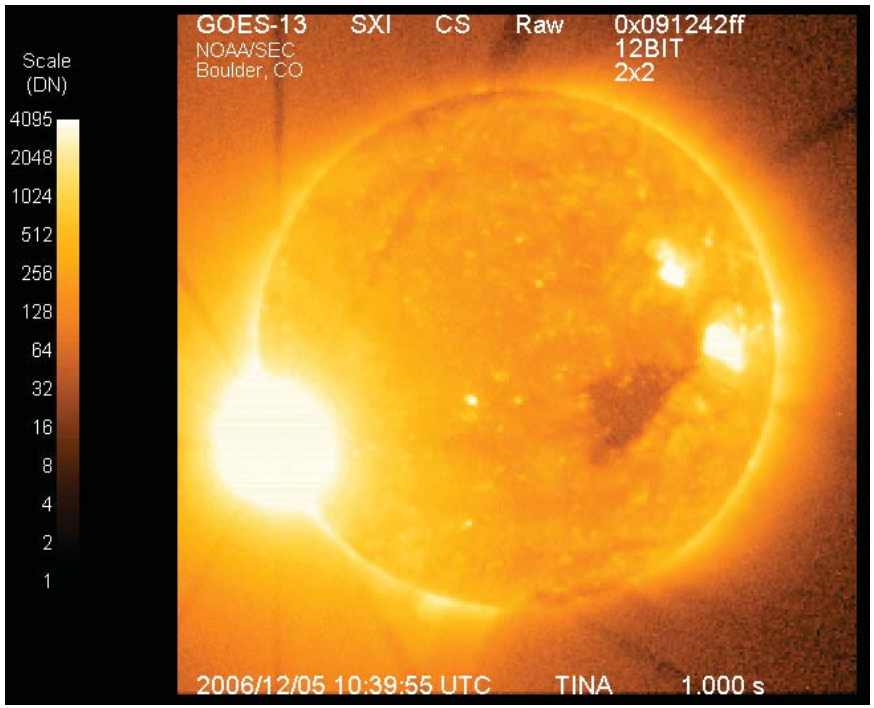
Its “sunglasses” are a new flight-software package that will enable the SXI sensor to observe even intense solar flares safely. Radiation from these largest flares can endanger military and civilian communications satellites, threaten astronauts in orbit, and even knock out cities’ power grids. SXI serves as an early warning system for these flares and helps scientists better understand what causes them. “We wanted to protect the sensor from overexposure, but we didn’t want to shield it so much that it couldn’t gather data when a flare is occurring,” says Cynthia Tanner, SXI instrument systems manager for the GOES-NOP series at NASA’s Goddard Space Flight Center in Greenbelt, Maryland. (GOES-14 was called GOES-O before achieving orbit).

Shielding the sensor from X-rays also reduces the amount of data it can gather about the flare. It’s like stargazing with dark sunglasses on. So NASA engineers must strike a balance between protecting the sensor and gathering useful data. When a dangerous flare occurs, the new SXI sensor can protect itself with five levels of gradually “darker” sunglasses. Each level is a combination of filters and exposure times carefully calibrated to control the sensor’s exposure to harmful high-energy

X-rays. As the blast of X-rays from a major solar flare swells, GOES-14 can step up the protection for SXI through these five levels.

The damaged sensor on GOES-13 had only two levels of protection—low and high. Rather than gradually increasing the amount of protection, the older sensor would remain at the low level of protection, switching to the high level only when the X-ray dose was very high. "You can collect more science while you're going up through the levels of protection," Tanner says. "We've really fine-tuned it." Forecasters anticipate a new solar maximum in 2012-2013, with plenty of sunspots and even more solar flares. "GOES-14 is ready," says Tanner.

For a great kid-level explanation of solar "indigestion" and space weather, check out spaceplace.nasa.gov/en/kids/goes/spaceweather.



X-9 class solar flare December 6, 2006, as seen by GOES-13's Solar X-ray Imager. It was one of the strongest flares in the past 30 years

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration

Presidents Message

January 2010

At our December monthly meeting I suggested the idea of making the major focus for our Centre in 2010 "Light Pollution Abatement" (LPA). Your response was positive and several individuals immediately offered to help.

The concept is to build on the goodwill and awareness of astronomy that has developed in the Greater Victoria Community as a result of the efforts of ourselves, our partners and the international IYA activities during 2009.

I set out a possible strategy in an e-mail on Dec 15 and received additional support for the concept and some good suggestions. There seems to be a consensus that a coordinated approach based on several different activities could be effective with a small team taking responsibility for each. At this time the following teams appear to cover the bases, however we can learn and adjust as needed during the year.

Team 1) Preparation of packages to be distributed to the schools for students to take home. The ground work is well prepared as a result of the work of the school program. In addition, our light pollution cards are excellent as is the one-pager material on our website.

Team 2) Approaches to the technical staff that deal with municipal lighting to make them aware of the technologies that can be used to improve lighting and regulate private enterprise use of lights.

Team 3) Approaches to vendors of lighting fixtures to enlist their active help in promoting the use of smart lighting.

Team 4) Approaches to community groups to help them understand the negative effects of light pollution and enlist their support in combating it. Coupled with this we could have a speakers list - members who could give short informative talks on LPA.

Team 5) Approaches to politicians and committees in the local municipalities to enlist their support and commitment to light pollution abatement.

Team 6) Approaches to media. Finding a champion in the media would be very helpful. Creating op-ed articles for local (and national) media to reach as many citizens as possible with good information about light pollution could also be effective. The need here is for people with media connections and/or effective writing skills.

I would appreciate hearing from you if you want to help with any one or more of these tasks. There will also be a short organizational session following our first regular meeting of the year on January 13 for those who can make it. For those who can't stay after the meeting,I would be happy to pass on your suggestions and/or willingness to help.

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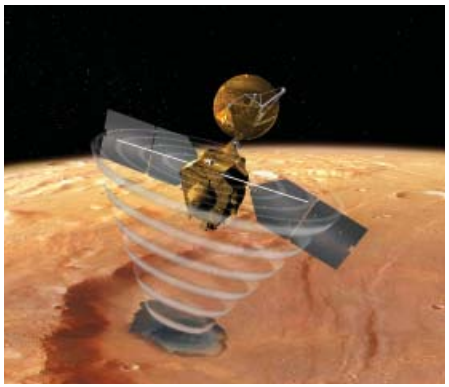
would create gaps as ice sublimates from the Martian surface, leading to a collapse that would form the depression. But sublimation alone would not explain the channels, researchers said. Similar channels can be seen on Earth in Alaska and Siberia, where permafrost melts to carve drainage channels that connect different lakes, they added.

Warner and his team are unsure how long the more recent warm, wet period on Mars may have lasted, or how long liquid water could have flowed between the lakes. But the ancient lakebeds from the current study could provide attractive targets for future probes to seek out regions on Mars that may have once been habitable for microbial life, they added.



The scientists plan to seek other potential lakebeds in other regions along Mars' equator using more images from the Mars Reconnaissance Orbiter. Launched in 2005, the orbiter is NASA's most powerful spacecraft circling Mars today and has collected more images of the Martian surface than all other missions to the red planet combined.

THE NEWTON COLD CAMERA

by Bill Almond

In the "dark ages" before digital imaging made its welcome appearance, astrophotographers had to struggle to make long exposures using colour film such as Ektachrome 400. The assassin lying in wait to blight your images was "reciprocity failure", which is a property of emulsion towards decreasing capacity to record faint light during long exposures.

The widely accepted method of combating this problem was gas hypering, which meant treating an emulsion in a mixture of nitrogen and hydrogen prior to exposure. But this process had its own problems: it was prone to raising the emulsion's fog level and could lead to shifts in colour balance. Another method was the experimental cold camera, which had been made and used by a few amateurs. Celestron also manufactured one for a short time. These cameras used 35-mm film cut into individual frames.

Then, in the early 1980's, Jack Newton and George Ball, well-known Victoria Centre members, designed and made a cold camera featuring distinct improvements over earlier models. The Newton Cold Camera, which was marketed through Jack's Northern Lites business, offered the ability to use 35-mm film in conventional cassettes rather than cut into separate frames.

The camera was simple in principle and design. During exposure the film was sandwiched between an acrylic optical plug, pressed against the emulsion and a metal plate chilled by dry ice. The plug prevented moisture-laden air from reaching the film and turning into frost. The camera was made entirely of plastic and was lightweight.

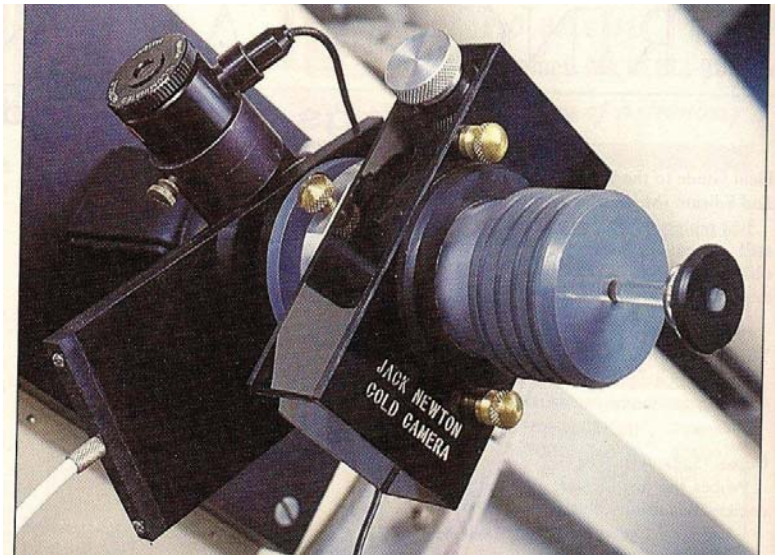
One not-so-simple feature was the 20-step checklist to ensure optimum exposure. Most of the steps were related to chilling the film while keeping it free from frost. The instructions were meant to be followed to the letter, and once done you could enjoy a long evening at the telescope. Practice makes perfect, they say, and that was so true with this camera. However, the results were spectacular and made the whole operation worthwhile.

Focussing the camera was achieved using a fairly bright star and the knife-edge test. It required looking through a clear plastic cap containing

a coarse Ronchi grating held against the camera's optical plug. The dry ice chamber held about three tablespoons of granular dry ice, which lasted about 40 minutes on a warm night.

After each exposure the camera body had to be removed from the shutter assembly, the dry ice emptied out, and the cold film heated with a portable hair drier to prevent it shattering. Then the entire camera body needed heating to eliminate frost or condensation before the next exposure could begin…which took about 10 minutes. Following that the dry ice was replaced, the camera re-cooled and then you could refocus!

The Centre still has a number of Jack's trend-setting images. Some deep-sky objects were taken using the gas hypering system and three were taken of Comet Halley, January 1986, with a Cold Camera similar to that shown in the picture.



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this month

monday nights

Astronomy Cafe
Fairfield Community Centre,
1330 Fairfield, Victoria
7:30-11pm

Call Geoff at 250.592-2264 for directions and information. New comers are especially welcome. Come and enjoy!

second wednesday of the month

Monthly Meeting
7:30 PM, Elliott Lecture Theatre, Rm 061, UVic.

as sky and interest dictate

New Observers Group
Hosted by Sid Sidhu.
1642 Davies Road, Highlands.
Call 250.391-0540 for information and directions.

by email

Observer/CU Volunteers/ Members email lists
Contact Joe Carr to subscribe to these email lists for important, timely, member-related news.