

WALKING. THE NEW RUNNING.

Introducing the **TreadClimber®** cardio machine

Try it and get **24 DAYS OF FITNESS FREE**

Exclusively at **24 FITNESS™** [Get your pass >>>](#)



San Francisco Chronicle

Martian dust devils could hamper future manned missions

Keay Davidson, Chronicle Science Writer
Monday, January 12, 2004

The surface of Mars is scoured by **dust** storms of biblical immensity -- **dust** storms that could make life rough, even risky, for the first astronauts who visit the fourth planet from the sun.



- [Printable Version](#)
- [Email This Article](#)

Now that President Bush wants to send Americans to Mars, NASA planners are likely to launch careful studies of the potential hazards of the Red Planet.

To Mars explorers, the eeriest threat could come from immense "**dust devils**." Resembling tornadoes, these miles-high columns of swirling **dust** might generate electrical discharges -- like microscopic lightning bolts -- powerful enough to fry electronic equipment. The electrically charged **dust** might also cling to astronauts' helmet visors, obscuring their vision, and block sunlight needed for solar panels.

As troops and journalists learned during the war in Iraq, windblown **dust** particles are so fine that they creep into everything -- computer keyboards, gear shifts, tank engines, you name it -- and cause malfunctions. Hence "**dust** storm forecasting" will be as important to Mars-nauts as hurricane forecasters are to navies, transoceanic airlines and cruise line operators.

Fortunately, air pressure on Mars is very low -- less than one-half of one percent of Earth's surface air pressure. Hence, even high-speed **Martian** winds wouldn't carry enough "punch" to topple a spaceship. At worst, a **Martian** gale might carry as much force as a terrestrial wind of about 25 mph.

But the potential electrical hazards of **Martian dust** could outweigh the advantage of Mars' frail breezes.



ChronicleJobs
TOP JOBS

HEALTHCARE
MULTIPLE POSITIONS
[Sonoma Valley Hospital](#)

HEALTHCARE
Explore Exciting Opportunities
[Pathways Home Health](#)

HEALTHCARE
Several Positions Available
[Professional Home Care Associates](#)

HEALTHCARE
Several Positions Available
[El Camino Hospital](#)

HEALTHCARE
SIGN ON BONUS
[Hill Physicians Medical Group](#)

HEALTHCARE
Project Manager UCSF's Inst for

HOTEL
Exp'd Gen. Mgr . needed for

INSURANCE
Now Hiring
[Farmers Insurance](#)

LANDSCAPE
2 POSITIONS



**HE CAN
STEAL YOUR
IDENTITY
IN SECONDS.**

Before Bush's plans for manned Mars missions were reported last week, scientists at UC Berkeley and elsewhere were investigating a new method to study and, perhaps, to forecast **Martian dust** storms -- by monitoring their electrical activity.

In theory, friction between the **dust** particles would knock electrons off their atoms, making them electrically charged. In the 1970s, radioastronomers reported detecting curious radio emissions from Mars that, some speculated, were caused by **dust** storm electrification. But these early reports have never been verified.

Now, a giant radiotelescope in New Mexico should be used to scan Mars for evidence of electrical emissions from its **dust** storms, scientists propose in a recent issue of the journal Geophysical Research Letters (GRL).

By measuring variations in **dust** storm-generated electrical activity, they hope to determine how severely electrified the **Martian** environment is.

Such monitoring, they say, could lead to a warning system for **Martian dust** storms. (One analogy is weather satellites that scan the oceans for incipient hurricanes; another is deep-space satellites that monitor the sun for "solar flares" that threaten terrestrial radio communications and power grids.)

For Mars explorers, "a big potential problem (of **dust** storms) is electrical interference in spaceships -- it might damage electronic circuits," said the GRL article's lead author, Professor Nilton O. Renno of the University of Michigan. Electrification might be intense enough to generate the Mars equivalent of terrestrial lightning bolts which, in the low air pressure of Mars, would tend to spread out rather than follow thin, bright channels -- "they might resemble fluorescent light bulbs."

"We're not sure whether (a bolt) would be dangerous (to humans). But it certainly could be dangerous to equipment," says Renno, who is heading the atmospheric science portion of a future NASA robotic mission to Mars, a project known as Phoenix. The robot is scheduled for launch in 2007.

The article's other authors are, besides Renno, Ah-San Wong and Sushil K. Atreya, who, like Renno, work at the department of atmospheric, oceanic, and space sciences at the University of Michigan; astronomy Professor Imke de Pater of UC Berkeley; and astronomer Maarten Roos-Serote of the Lisbon Astronomical Observatory in Portugal.

Mars is far, far away -- usually more than 100 million miles -- so a huge radiotelescope would be needed to detect **dust** storm-generated electrical emissions (if there are any) from that world. De Pater says the ideal radio-observatory telescope for the task is the world's biggest, the Very Large Array (VLA) in Socorro, N.M.

[The Presidio Trust](#)

LOANS
COMMERCIAL LENDER
Charter Oak Bank

MAINTENANCE
WATER SYSTEMS
TECHNICIAN \$30.63

MANAGEMENT
Make an IMPACT of EPIC
Proportions
[Aerojet](#)

MANAGER
Medical accounts Manager
[IMMIX Management Services](#)

MARKETING
GRAPHICS ASST . P/T. new
apparel

MECHANIC
Demonstrated journey lev
skills
[UC DAVIS](#)

- [About Top Jobs](#)
- [View All Top Jobs](#)



So far, Renno and his colleagues have had trouble persuading VLA managers to fund their proposed research into the electrification of **Martian dust** storms. For the time being, VLA operators doubt that electrical emissions from **Martian dust** storms would be bright enough to be detected from Earth, even with such a huge radiotelescope, De Pater says.

"It will be hard to detect those things," she acknowledged in an interview. However, she said she hoped the VLA would proceed with the experiment.

"I think it's worth doing even if we don't detect any **dust** (electrical) emissions," she said. If they do eventually detect strong electrical signals, then that would help NASA to determine how severely electrified -- and, hence, potentially hazardous to future missions -- the **Martian** environment is during **dust** storms.

While hoping for the VLA managers to change their minds, one of Renno's colleagues, Roos-Serote, has begun observing Mars with smaller radiotelescopes -- the Westerbork Synthesis Radio Telescope in the Netherlands and the Nançay Radio Telescope in Nançay, France. Observing the Red Planet at 6- and 21-centimeter wavelengths, they enjoyed especially good observations in late summer 2003, when Mars made its closest approach to Earth in thousands of years.

So far, Roos-Serote can't determine if the observations reveal evidence of **dust** storm-generated electrical emissions on Mars. That's because the accumulated data is extremely complex -- it's a veritable Niagara of wavelength measurements. The data require intensive computer analysis before any such signal becomes clear, he says.

On Earth, **dust devils** can generate a significant amount of electrical charge, as much as 100,000 volts per meter, says Greg Delory, a space physicist and senior fellow at the Center for Integrative Planetary Sciences at UC Berkeley. In 2001-2002, with funding from NASA, he and colleagues measured the electrical activity within terrestrial **dust devils** by driving through them in vehicles equipped with electricity-measuring instruments.

Electrically charged **dust** already has been a problem on robotic missions to Mars. Due to the "electrostatic stickiness" of **dust**, it clings to robots' solar panels, says Joy Crisp, project scientist for NASA's Mars Exploration Rovers program. "It's very fine **dust**, much of it less than a micron (a millionth of a meter) in size," she told The Chronicle.

"We don't really know much about the composition of the **dust**, that is its mineral makeup, so we don't understand its electrostatic properties very well either," Crisp added. "We hope to definitely learn more on this (latest robotic) mission," which successfully landed on Mars on Jan. 3.

"Airborne **dust** presents a potentially significant hazard to human operations on the surface of Mars," according to a

2002 study, "Safe on Mars," published by the National Academy of Sciences. However, the report expresses confidence "that NASA engineers and scientists will be able to design and build systems to mitigate the hazards posed by airborne **dust**."

The existence of **Martian dust devils** wasn't recognized until the 1970s, when scientists noticed curious dark tracks on photos from Mars-orbiting satellites. Now they know the tracks are paths carved out by **dust devils**. Judging by recent space photos, parts of Mars are so crisscrossed with **dust** devil trails that they resemble Jackson Pollock paintings.

Despite their potential hazards, Renno speculates, **Martian dust devils** might prove to be rather pretty at night. If they are, indeed, highly charged, then their lower portions might "glow" like faint neon lights. They might resemble dusty ghosts, whizzing -- hopefully at a safe distance -- past the eyes of the first visitors from Earth.

E-mail the author at kdavidson@sfnchronicle.com.

Page A - 4

Ads by Google

[Golden Gate Bridge Tours](#)

San Francisco City Muir Wood Tour Golden Gate Bridge attractions
www.exploreortour.com/

[All San Francisco Tours](#)

City, Alcatraz, Bay cruises Golden Gate Bridge, Yosemite, Napa
www.allsanfranciscotours.com

[San Francisco Info](#)

Find Reviews, Guides & Resources For Any Destination: Travel Smarter
www.mytravelguide.com



[Get 50% off home delivery of the Chronicle for 12 weeks!](#)

[Back To Top](#)

San Francisco Chronicle Sections

[©2005 San Francisco Chronicle](#) | [Feedback](#) | [RSS Feeds](#) | [FAQ](#) | [Contact](#)