Lost into space: Physicists study impact of solar wind on Mars atmosphere

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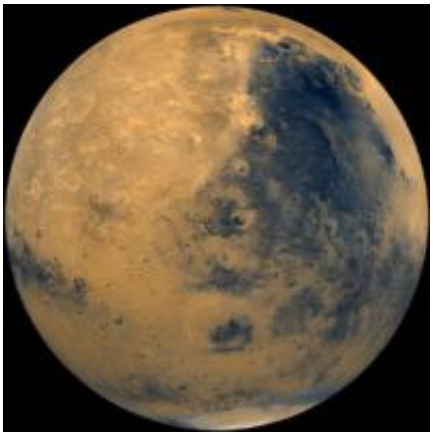

Mars. Image: NASA

(PhysOrg.com) -- Space physicists from the University of Leicester are part of an international team that has identified the impact of the Sun on Mars' atmosphere.

Writing in the AGU journal *Geophysics Research Letters*, the scientists report that Mars is constantly losing part of its atmosphere to space.

The new study shows that pressure from solar wind pulses is a significant contributor to Mars's atmospheric escape.

The researchers analysed solar wind data and satellite observations that track the flux of heavy ions leaving Mars's atmosphere. The authors

found that Mars's atmosphere does not drift away at a steady pace; instead, atmospheric escape occurs in bursts.

The researchers related those bursts of atmospheric loss to solar events known as corotating interaction regions (CIRs). CIRs form when regions of fast solar wind encounter slower solar wind, creating a high-pressure pulse. When these CIR pulses pass by Mars, they can drive away particles from Mars's atmosphere.

The authors found that during times when these CIRs occurred, the outflow of atmospheric particles from Mars was about 2.5 times the outflow when these events were not occurring. Furthermore, about one third of the material lost from Mars into space is lost during the impact and passing of CIRs.

The study should help scientists better understand the evolution of Mars's atmosphere.

Professor Mark Lester, Head of the Department of Physics and Astronomy at the University of Leicester said: “The main reason it happens at Mars and not at Earth is the lack of a magnetic field produced by the planet, which protects the atmosphere at Earth.

“One other aspect of this work is that the observations were made during a very quiet period in the eleven year solar cycle and so we would expect the effect of these and other large scale disturbances to be higher at other times in the solar cycle.”

Leicester's role in the study was to analyse the data using ideas that academic researchers had from discussions within the Radio and Space Plasma Physics Research Group.

More information: *Geophysical Research Letters*, 2010.

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