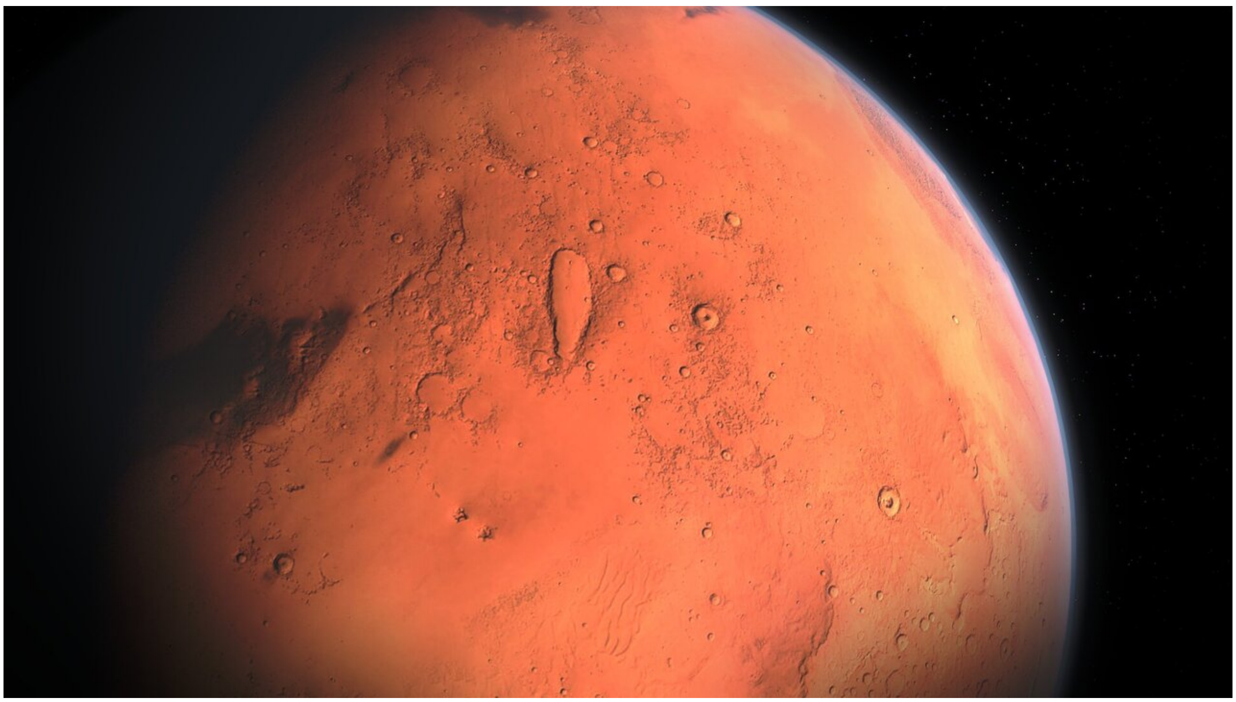
# Historic climate change on Mars might be detectable

November 20 2019



Credit: CC0 Public Domain

Historical instances of extreme climate change on Mars could be detected through the measurement of subsurface temperatures, according to a new University of Stirling study.

Experts in Stirling's Planetary Ices Laboratory, located within the Faculty of Natural Sciences, believe that the technology used by the heat flow probe on the latest NASA mission to Mars might be able to identify "major" climate change events of the past.

The team—led by Dr. Nicholas Attree—say the findings of their research, which involved hypothetical modeling, could help to understand similar historical events on Earth, where historical climate changes are already being traced in borehole temperature measurements.

Dr. Attree and Stirling colleague Dr. Axel Hagermann are working on NASA's InSight mission, which landed on the Red Planet last November. The scientists are simulating data obtained by the Heat Flow and Physical Properties Probe (HP3), an instrument provided by the German Institute of Planetary Research in Berlin. Dr. Attree used numerical models to estimate the effect that historic freak climate changes might have on the heat flow measurements.

Dr. Attree explained: "HP3 will be digging down into the subsurface of Mars and recording temperatures and heat flow from the interior. The magnitude of the heat flow tells us about the Martian deep interior and helps to create formation and evolution models. If historical climate change has led to more or less excess heat stored in the subsurface, it could influence HP3's results."

The team considered a specific situation where cycles in Mars's orbit causes its atmosphere to collapse—or freeze—onto the poles. In these cases, the team found that thermal conductivity of the Martian soil decreases—and, in turn, excess heat could build up.

"We found that small changes caused by climate change are unlikely to be picked up by HP3," Dr. Attree continued. "However, it may be possible to detect very large changes—and this is important because we may be able to carry out similar measurements on other planets."

Dr. Hagermann added: "We have demonstrated that it is not only historical changes in air temperature but also changes in air pressure and thermal conductivity of the soil that could be detectable, which might also be relevant for Earth, where borehole temperature measurements have played an important part in reconstructing past climate."

Built by the German Aerospace Centre, the self-hammering HP3 probe is designed to burrow between three and five meters (10 to 16 feet) into the Martian soil—15 times deeper than any previous hardware on Mars—to measure the heat flow from the planet's interior. By combining the rate of heat flow with other InSight data, the team will be able to calculate how energy within the planet drives changes on the surface, such as planetary evolution and the shaping of mountains and canyons.

The latest paper, "Potential effects of atmospheric collapse on Martian heat flow and application to the InSight measurements," is published in *Planetary and Space Science*.

**More information:** N. Attree et al. Potential effects of atmospheric collapse on Martian heat flow and application to the InSight measurements, *Planetary and Space Science* (2019). DOI: 10.1016/j.pss.2019.104778

Provided by University of Stirling

Citation: Historic climate change on Mars might be detectable (2019, November 20) retrieved 25 April 2024 from https://phys.org/news/2019-11-historic-climate-mars.html