Space & Astronomy | Nov 24, 2026 | 3 min read | By Bryan White

NASA Mars Orbiter Spots Neat, Curving Rows of Boulders Across Daedalia Planum

Environment * Climate Change * Atmospheric Physics

Even after nearly two decades in orbit, NASA's Mars Reconnaissance Orbiter (MRO) continues to uncover landscapes that defy easy explanation. In high-resolution images captured by MRO's HiRISE (High Resolution Imaging Science Experiment) camera and highlighted in November 2026 planetary science coverage, researchers spotted an unusually orderly field of bright boulders arranged into long, smooth, curving rows across a region called Daedalia Planum . Sweeping gracefully around local impact craters, the parallel lines sit roughly 5 to 10 meters (16 to 33 feet) apart , giving the Martian dust an appearance planetary scientists compare to a giant fingerprint or a raked zen garden.

While orbital cameras have documented countless boulders, sand dunes, and rocky ridges across the Red Planet, researchers from the U.S. Geological Survey and the University of Arizona note that stone arrangements with this degree of geometric neatness have not been observed anywhere else on Mars.

An Equatorial Volcanic Plain With an Unexpected Pattern

Daedalia Planum sits along the southwestern flank of the Tharsis volcanic province near the Martian equator -- a high-elevation expanse shaped by ancient basaltic lava flows and blanketed over billions of years by wind-blown dust and impact debris. Because HiRISE can resolve surface features smaller than a kitchen table from roughly 300 kilometers above Mars, the camera routinely spots individual boulders tumbling down crater walls or scattered randomly across ejecta blankets.

In this patch of Daedalia Planum, however, the boulders are neither random nor confined to steep slopes. Instead, light-toned rocks align in rhythmic, evenly spaced bands that bend smoothly around topographic obstacles, suggesting that a slow, large-scale physical sorting process -- not a single violent impact -- organized the rocks over time.

| Observation Parameter | | Daedalia Planum Boulder Rows |

| Spacecraft & Instrument | | NASA Mars Reconnaissance Orbiter (MRO) -- HiRISE Camera |

| Martian Region | | Daedalia Planum (Tharsis volcanic province, near equator) |

| Row Spacing | | Approximately 5 to 10 meters (16 to 33 feet) between parallel lines |

| Leading Hypotheses | | Ancient freeze-thaw frost heaving (stone stripes) or seismic granular sorting |

Competing Clues: Ancient Frost Heaving or Seismic Shaking?

To figure out how Mars could rake boulders into neat lines without liquid rivers or human hands, planetary geologists look to natural "sorted patterned ground" on Earth. In cold mountain and polar regions, repeated freezing and thawing of water-rich soil causes frost heaving : expanding ice pushes buried stones upward and outward, gradually sorting mixed gravel into strikingly regular polygons, circles, and parallel stone stripes on gentle slopes.

Because Daedalia Planum lies near the Martian equator, where surface ice is unstable today, any frost-heave origin would likely date back to an earlier climatic era when shifts in Mars's axial tilt allowed equatorial snow or ground ice to accumulate and cycle seasonally. An alternative explanation invokes granular convection -- often called the "Brazil nut effect." When a mixture of fine dust and heavy rocks experiences repeated vibrations, such as marsquakes or nearby meteorite impacts, larger boulders gradually work their way upward to the surface and can segregate along subtle subsurface ridges.

Why Solving the Pattern Matters for Martian Climate History

Distinguishing between ancient ice-driven frost heaving and dry seismic shaking is more than a visual curiosity. If future orbital stereo elevation maps and thermal-infrared measurements show that the Daedalia Planum boulder rows formed through freeze-thaw sorting, they would preserve a valuable geological record of past equatorial ground ice on Mars -- helping scientists reconstruct when, and how widely, climate conditions near the Martian equator could support icy soils.

References & Primary Sources

* [1] University of Arizona Lunar and Planetary Laboratory -- High Resolution Imaging Science Experiment (HiRISE) Official Portal. -- https://www.uahirise.org/

* [2] NASA Science -- Mars Reconnaissance Orbiter (MRO) Mission Overview. -- https://science.nasa.gov/mission/mars-reconnaissance-orbiter/

* [3] Keszthelyi, L., et al. (2008). High Resolution Imaging Science Experiment (HiRISE) images of volcanic terrains from the first 6 months of the Mars Reconnaissance Orbiter Primary Science Phase. Journal of Geophysical Research: Planets. -- https://doi.org/10.1029/2007je002968

* [4] Matsuoka, N., et al. (2003). Differential frost heave and sorted patterned ground: field measurements and a laboratory experiment. Geomorphology, 52(1-2), 73-85. -- https://doi.org/10.1016/s0169-555x(02)00249-0