

Marsquake

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In news— Recently, NASA's InSight Mars lander has detected the largest quake ever observed on another planet.

What is Marsquake?

- **A marsquake is a quake which, much like an earthquake, would be a shaking of the surface or interior of the planet Mars as a result of the sudden release of energy in the planet's interior,** such as the result of plate tectonics, which most quakes on Earth originate from, or possibly from hotspots such as Olympus Mons or the Tharsis Montes
- On Earth, quakes are caused by shifts in tectonic plates. **Mars, however, does not have tectonic plates, and its crust is a giant plate.**
- According to NASA, **'marsquakes' are caused due to stresses that cause rock fractures or faults in its crust.**
- NASA's rover first landed on Mars in November 2018, and has since heard 1,313 quakes.
- **The detection and analysis of marsquakes could be informative to probing the interior structure of Mars,** as well as identifying whether any of Mars's many volcanoes continue to be volcanically active or not.
- Quakes have been observed and well-documented on the Moon, and there is evidence of past quakes on Venus.
- **However, marsquakes were not definitely observed until 2019.**
- Compelling evidence has been found that Mars has in the past been seismically more active, with clear magnetic striping over a large region of southern Mars.
- Magnetic striping on Earth is often a sign of a region of particularly thin crust splitting and spreading, forming new land in the slowly separating rifts, a prime example of this being the Mid-Atlantic Ridge.

- The **4,000 km long canyon system, Valles Marineris, has been suggested to be the remnant of an ancient Martian strike-slip fault.**
- **The first confirmed seismic** event emanating from Valles Marineris, a quake with a magnitude of 4.2, was detected **by InSight on 25 August 2021, proving it to be an active fault.**

NASA's InSight-

- The Interior Exploration using Seismic Investigations, Geodesy and Heat Transport mission is a robotic lander designed to study the deep interior of the planet Mars.
- Launched in 2018, InSight is studying what Mars is made of, how its material is layered, and how much heat seeps out of it.
- With InSight, scientists hope to compare Earth and Mars, and better understand how a planet's starting materials make it more or less likely to support life.
- There are other missions to Mars that are looking for life on the planet, which makes InSight's mandate unique.

Other missions on Mars-

- **Some missions studying the possibility of life on Mars include** UAE's Hope, China's Tianwen-1, and NASA's Perseverance.
- India's Mars Orbiter Mission (MOM), also called Mangalyaan, launched by ISRO is a space probe orbiting Mars since 24 September 2014. It is India's first interplanetary mission and it made it the fourth space agency to achieve Mars orbit, after Roscosmos, NASA, and the European Space Agency.