

Offered Title: InSight – Our Next Step to Mars

NASA's InSight has landed! The acronym is short for *I*nterior *E*xploration using *S*eismic *I*nvestigations, *G*eodesy and *H*eat *T*ransport. It is not alone.

Launched on May 5, 2018, InSight was accompanied by two mini-spacecraft called CubeSats named Mars Cube One, or MarCO. More on them below.

We plan to plant a USA flag on Mars in the future, so we need to know as much about it as possible. InSight is taking us a step closer. It landed on November 26th and not being a rover it used a parachute and retrorockets for a soft touchdown. After it runs systems checks to verify instrument integrity InSight will start its science mission.

Previous Mars landers and rovers have spent decades examining Mars' surface, determining its physical and chemical makeup. InSight will check out Mars' interior with several technologies.

SEIS (Seismic Experiment for Interior Structure): A round, dome-shaped instrument deployed on the surface a couple of feet away from InSight, SEIS will detect and measure seismic vibrations. SEIS is also fitted with wind, atmospheric pressure, temperature, and magnetic field sensors. All the SEIS instruments working in concert will help identify the source of vibrations, and nature of material beneath the surface.

HP3 (Heat flow and Physical Properties Probe): Looking like a micro drilling derrick, HP3 is deployed on the surface a couple of feet away from InSight. It will burrow nearly 16 feet below the surface and measure heat radiating from Mars' interior, kind of like a 16-foot thermometer! The information it gathers will help us understand how Mars formed, evolved, and how active its interior is today. HP3 will give scientists a clue whether Earth and Mars formed from the same cloud of solar debris 4.5 billion years ago.

RISE (Rotation and Interior Structure Experiment): An array of antennas, RISE will precisely track InSight's location. A signal sent from Earth is reflected back by RISE to the Earth-bound station. Measuring changes in the signal, called "Doppler shift", will help determine if and how much wobble Mars has in its orbit around the Sun. Wobble information will in turn help determine the nature of Mars' core...liquid or solid. This will also give scientists a clue regarding which elements beside iron might be present in the core. RISE will measure Mars' rotation rate as well, helping us better understand how seasonal changes on Mars affect it.

Now to the CubeSats named MarCO. These little guys are an experiment in communications. They were used to relay data to Earth, from InSight as it landed. Their success means improved interplanetary communication, once they are deployed throughout the solar system.

We're going to Mars and the more we know about it the better.

What's in the Sky?

December 3; pre-dawn; southeast: A waning Crescent Moon, Venus, and the star Spica make a tight triangle

December 8; dusk; southwest: A one day old Crescent Moon is close to Saturn near the horizon