

EnVision: Understanding why Earth's closest neighbour is so different

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EnVision is a proposed orbiter mission aiming at determining the nature and current state of Venus' geological evolution and its relationship with the atmosphere, to understand how and why Venus and Earth evolved so differently. It is one of two M5 mission concepts in Phase A study with a final down-selection expected in June 2021. EnVision's overall science goals are

- to **characterise** the sequence of events that generated the regional and global surface features of Venus, and characterize the geodynamics framework that controls the release of internal heat over Venus history;
- to **search** for ongoing geological processes and determine whether the planet is active in the present era;
- to **characterise** regional and local geological units, to better assess whether Venus once had condensed liquid water on its surface and was thus perhaps hospitable for life in its early history.

EnVision will deliver new insights into geological history through complementary imagery, polarimetry, radiometry and spectroscopy of the surface coupled with subsurface sounding and gravity mapping; it will search for thermal, morphological, and gaseous signs of volcanic and other geological activity; and it will trace the fate of key volatile species from their sources and sinks at the surface through the clouds up to the mesosphere.

EnVision's science payload consists of VenSAR, a dual polarization S-band radar also operating as microwave radiometer, three spectrometers VenSpec-M, VenSpec-U and VenSpec-H designed to observe the surface and atmosphere of Venus, and the Subsurface Radar Sounder (SRS), a High Frequency (HF) sounding radar to probe the subsurface. These are complemented by a radio science investigation which achieves gravity mapping and radio occultation of the atmosphere, for a comprehensive investigation of the Venusian surface, interior and atmosphere and their interactions.

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