

# EnVision M5 Venus Orbiter Proposal

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**EnVision** [1,2] is a Venus orbiter mission that will determine the nature and current state of geological activity on Venus, and its relationship with the atmosphere, to understand how and why Venus and Earth evolved so differently. It is a candidate for ESA's M5 Space Science mission, with strong NASA participation. It is currently in Phase A study; Wnal mission selection is expected in June 2021. If selected, EnVision will launch by 2032 on an Ariane 6.2 into a six month cruise to Venus, followed by aerobraking, to achieve a near-circular polar orbit for a nominal science phase lasting at least 4 Venus days (2.7 Earth years).

The **Synthetic Aperture Radar, VenSAR**, will:

- Obtain images at a range of spatial resolutions from regional coverage to images of targeted localities
- Measure topography from stereo and InSAR observation;
- Characterize volcanic and tectonic activity, estimate rates of weathering and surface alteration; and
- Characterize surface mechanical properties and weathering through multi-polarisation radar, and emissivity mapping.

The **Subsurface Sounder, SRS**, will:

- Characterize the vertical structure and stratigraphy of geological units including volcanic bows; and
- Determine the depths of weathering and aeolian deposits.

The **Venus Spectrometer suite, VenSpec**, will:

- Obtain global maps of surface emissivity in Wve wavelength bands in the near-infrared, to constrain surface composition and inform evolution scenarios; and
- Measure variations of SO<sub>2</sub>, SO and linked gases in the mesosphere, in order to link these variations to tropospheric variations and volcanism.

The **Radio Science & Geodesy** investigation will:

- Constrain crustal & lithospheric structure at Wner spatial scale than Magellan; and
- Measure spin rate and spin axis variations to constrain interior structure.

EnVision will produce a huge dataset of geophysical data of a quality similar to that available for Earth and Mars, so will permit investigation across a large range of disciplines. Lab-based and modelling work will also be required to interpret results from the mission. We therefore invite scientists from across planetary, exoplanetary and earth science disciplines to participate in the mission preparation and analysis of the data.

[1] Ghail R. C. et al., (2016) EnVision M5 proposal, <https://arxiv.org/abs/1703.09010>

[2] [www.envisionvenus.eu](http://www.envisionvenus.eu)

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