ENVISION : EUROPE'S PROPOSED MISSION TO VENUS. T. Widemann[1], R. C. Ghail[2], C. F. Wilson[3], D. V. Titov[4] and the EnVision Team, [1]Paris Observatory, Meudon, France, [2]Royal Holloway, University of London, United Kingdom, [3]Univ Oxford, Oxford, United Kingdom, [4]ESA- ESTEC, Noordwijk, Netherlands.

Introduction: 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. EnVision is one of three ESA M5 missions in Phase A study with a final down-selection expected in June 2021. The EnVision mission is studied in collaboration with NASA, with the potential sharing of responsibilities currently under science, technical and programmatic assessment.

If selected, the proposed mission will launch in late November 2032 on Ariane 62. Following orbit insertion and periapsis walk-down, orbit circularisation will be achieved by aerobraking over a period of several months, followed by a nominal science phase lasting at least 4 Venus days (2.7 Earth years).

EnVision will use a number of different techniques to search for active geological processes, measure changes in surface temperature associated with active volcanism, characterise regional and local geological features, determine crustal support mechanisms and constrain mantle and core properties :

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 flows; and
- Determine the depths of weathering and aeolian deposits.

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

- Obtain global maps of surface emissivity in five wavelength bands in the near-infrared to constrain surface composition and inform evolution scenarios [3]; and
- Measure variations of SO2, SO and chemically-related gaseous species in the mesosphere and nightside troposphere, in order to link these variations to atmospheric dynamics, chemistry and volcanism.

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

- Constrain crustal & lithospheric structure at finer 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, and 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 analysis of the data.

References:

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