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EnVision: understanding why our closest neighbour is so different

Thomas Widemann¹, Anne Grete Straume-Lindner², Adriana C. Ocampo³, Thomas Voirin², Ann Carine Vandaele⁴, Alberto Moreira⁵, Bruce Campbell⁶, Caroline Dumoulin⁷, Emmanuel Marcq⁸, Gabriella Gilli⁹, Jörn Helbert¹⁰, Walter Kiefer¹¹, Lynn Carter¹², Lorenzo Bruzzone¹³, Philippa Mason¹⁴, Scott Hensley¹⁵, and Tatiana Bocanegra-Bahamon¹⁵

¹CNRS Paris Observatory, LESIA, Meudon, France (thomas.widemann@obspm.fr)

²ESA-ESTEC, Noordwijk, The Netherlands

³NASA Headquarters, Washington DC, USA

⁴Royal Belgian Institute for Space Aeronomy (BIRA-IASB), Brussels, Belgium

⁵DLR Microwaves and Radar Institute, Oberpfaffenhofen, Germany

⁶Smithsonian Institution, Washington, DC, USA

⁷LPG, Université de Nantes, France

⁸LATMOS, IPSL, Guyancourt, France;

⁹Instituto de Astrofísica de Andalucía (IAA-CSIC), Granada, Spain

¹⁰DLR Institute of Planetary Research, Berlin, Germany

¹¹Lunar and Planetary Institute, Houston, TX, USA

¹²Lunar and Planetary Laboratory, University of Arizona, AZ, USA

¹³Università di Trento, Italy

¹⁴Imperial College London, UK

¹⁵Jet Propulsion Laboratory, Pasadena, CA, USA

EnVision was selected as ESA's 5th Medium-class mission in the Agency's Cosmic Vision plan, targeting a launch in the early 2030s. EnVision's overarching science questions are to explore the full range of geoscientific processes operating on Venus. It will investigate Venus from its inner core to its atmosphere at an unprecedented scale of resolution, characterising in particular core and mantle structure, signs of past geologic processes, and looking for evidence of past liquid water. Far more than a simple radar mission, this suite of investigations works together to comprehensively assess surface and subsurface geological processes, interior geophysics and geodynamics, and atmospheric pathways of key volcanogenic gases, which together illuminate how and why Venus turned out so differently to Earth. Recent modeling studies strongly suggest that the evolution of the atmosphere and interior of Venus are coupled, emphasizing the need to study the atmosphere, surface, and interior of Venus as a system.

EnVision is an ESA Venus orbiter mission formulated in collaboration with NASA; As a key partner in the mission, NASA provides the Synthetic Aperture Radar, VenSAR. The EnVision payload consists of five instruments provided by European and US institutions. The five instruments comprise a comprehensive measurement suite spanning infrared, ultraviolet- visible, microwave and high frequency wavelengths, complemented by the Radio Science investigation exploiting the spacecraft TT&C system. All instruments in the payload have substantial heritage and robust margins relative to the requirements with designs suitable for operation in the Venus environment. This suite of

instruments was chosen to meet the broad spectrum of measurement requirements needed to support EnVision science investigations.