

# VERITAS

Venus Emissivity, Radio Science, InSAR,  
Topography, & Spectroscopy

## SCIENCE GOALS

- 1** *What processes shape rocky planet evolution?*
  - 1a** What is the global composition and origin of major geologic terrains?
  - 3b** What is the record of prior geologic regimes?
  - 3c** Is volcanism steady (Earth-like) or catastrophic (variable geodynamic processes)?
  - 3d** Is subduction active today, showing how plate tectonics begins?
- 2** *What geological processes are currently active?*
  - 2** Does Venus' young surface have active deformation and volcanism, and geochemical/weathering signatures of recent volcanism?
- 3** *Is there evidence for past and present interior water?*
  - 3a** Are Venus' plateaus like Earth's continents, implying formation in a wetter past?
  - 3b** Is interior water being volcanically outgassed today, implying Earth-like concentrations?

## Mission Overview

Launch Date: May 2025

Venus Orbit Insertion: Dec 2025

3 years of science operations from orbit

>40 Tb of science data returned

## What makes a rocky planet habitable?

*Like Earth, Venus started with all the building blocks of a habitable world.*

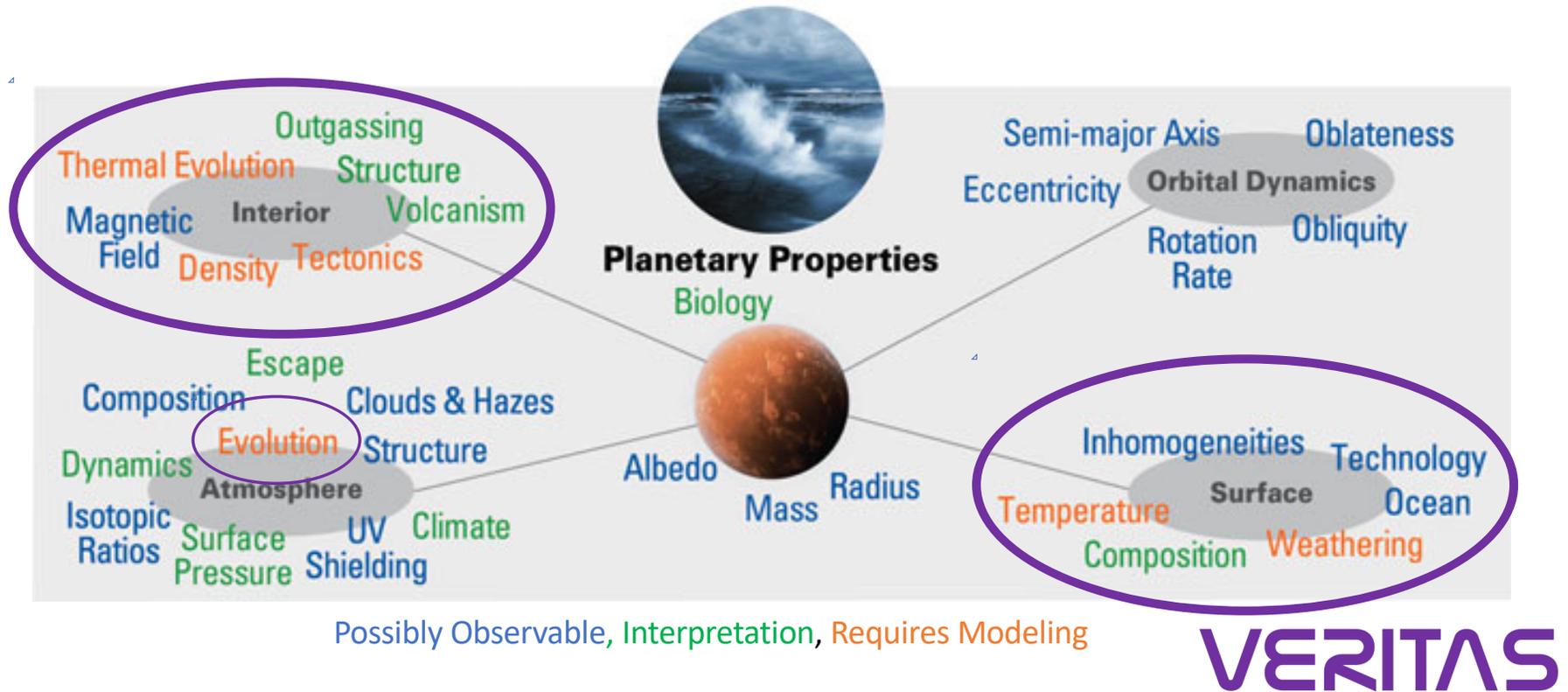
*How was habitability lost?*

## High-Resolution Global Reconnaissance

- 1. VISAR** (Venus Interferometric Synthetic Aperture Radar)
  - Highest resolution global topography for terrestrial planets
  - 1st planetary active deformation map
  - Global data sets:
    - Topography: 250 m horiz, 5 m vertical
    - SAR imaging: 30 m
  - Targeted data sets:
    - SAR imaging: 15 m
    - Surface deformation: 1.5 cm vertical
- 2. VEM** (Venus Emissivity Mapper)
  - 1st near-global map of rock type, iron mineralogy, and surface weathering
  - 6 NIR surface bands with robust SNR
  - 8 atmospheric bands for calibration / water vapor
- 3. Gravity Science Investigation**
  - Global derived elastic thickness, 1st estimate of core size

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# Why Geodynamics is essential for exoplanet studies



Factors Affecting Exoplanet Habitability, Victoria S. Meadows and Rory K. Barnes, Springer Nature 2018  
 H. J. Deeg, J. A. Belmonte (eds.), Handbook of Exoplanets, [https://doi.org/10.1007/978-3-319-30648-3\\_57-1](https://doi.org/10.1007/978-3-319-30648-3_57-1)

# Exoplanet Habitability

- Planetary factors expected to impact habitability
  - Oceans on the planetary surface *Tesserae*
  - Stable secondary atmosphere (incl. volcanic outgassing) *Current Outgassing*
  - Tectonic/volcanic activity & weathering processes to replenish atmosphere *Present & past tectonism & volcanism*  
*Surface weathering*
  - Internal energy budget *Elastic thickness*
  - Magnetic field *Core size and state*
  - Feedback between processes **VERITAS!**

