

## VEIL: A New Frontiers Class Mission Concept for Exploring Venus

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Comparing the present states of the terrestrial planets can lead to new insights into the evolution of habitable regions in our own and other solar systems. As the terrestrial planet closest in size to Earth, Venus is a particularly interesting analogue when considering the future of our own world. Exploration of Venus, however, presents many challenges due to the extreme environments encountered in the atmosphere and on the surface. Here, we describe VEIL (Venus Exploration In-situ Landers), a design concept for an in-situ mission to Venus developed through NASA/JPL's Planetary Science Summer School (2007). The 2003 NASA New Frontiers Announcement of Opportunity and NASA's 2006 SSE Roadmap were used as guidelines for setting the science goals of the mission and developing the architecture. The science goals for the design presented here focus on surface-atmosphere interactions on Venus. The mission architecture includes two descent probes on a fly-by carrier spacecraft to study two characteristic regions on Venus: tesserae and lowlands. In each area, the probes' goals would be to characterize the composition of the lower atmosphere and the mineral composition of the surface, neither of which have been well quantified. Each probe would house five instruments: a GCMS to measure the composition of the atmosphere, a thermal-infrared imaging spectrometer to study the mineral composition of the surface, a Raman/LIBS spectrometer to characterize the mineral and elemental composition of the surface, visible imagers to characterize cloud and surface morphology, and a meteorology package to obtain temperature and pressure profiles of the atmosphere. The probes are optimized for rapid descent through the upper atmosphere in order to minimize time spent in the hazardous sulfuric acid haze layer, and maximize time spent in the lower atmosphere and on the ground. The probes would be expected to spend a total of an hour and forty-five minutes measuring the properties of the lower atmosphere and the surface. A mission of this type might be a necessary step in the development of a future flagship mission to Venus.