

SPACE EXPLORATION SYMPOSIUM (A3)
Solar System Exploration (5)

Author: Mr. David MIMOUN
ISAE-Supaero University of Toulouse, France

Dr. James A. Cutts
National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory, United States

A MISSION FOR PROBING THE INTERIOR STRUCTURE OF VENUS

Abstract

The formation, evolution and structure of Venus remain a mystery more than fifty years after the first visit by a robotic spacecraft. What are the dynamic processes that shape these features, in the absence of any plate tectonics? What is their relationships with the dense Venus atmosphere, which envelops Venus like an ocean? To understand how Venus works as a planet, we now need to probe its interior. Under the auspices of the Keck Institute for Space Studies (**KISS**) a multidisciplinary study team was formed in June 2014 to explore the feasibility of investigating the interior of the planet with seismological techniques.

Conventional seismology employs sensors in contact with the planetary surface that must tolerate the Venus environment (460oC and 90 bars). Present technology allows experiment duration up to a few hours, but any interior structure focused instrument would need to survive weeks to months: this is for now a major technical challenge. On the other hand, the dense atmosphere of Venus efficiently couples seismic energy into the atmosphere as infrasonic waves. It therefore enables the detection of infrasonic waves in the upper atmosphere using either long duration high altitude balloons or orbiting spacecraft. We will describe how these techniques open the path to new mission concepts, and draw a pathway to a dedicated mission for studying Venus' interior structure.