

Research Proposal

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Group 5

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“Survey of Venus inner structure by seismic wave studies”

Venus is one of the most geologically active planets in our solar system as well as it is assumed to be a sister planet of earth, yet we know very little about the planet. This mission aims to detect and resolve the constituents and the inner structure of it.

Venus Express have instruments intended for atmospheric studies of the planet. Because of Venus thick atmosphere it has been proposed that you might be able detect seismic waves that propagates through the atmosphere and can hereby be detected from space. This in turn could give us a rough estimation of the inner structure. Our aim is to pin down the exact structure. This will also give us information about the mechanical coupling between the lower atmosphere and the surface of the planet.

4-5 passive seismic sensors are placed on the surface of the planet, each one capable of sending its data to the orbiting satellite which relays the information to earth. The fact that each sensor has its own transmitter will give us a certain amount of redundancy and increase the probability of success. Each sensor can be made very sturdy to survive Venus extreme conditions for an expected mission duration of 2 months. This time should be long enough to give us enough data to resolve Venus structure. As an benchmark there is a possibility to set off an underground explosion in the initial state of the mission to get data of which we know the onsetting force.

The simplicity of the sensors and their redundancy grants us a high probability of success of a mission that will give us highly needed information about our sister planet.

References:

“Detecting atmospheric perturbations produced by Venus quakes”, Garcia et al, Geophysical research letters, vol 32, L1, 2005

ESA homepage for Venus Express, http://www.esa.int/SPECIALS/Venus_Express/ 2006-01-08