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A proposed Sensor Suite for the Investigation of Electric and Acoustic Phenomena in the Venusian Atmosphere

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The Permittivity, Wave and Altimetry (PWA) experiment, a subunit of the Huygens atmospheric structure instrument, provided a wealth of information on atmospheric electricity, acoustic phenomena, and surface properties during the Huygens mission on Titan. For future Venus entry probes, there is a high scientific interest in the investigation of the same phenomena and parameters. Based on the experience from the successful development, test and flight of the PWA experiment, we propose a miniaturized set of sensors in order to investigate atmospheric electric fields, lightning events, electron and ion densities, and acoustic phenomena in the atmosphere of Venus.

A first design of a possible payload package for atmospheric investigations in the Venusian atmosphere is presented. Sensor candidates and their measurement principles are introduced. The on-board processing of measurement data is described. Lessons learned from the Huygens mission are presented, and conclusions for the design of future sensors are drawn. The instrument and sensor accommodation on an entry vehicle is discussed, and first estimations of mass and power requirements are presented.