



Scientific surveys with planetary aerial vehicles

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A relatively-large number of proposals have been made to explore an extra-terrestrial planet's surface and atmosphere with landers and rovers. A number of landing missions have been realized and successfully deployed on the Earth's moon, Venus, Mars and Titan, including surface rovers in the case of lunar and martian missions. The exploration of objects possessing an atmosphere can be supported by missions including aerial vehicles which for Venus was pioneered by balloons carried by the Soviet VEGA-1 and VEGA-2 spacecraft.

The technical and technological challenges in designing planetary aerial vehicles, whether balloons, airships or aircraft, are to some degree dependent on the information gained from terrestrial-based observation, planetary probes and surveyor satellites placed in orbit around the planet. A further challenge is to be found in the design of instruments and sensors to be fitted to the vehicle, as its scientific payload is a small fraction of its total mass, and the volume and location of the payload within the vehicle is constrained by the latter's configuration. Micro-miniaturization of the payload and its data transmission system and source of energy will certainly be required.

This paper outlines the roles of planetary aerial vehicles, identifies the types of scientific payload they might carry or deploy with respect to the mission and how they might interact with in-place surface infrastructures. Examples of appropriate scientific instrumentation are given.