Phobos/Deimos Effects in the Solar Wind

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Since the Russian Mars mission in 1976 there is an ongoing debate about possible plasma effects which may be caused by the interaction of the solar wind with the Martian moons Phobos and Deimos. One of the most significant phenomena is the detection of large-amplitude plasma and magnetic field disturbances far downstream of Deimos which have been interpreted as crossings of the body's solar wind Mach cone. The idea behind the underlying mechanism is that Deimos forms an effective 'obstacle' by a cloud of neutral atoms or charged fine dust (with a radius of about 150 km) which may exist around it. Relevant observations have been made by Phobos-2 in 1989 and Mars Global Surveyor in 1997. Other indications for dust activity of Phobos and Deimos are based on observations of plasma disturbances by Phobos-2 when the spacecraft crossed the orbit of the moons. Whether neutral gas/dust rings of the moons are present, is the related question. A Phobos/Deimos mission equipped with a magnetometer, a dust detector and high-resolution plasma instruments would bring valuable information helping to understand basic micro-processes in the plasma and dust environment of both small bodies.