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Strong bulk plasma acceleration in the Martian magnetosheath under low Alfvén Mach number solar wind

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The magnetosheath environment around Mars is a key for understanding interactions between the solar wind, the ionosphere, and the induced magnetosphere. The dependence of the magnetosheath plasma on the solar wind Alfvén Mach number (M_A) has been studied statistically, while no detailed study of very low M_A events at Mars has been conducted yet. Here we report MAVEN observations of strong bulk plasma acceleration in the magnetosheath near the ionopause around the terminator under the low M_A solar wind condition ($M_A \sim 2-3$). In these events, the solar wind speed was about 400 km/s and decelerated to 250 km/s at the bow shock, while the speed of the accelerated flows in the magnetosheath was as high as 550 km/s. The interplanetary magnetic field was of the Parker spiral configuration, and the accelerated flows were detected in the -E hemisphere and almost perpendicular to the local magnetosheath magnetic fields. The accelerated flows around the Martian ionopause may be a counterpart of those found in the terrestrial magnetosheath under the low M_A solar wind condition; that is, the strong acceleration may be attributed to both magnetic pressure gradient and tension force. We will discuss the possible effect of the low M_A solar wind on the Martian atmospheric escape in the -E hemisphere, where snowplows can play a substantial role under the typical M_A values.