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## Evidence of strong deformation of the Earth's magnetosphere under low Ma solar wind

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The density of the solar wind (SW) around the Earth's magnetosphere at times decreases to only several percent of the usual value, and such density extrema results in a significant reduction of dynamic pressure and Alfvén Mach number (Ma) of the SW flow. While simple expansion of the Earth's magnetosphere by the low dynamic pressure was assumed in previous studies, a recent simulation study predicted a remarkable dawn-dusk asymmetry of the magnetotail in shape under low Ma SW and Parker-spiral IMF configuration (Nishino et al., Phys. Rev. Lett., 2008). Therefore, direct observations of the magnetopause under these conditions have been awaited. Here we show evidence of strong deformation of the magnetotail under low Ma SW and Parker-spiral IMF conditions, based on Geotail observations on both the dawn and dusk sides. The tail magnetopause on the duskside remained at the usual position despite extremely low dynamic pressure in the SW, while the magnetotail on the dawnside drastically expanded dawnward, both of which are consistent with the simulation result. The strong deformation of the magnetotail can be universal phenomenon, because it is attributed to the extremely low Ma (low beta) SW environment that may also take place around the Earth's magnetosphere passed by coronal mass ejections (CMEs) as well as around Mercury and in the interstellar medium outside the heliopause.

Keywords: low Ma solar wind, solar wind - magnetosphere interaction, deformation of the magnetosphere, Geotail observations, global MHD simulation