



## **Shocked Magnetotail: ARTEMIS Observations and MHD Simulations**

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Interplanetary shocks can cause magnetospheric disturbances on various scales including kinetic and MHD processes. In this paper we study a shock event using ARTEMIS in situ observations and OpenGGCM MHD simulations, which shows how significant effect of interplanetary shocks could be on the magnetotail. The two ARTEMIS spacecraft were located near the tail current sheet and lobe center at  $(-60, 1, -5\text{Re}_{\text{GSM}})$  when the shock arrived and recorded an abrupt tail compression leading to significant enhancements in the plasma density, temperature, magnetic field strength, and cross-tail current density, as well as to tailward flows and current sheet crossings. About 10 min later, the spacecraft entered the sheath solar wind unexpectedly. Two hypotheses are considered: either the tail was cut off by the high solar wind ram pressure ( $\sim 25\text{-}30$  nPa), or the compressed tail was pushed aside by the appreciable downward solar wind flow imposed by the shock. OpenGGMC simulation results confirmed the second hypothesis and revealed that during this 10 min interval, the lobe center moved downward by  $\sim 12$  Re and the tail width in Y was reduced from  $\sim 40$  to 26 Re, which eventually exposed ARTEMIS to the sheath solar wind. Comparisons of plasma and magnetic parameters between ARTEMIS in situ observations and simulations showed a satisfied consistence.