

## The Induced Global Looping Magnetic Field on Mars

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Magnetic fields inconsistent with draped IMFs and crustal fields have been observed on Mars. Considering the discovery of a global looping magnetic field around the Venusian magnetotail and the similarities in the solar wind interactions between Mars and Venus, we use MAVEN observations to investigate the global looping field on Mars and its formation mechanism. It is found that a global looping field also exists on Mars; therefore, this type of global looping field is a common feature of unmagnetized planetary bodies with ionospheres and it should also exist on Titan and near-Sun comets. The comparison of the looping fields on Mars and Venus shows that the looping field is stronger on Mars. Solar wind azimuthal flows around the magnetotail towards the -E magnetotail polar region ( $X_{MSE} < 0, Y_{MSE} = 0, Z_{MSE} < -1R_M$ ) are observed. We illustrate that the looping field can be formed by bending the draped field lines with these azimuthal flows, and that these azimuthal flows are associated with heavy ion plumes along the +E direction that are expected to be stronger on Mars than Venus. The current system associated with the looping field and its possible connection with the nightside ionosphere formations and ion escapes on Mars and Venus are discussed.

Keywords: Mars, Venus, induced magnetosphere, looping magnetic field

