Magnetic pumping at Earth and Mars

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Abstract

Magnetic pumping is a non-resonant wave-particle interaction, allowing the transfer of energy from waves to electrons at magnetohydrodynamical (MHD) scales to kinetic scales. It can cause significant localized heating of ambient electrons and occurs at both magnetized (Earth) and unmagnetized (Mars, Venus) planets. There are many unanswered questions about magnetic pumping - what are the parameter spaces, efficiency and global implications of this process at both types of bodies. Earth orbiting spacecraft (eg MMS) provide plasma observations at unparalleled resolution at the kinetic scales, which are not accessible to interplanetary spacecraft (eg MAVEN or VEX). Thus, comparative study of magnetic pumping at Earth, Mars and Venus, allows us to probe the physical processes across a spectrum of ambient plasma conditions and magnetospheric configurations. We present ongoing case studies of events observed by MMS and MAVEN, focusing on the evolution of the plasma distribution functions.

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