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Cold ions at the dayside magnetopause: implications for magnetic reconnection

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Magnetic reconnection is a key plasma process that couples the shocked solar wind (magnetosheath) to the Earth's magnetosphere. The magnetospheric side of the subsolar magnetopause is often populated by cold (10 eV) plasma of ionospheric origin, in addition to the common hot (10 keV) magnetospheric plasma. The presence of cold plasma mass loads the subsolar region up to several particles per cc. In addition, the ion gyroradius of cold plasma is much smaller than the hot ion gyroradius and introduces a new length-scale into magnetic reconnection and its associated processes. Finally, the cold plasma is heated inside the separatrix region of magnetic reconnection, although this mechanism is not always present. We present MMS observations of magnetic reconnection with the presence of ionospheric cold plasma and investigate the heating mechanisms as well as their implications for the global energy budget.