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Observations of cold ion heating inside the magnetospheric separatrix region

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Several studies have shown that cold ions (energies up to tens of eV) of ionospheric origin can be found in different regions of the magnetosphere, including the dayside magnetopause. They can be very abundant, up to $\sim$100 cc, e.g. plasmaspheric plumes, and become the dominant population of the magnetosphere. Cold ions, when present, participate in magnetic reconnection at the dayside magnetopause, mass loading the magnetospheric side and adding a new length-scale into the system owing to their smaller gyroradius. At the same time, reconnection accelerates and heats the cold ions. Based on multi-spacecraft observations, we report observations of cold ion heating inside the separatrix region when reconnection is ongoing and study the mechanisms that energize the cold ions. The heating is not always observed and our observations indicate that cold ion heating is more effective next to the X-line. We find that large electric field gradients and wave-particle interactions are consistent with the heating observed.