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Ion heating by Alfvén waves associated with dipolarization in the magnetotail: Two-dimensional global hybrid simulation

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In this paper, ion heating by Alfvén waves associated with dipolarization in the near-Earth magnetotail is investigated by performing a two-dimensional (2-D) global-scale hybrid simulation. In our simulation, the earthward-propagating plasma flow is initialized by the electric drift near the equatorial plane due to the existence of the dawn-dusk convection electric field. When the earthward flow reaches the strong dipole field region, it is braked by the geomagnetic field, and simultaneously leads to the pileup of the magnetic flux. This continuous pileup finally results in the formation of the large-scale dipolarization. Dipolarization firstly appears around near_Earth and subsequently spreads tailward. In the dipolarization region, Alfvén waves are excited and cause the scattering and heating of ions. The heating is mainly on the perpendicular direction. Therefore, the ion temperature anisotropy can be formed in the dipolarization region. Our work provides one possible mechanism for the ion heating and anisotropic distributions observed near the dipolarization region.