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Numerical simulation of Oxygen energization at high latitude magnetopause

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During the Cluster magnetopause crossing of February 13, 2001, a population of singly charged oxygen ions of ionospheric origin was observed, with temperature corresponding to 10 KeV and energy of bulk motion corresponding to 20-30 keV. In this work we explore the possibility that oxygen energization is due to the combine effect of the cross magnetopause electric field En and the observed magnetic turbulence. A numerical simulation is performed in which the oxygen ions are injected into a model magnetic structure mimicking the observations, plus a realization of magnetic turbulence. We find that both oxygen heating and direct acceleration are possible if both the electric field En and a realistic level of turbulence are present. Comparison with the same kind of simulation for protons shows that oxygen transport and direct acceleration are favoured by the large oxygen Larmor radius.