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Alfvén waves in the near-PSBL lobe: Cluster observations

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The Cluster spacecraft sometimes observe electromagnetic fluctuations in the magnetospheric lobe just before the fast PSBL crossing. The frequency range of those fluctuations is in the ULF range (3-10 mHz: 50-180sec) and perpendicular fluctuations are dominant.

Using electric field (EDI) and magnetic field (FGM) observations, we found that the Alfvén waves are generated near the reconnection site or the boundary layer, propagate earthward almost along the field lines even in the lobe. Moreover, the propagating waves prefer O+ rich conditions (O+ density is often larger than proton density), likely because the higher O+ density lowers the Alfvén velocity, which is in proportion to dE/dB.