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Modelling of electron acceleration structures above the polar caps

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Observations aboard the 4 CLUSTER spacecraft revealed the presence of accelerated electrons associated with ions acceleration structures above the polar caps. By comparison with the auroral zone, these events occur during period of northward IMF, on open magnetic field lines and at high altitude, about 5 RE. We aim at determining the sources of these accelerated electrons and the origin of the acceleration structures. As suggested by the observations, we start with electrostatic potential drops aligned along the magnetic field lines. We then compute the particle field-aligned motion from sources, in the ionosphere and in the distant magnetosphere/boundary layers, up to the measurement site. An iterative method of data fitting allows us to propose a plausible distribution for the field-aligned potential along magnetic field lines.