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A statistical survey of the electric field Z(GSM) component in the plasma sheet based on Cluster data

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This poster presents results from a statistical survey of the electric field Z_{GSM}-component in the plasma sheet. The electric field is estimated by using Cluster magnetic field and ion data, and by assuming the validity of $\mathbf{E} = -\mathbf{v} \times \mathbf{B}$. The data is from the 2002 Cluster tail season. Such electric fields may be connected with Hall effects in the diffusion region. In a current sheet thinner than the ion inertial length ions are demagnetized while electrons will continue to convect if an electric field is present. This creates charge separation and a second electric field perpendicular to the first. Such Hall-effects may play an important role in collisionless reconnection in the magnetotail. It will result in current loops with one field aligned current away from (towards) the X-line upstream (downstream) of the separatrix. These current loops and the second electric field may extend to large distances from the reconnection site and, on the earthward side, actually close in the ionosphere. In the part of the plasma sheet where the magnetic field elevation angle is small, this electric field will be mainly north-south aligned. This study will primary focus on the scale size in the north-south direction of this electric field. This is found by estimating the linear gradient perpendicular to the magnetic field of the E_{Z}-component from the measurements of the three spacecraft which have ion data.