Review of Manuscript angeo-2018-31: “Dynamics of the electrojet during intense magnetic disturbances” by L. I. Gromova et al.

In the manuscript the authors analyze total magnetic field data from the CHAMP satellite during six periods of magnetic storms with respect to the relation between the phases of the storms and those of the polar and auroral electrojets. A somewhat complex procedure allows deriving sheet current densities of the Hall currents flowing underneath the spacecraft. The measurements were made during Northern summer periods and stem from noon-midnight as well as dawn-dusk crossings of the spacecraft. The main products consist of correlations between the measured Hall current locations and strengths with auroral and ring current activity as quantified by various geomagnetic indices. The results allow some interesting insights into the mutual dependences or lack of them.

The presented text contains some valuable data deserving publication. However, the presentation is too detailed and tedious to read. The main products are well presented in Figures 4 to 7 and their discussion appropriate. However, the conclusions are not concise, but rather repetitive of the earlier description of the data. One misses interpretations in terms of the build-up of the asymmetric and symmetric ring currents and the role played in that by the high-latitude magnetosphere as indicated by the behavior of the polar and auroral electrojets. I recommend to encourage the authors to shorten strongly Abstract, Introduction, and Conclusions and concentrate in the latter on the meaning of the most striking correlations.

Two additional comments.

The polar and auroral electrojets are treated as if there was no relation. One is missing a reference to the Region 1 and 2 field-aligned current systems.

Pages 17 and 18 contain estimates of electric field penetration from the solar wind into the magnetosphere. The authors seem to take this concept literally. There is no direct electric field penetration. There is reconnection and maybe some viscous interaction by plasma waves between the solar wind and the Earth’s magnetic field. Thereby forces are being transferred via magnetic shear stresses. The direction of By matters of course. Electric fields inside the magnetosphere stem from the application of these stresses to the ionospheric plasma. Therefore, the calculated percentages of electric field transfer from a partial magnetic field component are meaningless.