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Interactive comment on "Dynamics Geomagnetic Storm on 7–10 September 2015 as Observed by TWINS and Simulated by CIMI" *by* Joseph D. Perez et al.

Anonymous Referee #2

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This manuscript shows comparisons between models and observations of the pressure peaks in the inner magnetosphere during a storm event. The comparison reveals both consistency and significant differences between the observations and model predictions. The authors discussed the possible cause of the difference (i.e., the missing transient structures in the simulation). The results of this manuscript are important for future improvement of models. However, there a few points that I would suggest the authors to address before I recommend the manuscript for publication:

- Line 276: varies -> vary

- Line 399-400: The authors start the sentence with both electric and magnetic shield-

ing but only explain magnetic shielding (gradient curvature drifts) in the later half of the sentence. The electric shielding is caused by the closure of region 2 current through the ionosphere, which creates a Peterson current, and thus electric field at lower latitudes than the region 2 current. This electric field, when mapped to the inner magnetosphere, cancels the original cross-tail electric field, so particles cannot ExB drift closer to Earth (see, e.g., Jaggi and Wolf, 1973). The electric shielding is more effective for low-energy particles. I do not think it is very important for the energy range which the authors are interested in.

- Line 455, and Line 547-548: 'parallel pitch angle anisotropy . . . first adiabatic invariant as they enter the inner magnetosphere': The conservation of first adiabatic invariant says that when a particle moves to a stronger magnetic field, it will have more perpendicular energy. Thus, the perpendicular anisotropy should increase instead of the parallel.

- Line 512-Line 527: This paragraph makes a strange comparison. To find the origin of the multiple pressure peaks, the authors uses particle tracing in the model, which does not have the multiple pressure peaks. As the authors said, the reason why the model cannot reproduce the observed multiple peaks is that there may be transient, small-scale structures that do not show up in the model. These structures can change the particle trajectory significantly. Therefore, the trajectories shown in the manuscript does not bear much useful information in explaining the multiple pressure peaks.

Line 537-538: '. . . indication of enhanced electric and magnetic shielding in the observations': How can you which of these two is effective from observation? As I commented above, the electric shielding may be not very effective for the energy range considered by the authors.

Figure 2a: Which MLT is this panel showing? Figure 2b: Which radial distance is this panel showing?

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