

¹ **Effects of Anomalous Electron Heating in simulations
of the March 17, 2013 Geomagnetic Storm**

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³ **Abstract.** Examines the impacts of including Anomalous Electron Heat-
⁴ ing (AEH) in simulations of to the geomagnetic storm that occurred on 17
⁵ March 2013. We see many cool things.

1. Introduction

6 Here we will need to include a background

2. Simulation Setup

7 This section discusses the simulation setup for the study. Need to address how LFM-
8 RCM works for situtaions with dipole tilt. Need to discuss the implmentation of the AEH
9 term. And finally the setup for the 17 March 2013 event.

2.1. LFM-RCM

10 This section covers how LFM-RCM has been modified to work for dipole tilts.

2.2. AEH Implementation

11 Here we discuss how the AEH term has been included in the simulation.

2.3. 17 March 2013 Event

12 Here we talk about the conditions during the event

3. Analysis of results

13 In this section we examine impact of the using AEH.

3.1. Baseline versus AEH

14 Possible figures include

3.2. Comparison with DSMP

15 Here will discuss SAPs and the comparison with the DSMP results.

3.3. Comparison with AMPERE

16 Here will discuss the results and compare them with AMPERE

3.4. Comparison with TS07-D

¹⁷ May include a comparison with pressures in the ring current depending on length
¹⁸ and quality of comparison.

4. Summary and Future Directions

¹⁹ Our SAPS are the best!

²⁰ **Acknowledgments.** This material is based upon work supported by NASA grants
²¹ NNX13AE39G, NNX13AF82G, NNX12AD31G, and NNX13AF78G. The National Center
²² for Atmospheric Research is sponsored by the National Science Foundation. All model
²³ output, simulation codes, and analysis routines are being preserved on the NCAR High
²⁴ Performance Storage System and will be made available upon written request to the
²⁵ lead author of this publication. The computations were performed on Kraken through
²⁶ an allocation of advanced computing resources provided by the Extreme Science and
²⁷ Engineering Discovery Environment (XSEDE), which is supported by NSF grant OCI-
²⁸ 1053575.

References

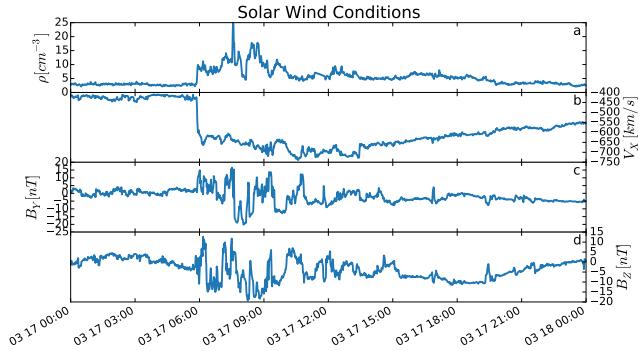


Figure 1. Solar wind and IMF conditions during the 17 March 2013 geomagnetic storm event. Panel a) shows the number density, b) the V_X in GSM coordinates. The IMF GSM Y and Z values are plotted in panels c) and d) respectively.

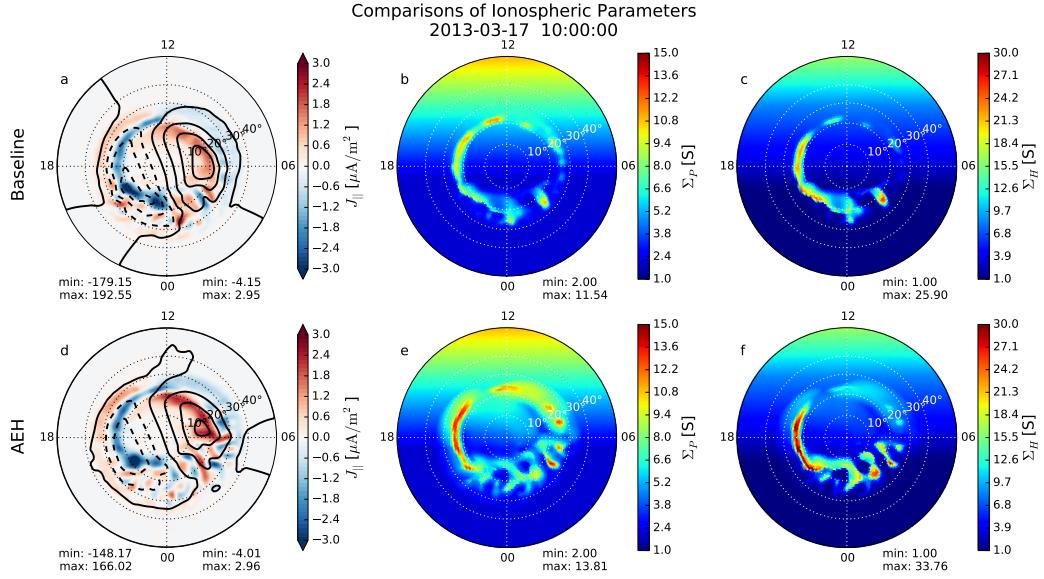


Figure 2. Comparison of FAC and CPCP as well as Pedersen and Hall conductivities for the Baseline and AEH simulations of the 17 March 2016 geomagnetic storm. The top row (panels a-c) contains the results from the baseline simulation while the bottom row (panels d-f) contains the results of the simulation with the AEH enabled. The first column (panels a and d) has the FAC in color with blue being upward and red being downward as well as the CPCP pattern with 20 kV contours. The middle column (panels b and e) contains the Pedersen conductivity. The last column (panels c and f) contains the Hall conductivity. The colorbar for all conductivity plots is the same.

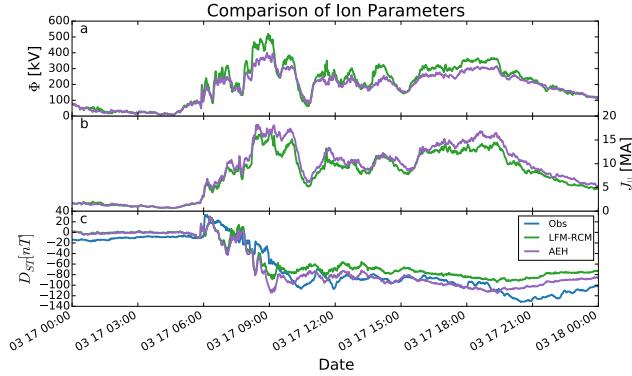


Figure 3. Comparison of the CPCP, FAC, and D_{ST} time series for the storm event for the Northern hemisphere . Panel a at the top shows the CPCP in kV. The middle panel (b) has the integrated FAC. Panel c at the bottom has the D_{ST} index. In each panel the LFM-RCM results are shown with the green line, the AEH results with the purple line. In the bottom panel the D_{ST} obtained from CDAWeb is plotted in blue

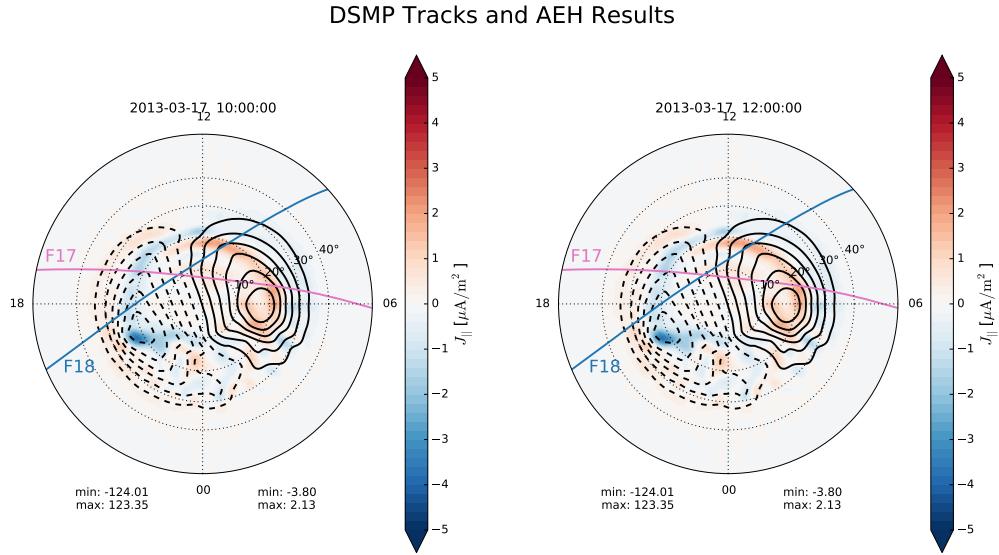
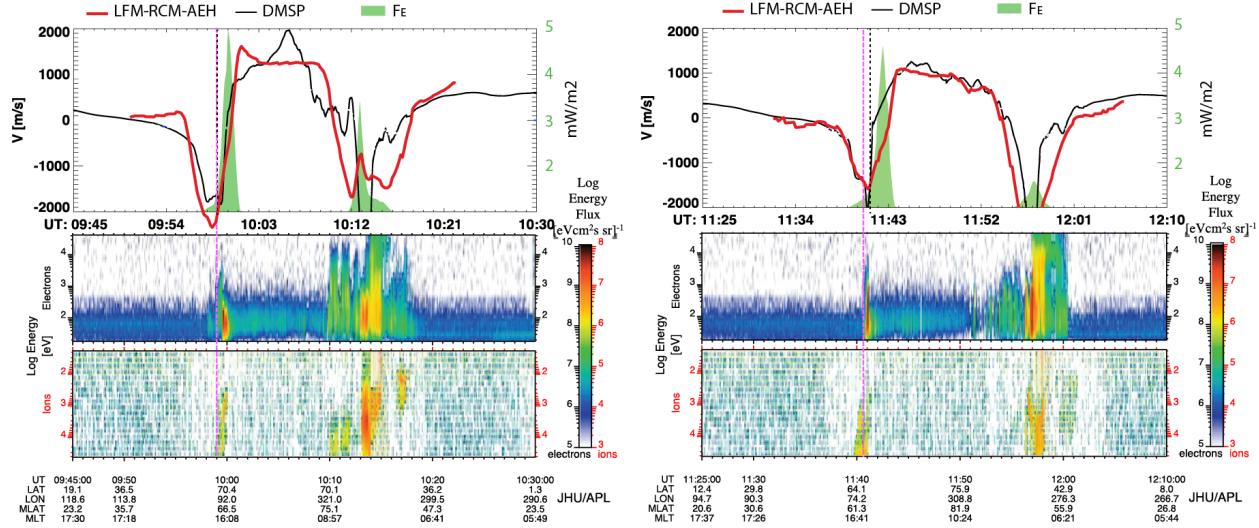
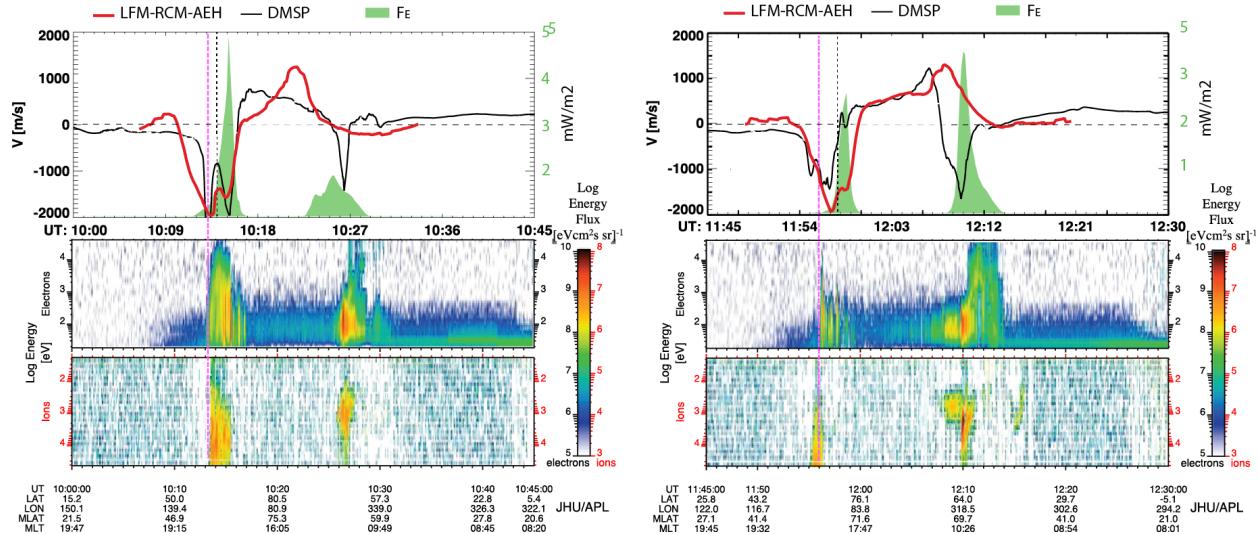


Figure 4. DSMP F17 and F18 trajectories overlaid onto AEH FAC and CPCP patterns. Panel a shows the F17 trajectory between 0945 and 1030 UT and the F18 trajectory between 1000 and 1045 UT overlaid on top of the AEH simulation results for 10:00UT. Panel b shows the F17 trajectory between 1125 and 1210 UT and the F18 trajectory between 1145 and 1230 UT overlaid on top of the AEH simulation results for 12:00UT. In each panel the F17 trajectory is pink and the F18 trajectory is blue.

**Figure 5.** Temporary Figure comparing DMSP F17 results.**Figure 6.** Temporary Figure comparing DMSP F18 results

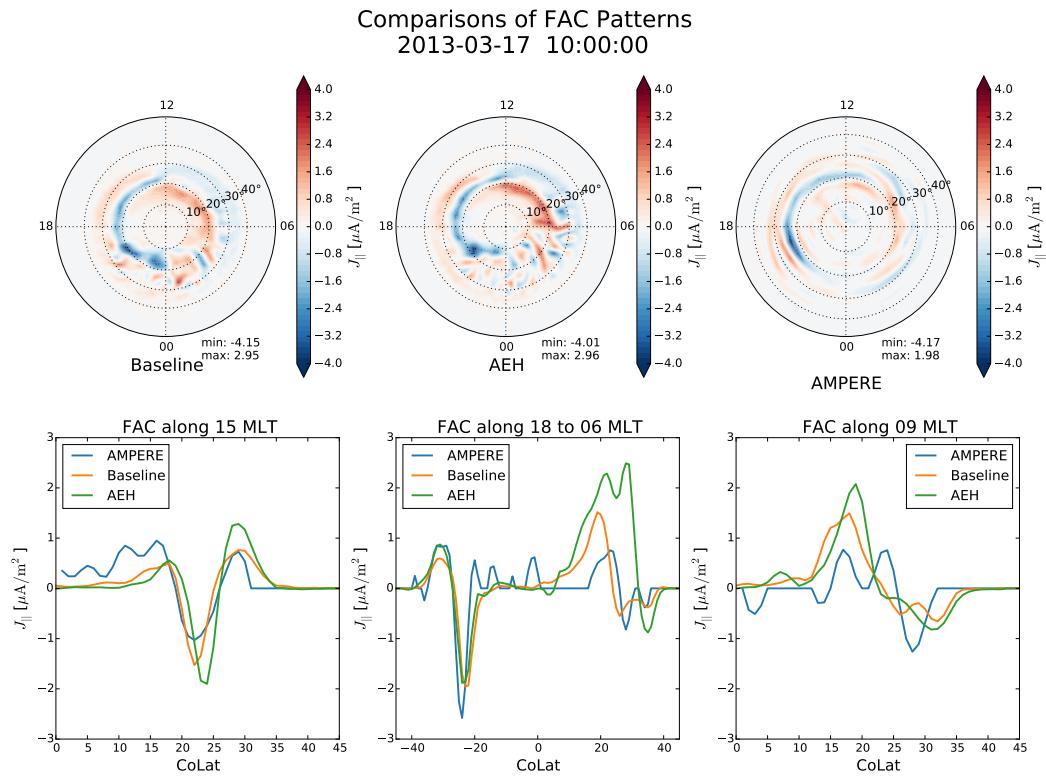


Figure 7. Temporary Figure comparing AMPERE and LFM-RCM

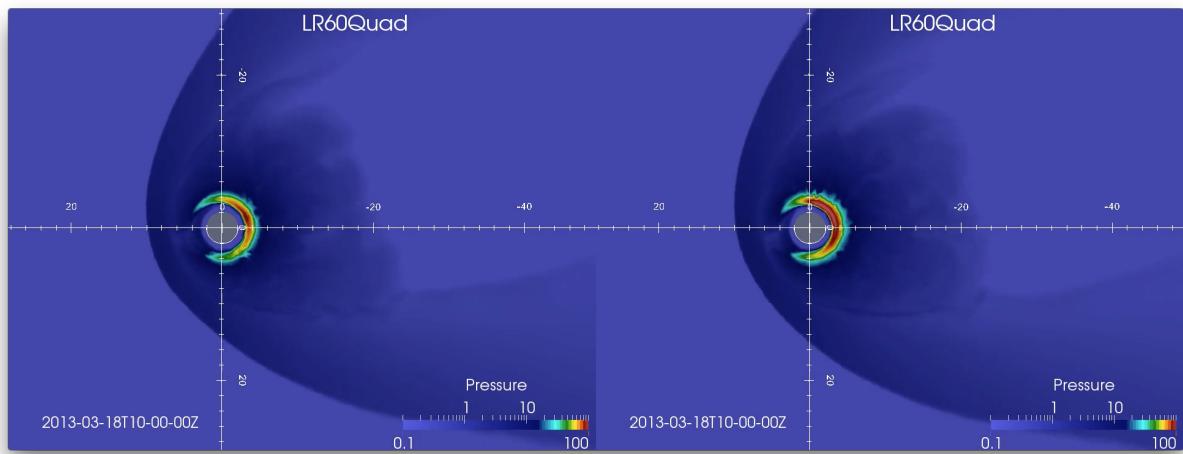


Figure 8. Temporary Figure comparing Baseline and AEH pressures