Goals

The September 10, 2017 event produced a long-lasting and intense plasma sheet. We seek to perform detailed thermal analysis of plasma sheet region by:

- Utilizing the differential emission measure to characterize plasma conditions
- Observe the thermal energy over time to determine thermal processes contributing to sustained plasma conditions.

Process

Accurately determine the length of the current sheet region (see figure 1) using AIA intensity plots of 193A wavelength.

Calculate the differential emission measure using regularized DEM algorithm demonstrated in Hannah & Kontar 2012.

Derive key parameters from the differential emission measure that characterize the plasma sheet region (see figure 2).

Plot the thermal energy as a function of time. Compare to expected conductive cooling and radiative loss rates (see figure 3).

Conclusion

- In the current sheet region, key parameters such as the emission measure and emission measure weighted average temperature remain relatively constant as a function of time.
- Results show there is no substantial decrease in the total thermal energy over time as the current sheet evolves.
- The minimal change in temperature and the thermal energy contradicts what is expected from conductive cooling and radiative loss rates.

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