

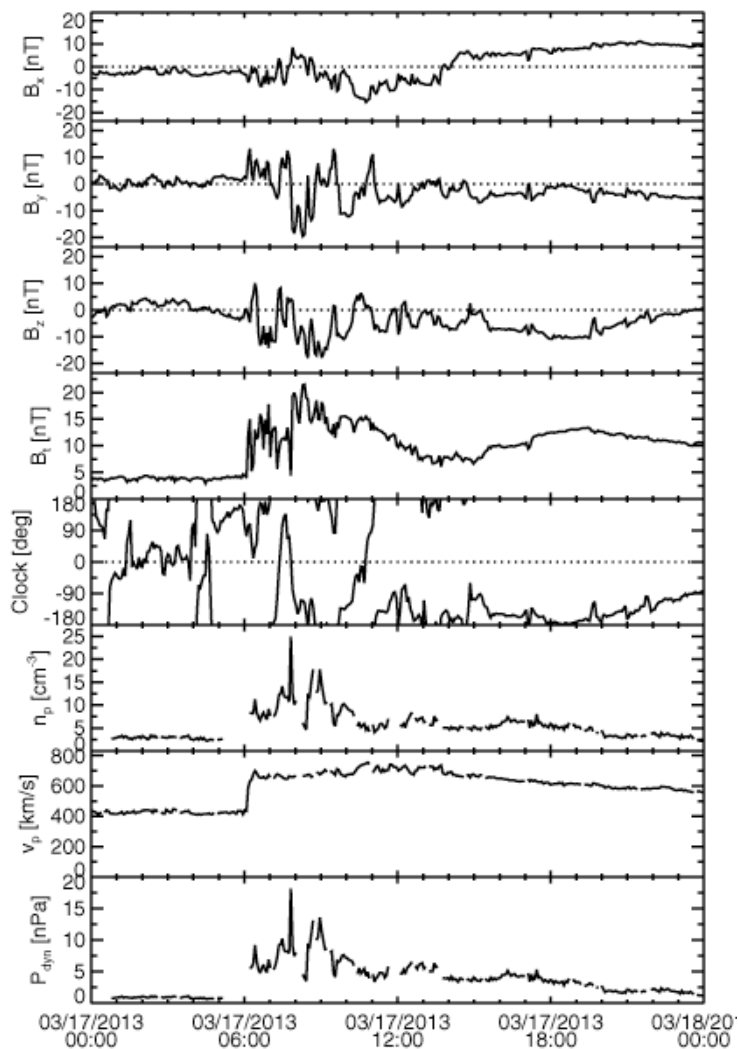
AMPERE – Model Comparison: 17 March 2013

H. Korth, B. J. Anderson, R. J. Barnes, C. L. Waters

GEM Workshop, Santa Fe, NM

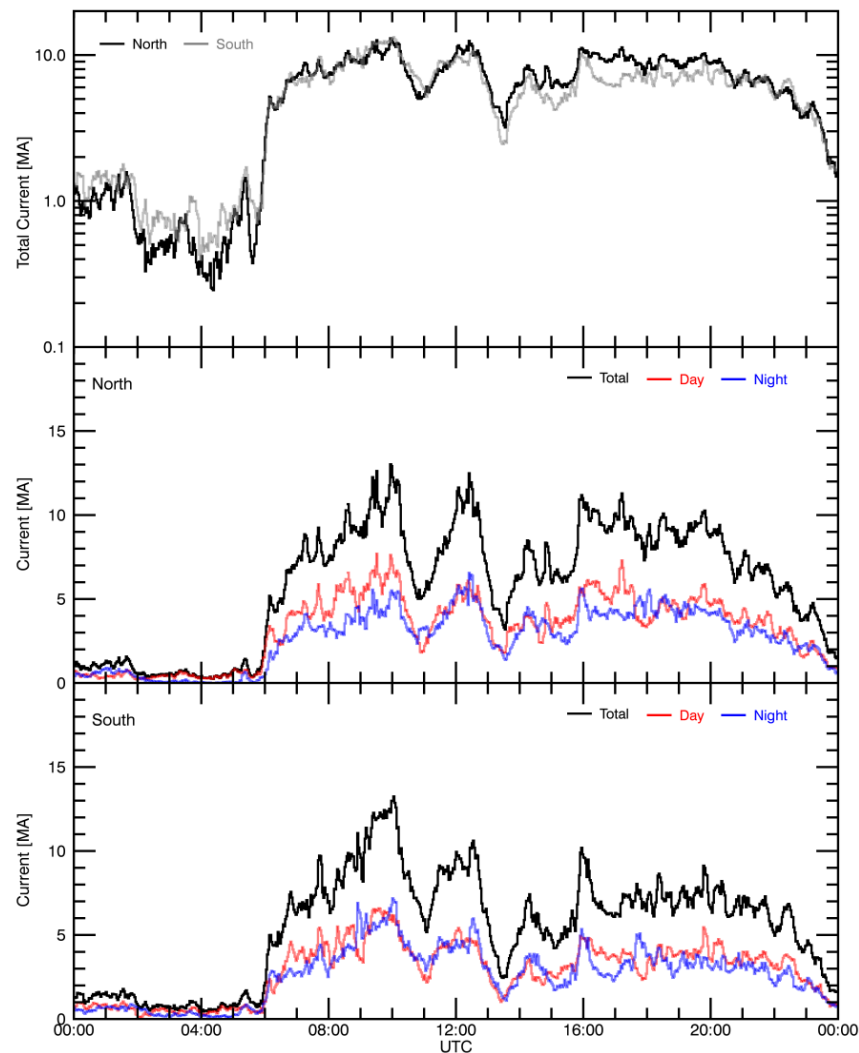
16-18 March 2015

ACE, shifted by 42 min



AMPERE

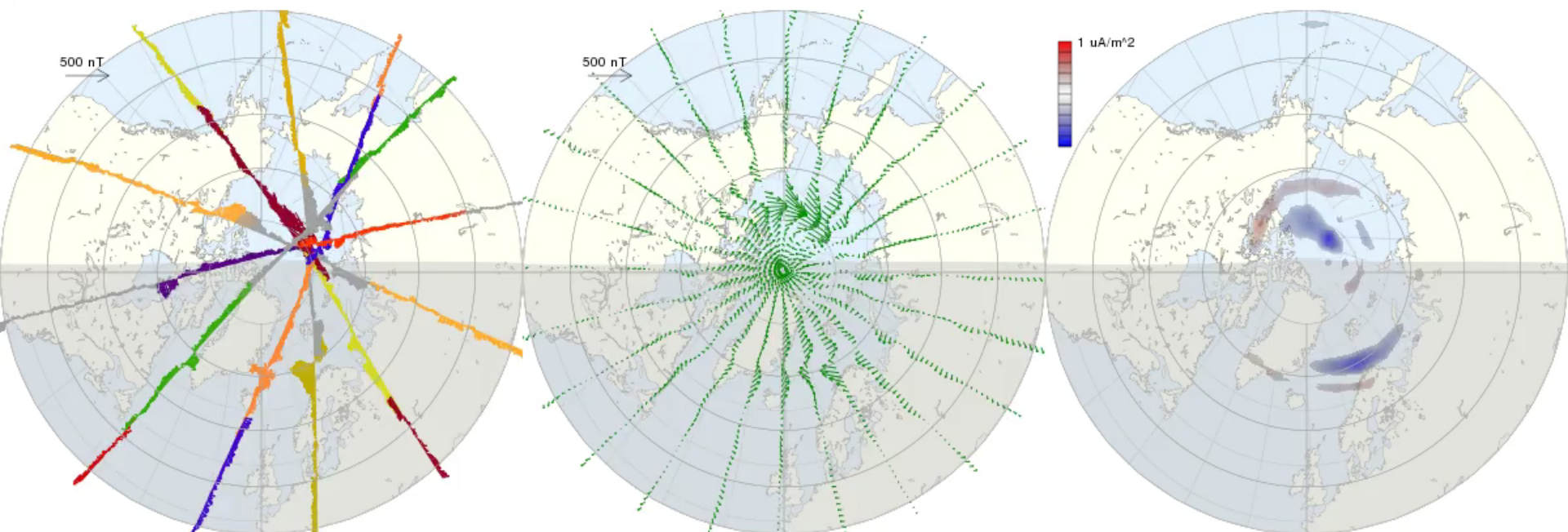
AMPERE Total Current: 20130317



AMPERE Summary Movie

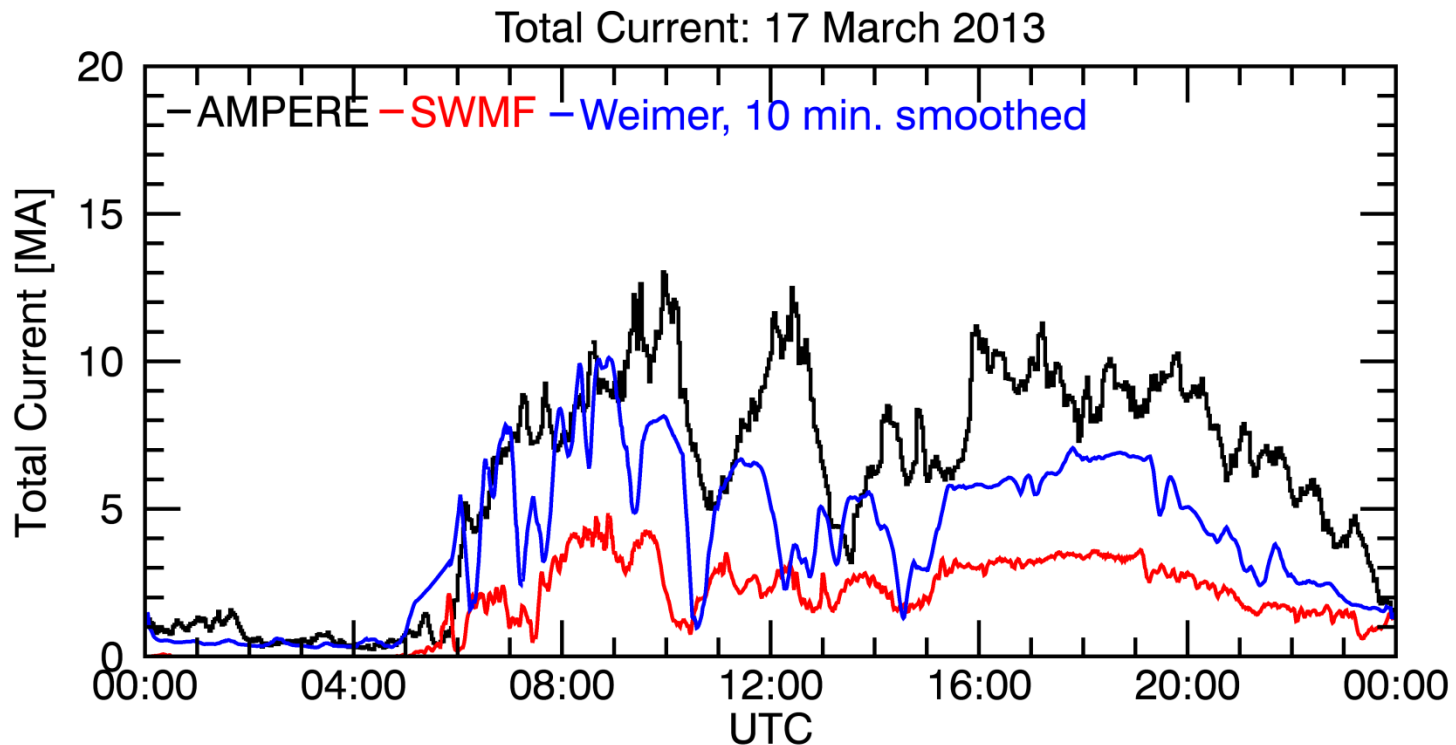
- Panels: Observed (left) and fitted (middle) magnetic perturbations; radial current density (right).
- Features: Onset intensification, equatorward expansion, variable current intensity during main phase, IMF By control of dayside currents.

17 Mar 2013 00:00:00 - 00:10:00 UT



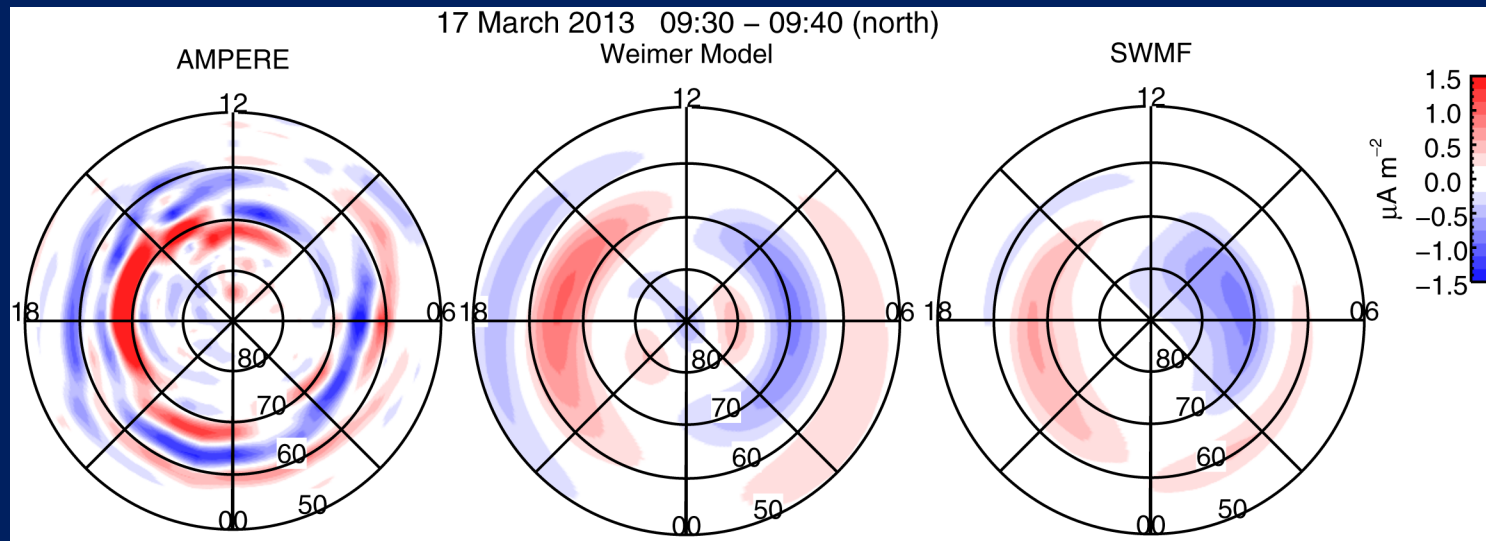
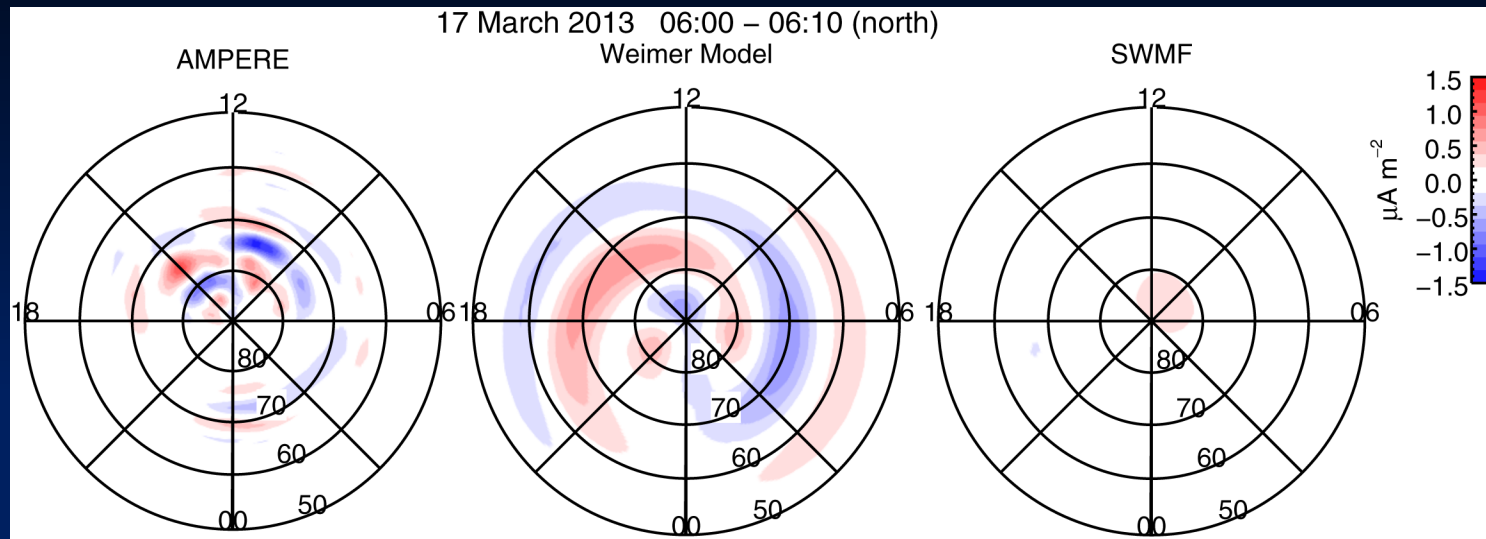
Total Current

- SWMF total current is about 0.3-0.5 that measured by AMPERE lower than AMPERE.
- Weimer is usually lower than AMPERE. Direct/immediate coupling to IMF/SW leads to short transitions that are not observed.
- Note: AMPERE believed to underestimate actual total current; ΔB -fit max is about half of the observed ΔB .



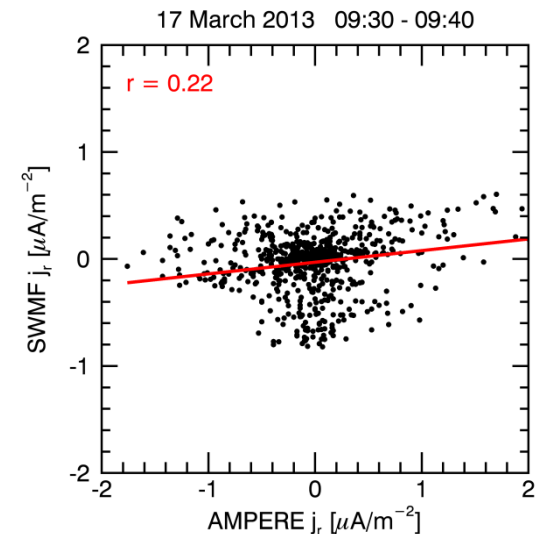
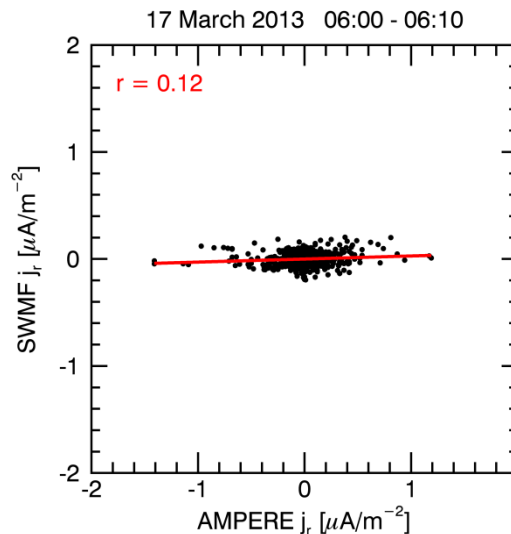
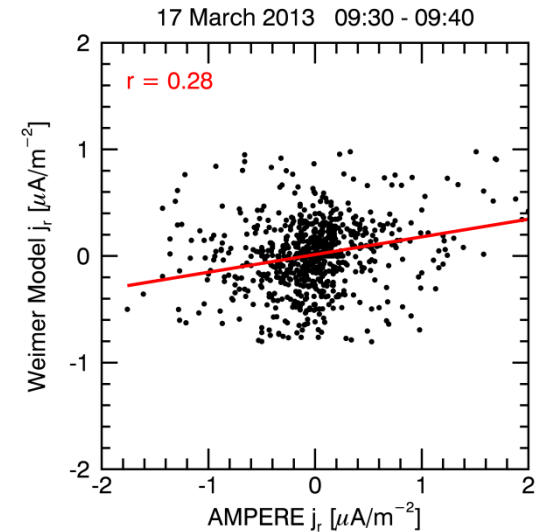
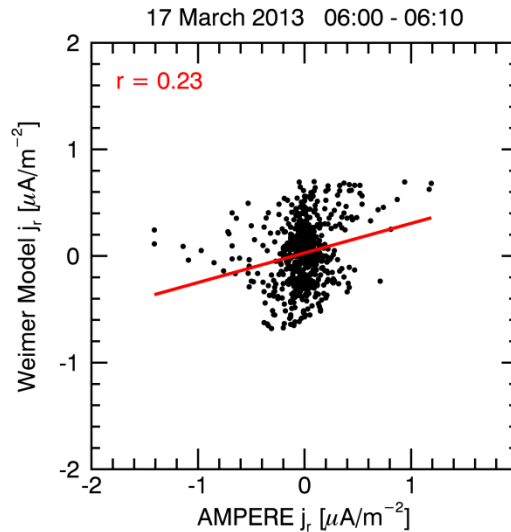
J_r Distribution

- Initial currents are not in the right place.
- Model distributions are about 10 deg too broad.
- Weimer extends too far equatorward; the polar cap currents are not real.
- SWMF extends currents too far poleward.



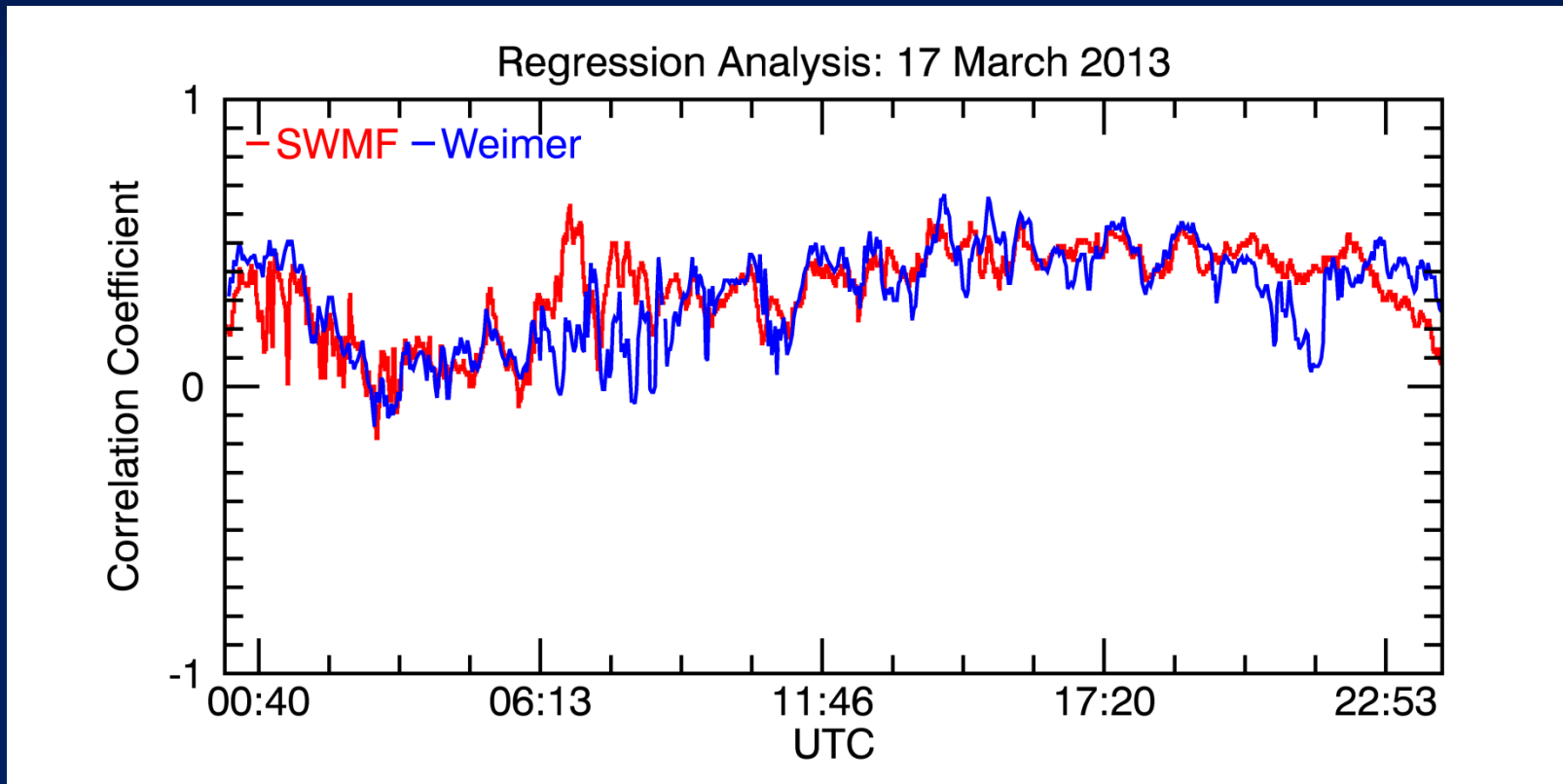
J_r Correlation

- Mismatch in locations leads to generally low correlation.
- AMPERE current densities tend to be ~50% higher.



J_r Correlation Time Series

- Correlation is positive (nice!) but is typically below 0.5 implying that typically less 25% of the J_r are consistent (room for improvement!).





Backup

Birkeland Current Analysis

- Vector magnetic perturbation data, δB .
- Continuous δB map via spherical harmonic fit.
- Field-aligned current density, J_r , from Ampere's law applied to horizontal δB .
- Time cadence: 9 min, set by inter-spacecraft separation.
- Latitude resolution: 1.15° for 19.44 s sampling, 0.13° for 2.16 s sampling.

