Comparison of IT responses to solar wind driving during March storms in 2013 and 2015

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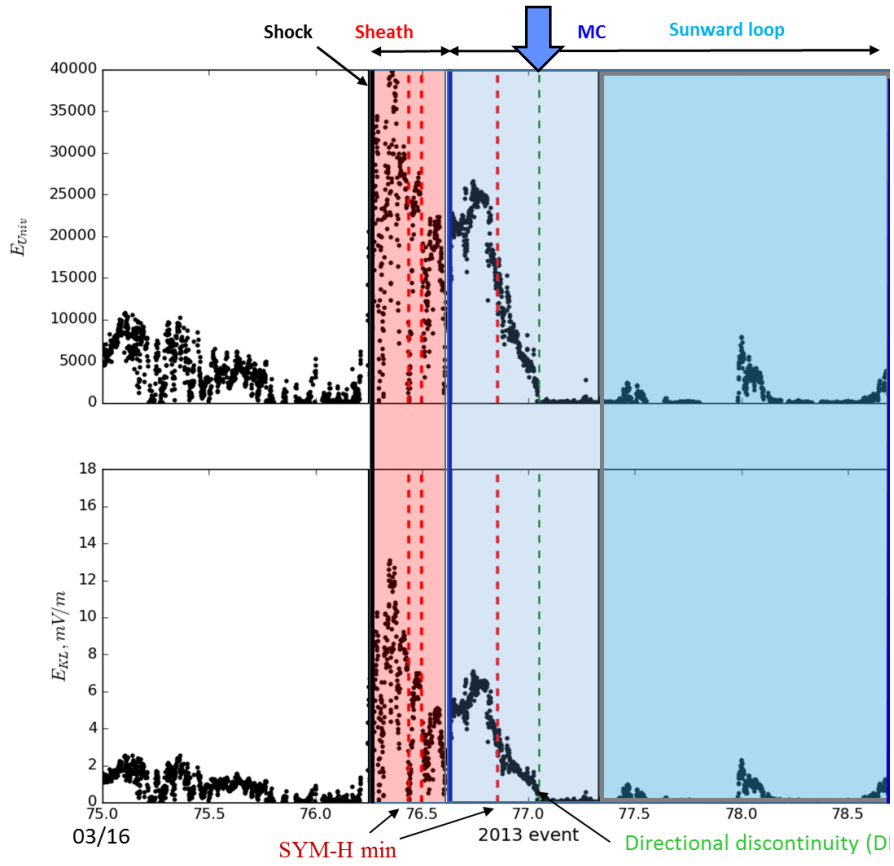
Solar wind – magnetosphere coupling in March 2013 and 2015 storms

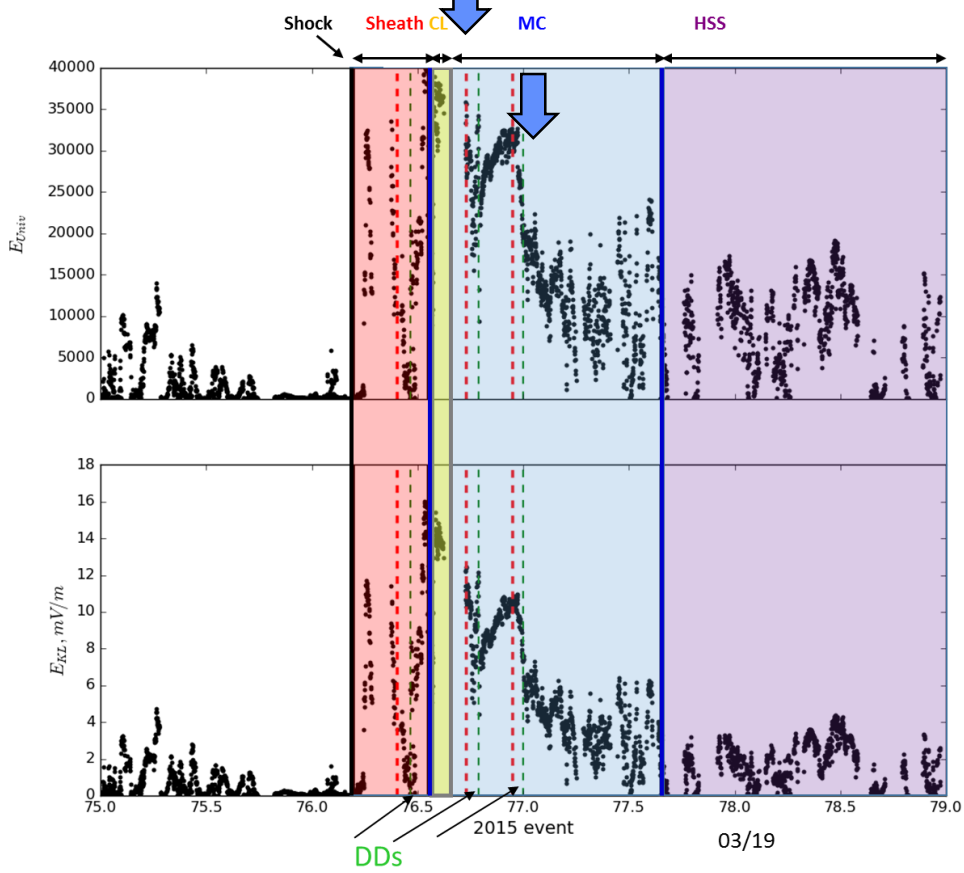
2013

cessation of coupling



2015

decreases in coupling at DDs



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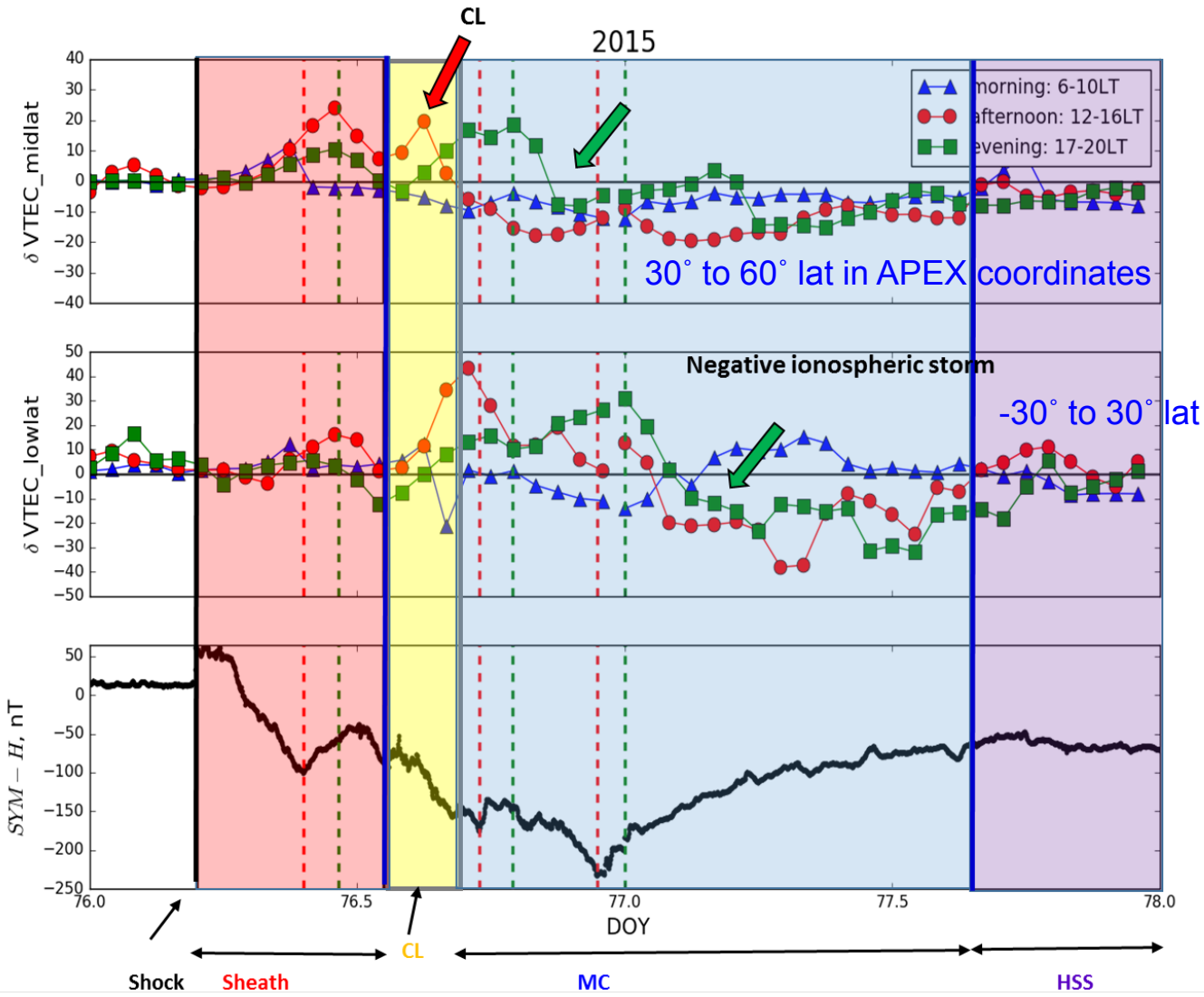
(Verkhoglyadova et al., submitted to JGR, 2016)

Coupling can change at directional discontinuities (DDs)!

VTEC dynamics for March 2015 storm

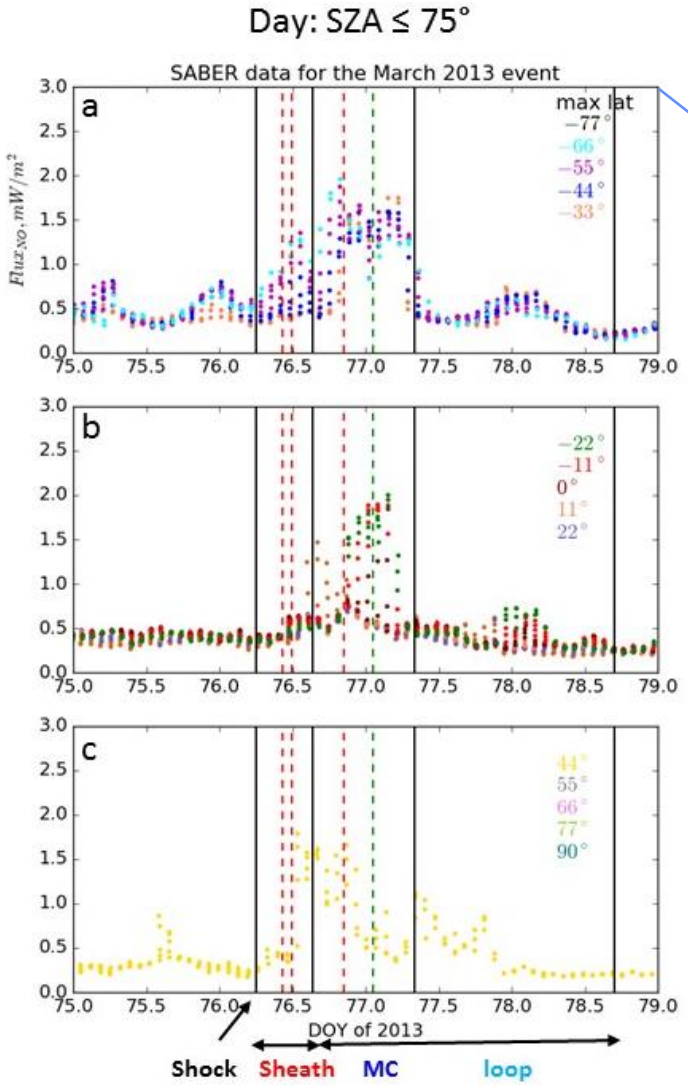


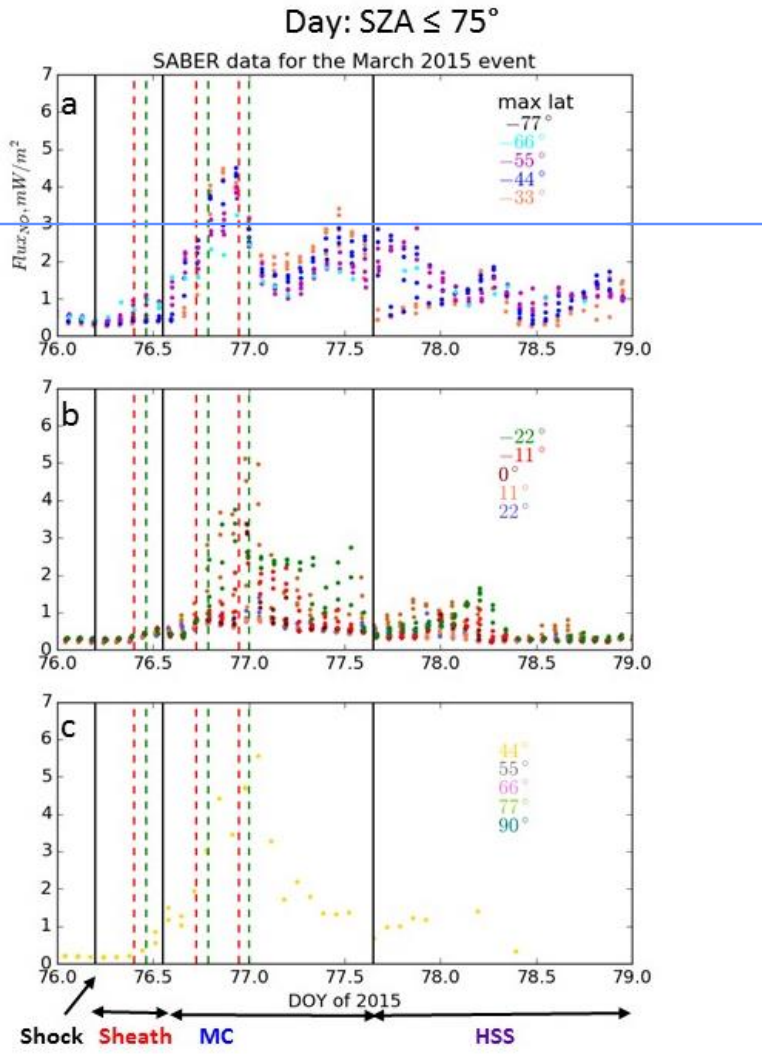
- TEC cluster analysis is based on averaged VTEC every hour within the LT and LAT ranges;
- δVTEC relative to a quiet-time;
- Using ~2000 GNSS ground sites around the globe (*Komjathy et al., 2005*)

Each point ~ $10^3 - 10^6$ measurements;
Fixed LT, ΔUT=1hr

NO cooling emission from TIMED/SABER

11 degree binning in latitude - > averaged emission in each latitude bin every 1.5 hr !





Conclusions/Discussion:

1. **Importance of solar wind structures** for understanding the solar wind – magnetosphere coupling (directional discontinuities can mark a change in coupling efficiency)
2. **Importance of solar wind structures** for understanding ionospheric dynamics (VTEC) and thermospheric NO cooling;

How can we quantify solar wind – IT coupling (input/output)?

Directly driven IT system vs preconditioning?

Does the saturation in IT storm response occur? (see Myllys et al., JGR, 2016 on saturation of the solar wind – magnetosphere coupling)

- *negative storm*