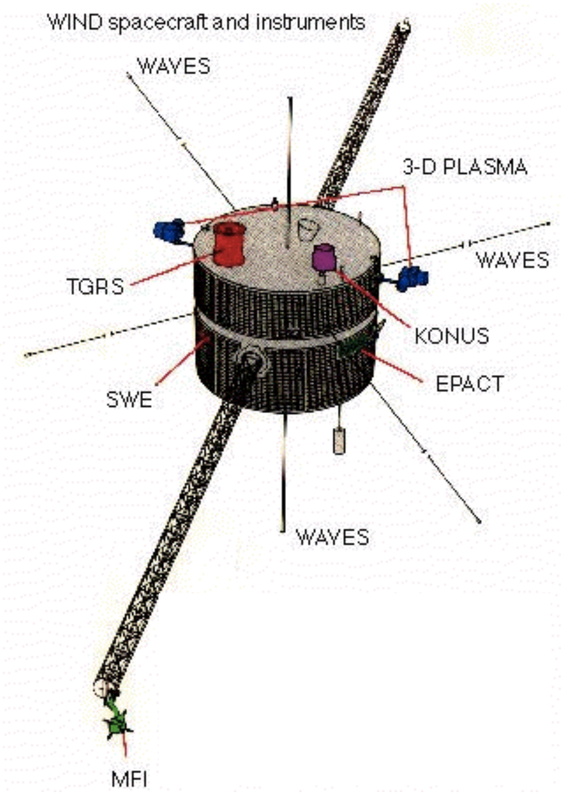
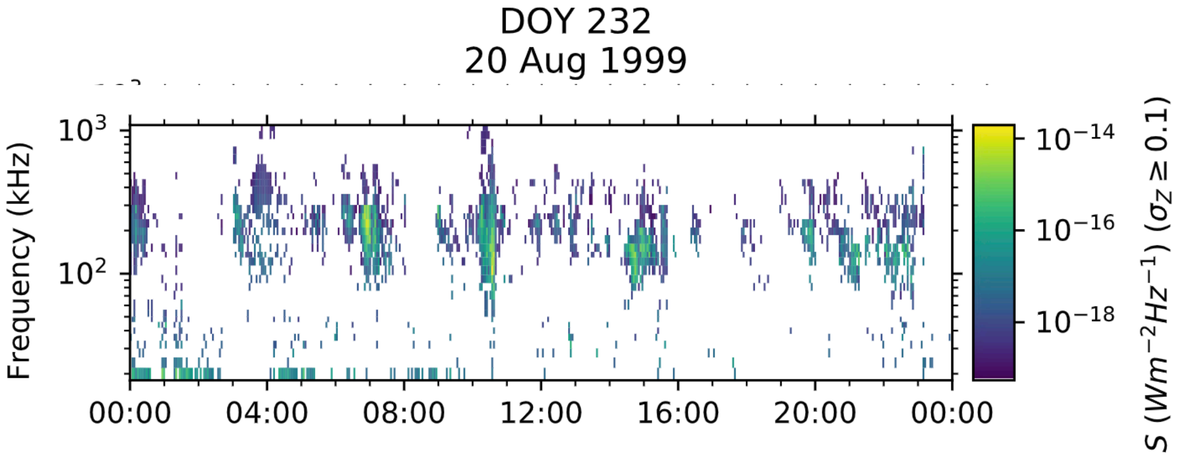
Using novel multi-point observations to study the auroral acceleration region at substorm onset

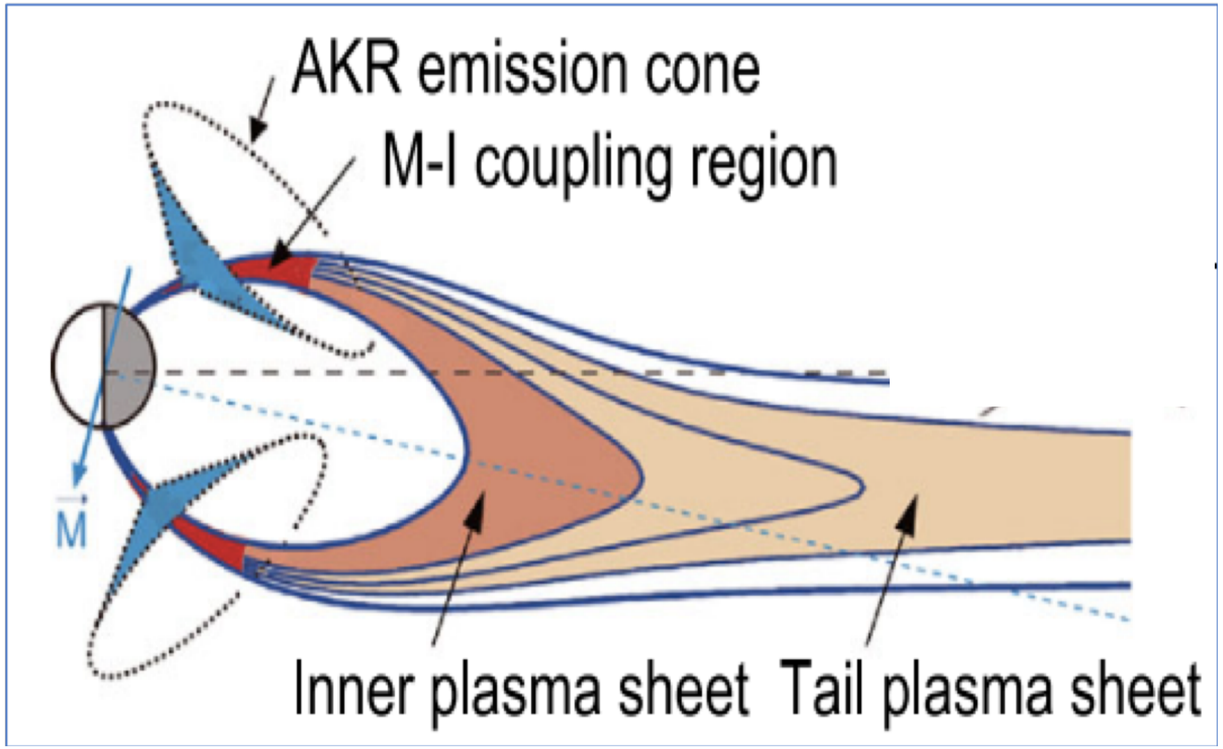
J. E. Waters, C. M. Jackman, D. K. Whiter, A. R. Fogg, L. Lamy, J. A. Carter, J. C. Coxon, L. Fryer, C. K. Louis, L. J. Paxton, C. Briand, B. Cecconi, K. Issautier, X. Bonnin, and P. Gallagher





Colloque PNST 2024
9-12 Jan, Marseille, France

Auroral kilometric radiation - Remotely observing the auroral acceleration region



Morioka+ 2013

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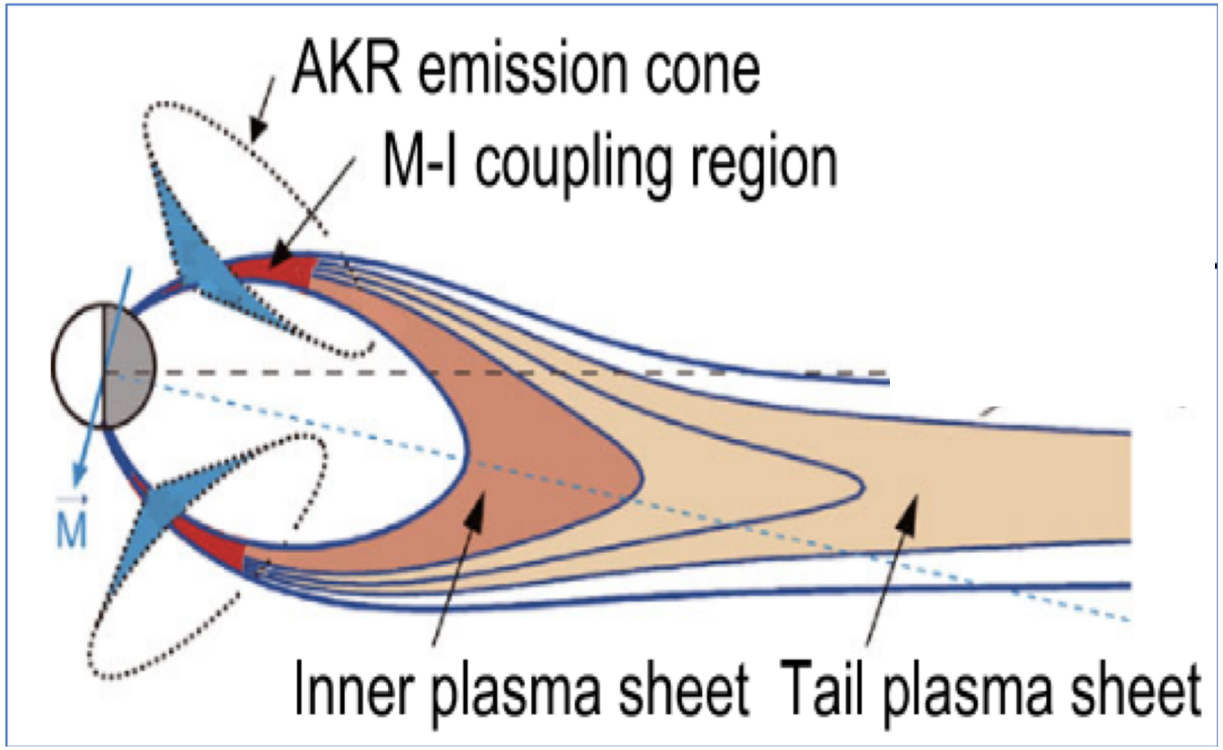
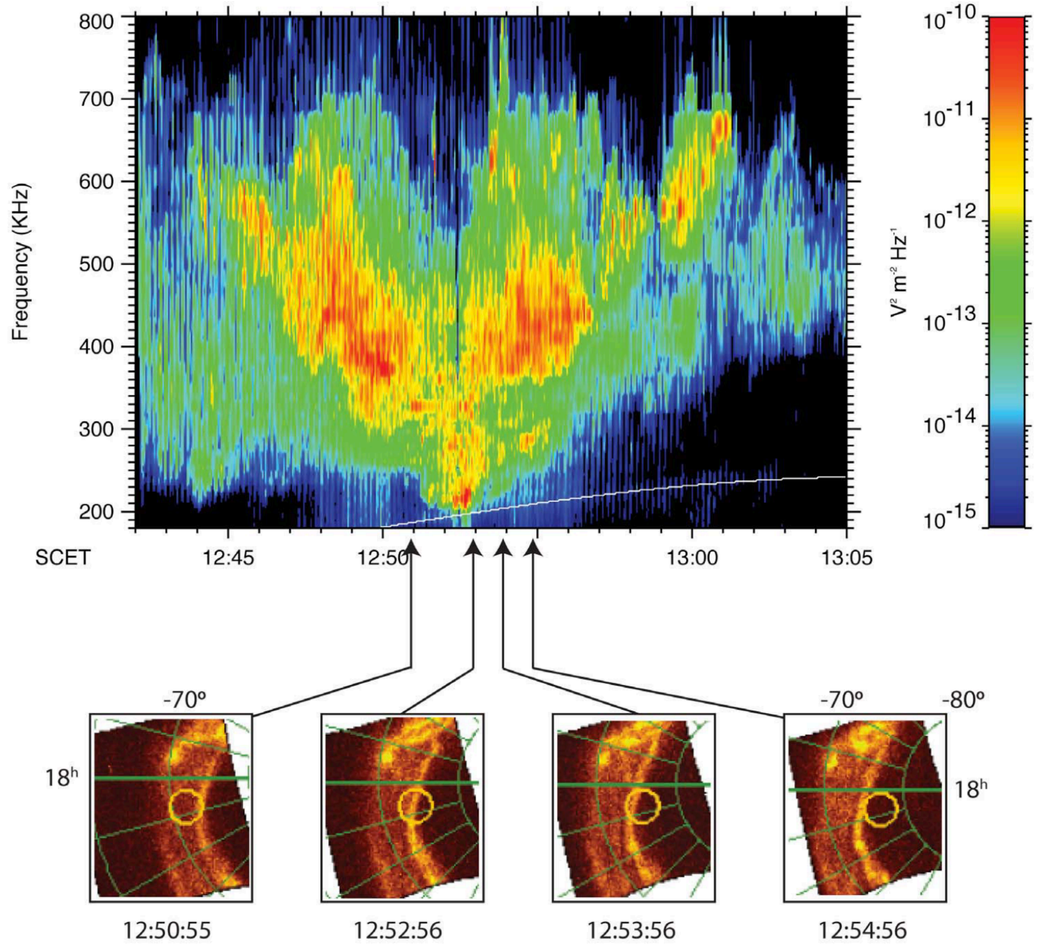
Auroral kilometric radiation - Remotely observing the auroral acceleration region



Morioka+ 2013



Menietti+ 2011

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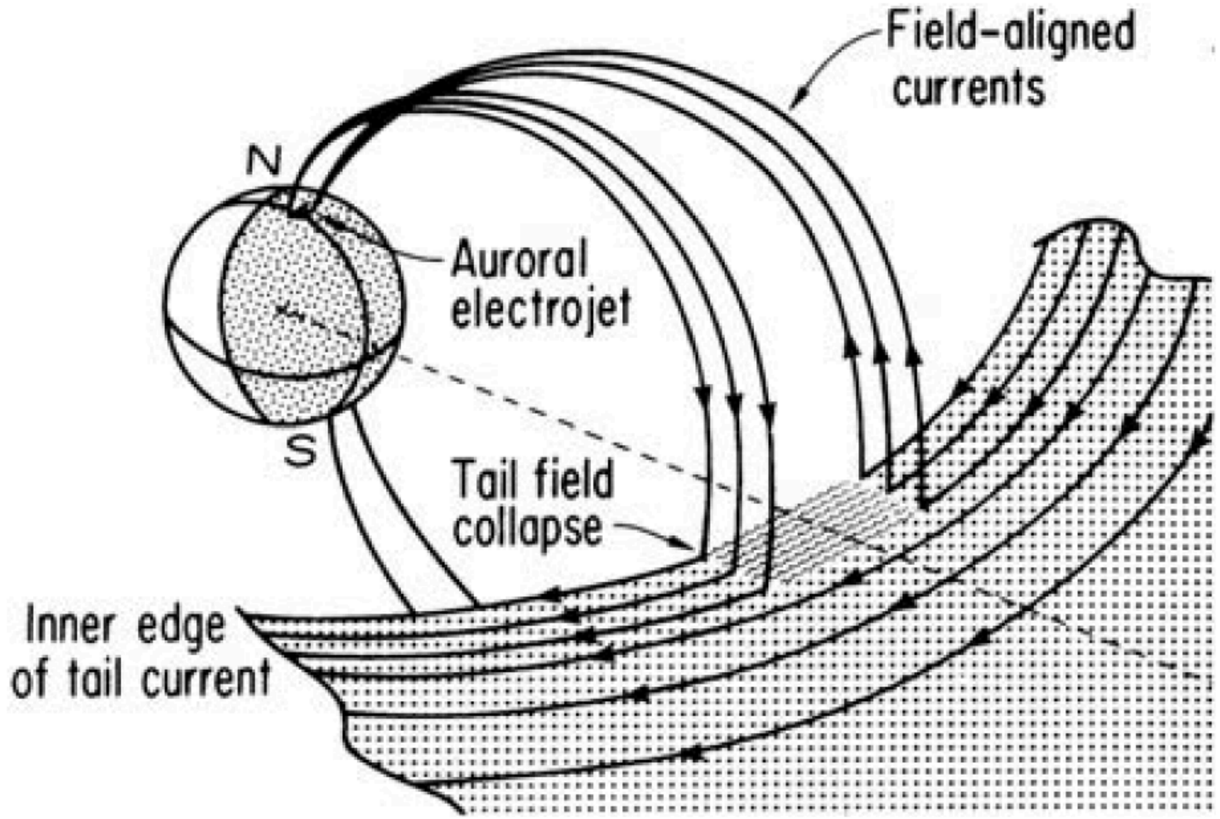
Auroral kilometric radiation and substorms



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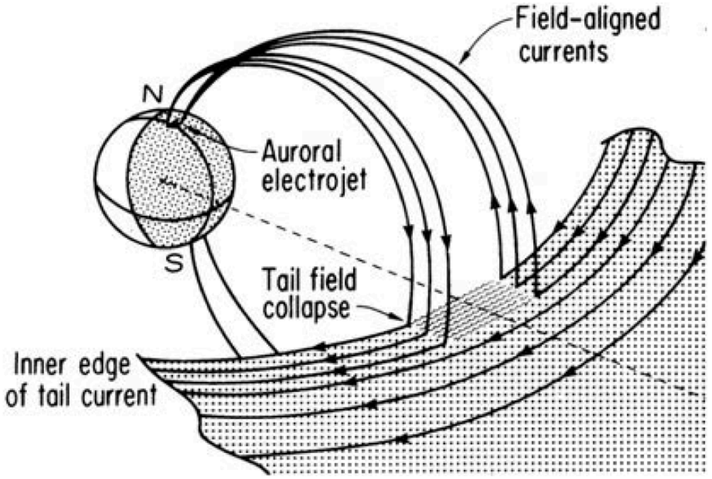
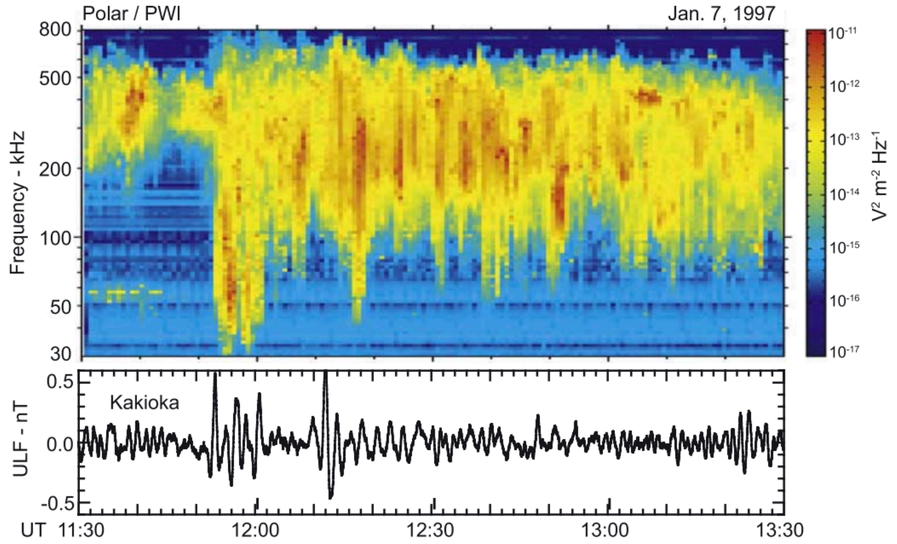
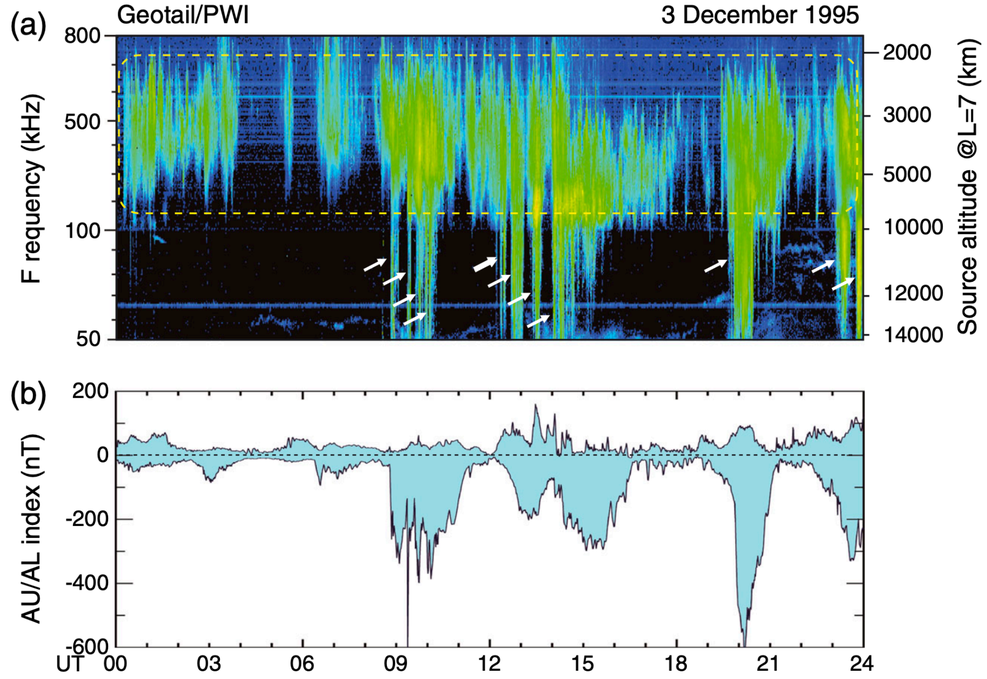
Auroral kilometric radiation and substorms







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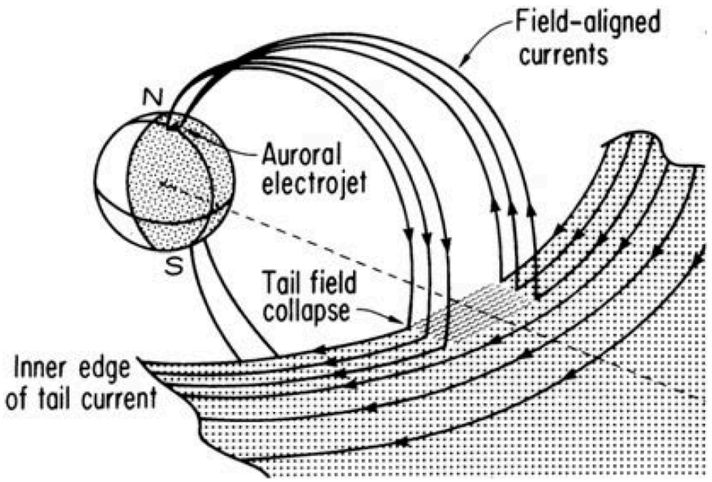
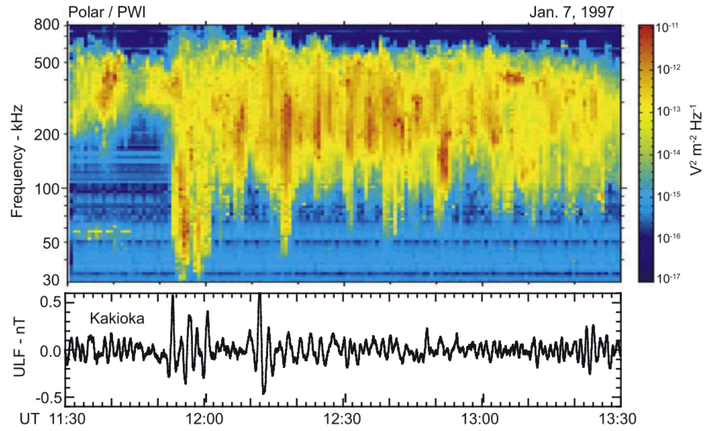
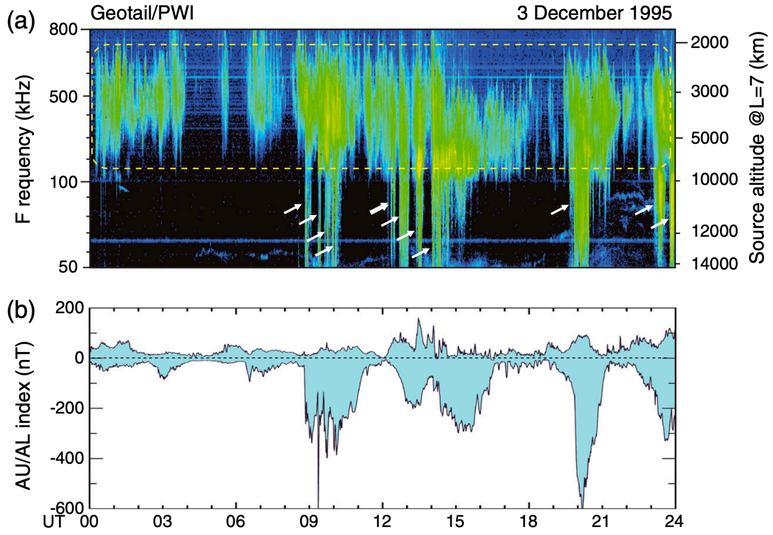
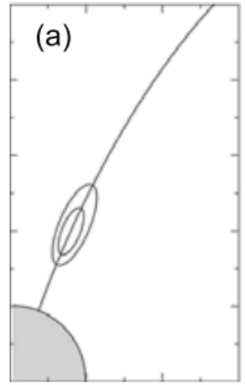
Auroral kilometric radiation and substorms

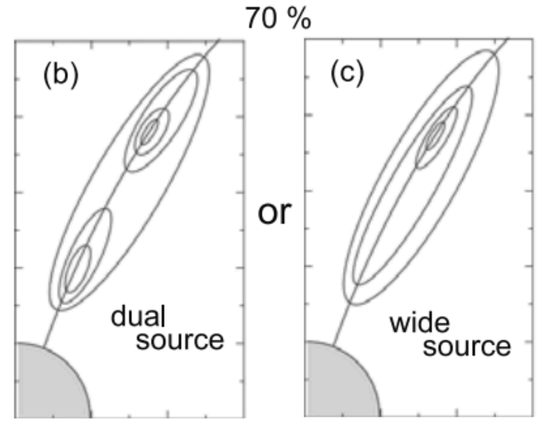


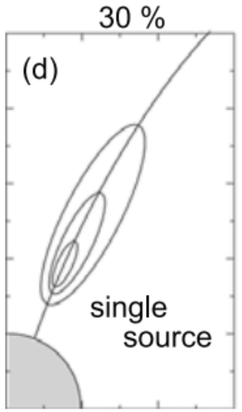






pre-onset





onset / post-onset

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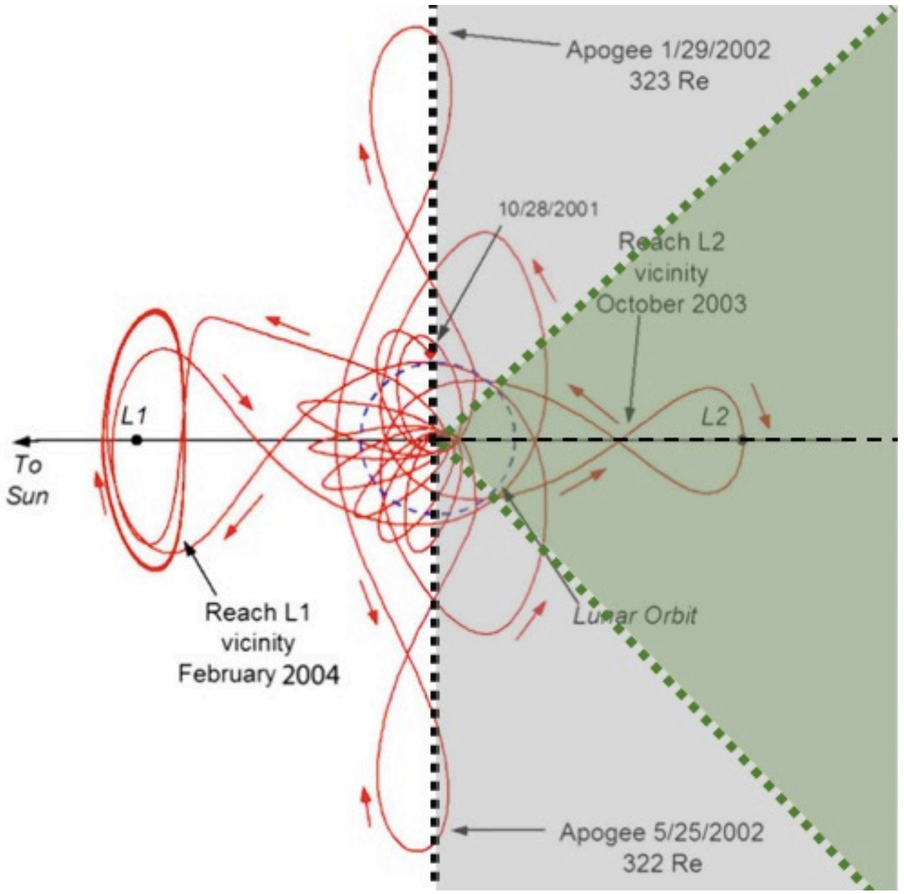
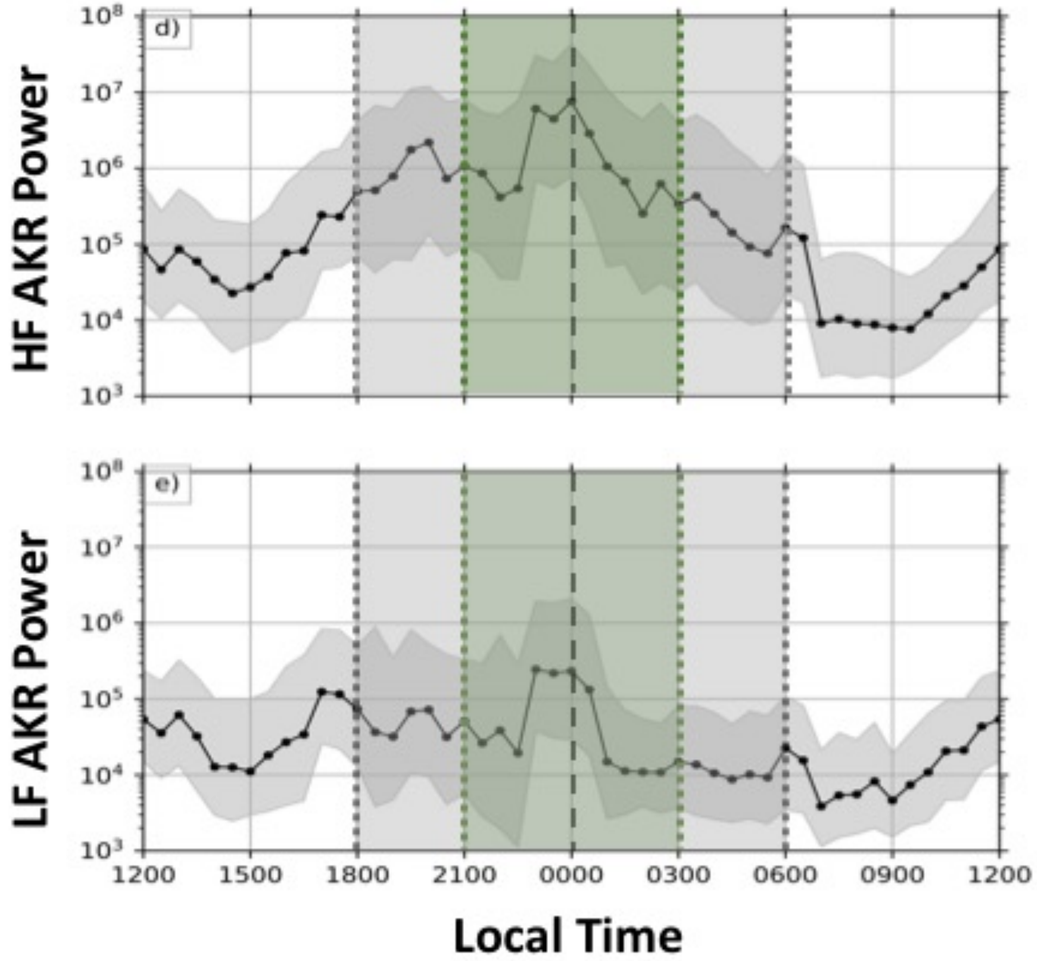
Auroral kilometric radiation - Remote Viewing



Adapted from Pelton+2015

Adapted from Waters+ 2022



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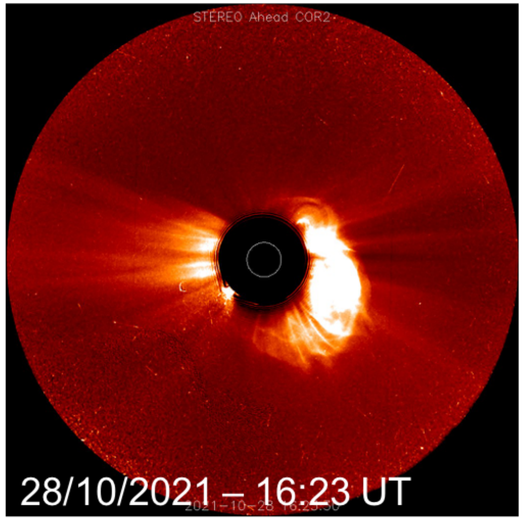
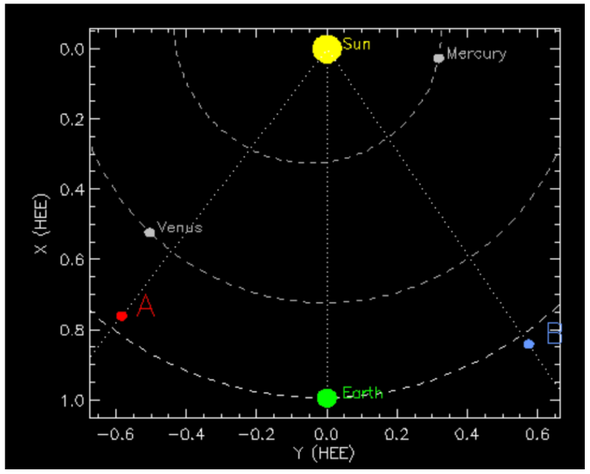
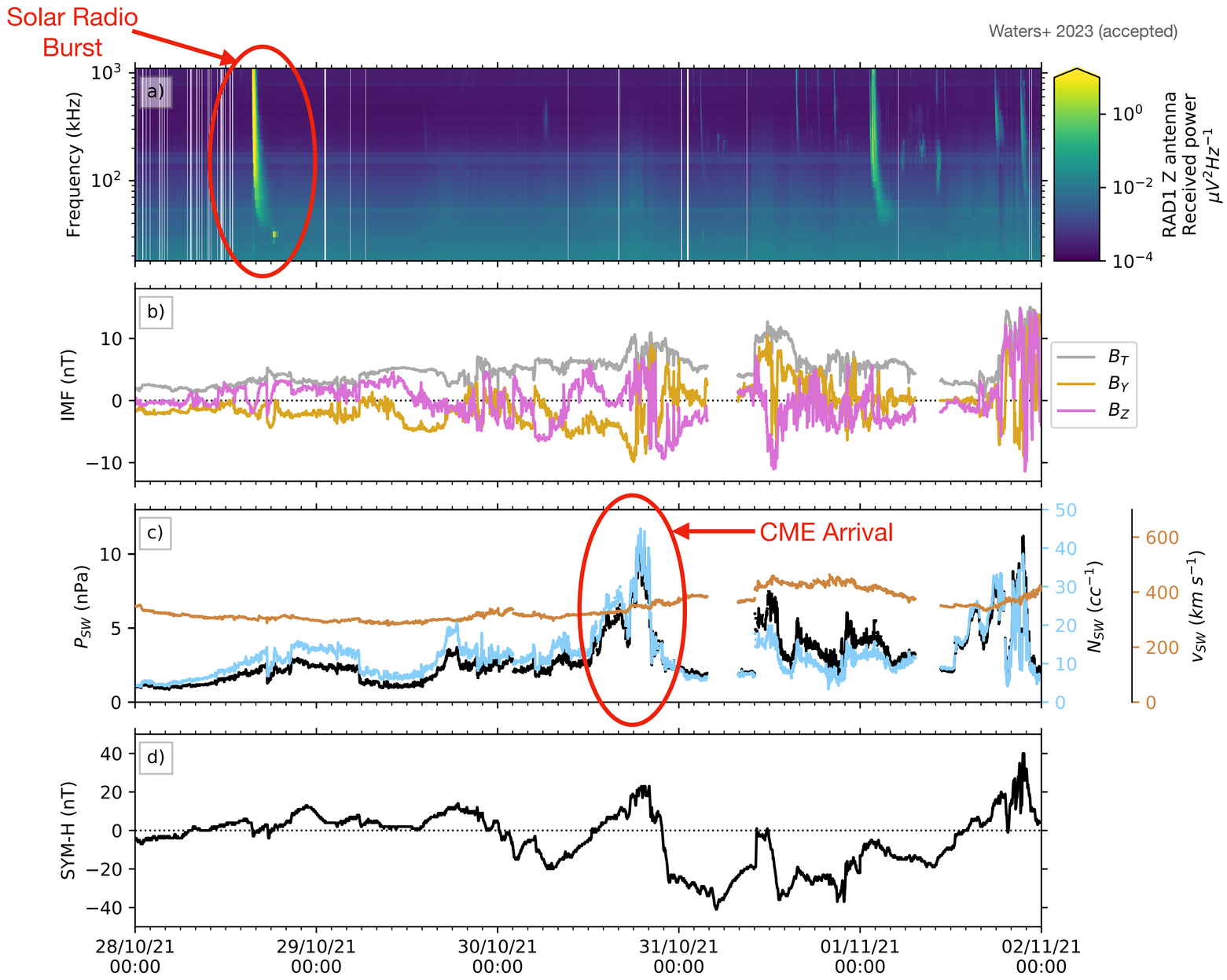
Case Study - 28 Oct 2021 Coronal Mass Ejection



STEREO A – White Light Coronagraph





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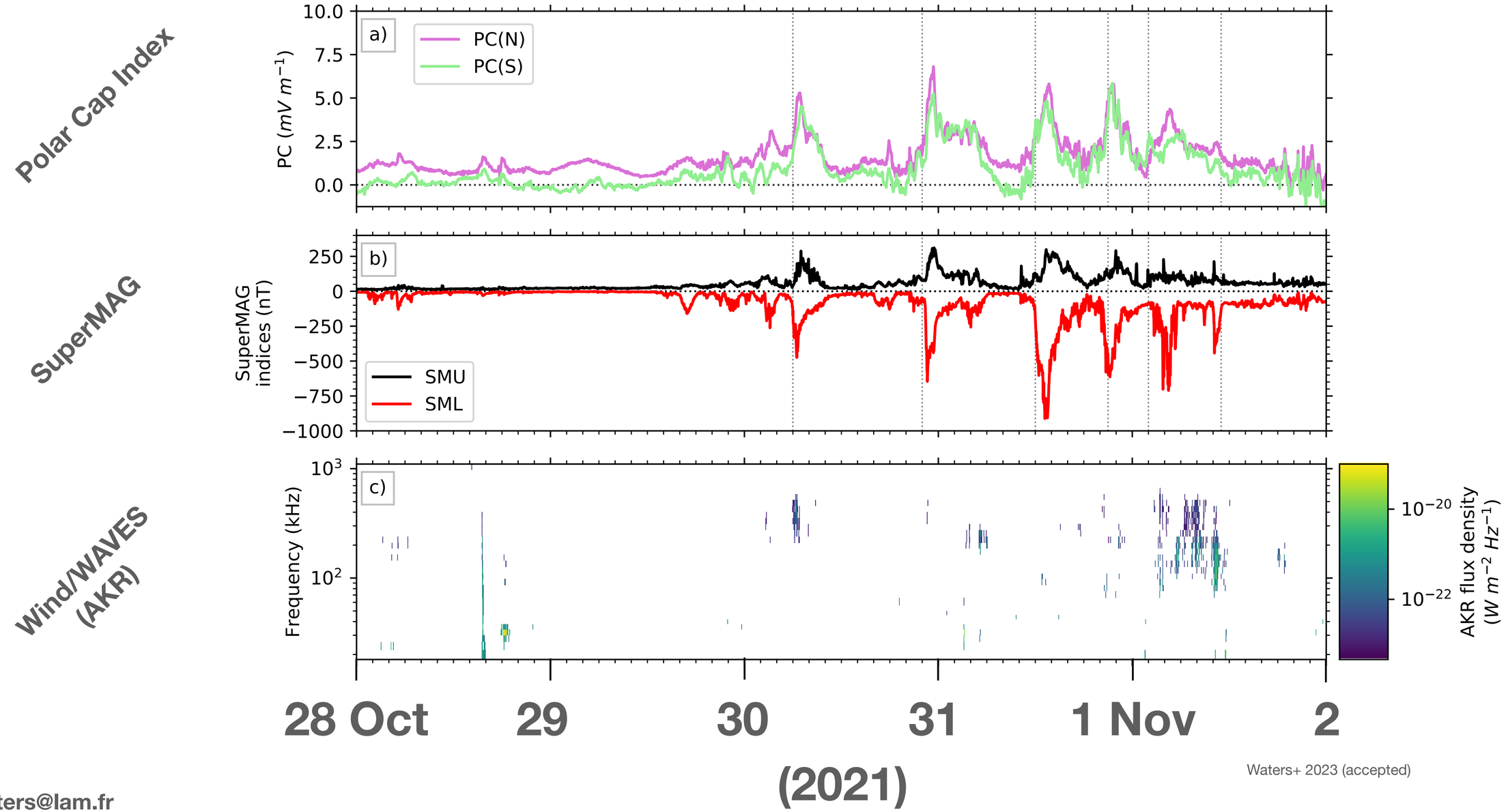
Geomagnetic activity - multiple substorms



Waters+ 2023 (accepted)

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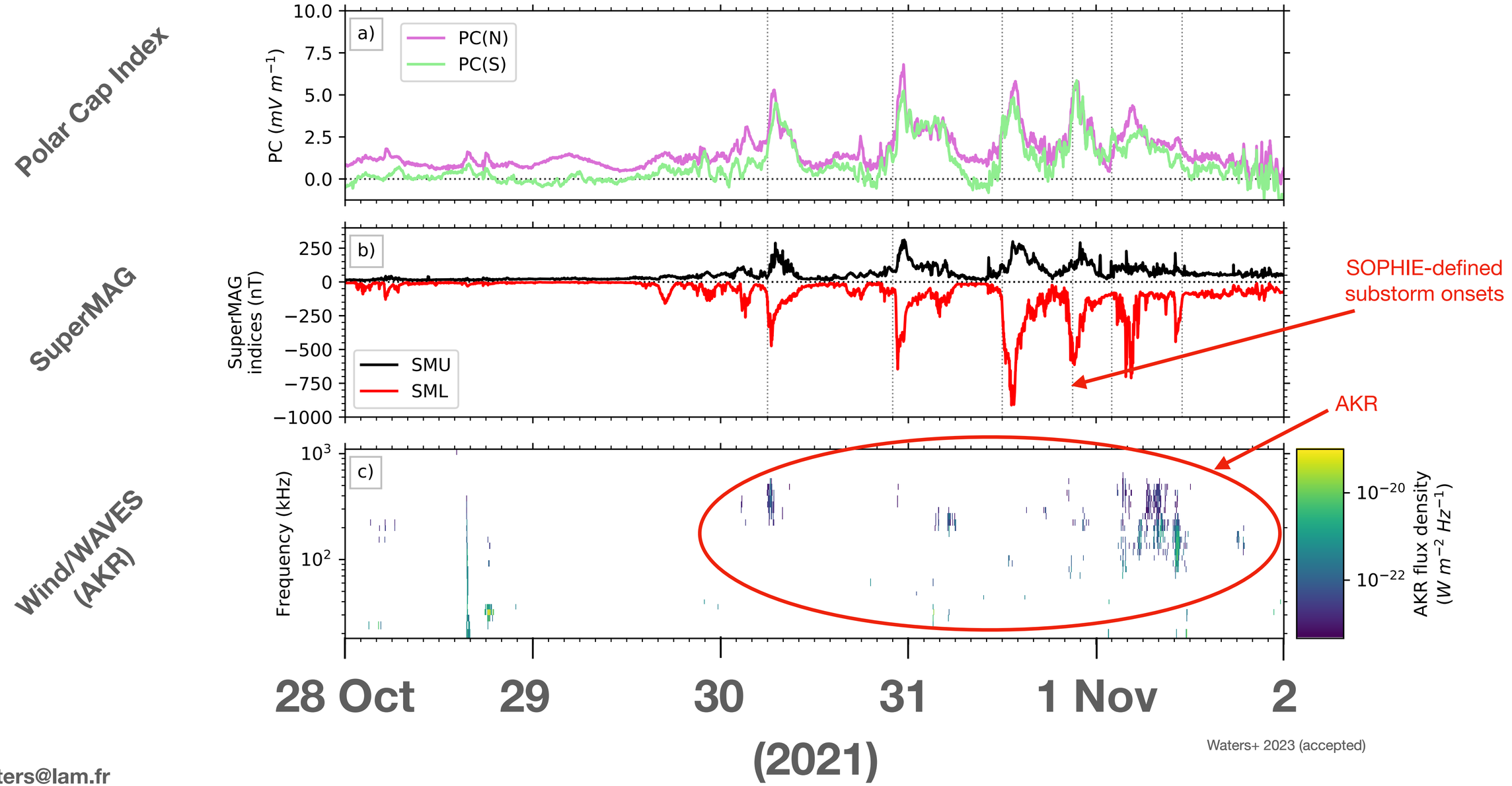
Geomagnetic activity - multiple substorms



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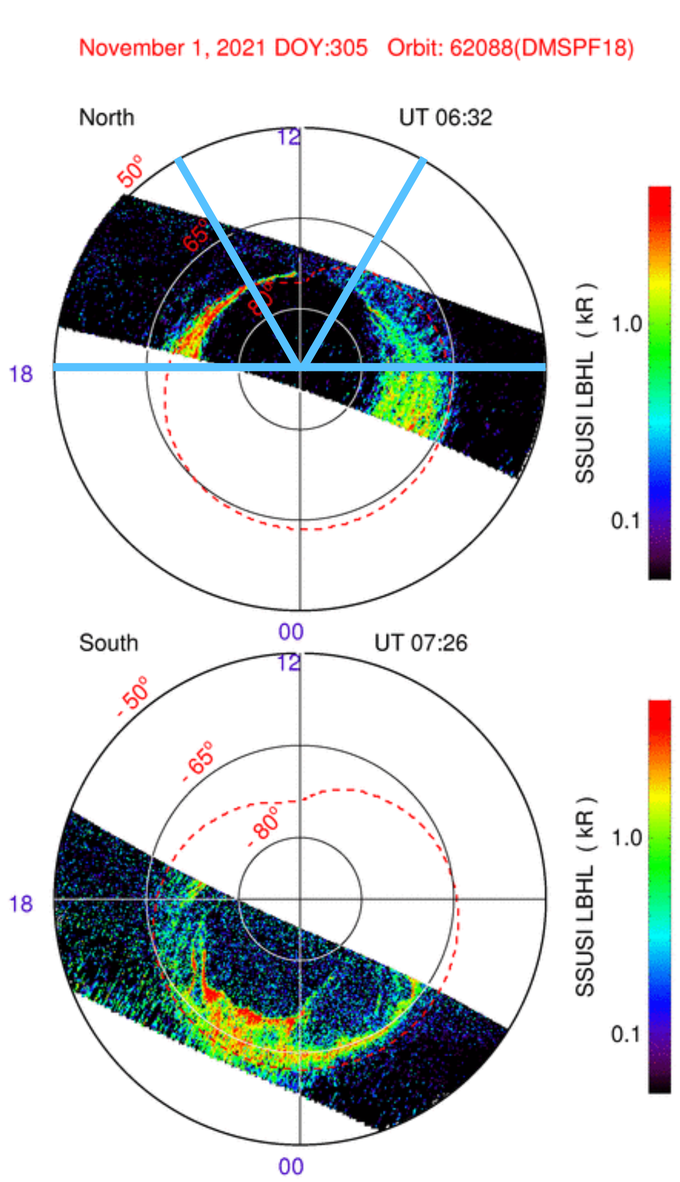
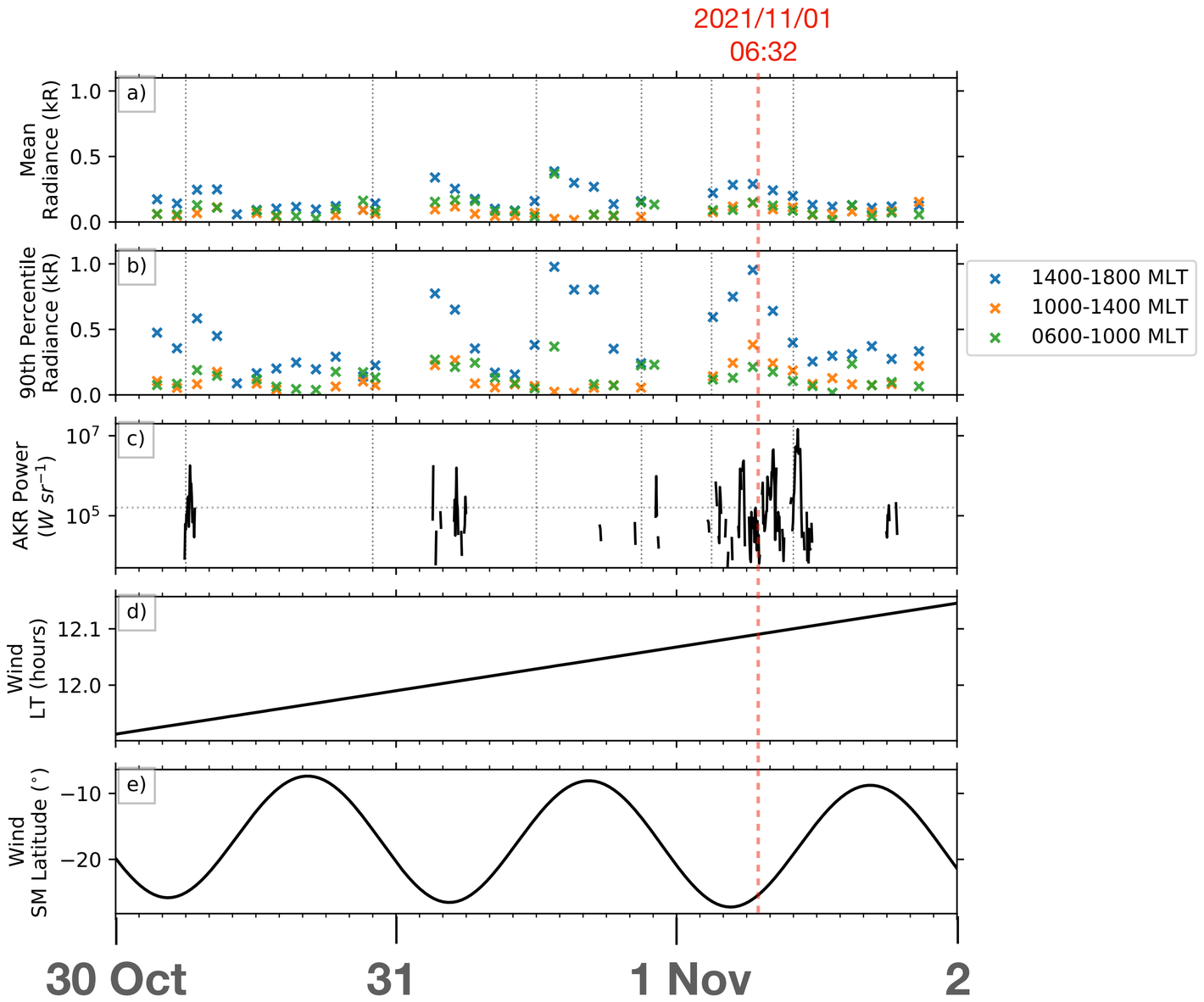
Multipoint Observations: AKR with Wind/WAVES and UV with DMSP/SSUSI





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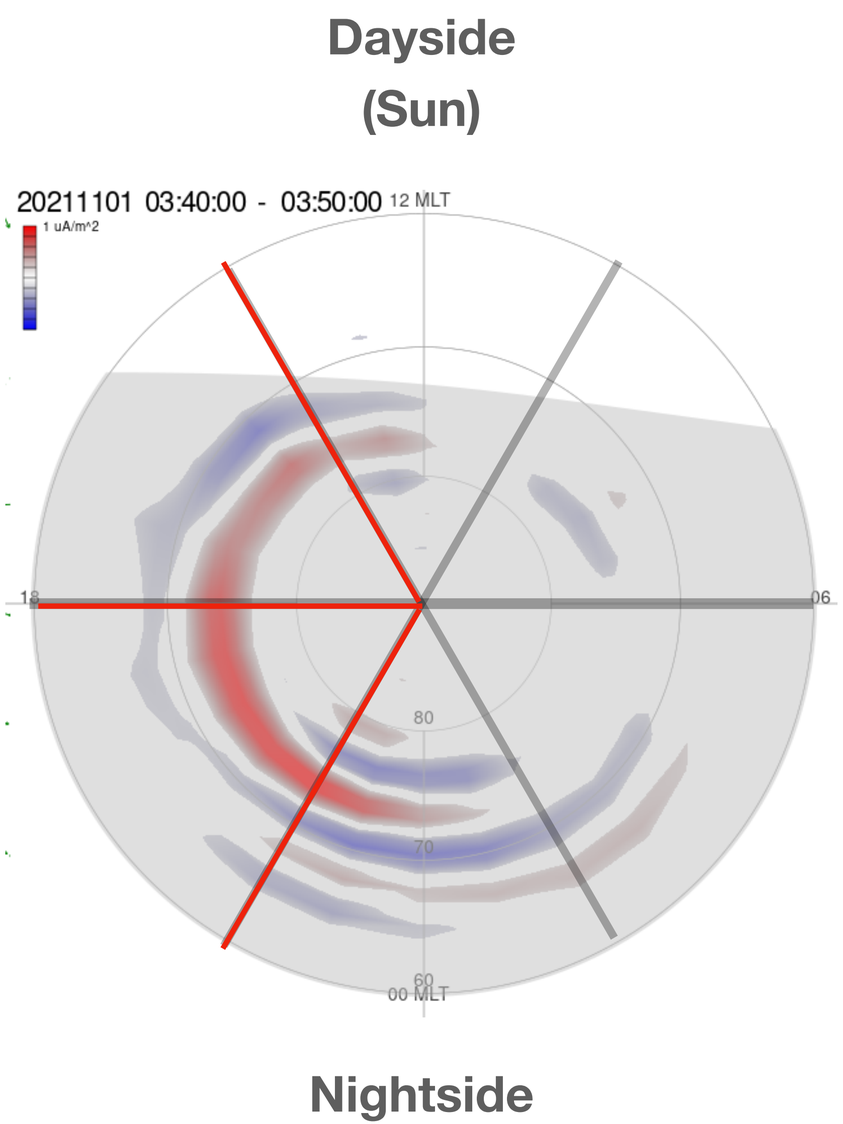
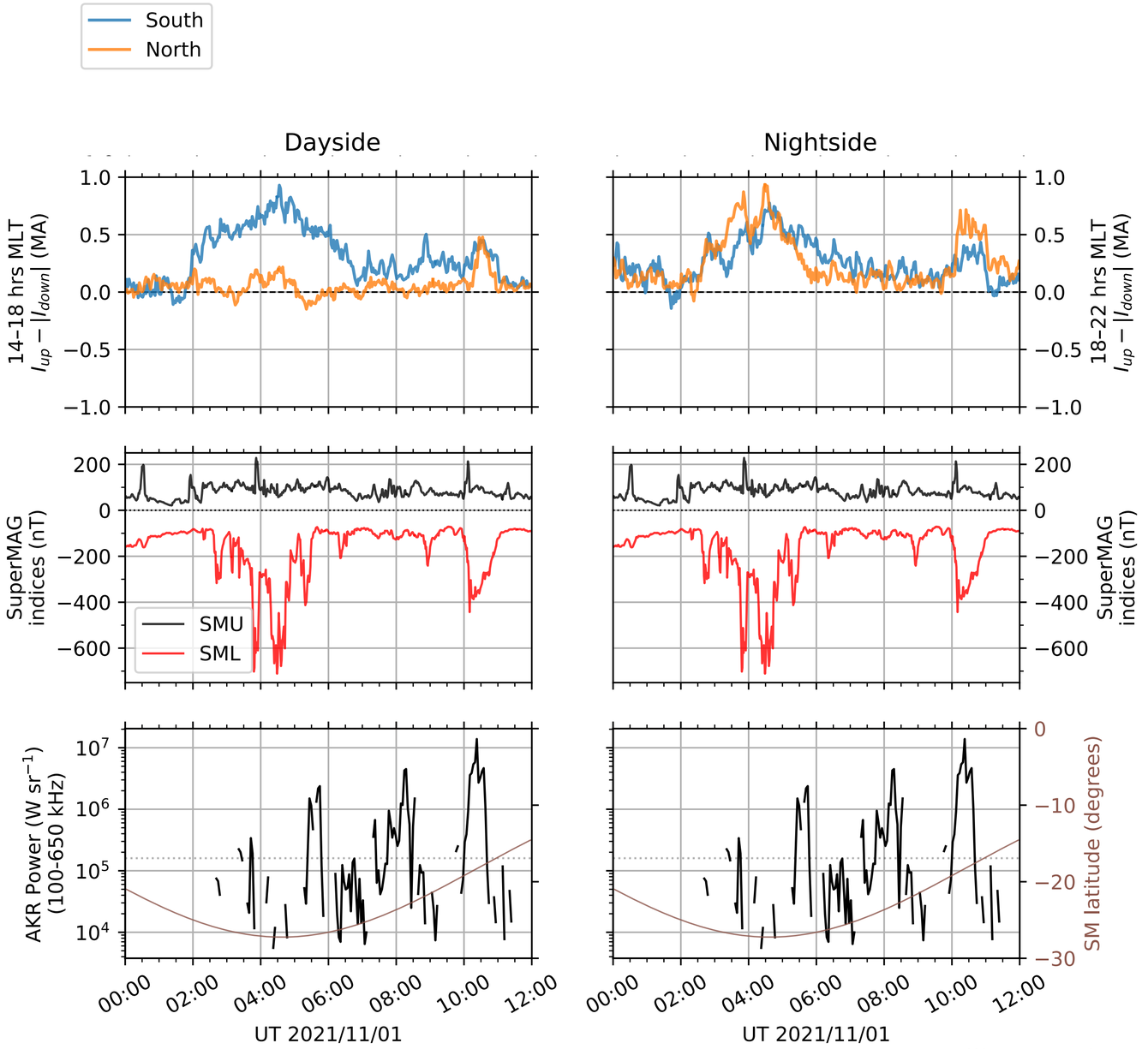
Multipoint Observations: AKR, AMPERE FACs and SML





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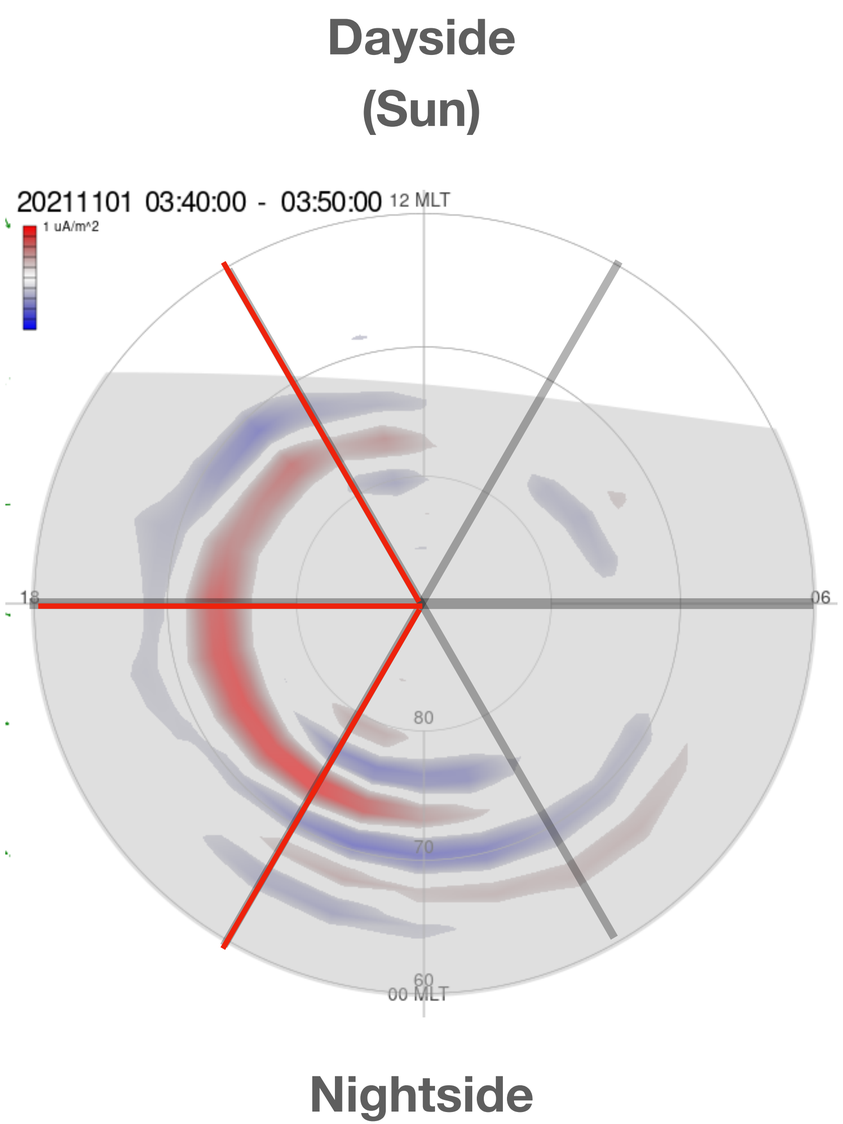

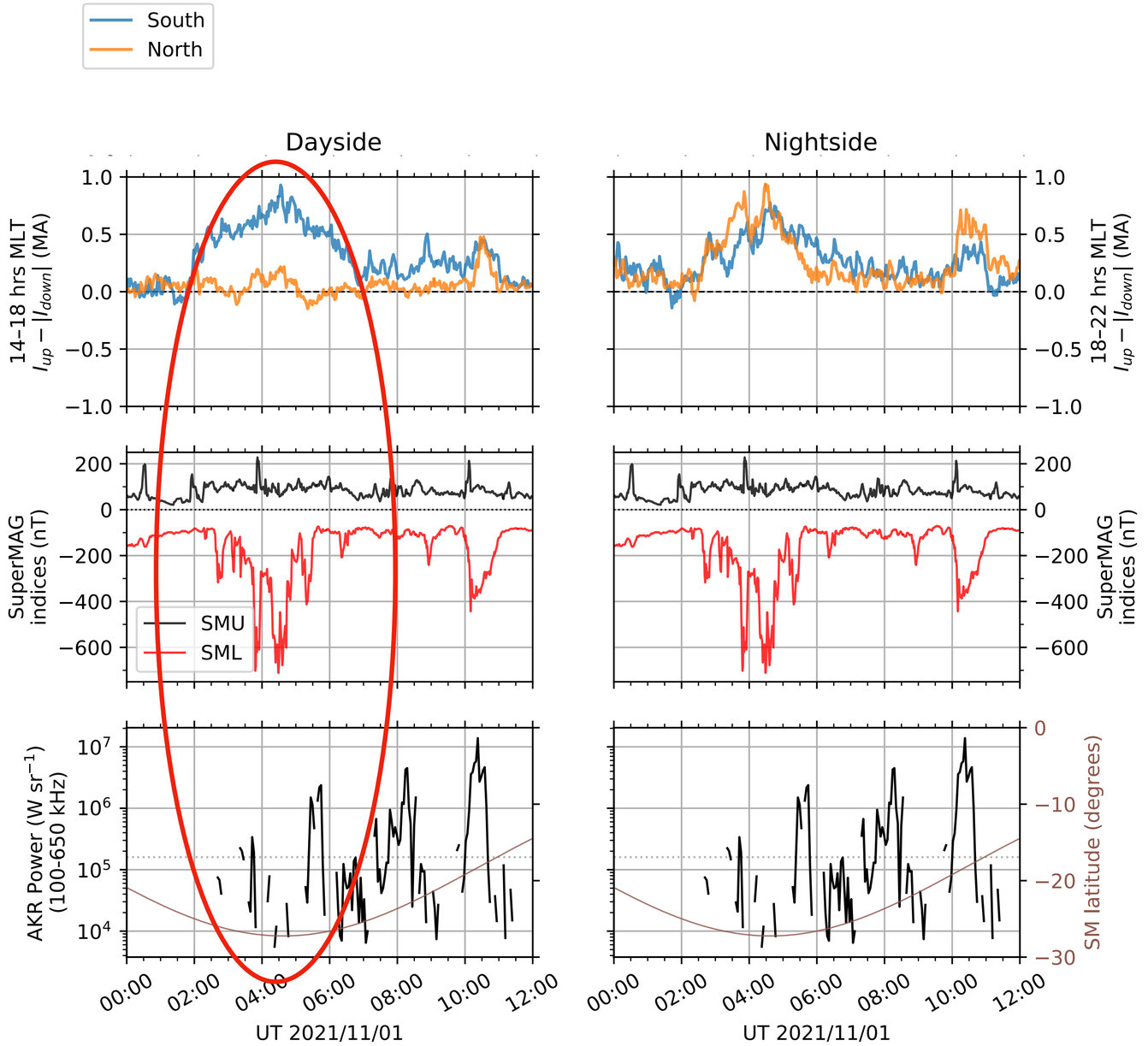

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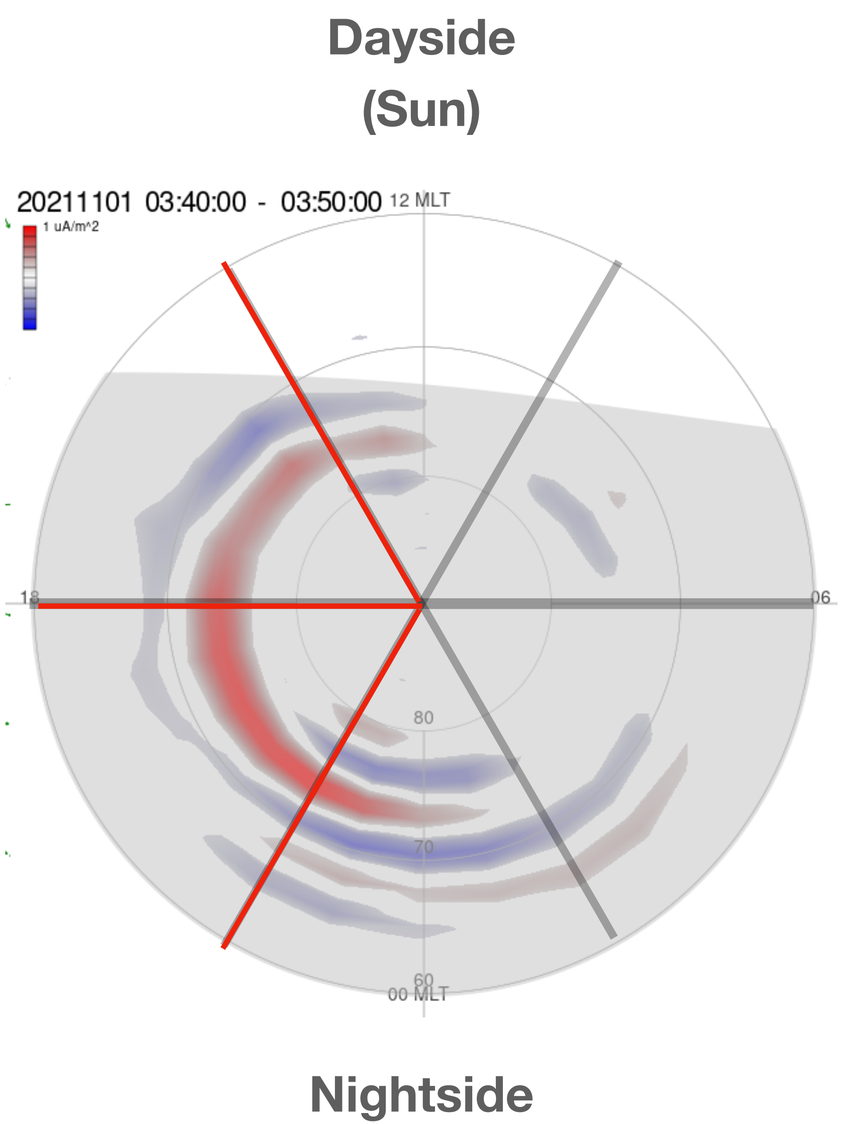

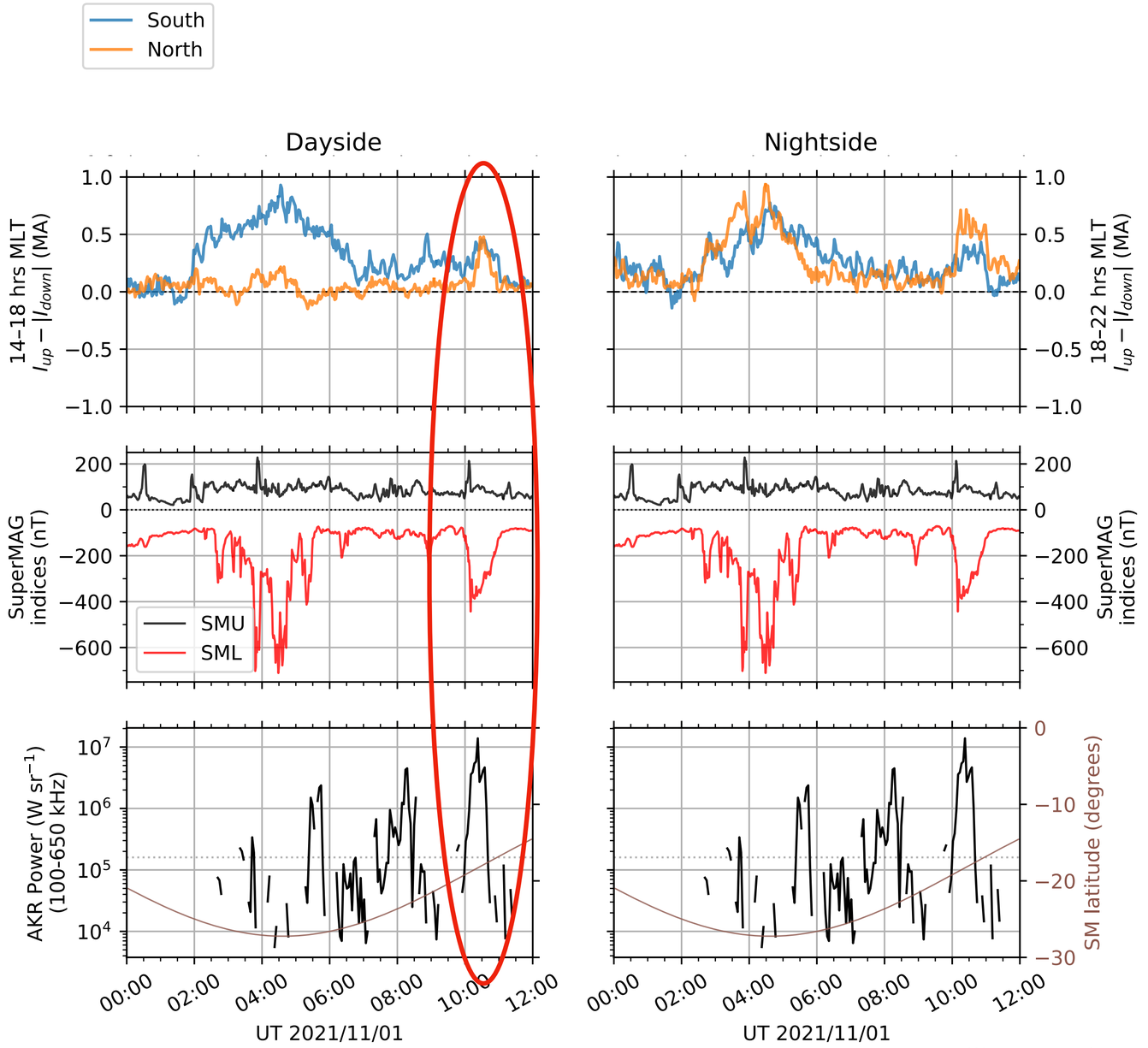

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Waters+ 2023 (accepted)

Summary

- AKR provides valuable insight to the development of Earth's auroral acceleration region - particularly the vertical extent
- For this event, bright, discrete aurora from substorm electrojet reaches dusk-side LTs. Associated AKR, observed from L1, highlights dominance of acceleration process when compared with field-aligned currents.
- Alongside existing instruments such as AMPERE and SSUSI, can thus infer spatial distribution of acceleration processes with coincident, remote AKR observations with Wind
- Such multipoint observations useful for constraining the AKR source location
- Potential for quantitative determination of acceleration location with theoretical treatment of beaming, modelling and simultaneous observations as show

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