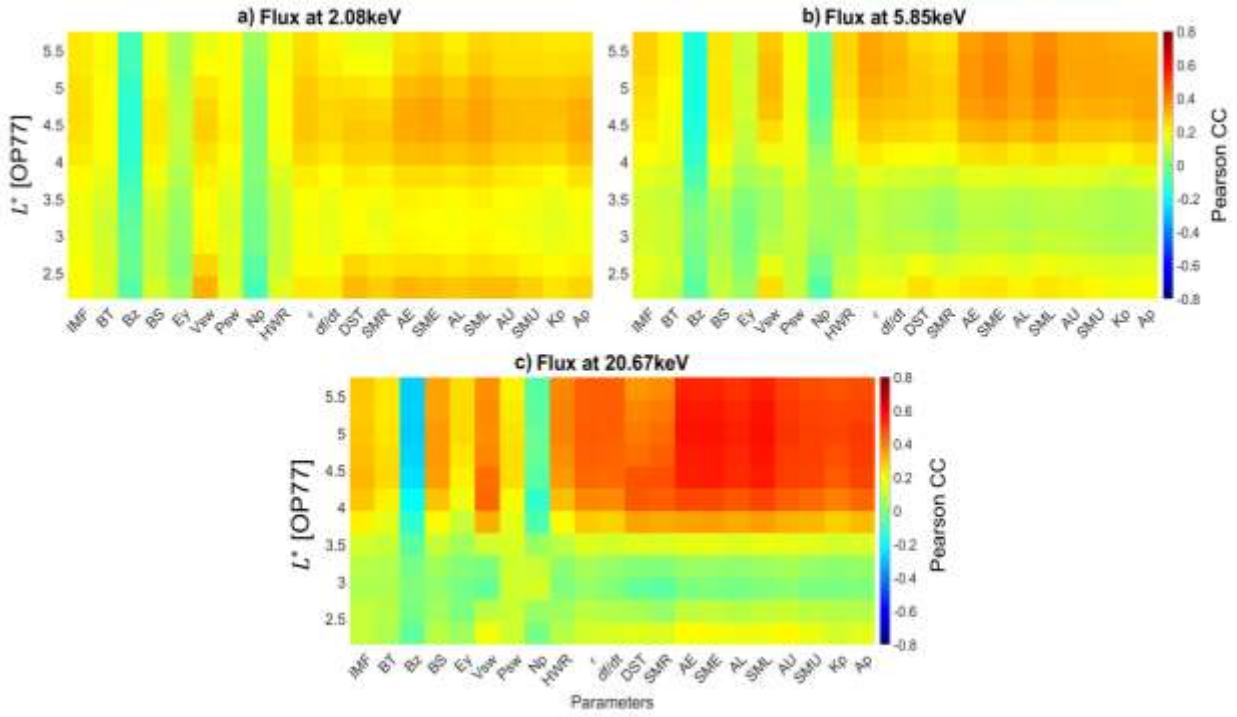
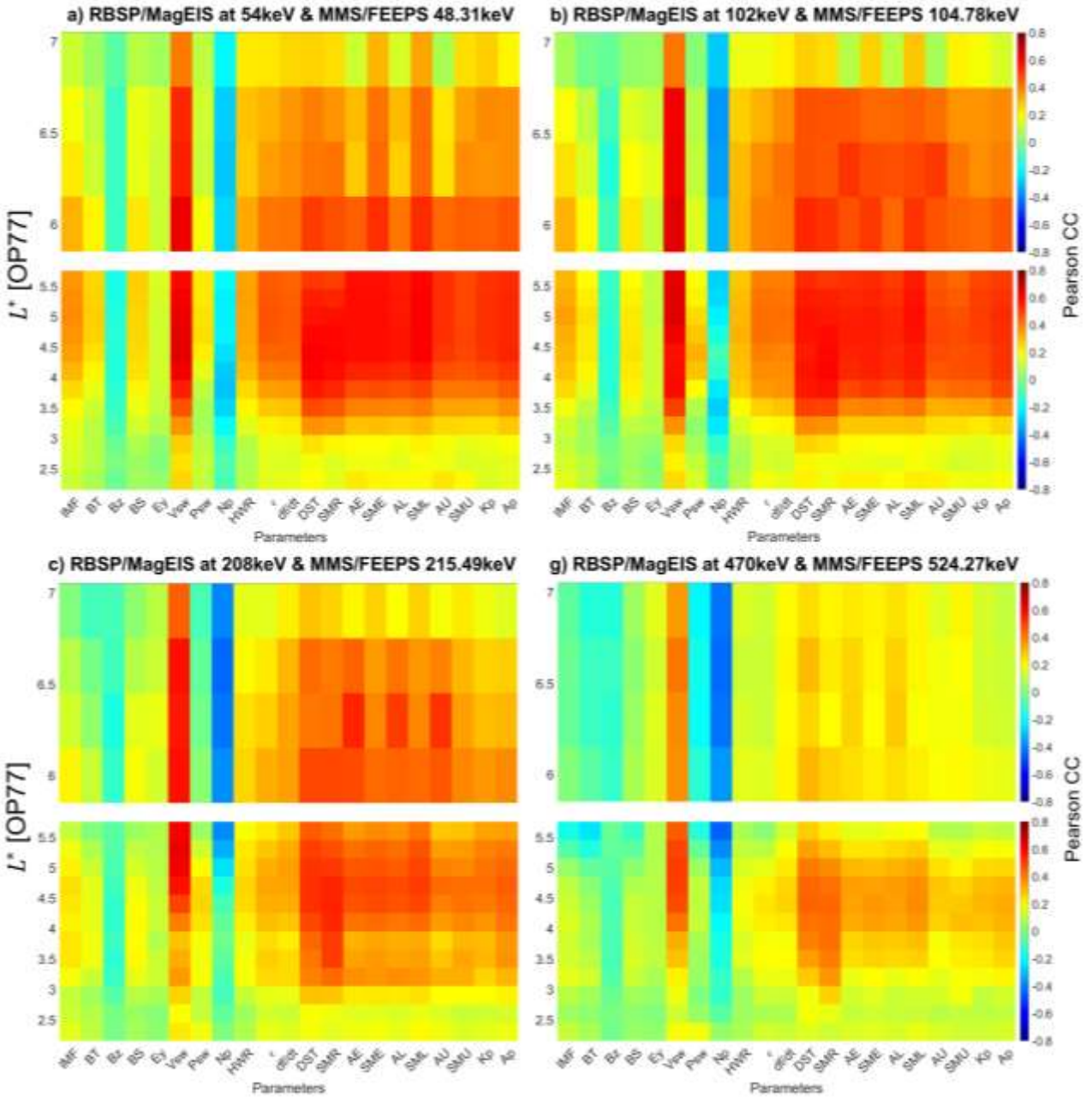
Motivation and Analysis

We analyzed multimission data from the **RBSP and MMS spacecraft** as well as relevant space weather parameters, and employed **Correlation Coefficient Analysis,** aiming to identify the drivers behind the sub-relativistic electron flux variations.

- We used electron flux data from 1 keV to 500 keV from: (1) RBSP-ECT (2012 - 2019) for $L^* = [2 - 6]$, (2) MMS-FEEPS (2015 - 2024) for $L^* = [6 - 8]$.
- We also used data from the OMNIWeb and SuperMAG databases – 21 parameters: IMF, BT, Bz, Bs, Ey, Vsw, Psw, Np, HWR, Epsilon parameter, Newell's function, DST, SMR, SME, AL, SML, AE, AU, SMU, Kp, and Ap.
- We calculated the Pearson correlation coefficient between flux and solar wind/geomagnetic parameters in three ways: (a) lin(parameter) - lin(flux), (b) lin(parameter) - log(flux), and (c) log(parameter) - log(flux).
- We also investigated possible time-lag up to 48 hours (2 days) in the past.

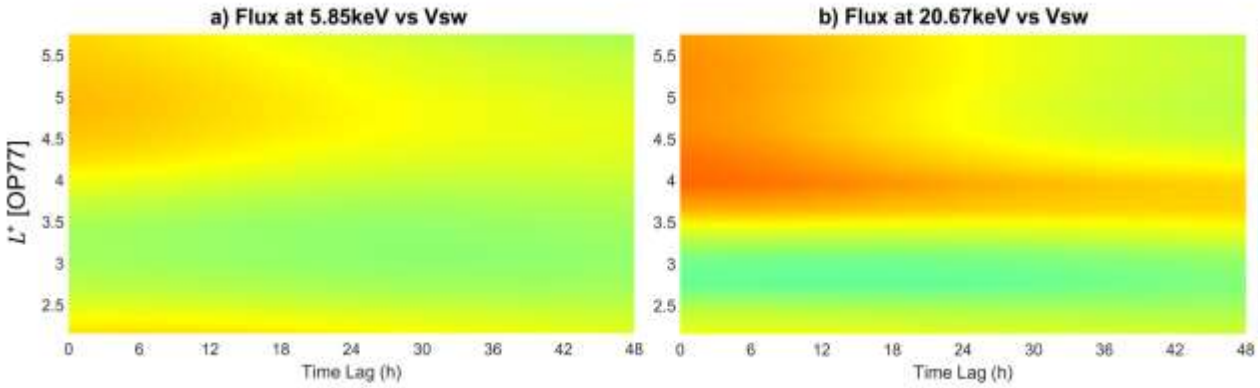
Time lag set to zero

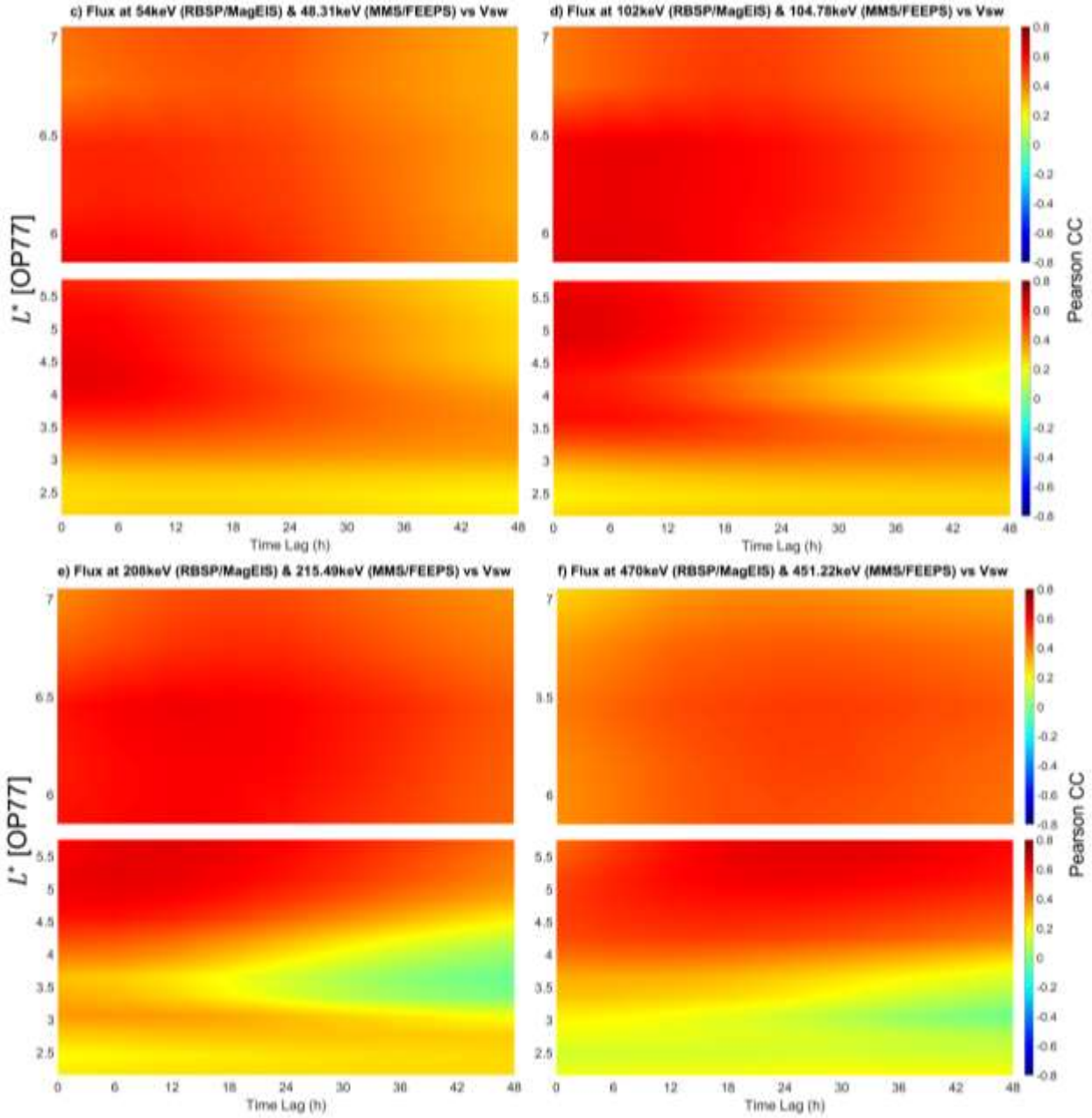




- CCs **increase with increasing energy**, and as energy rises, strong CCs are observed over progressively **lower L^* values**.
- The CCs of seed electrons with all drivers **decrease** and are confined in a smaller L^* range, except for V_{sw}.

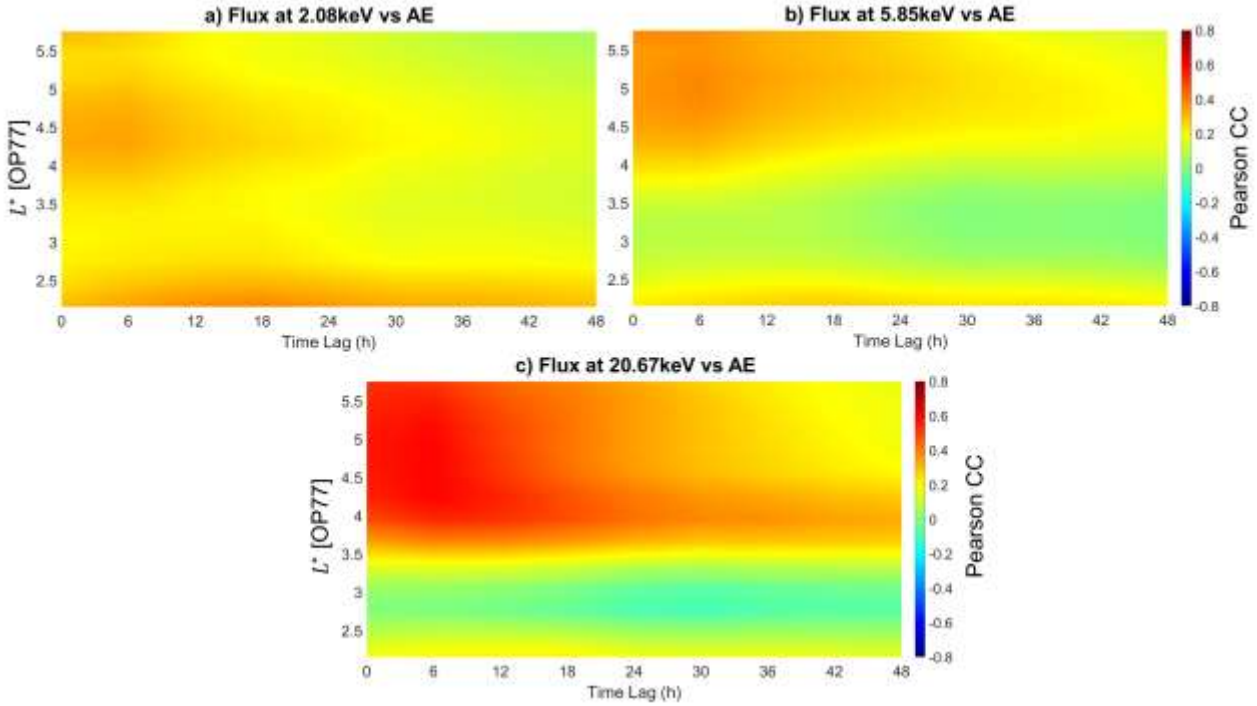
Solar Wind Speed

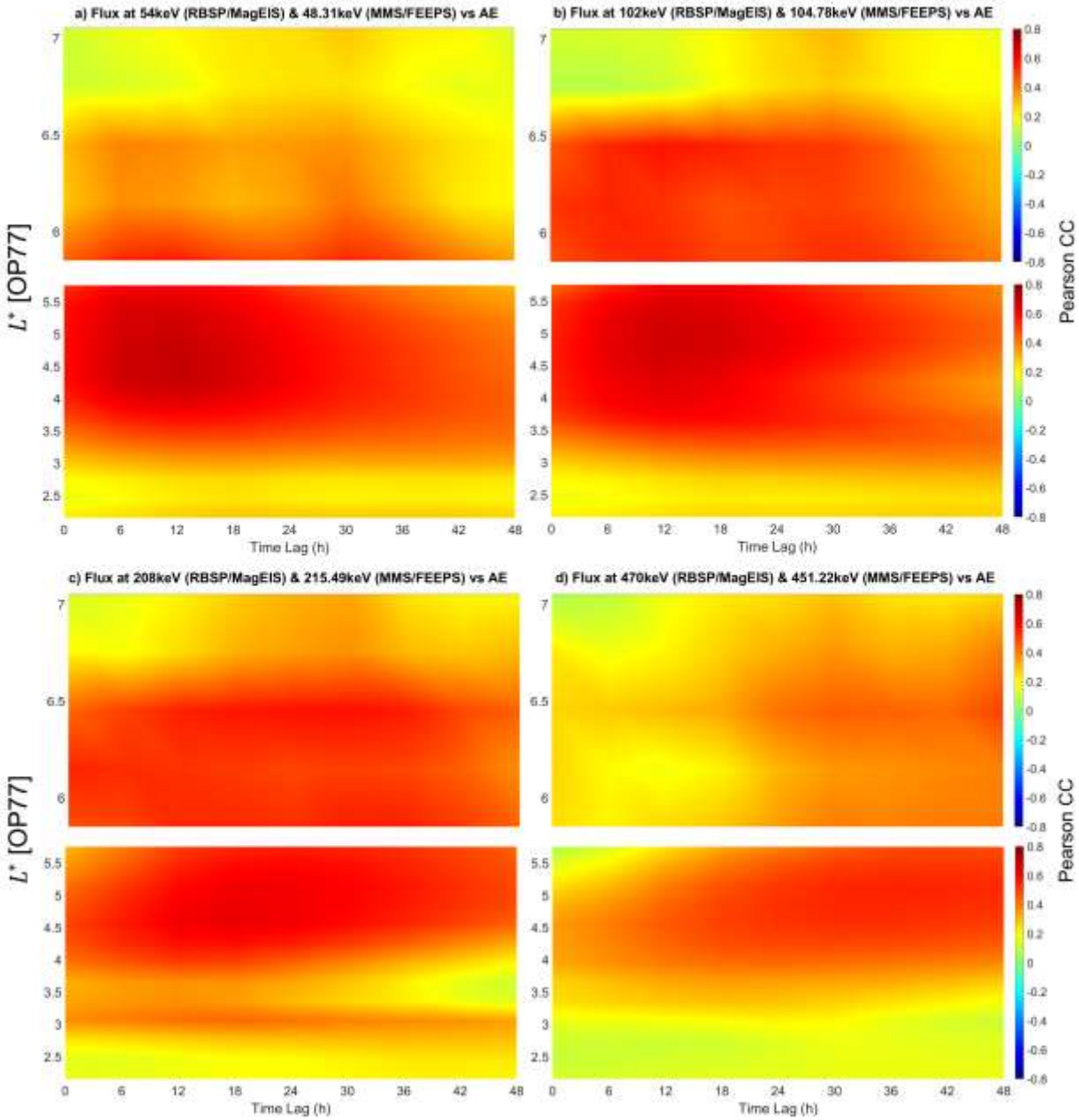




- **V_{sw} is one of the most influential driving parameters for fluxes >50keV**
- Energies >200keV correlate stronger with V_{sw} **after a few hour lag and until 48h**.

AE Index





- **Fluxes correlate strongly with AE in a wide energy range**, especially for energies >20keV
- Seed electrons correlate stronger with the index **after a few hours**. This delay becomes longer with increasing energy.

Important finding

- Max CCs of AE exhibit a consistently increased time-lag by 12 hours, compared to the max CCs of Vsw.
- At $L^* = [3.5 - 4.5]$ the response of seed electrons to Vsw variations is almost simultaneous, while the response exhibits an increasing time delay inward and outward from the heart of the outer belt.
- The increase of the time delay below $L^* = 3.5$ is much faster.
- CCs below $L^* = 3.5$ are below 0.5.