

Substorm Energy Transport from the Magnetotail to the Nightside Ionosphere

This study examines the partition of energy transport from the magnetosphere to the ionosphere during the substorms. It concludes that the poleward boundary of the auroral bulge is a persistent and critical energy sink, and the associated energy is transported along, rather than across, the magnetic field in the plasma sheet.

- The area around the auroral surge is a crucial and persistent energy sink during the substorm expansion phase.
- Energy deposited for each auroral streamer accounts for ~1% of the total substorm energy deposition to the ionosphere.
- More energy is transported earthward along, rather than across, the magnetic field lines in the plasma sheet at tail magnetic reconnection.

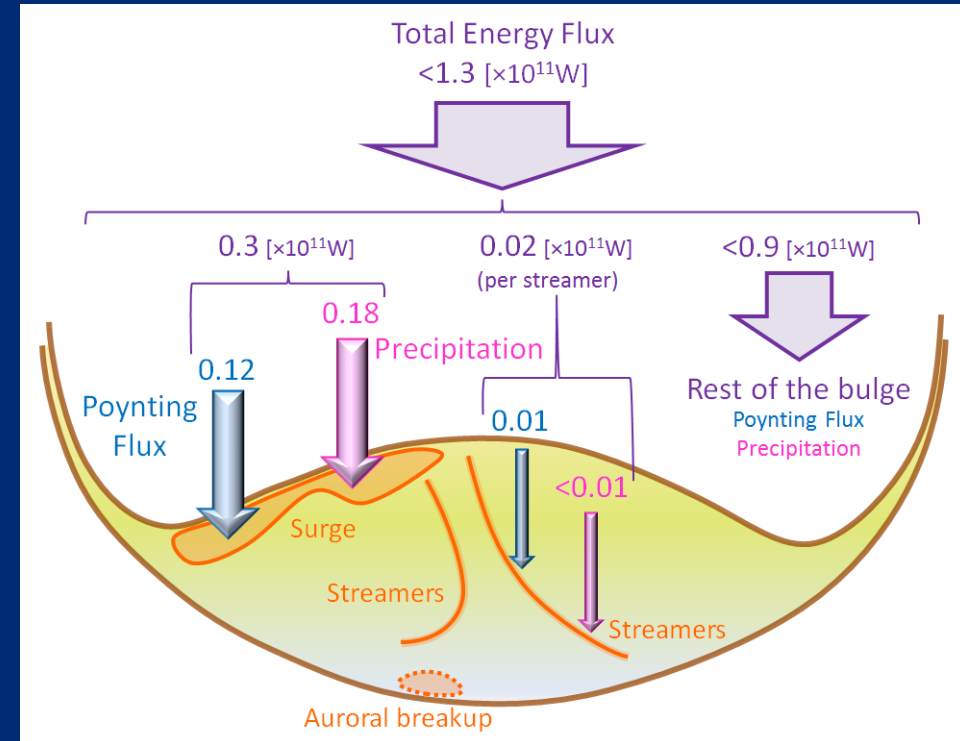


Figure. Schematic illustration of energy deposition to the ionosphere. Whereas the westward traveling surge, the duskside poleward boundary of the auroral bulge, accounts for 20-30% of the total energy deposition to the ionosphere, the contribution of the auroral streamer is ~1% per streamer and <10% in total during the expansion phase.

The field-aligned energy transport in the plasma sheet and subsequent deposition into the poleward boundary of the auroral bulge is most critical for substorm energy budget.