

## **SESSION: Solar Wind, Magnetosphere, Ionosphere I**

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### **Alfvenic Magnetosphere-Ionosphere Coupling: A Northern Preference for Electromagnetic Energy Input**

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Magnetosphere-ionosphere coupling (MIC) processes transfer energy and momentum between the dynamic magnetosphere and the Earth's ionosphere and upper atmosphere. This study uses electric and magnetic field measurements on the ESA Swarm mission from low Earth polar orbit to report on a persistent seasonally averaged asymmetry in statistical Poynting flux at auroral latitudes, indicating a preferential electromagnetic energy input into the northern hemisphere. Based on the assumption of a seasonally averaged symmetric driver in the magnetosphere, we argue that the asymmetry in electromagnetic energy transfer can be explained by Alfvenic interactions combined with an active role for the ionosphere in MIC processes. We use analysis of the relative phase between the electric and magnetic fields to argue for a strong role for Alfven waves, and introduce a potentially active role for ionospheric conductance through wave reflection and interference. Within this paradigm, we suggest that the observed interhemispheric asymmetry in energy transfer can be explained by the different positions of the north and south magnetic poles with respect to the rotation axis, creating a hemispherically asymmetric solar illumination of the northern and southern auroral zones by Earth's rotation. Overall, our observations support the hypothesis that Alfven waves play a fundamental role in MIC. Through electrodynamic coupling to the aurora, our results suggest that a similar seasonally averaged interhemispheric asymmetry in the aurora may exist as well.