



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 157

Type: **Oral not-in-competition (Graduate Student) / Orale non-compétitive (Étudiant(e) du 2e ou 3e cycle)**

Partial Equatorward Closure of Region 2 Birkeland Currents

Tuesday 10 June 2025 15:30 (15 minutes)

The classic picture of the Birkeland current system includes a poleward (R1) and an equatorward (R2) sheet at most local times [Iijima and Potemra, 1976a], with an additional poleward sheet near noon [Iijima and Potemra 1976b] and midnight (in the Harang region). Away from noon and midnight, the R1/R2 currents are generally considered to form a nearly-balanced pair, with a fraction of the R1 currents closing across the polar cap, and R2 comprising the Birkeland system's equatorward boundary. However, using precise magnetic field measurements from ESA's Swarm satellite mission, we find that a significant fraction of auroral zone traversals display evidence of an additional sheet equatorward of R2, occurring at all local times, and having the opposite polarity of R2, indicating partial closure of the R2 sheet in the equatorward direction. In this presentation we explore their dependence of these "Region 3" currents on local time, magnetic activity level, and other parameters.

Keyword-1

Birkeland Currents

Keyword-2

Region 2 (R2) currents

Keyword-3

Region 3 (R3) currents

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Session Classification: (DPP) T2-8 Plasma Material Synthesis | Synthèse de matériaux par plasma (DPP)

Track Classification: Technical Sessions / Sessions techniques: Plasma Physics / Physique des plasmas (DPP)