

AURORAL CURRENT AND ELECTRODYNAMICS STRUCTURE (ACES)  
OBSERVATIONS OF IONOSPHERIC FEEDBACK IN THE ALFVÉN RESONATOR

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**ABSTRACT:** In 2009, the Auroral Current and Electrodynamics Structure (ACES) High and Low sounding rockets were launched from the Poker Flat Rocket Range (PFRR) in Alaska, with the science objective of gathering in-situ data to quantify current closure in a discrete auroral arc. As ACES High crossed through the return current of an arc (that was monitored using an allsky camera from the ground at Fort Yukon), its instruments recorded clear Alfvénic signatures both poleward and equatorward of the return current region, but not within the main region of the return current itself. These data provide an excellent opportunity to study ionospheric feedback and how it interacts with the Alfvén resonator. We compare the observations with predictions and new results from a model of ionospheric feedback in the ionospheric Alfvén resonator (IAR) and report the significance and impact of these new data for the Magnetosphere-Ionosphere Coupling in the Alfvén Resonator (MICA) rocket mission to launch from PFRR this winter. MICA's primary science objectives specifically focus on better understanding the small-scale structure that the model predicts should exist within the return current region.