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Recurrent Tailward Propagation of Auroral Arcs Driven by Kelvin-Helmholtz Instabilities

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We report recurrent tailward-propagating auroral arcs associated with Kelvin-Helmholtz (KH) instabilities on January 2, 2011. During northward IMF, THEMIS satellites detected KH waves at the dawnside magnetopause boundary layer, downstream of the quasi-perpendicular shock. During the KH period, ground-based all-sky imager observations at Resolute Bay revealed auroral arcs detached from the poleward boundary of the auroral oval and propagating tailward. Concurrent DMSP satellite measurements identified multiple arcs on the dawnside and detected upward field-aligned currents with electron-only precipitation over the arcs, suggesting a solar wind origin. These combined observations demonstrate that KH instabilities play a key role in energy transfer between the solar wind, magnetosphere, and ionosphere.