

Beading Auroral Arcs At Substorm Onset





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Fig.2 Four exemplary events of pre-onset auroral beading with unaffected nearby arcs .

The beading of an auroral arc is not a direct manifestation of the substorm triggering instability in the (M)agnetosphere, but the (I)onosphere, or M-I coupling, plays a critical role in its development.

- Auroral beading characterizes the onset of auroral substorms, but whether its cause is magnetospheric or ionospheric has been controversial.
 - We found that the development of auroral beading is (i) not always conjugate between two hemispheres (Fig.1), (ii) confined in latitude with nearby arcs not affected (Fig.2), and (iii) not organized by meso-scale convection.
- We concluded that a small-scale ionospheric, or M-I coupling, process/structure is critical.

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Fig.1 The sequence of auroral beading at Tjornes (Iceland) and Syowa (Antarctica).