

30-Hz 全天TVカメラで観測されたサブストーム開始時のオーロラ微細構造のダイナミクス

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Dynamics of onset arcs at auroral substorms observed by 30-Hz all-sky TV cameras during the THEMIS-ground campaign

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During the tail-aligned phase of the THEMIS satellites we made a campaign observation of aurora at Gillam (56.4N, 265.4E) and Fort Smith (60.0N, 248.1E), Canada. The observations were carried out using all-sky TV cameras (180 degree field of view (FoV)) with a sampling rate of 30 Hz and narrow FoV cameras (~50 degree FoV) with a sampling rate of 1 s.

In this presentation, we show dynamics of fine scale structures in initial brightening auroral arcs using four auroral substorm events. Two of them, which were observed at (1) ~2148 LT (~0448 UT) and (2) ~0130 LT (~0830 UT) on January 8 at Fort Smith, show dynamics of structured edges of onset arcs although the initial brightening started from out of FoV of the cameras. The other two, which were observed just in the FoVs of the cameras at (3) ~0041 LT (~0741 UT) on January 7 at Fort Smith and at (4) ~2155 LT (~0455 UT) on January 15 at Gillam, show characteristic features of auroral initial brightening. All four events showed different auroral dynamics which can be summarized as follows:

Event 1: During (just after) the initial brightening, several auroral arcs were generated periodically (period: ~15s), flowing eastward with velocities of 20-40 km/s (increasing with time).

Event 2: During (just after) the initial brightening, eastern edge of initial brightening had pearl-beading structure moving eastward with a velocity of ~800 m/s.

Event 3: An initial brightening, which had an arc-like structure, developed westward with a velocity of more than 50 km/s.

Event 4: An initial brightening, which had ray-like structures, developed both eastward and westward with a velocity of more than 50 km/s.

From these fine-scale dynamics of initial brightenings, we will discuss possible instabilities that triggered the auroral initial brightenings at substorm onset.