

Pressure-driven instability in auroral images to create auroral patches

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We show two examples on the signature of pressure-driven instability observed in auroral images during expansion and recovery phases of auroral substorms, based on all-sky auroral observations at Athabasca (MLAT=61.7N) and Gillam (65.5N), Canada, and at Tromsø (67.1N), Norway. They show finger-like structures in auroral images with horizontal scale sizes of a few tens to a few hundreds kilometers at ionospheric altitudes and time scales of a few to ten minutes. The structures tend to develop in north-south direction without any shear motion, indicating that the pressure-driven instability occurs in the balance between earthward magnetic tension force and the tailward pressure gradient force in the equatorial plane of the magnetosphere. The structures divide uniform diffuse aurora into many fragmental structures which form auroral patches typically seen during substorm recovery phase.