Auroras which appear in the polar cap are called transpolar arcs, polar cap arcs, sun-aligned arcs, or theta-aurora because of its spatial distribution resembling Greek character 'theta.' Evolution of ionospheric convection together with transpolar arc was analyzed for the first time (Event on February 12, 1999). The transpolar arc was split from the morning auroral oval and moved duskward. POLAR-UVI was used for the investigation of the transpolar arc. Convection was inferred from three velocity data sets: ExB drift from the ASTRID-2 satellite; ion driftmeter from the DMSP satellites; and Doppler shifted velocity from ground-based radars (SuperDARN).

There were three convection cells before the transpolar arc but the number of the cells became four during the period of the transpolar arc. This result suggests that there is a convection cell which can be associated with a transpolar arc.