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Varying IMF-By effects on interhemispheric conjugate auroras

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Interhemispheric conjugate auroras during a weak substorm interval have been investigated by using simultaneous all-sky camera (ASC) measurements at the northern and southern geomagnetic conjugate points, Tjornes (TJO, 66.2N, 342.9E) in Iceland and Syowa Station (SYO, 69.0S, 39.6E) in Antarctica. Just after the substorm onset, the ASC field-of-view (FOV) at TJO around midnight was first filled with dynamic auroral activations, while the counterpart was not detected over the zenith at SYO. In contrast, during the substorm recovery phase we observed band-type auroras with similar shape drifting eastward across the center of each ASC-FOV, although the TJO one preceded the SYO one. Time sequence of the inter-hemispheric conjugate auroral features was well reflected to the geomagnetic field variations at both stations. Based on a detailed comparison of both ASC images, we identified that the northern footprint of SYO shifted poleward of TJO by up to 3.0 degrees or more during the expansion phase of the substorm, whereas during the recovery phase it shifted significantly eastward (about 1.0 MLT) and then it was approaching TJO. We emphasize that the dynamic motion of the conjugate points reflects a consequence of the time-dependent magnetotail field reconfiguration process, controlled by varying interplanetary magnetic field (IMF)-By polarity.

Keywords: conjugate aurora, substorm, IMF