Tomography analysis of westward traveling surge observed in February, 2018

Yoshimasa Tanaka[1]; Yasunobu Ogawa[2]; Akira Kadokura[2]; Takanori Nishiyama[2]; Akimasa Yoshikawa[3]
[1] NIPR/SOKENDAI; [2] NIPR; [3] ICSWSE/Kyushu Univ.

We conducted a campaign of ground-based network observation using multi-point monochromatic imagers and the EISCAT-UHF radar in the northern Europe during February 14-17, 2018. The purpose of this campaign is to derive 3 dimensional (3D) current system of various mesoscale auroral vortex structures (e.g., spirals, westward traveling surges, and omega bands) and quantitatively estimate the ionospheric effect on the formation of them. During this period, high-speed solar wind stream (HSS) originated from coronal holes on the solar surface and associated corotating interaction region (CIR) in front of the HSS arrived in the Earth's magnetosphere and auroral activity was high. Fortunately, we observed various types of auroras during this period, such as auroral breakups, poleward expansions, westward traveling surges, omega bands, etc. In this study we focus on the westward traveling surge observed around 22:45 UT on February 16. The strategy of data analysis is as follows. First, we apply the auroral computed tomography (ACT) method to multiple auroral images for reconstructing 3D structure of the auroral emission, and then calculate height-integrated ionospheric conductivity by using the empirical atmospheric model. Second, we derive the equivalent ionospheric current from the ground-based magnetometer network data. Finally, we estimate the 3D current system (i.e., horizontal ionospheric current and field-aligned current) and horizontal distribution of the electric field by combining the ionospheric equivalent current with the conductivity. In the presentation, we will show the preliminary results of the tomography analysis.