

# Auxiliary Material for

## Auroral vortex street formed by the magnetosphere-ionosphere coupling instability

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### Introduction of the fig2-anime file

This file contains an animation that supports the results of Figure 2 (see text). It shows the temporal variation in vorticity  $\omega$  at the ionosphere  $s = 0$  during  $t/\tau_A = 0-7$ , in the case of a convection electric field  $E_0 = 60$  mV/m.

1.  $s$ , the field line position. The origin  $s = 0$  is set at the ionosphere.
2.  $\tau_A \approx 47$  s, the Alfvén transit time.
3. Axes  $x$ , km, and  $y$ , km, show the poleward and eastward directions, respectively. Note that the  $y$ -axis is reversed ( $x \times y \parallel b_0$ ) because we are considering the southern hemisphere.  $b_0$ : the unit vector of the magnetic field line.

### Introduction of the fig4a-anime file

This file contains an animation that supports the results of Figure 4 upper panel (see text). It shows the temporal variation in root-mean-square vorticity  $\langle\omega\rangle$  as a function of  $s$  during  $t/\tau_A = 0-7$ , in the case of a convection electric field  $E_0 = 60$  mV/m.

1.  $s$ , the field line position. The origin  $s = 0$  is set at the ionosphere. The unit is normalized by the Earth's radius  $R_E \approx 6370$  km.
2.  $\tau_A \approx 47$  s, the Alfvén transit time.

### Introduction of the fig4b-anime file

This file contains an animation that supports the results of Figure 4 lower panel (see text). It shows the temporal variation in vorticity  $\omega$  at the magnetic equator  $s = l$  during  $t/\tau_A = 0-7$ , in the case of a convection electric field  $E_0 = 60$  mV/m.

1.  $s$ , the field line position. The origin  $s = 0$  is set at the ionosphere.  $l \approx 7 \times 10^4$  km, the field line length of our interest.

2.  $\tau_A \approx 47$  s, the Alfven transit time.

3. Axes  $x$ , km, and  $y$ , km, show the poleward and eastward directions, respectively. Note that the  $y$ -axis is reversed ( $x \times y \parallel b_0$ ) because we are considering the southern hemisphere.  $b_0$ : the unit vector of the magnetic field line.