

The relationship between electric field and currents in the ionosphere and the geomagnetic Sq field

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Relationships of the geomagnetic Sq field to the ionospheric currents estimated from the electric field and conductivity were studied from the correlation of the Sq amplitude in the Y-component with that of the ionospheric electric field and currents. The electric field was obtained from the observation by the MU radar from 1987 to 2001, the conductivity was calculated by using the electron density profile obtained from the IRI 90 model, and the currents were estimated from the obtained field and conductivity. Estimated daily amplitudes of the ionospheric currents explain the Sq variation fairly well including its variation. However, variation of the Sq amplitude is more due to that of the local ionospheric conductivity even if the analysis is made for separated seasons. Another interesting feature is that the Sq amplitude tends to be small in winter for the same estimated ionospheric currents. This is probably due to the magnetic effect of the field-aligned currents flowing between the both hemispheres driven by the asymmetric dynamo action in the ionosphere.