



Ground and CHAMP observations of field-aligned current circuits generated by lower atmospheric disturbances and expectations to the SWARM to clarify their three dimensional structure

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Acoustic gravity waves propagated to the ionosphere cause dynamo currents in the ionosphere. They divert along geomagnetic field lines of force to another hemisphere accompanying electric field and then flow in the ionosphere of another hemisphere by the electric field forming closed current circuits. The oscillating current circuits with the period of acoustic waves generate magnetic variations on the ground, and they are observed as long period geomagnetic pulsations. This effect has been detected during big earthquakes, strong typhoons, tornados etc. On a low-altitude satellite orbit, the spatial distribution (i.e. structure) of the current circuits along the satellite orbit should be detected as temporal magnetic oscillations, and the effect is confirmed by a CHAMP data analysis. On the spatial structure, in particular, in the longitudinal direction, it has been difficult to examine by a single satellite or from ground magnetic observations. The SWARM satellites will provide an unique opportunity to clarify the three dimensional structure of the field-aligned current circuits.