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Time derivative of the geomagnetic field has a short reset time

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Space weather, like solar eruptions, can be hazardous to Earth's electric grids via geomagnetically induced currents (GIC). In worst cases they can even cause city-wide power outages. GIC is a complicated phenomenon, closely related to the time derivative of the geomagnetic field. However, behavior the time derivative is chaotic and has proven to be challenging to predict. In this study we look at the geomagnetic field orientations at different magnetometer stations in the Fennoscandian region during active space weather conditions. We aim to characterize the magnetic field behavior, to better understand the drivers behind strong GIC events. One of our main findings is that the direction of time derivative of the geomagnetic field has a very short "reset time", only a few minutes. We conclude that this result gives insight on the time scale of the ionospheric current systems, which are the primary driver behind the time derivative's behavior.